

INFORMATION FOR STUDENT PILOTS
EASA PPL(A)

The enclosed specific aircraft training notes form the basis of the flying training for the EASA Private Pilot's Licence. They have been set out to show the content of each flying lesson and will prove a useful 'aide memoire' throughout the course. For expanded information reference should be made to one of the many informative Flying Manuals from the School shop.

Towards the end of the course the student pilot will be 'readied' for the final test for the issue of the licence.

Full details of this test, called a PPL Skill Test, are contained in CAA Standards Document 19 a copy of which will be available for student pilot reference.

When applying for the licence the CAA Syllabus states that a pilot should have flown:-

A course minimum of 45 hours (of which up to 5 hours may be in a Flight Navigation Procedure Trainer or Flight Simulator) including:

- 1) minimum of 10 hours solo
- 2) minimum of 25 hours dual

The 25 hrs dual must include:

- a) at least 2 hrs stall/spin awareness
- b) sufficient I.F. dual to enable a student pilot to maintain safe flight to regain VMC. This would 1 hour
- c) at least 5 hrs solo cross-country inc. at least one solo triangular cross-country of at least 150 n.m., with 2 landings away

And of course, have completed all the relevant ground examinations including R/T.

AIRCRAFT FAMILIARIZATION – EXERCISE 1 & 1E & EMERGENCY DRILLS

AIM: To familiarise the student with the functions and operation of the aircraft systems so that by the time of the first solo flight the under mentioned items are fully understood. The emergency drills in particular must have been learned prior to the first instructional flight.

Airframe general

Engine general

Cockpit layout

Flying control including flaps

Systems: Fuel, Oil, Ignition, Carb Heat, Electrical, Radio, Brakes, Mixture, Cabin heating, Cabin Ventilation, Instruments pressure/vacuum, Stall warner, pitot/static system.

Fire extinguisher

First aid kit

Control locks & Tow-bar

Checklists & check procedures including Emergencies

Sources of information:

For information the student pilot is to read the associated pilots notes incorporated in the flight manual and the associated C-152 checklist.

Emergency drills:

Action in the event of fire in the air and on the ground: Engine, Cabin & Electrical.

Systems failure as applicable to type e.g. Brakes, Radio, Alternator and Oil system.

Escape drills, location and use of emergency equipment, and exits.

PREPARATION FOR AND ACTION AFTER FLIGHT – EXERCISE 2

AIM: To teach the student how to prepare himself and the aircraft for flight and also how to check and leave the aircraft after flight. The many items will need to be learned over many flights.

TOPICS:

Student clothing suitability especially footwear
Flight authorisation, aircraft acceptance, and serviceability documents
External checks including local refuelling procedures and fire precautions
Internal checks
Student comfort, harness seat and adjustment
Special precautions e.g. - door locking and unlocking
Starting and warming up checks
Power checks
Running down and stopping the engine
Leaving the aircraft, noting of defects, security and picketing
Completion of authorisation and aircraft service documents, recording of any defects

IMPORTANT

If it is necessary to move the aircraft on the ground without power, the nosewheel tiller is to be used. Moving the aircraft by pressing down on the tailplane is strictly forbidden. If further information is required a flying instructor should be consulted.

Sources of information:

Cessna 152 Pilot's notes
Associated C-152 checklist(s)

AIR EXPERIENCE – EXERCISE 3

AIM: To familiarise a prospective pilot with flight in a light aircraft and to assess the possibilities of learning to fly.

T.E.M: Seat - safety harness - headset adjustment - Emergencies.

AIR EXERCISE:

1. Familiarisation with the aircraft and the cockpit, including entry and exit.
2. Airfield layout and method of controlling the aircraft on the ground.
3. Airborne: new environment.
4. Familiarisation with aircraft controls, including use.
5. Re-joining and landing.

Note: Check before flight if this is to be the first flight in a light aircraft. If so, avoid prolonged turning etc. Watch for signs of discomfort etc.

EFFECTS OF CONTROLS – EXERCISE 4 (1)

AIM: To learn the effects of controls.

T.E.M: Lookout, Location, Handing over control, Follow Thru

AIR EXERCISE:

1. CONTROL	MOVEMENT	PRIMARY EFFECT	FURTHER EFFECT
Elevator	C.C. Fore & Aft	Pitch	I.A.S. R.P.M
Aileron	C.C. Side to Side	Roll	Yaw, more roll, Spiral descent
Rudder	Left Rudder Right Rudder	Yaw	Roll, more yaw, Spiral descent

- a) All control movements to be smooth and progressive.
- b) Aircraft continues to respond until the control is centralised.
- c) Aircraft movements are in relation to the aircraft axes and not to external references i.e. when level and when banked.
- d) Rate of aircraft movement is proportional to amount of control deflection.
- e) All control movements are natural and instinctive.

2. EFFECT OF AIRSPEED (At a constant lowish power setting)

High Speed	Controls firm and effective
Low Speed	Controls sloppy and not very effective

3. EFFECT OF SLIPSTREAM (At a constant I.A.S.)

High Power	Rudder/Elevator effective	} Ailerons unaffected by slipstream
Low Power	Rudder/Elevator less effective	

EFFECTS OF CONTROLS – EXERCISE 4 (2)

AIM: To teach the effects of the secondary controls and supplementary control systems on the aircraft in flight.

T.E.M: Lookout, Location, Flap Limit Speed 85 Knots.

AIR EXERCISE:

POWER	Increase Power Throttle Forward	Nose pitches up	Yaws to left
	Decrease Power Throttle Back	Nose pitches down	Yaws to right

Note: Smooth and progressive use of throttle.

TRIM A correctly trimmed aircraft will maintain its attitude at a constant I.A.S

Elevator If nose rises Forward trim needed
 If nose drops Backward trim needed

Note: The trimmer must not be used to change the attitude of the aircraft. That is, select the attitude using pitch control, then trim.

FLAPS	Lowering Flap 30 Degrees	VFE (85 Knots) Lower 10 Degrees, Repeat for other stages of flap	Nose pitches up speed reduces
	Retracting Flap	In stages	Nose pitches down speed increases

MIXTURE Operation: Caution re use

CARB HEAT Operation and effects

AIR CONDITIONING & VENTILATION SYSTEM Operation and effects

TAXYING – EXERCISE 5 & 5E

AIM: To teach how to manoeuvre the aircraft on the ground safely under its own power.

T.E.M: Lookout – ATC – Speed – Engine and brake handling, Airfield Characteristics

GROUND EXERCISE:

- | | |
|--|---|
| <p>1. PRE-TAXY CHECKS
Brakes on
Friction nut slackened
Trim neutral
Note W/V
ATC Clearance/Routeing
F.I. to check student's feet position</p> <p>2. INITIAL TAXYING
Lookout
Route to be followed, and clear
Close throttle. Brakes off
Increase power sufficiently to move aircraft.
Close throttle for brake check.
Resume taxiing. Check rudder and instruments when clear of obstructions</p> <p>3. CONTROL OF SPEED
Lookout
Speed control primarily with throttle, and brakes
Fast walking speed or as appropriate
More power up hill, or into wind, or soft ground
Less power down hill, or downwind, or hard surfaces
Smooth and gentle throttle movements
<u>Note:</u> Do not use brakes in opposition to power. Keep hand on throttle</p> <p>4. STOPPING
Anticipate inertia
Close throttle
Rudder pedals central
Toe brakes, as applicable
When stopped, park brake. Set 1200 RPM
<u>Note:</u> For parking or power check turn in to wind.</p> | <p>5. CONTROL OF DIRECTION AND TURNING
Lookout
Anticipate
Rudder pedals for turning
Anticipate recovery
Turning in confined space use differential brake, slow speed, slight increase in power
Watch wing tips and tail
Do not turn on locked wheel</p> <p>6. ROUTEING
ATC instructions
Centreline on taxiway
Watch for surface and slope
Right of centreline on runways
Join taxiways from grass 45°
Caution wet grass – brakes
<u>Note:</u> Use appropriate aileron control in crosswind conditions wherever the wind exceeds 12 k. Pilot will do the right thing when wind is really strong</p> <p>7. EMERGENCIES
(a) <u>Steering Failure</u>
Inform ATC
If total failure shut down aircraft
Remain with aircraft</p> <p>(b) <u>Brake Failure</u>
Shut down aircraft
Steer away from obstructions
Inform ATC
Remain with aircraft</p> <p><u>Note:</u> Initially, student to control rudder, whilst F.I. operates the throttle after initial demo. Later change over, then eventually student does 'in toto'.</p> |
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STRAIGHT AND LEVEL FLIGHT – EXERCISE 6 (1)

AIM: To fly the aircraft on a constant heading and at a constant height and in balance

T.E.M: Lookout – clock code – FRED A check

AIR EXERCISE:

1. INITIAL DEMONSTRATION of straight and level flight – Normal cruise

Note Power Setting 2300 RPM	Aircraft attitude IAS 90 kts Note wing tips	Aircraft trimmed Note inherent stability	Flies Hands Off Only small control movements necessary
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2. TO ATTAIN S & L FLIGHT (after F.I. disturb a/c)

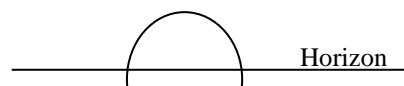
P ower - Select 2300 RPM. Prevent yaw

A ttitude - Select and hold nose level

Cross-check alt. Check lateral level and in balance

T rim -

Check I.A.S. P.A.T.



3. TO MAINTAIN S & L FLIGHT

Constant Height

Hold selected attitude
Cross check altimeter
Correct small errors
(+ or – 75') with elevator

For larger changes correct
with power

Constant Direction

Maintain wings level
(Ailerons)
Prevent yaw (rudder)
Cross check external
reference point or DI
To regain heading use co-
ordinated aileron and
rudder
Wings level, no yaw =
balance

Balance

Demo. Unbalance
Check wings level
Ball in centre
With wing level 'tread on
the ball'



Marked unbalance is
noticeable. Slight
unbalance difficult to
detect. Use TC

4. STUDENT PRACTICE ATTAINING & MAINTAINING S & L FLIGHT

(Instructor disturbs aircraft from S & L condition. Student recovers aircraft from various attitudes).

5. ORIENTATION AND RETURN TO AERODROME

STRAIGHT & LEVEL FLIGHT – EXERCISE 6 (2)

AIM: To fly the aircraft straight and level at different airspeeds, and with flap.

T.E.M: Lookout – Location – FREDA – Flap limiting speed Vfe

From normal cruise – 2300 rpm & 90 knots

AIR EXERCISE:

1. EFFECT OF POWER ON STRAIGHT & LEVEL FLIGHT

Note attitude at normal cruise then:-

Select High Power (2500 RPM)

Maintain attitude – aircraft climbs

Select lower nose attitude to maintain level flight

Trim

Note the lower nose attitude at the higher IAS, also trim change & inertia

Select Low Power (2000 RPM)

Maintain attitude – aircraft descends

Select higher nose attitude to maintain level flight

Trim

Note: The higher nose attitude at the lower IAS, also trim change & inertia

2. STRAIGHT & LEVEL AT SELECTED AIRSPEEDS

Straight & Level at 100 kts

P Select power 2550 RPM - prevent yaw

A Select lower nose attitude – hold

T Trim

Check instruments, re-adjust, trim aircraft

Straight & Level at 90 k

P Select power 2300 RPM -prevent yaw

A Select lower nose attitude – hold

T Trim

Check instruments, re-adjust, trim aircraft

S & L (with Flap) at 65 - 70 k (LSC)

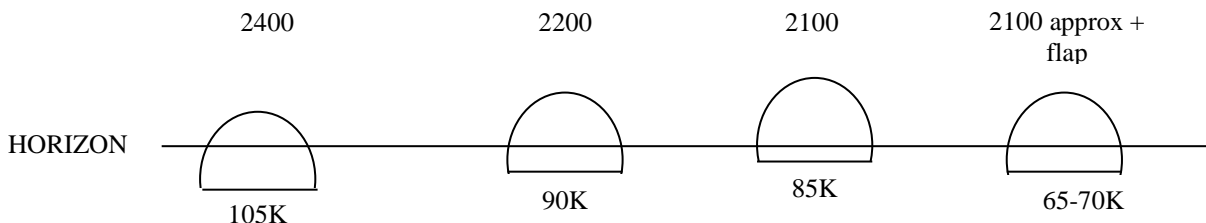
P Select power 2100 RPM – prevent yaw

A Lower 20° flap (VFE= 85k IAS)

T Trim

Check instruments, re-adjust, trim a/r

Note: Flap gives lower nose attitude and hence better forward vision. Extra RPM gives better control.



STRAIGHT & LEVEL FLIGHT – EXERCISE 6 (2) continued

3. FLIGHT AT CRITICALLY HIGH AIRSPEEDS

F.I. demo aircraft handling characteristics at the lower 'yellow arc' speeds pointing out the necessity for small control pressures if the aircraft inadvertently enters this speed range, plus the importance of VNE.

IMPORTANT: For every speed there is only one CORRECT attitude for level flight
In addition for any one power setting level flight is possible at two speeds.
This can be conveniently demonstrated on the return to the airfield.

Proof of understanding: ask the student to fly as fast as possible to get back to the field to 'beat' a storm. Or ask the student to loiter!

CLIMBING – EXERCISE 7 (1)

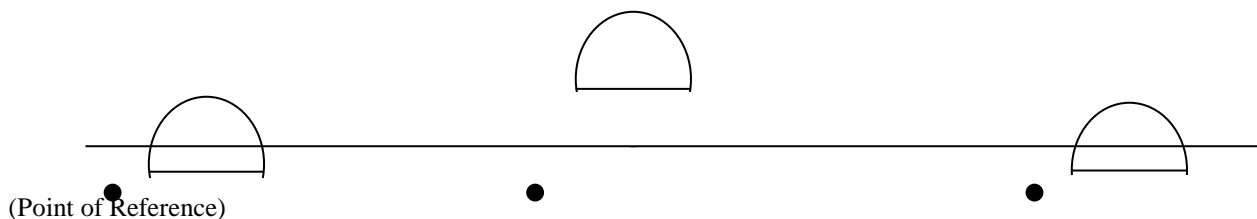
AIM: To climb the aircraft at a constant speed and in balance

T.E.M: **Lookout (especially above)** **Engine Ts & Ps**

AIR EXERCISE:

1. BEST RATE OF CLIMB (Vy) 65 kts

ENTRY	IN THE CLIMB	LEVELLING OFF
Lookout. Rich Mixture Select reference point	Lookout	Lookout
P Apply full power (Check engine instruments) Prevent yaw Check balance	Note attitude and maintain	Anticipate height
A Select attitude for climb and hold Wings level check	Balance constant Cross reference ASI to maintain 65 k	A Select attitude for 90 kts cruise. Hold
T Trim	Weave every 1000 ft for lookout purposes	P Reduce to cruise power (2300 rpm) Prevent yaw
Check I.A.S. 65 k Adjust attitude as necessary Re-trim Check balance/PAT	Check engine T & P's <u>Note:</u> Rate of climb decreases with altitude	T Trim Check APT Adjust as necessary Note aircraft inertia



2. CRUISE CLIMB

As above, using 70 - 80 k IAS.

3. CLIMB – BEST ANGLE (Vx) as above, using 55 k, no flap once initial climb-out is complete.

CLIMBING – EXERCISE 7 (2)

AIM: To learn to climb the aircraft with flap, and how to raise flap during the climb.

T.E.M: Lookout – Engine checks – Flap limiting speed Vfe – Application re 'go-around'

AIR EXERCISE: From normal climb note R.O.C.

1. LOWERING FLAP

At normal climb speed lower 10° stage of flap. Maintain normal climb speed 65 k.

Raise the nose and select rec'd speed for go-around 60 k

Raise the nose and select rec'd speed for best angle of climb 55 k.

Select 20° flap

Select 30° flap

EFFECT

Note reduced climb rate plus lower nose and trim change.

Climb rate largely restored.
Attitude and trim change

Good climb rate with reduced speed means better angle of climb.
Attitude and trim change.

Reduced rate of climb plus lower nose attitude and trim change.

Further reduced rate of climb plus lower nose attitude and trim change.

2. RAISING FLAP

EFFECT

CAUTION: Raising flap from full to zero in one selection is to be avoided as it can cause aircraft 'sink' which is hazardous at low speeds or near the ground. The correct procedure is to reduce flap in stages applying C.C. back pressure to prevent 'sink' and to select the next higher attitude for the flap setting plus trimming.

Reduce flap by stages

Attitude and trim change

Climb at appropriate speed

Rate of climb increases plus higher nose attitude as flap is retracted.

Resume normal climb 65 k

3. STUDENT PRACTICE

Application as for 'Go-around'



CLEAN
65K



10°
65K



10°
60K
GO-
AROUND



10°
55K
BEST
ANGLE



20°
55K



30°
55K

LOWERING FLAP IN THE CLIMB

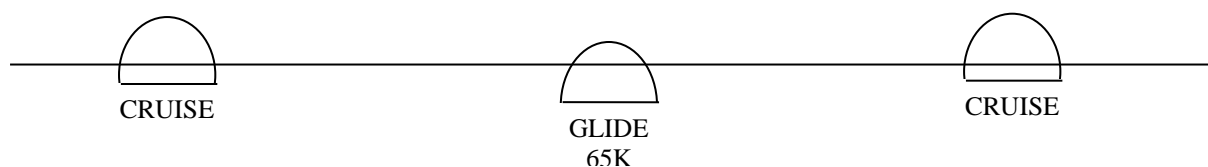
DESCENDING – EXERCISE 8 (1)

AIM: To learn how to descend the aircraft at a constant speed and in balance

T.E.M: Lookout (especially below) – carburettor heat - Engine checks - Altimeter

AIR EXERCISE: Gliding at 65 k

ENTRY	IN THE GLIDE	LEVELLING OUT
Lookout	Lookout	Lookout
Turn into cleared area Mixture rich Altimeter checked Carb heat select	Note attitude and R.O.D. Maintain attitude and balance	Carb heat cold Anticipate recovery altitude
P Close throttle Prevent yaw Wings level Direction constant	Weave nose Clear engine every 1000 ft (N.B. Clear ears)	P Apply cruising power Wings level Prevent yaw
A Attitude <u>hold</u> Then select for 65 k Maintain	<u>Note</u> : The controls, especially the tail surfaces, are less effective	A Select cruising attitude for 90 k <u>Hold</u>
T Trim (large back trim change)		T Trim (large fwd.) Check PAT Re-adjust
Check correct IAS Re-adjust. PAT		



DESCENDING – EXERCISE 8 (2)

AIM: To learn how to descend the aircraft at different speeds and in balance

T.E.M: Lookout (particularly below) – Engine warming – Ts & Ps – VFE

AIR EXERCISE: Revision of clean glide 65 k

1. DESCENDING WITH FLAP

Enter clean glide 65 k
Note rate of descent

Lower 20° flap
Maintain attitude
Airspeed decreases
Select lower attitude to regain 65 k
Trim
Note: Lower nose attitude and increased R.O.D.

Repeat for 30° flap

Note: Lower nose attitude and increased R.O.D. although good forward visibility there is need for anticipating recovery

Recover to straight and level, later to climb
Do not exceed VFE

i.e. Missed approach action (Going round again)

STUDENT REPEAT

2. DESCENDING WITH POWER

Enter clean glide 65 k
Note rate of descent

Increase RPM approx. 1600

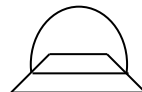
Maintain attitude
Airspeed increases
Select higher nose attitude to regain 65 k
Trim
Note: Higher nose attitude and reduced R.O.D.

Reduce RPM approx. 1300

Maintain attitude
Airspeed decreases
Select lower nose attitude to regain 65 k
Trim
Note: Increased R.O.D.

Rate of descent is varied with power

STUDENT REPEAT
Setting up various R.O.D.'s



3. APP. CONFIG'N VARYING THE DESCENT PATH

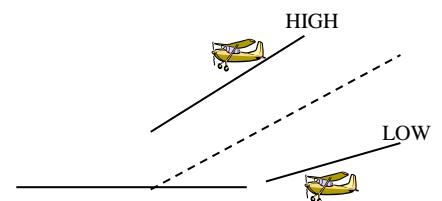
Set up power/flapped descent
Use field for simulated approach, into wind

If too high on descent
Reduce power
Lower nose to maintain 65k and trim
Note: Increased R.O.D.

If too low on descent
Increase power
Raise nose to maintain 65 k and trim
Note: Decreased R.O.D

i.e. Power ctrl's R.O.D
Elevator controls SPEED (attitude)
Aileron & Rudder control DIRECTION

STUDENT REPEAT



Note: Cruise descent is covered in Ex.18 Navigation
E.T.A. When to setup depends upon cruise altitude and time to run to the ATZ. HIGH ise speed 90 k to be used to maintain

DESCENDING – EXERCISE 8 (3)

AIM: To teach how to descend at greater than normal rates of descent without increasing the airspeed i.e. Side-slip.

T.E.M: Lookout - Anticipate safe recovery by 200 ft AGL. - Application re flapless landings, forced landings, and engine fires – See Pilot's Handbook re slipping with flap selected.

AIR EXERCISE:

1. SIDESLIP

ENTRY	IN THE SLIP	RECOVERY TO GLIDE
<p>From straight glide 65 k adopt a moderate bank to the left (15°) using opposite rudder to maintain heading. Simultaneously adjust nose attitude for 65 k. Note the increased R.O.D. and T.C. ball out of balance.</p> <p><u>Although greater bank angles give greater R.O.D. care must be taken to maintain adequate rudder control especially with flap selected.</u></p>	<p>Maintain selected bank and sufficient opposite rudder to maintain direction. Hold attitude for correct speed 65 k</p> <p><u>Caution:</u> Ensure safe speed maintained since A.S.I. can give erroneous indications during a slip.</p>	<p>Anticipate safe recovery i.e. not below 200 ft AGL. Level wings simultaneously centralising rudder, re-adjust pitch attitude to maintain 65 k</p>

Student practice. Left slips and Right slips.

4. SLIPPING TURN:

<p>From a gliding turn to the left 65 k apply opposite rudder to the turn maintaining the bank angle with ailerons. Adjust pitch attitude to maintain correct speed. Note increased R.O.D. and T.C. ball out of balance.</p>	<p>Maintain selected bank with sufficient opposite rudder. Maintain safe I.A.S.</p>	<p>To recover apply rudder pressure in the direction of the turn to regain balanced flight whilst using aileron control to maintain bank. Adjust pitch attitude to maintain correct I.A.S.</p>
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Student Practice. Left slipping turns then to the Right.

MEDIUM TURNS – EXERCISE 9

AIM: To learn how to turn the aircraft at a constant rate and in balance on to a specified heading.

T.E.M: Lookout (Raise Wing) + Behind

AIR EXERCISE:

1. LEVEL TURN – MEDIUM BANK (After demo. To show Lookout, Attitude in turn, & C.C back pressure, speed loss etc.)

ENTRY	IN THE TURN	Recovery
Lookout all round and above.	Lookout	Lookout
Straight and level 90 k Roll on bank up to 30° using aileron and rudder in desired direction Check with ailerons to maintain Increase C.C. back pressure to maintain height	B Maintain Bank 30° (ailerons) A Attitude, constant Ht. (Elevator & Alt.) B Balance (Rudder & B.I.) Co-ordination most important, if adjust one control need re-adjust the other two! <u>Note:</u> Slight loss of IAS <u>Check:</u> Bank, Att., Balance	Anticipate required heading Apply aileron and rudder opposite direction to rollout When wings level centralise controls Apply sufficient C.C. fwd. press to prevent gain in height <u>Note:</u> IAS restored

Student practice eventually both directions. Note offset seat effect. Stress instrument scan – Bank A/H etc. but not to detriment of lookout. Recoveries on features, or ‘roll out now’, then later on DI headings.

2. FAULTS IN THE TURN

Faults in the turn can easily be demonstrated in the sequence Bank – Attitude – Balance plus corrections.

3. CLIMBING TURNS

Teach from straight climb 65 k. Rate one/15° bank

Note R.O.C. less and need to control IAS accurately plus tendency to overbank especially to left

Nose attitude slightly lower in turn

Show increased angle of bank reduces R.O.C.

4. DESCENDING TURNS

Teach from straight descent 65 k. Descend into cleared area/lookout. Bank up to 30°

Note turn increases R.O.D. and lower nose attitude to maintain correct IAS

Show increased bank increases R.O.D. and power must be added if original R.O.D. required

IMPORTANT: All turns – Checking/Correcting Bank – Attitude – Balance in that order

5. SLIPPING TURNS: These are covered in Ex. 8 (3)

SLOW FLIGHT – EXERCISE 10A (1)

AIM: To acquaint the pilot with the handling characteristics and possibility of incipient stall spin

T.E.M: Lookout (especially because of high nose attitude) Ts and Ps

AIR EXERCISES

1. LEVEL FLIGHT

Power – reduce to 1500 rpm
Attitude – pitch up to maintain height
At 55 Knots – increase power to maintain speed and height (1800 rpm)
Trim
Settle and adjust
MUST USE CC & POWER.
Essential keep hand on throttle.

Student Practice

3. TURNING FLIGHT

Lookout
From slow flight Vs1 +5k enter medium turn without adding power.
Note lower airspeed i.e. cannot maintain alt. & airspeed. Recover.
Lookout
Repeat turn but adding power to maintain airspeed and altitude.
Note: for turns, must use extra power, and preferably keep bank gentle, hence must keep hand on throttle.

Student practice turns in both directions, including S-turns.
F.I. stress necessity to maintain balance.

2. CLIMBING

Lookout
Nominate R.O.C. say 300'/min. for Vs1 +5k (50 k)
Gradually increase power whilst maintaining airspeed, hdg., and balance. Stabilise power when ROC achieved. Trim.
Note: danger of too much aft trim and care needed to maintain balance.
Return to S & L at 50k

Student practice

4. DESCENDING

Lookout
Nominate R.O.D. say 500'/min. for Vs1 +5k (50k)
Gradually reduce power whilst maintaining airspeed, heading and balance. Stabilise power when R.O.D. is achieved. Trim.

Return to straight and level 50k

Student Practice then repeat above, including climbing and descending turns at Vso + 5k (45 k) with full flap.

Again, F.I. stress balance.

Finally, towards the end of this stage the flying instructor should begin to introduce student distractions as required. Flying time spent on this and other stall/spin awareness exercises is to be recorded separately in the student pilot's log book.

SLOW FLIGHT – EXERCISE 10A (2)

AIM: To acquaint the pilot with the handling characteristics in the range $V_{s1} + 5k$ and $V_{so} + 5k$ down to the minimum speed(s) at which the aircraft can be safely controlled, concluding with the symptoms of the approach to the stall and the recovery to safe flight.

T.E.M: Hasell – Lookout – Engine Handling/T&P's – Safe Height – Never fly at these speeds unless with F.I

AIR EXERCISES

After the preceding Part 1 exercises, the instructor should demonstrate, with subsequent student practice, the effects of applying full power in the landing configuration (to climb) and high power in the landing configuration as on a short field approach (descent) as described below. Please see also the 'Note to instructors'.

1. FULL POWER IN LANDING CONFIGURATION

F.I. demo a/c in full-flap climb at 45 k and necessity to maintain balance
Note poor ROC and if relax rudder pressure the ball moves off-centre.
Subsequent yaw can lead to roll; the loss of speed could lead to stall/spin.
Student practice $V_{so} + 5$ (45 k) flapped climbs, whilst retracting flap to simulate 'go-around' action.

2. HIGH POWER, FLAPPED DESCENT

From low speed flight F.I. demo a/c in full-flap descent simulating low speed short field approach. Whilst descending allow the IAS to fall off sufficient to cause stall Warner to operate. Note that the a/c could stall albeit with the nose still relatively low. Student practice the descent 45 k then entering full flap climb, initially at 45 k reverting to normal climb as flap is retracted.

Note to Instructors: A convincing demonstration of the above is to demo a go-around without compensating control or trim changes. That is, set up a/c in the approach configuration, 1500 rpm 65 k. Simulate go-around, apply full power, allow nose up and yaw to go unchecked. The IAS will decrease, and yaw will cause roll.
Wait until stall warner sounds, then correct with C.C. and rudder. Re-trim and revert to best angle climb speed.

3. DEMONSTRATION OF SYMPTOMS DURING APPROACH TO STALL

F.I. conclude the exercise by demonstrating the symptoms approaching the stall. It is recommended that a lowish power setting, say, 1950 rpm be used for this demonstration. The F.I. should demo the symptoms stressing that only a relatively small movement of the C.C. is necessary to return the aircraft to safe controlled flight. Student to practice, effecting recovery at the stall warner stage. This part of the flight is to be used to 'sow the seeds' of a recovery technique and so develop the student's competence in achieving safe recoveries to normal flight in the event of reaching a dangerous situation in the air. The F.I. should stress that there is nothing dangerous about stall recovery provided action is taken soon enough and at the right altitude.

STALLING – EXERCISE 10 (B) 1

AIM: To examine the symptoms of an approaching stall, the characteristics of a stall and to teach the standard recovery with a minimum height loss, ensuring that the student knows when the aircraft has safely recovered.

T.E.M: HASELL, HELL Checks

AIR EXERCISE: (After student having been shown a stall)

ENTRY	IN THE STALL	RECOVERY
<p>HASELL</p> <p>Lookout: clearing turn</p> <p>Aircraft wings level and in balance</p> <p>Close throttle (prevent yaw)</p> <p>Maintain height (pitch)</p> <p>Ailerons neutral</p> <p>Note datum ht.</p>	<p>Hold C.C. fully back</p> <p>Prevent yaw, ailerons neutral</p>	<p><u>WITHOUT POWER</u> – (i.e. elevators only)</p> <p>C.C. forward until buffet stops</p> <p>Prevent yaw with rudder</p> <p>Airspeed rises</p> <p>Ease out of dive 65 k</p> <p><u>Note:</u> Height loss approx. 300 ft</p> <p>Student practice</p>
<p>SYMPTOMS ON ENTRY</p> <p>Falling airspeed</p> <p>Sloppy controls</p> <p>High nose attitude</p> <p>Stall warner</p> <p>Slight buffet</p> <p>(Last symptom)</p>	<p>SYMPTOMS IN THE STALL</p> <p>Low IAS, High R.O.D.</p> <p>Heavy buffet</p> <p>Sink 'We are stalled'</p> <p>Nose pitches down</p> <p>Possible wing drop</p> <p>(Not use aileron)</p> <p>Note stall speed</p> <p>C.C. fully back, cannot raise the nose.</p> <p>The a/c is now no longer controllable in pitch</p>	<p><u>WITH POWER</u></p> <p>STANDARD STALL RECOVERY</p> <p>Holding ailerons neutral</p> <p>C.C. forward</p> <p>Full power</p> <p>Prevent yaw</p> <p>Airspeed rises</p> <p>Ease out of dive 65 k</p> <p><u>Note:</u> Height loss reduced 150 ft</p> <p>This is the basis of the Standard Stall Recovery (S.S.R.)</p> <p>Student practice</p>

2. DEMO RE WING DROP

Important: If wing drops – Incipient spin. Must Not use ailerons to lift wing.

Recovery: Apply sufficient opposite rudder to prevent further yaw.

C.C. forward and full power. As speed rises roll wings level and climb away.

See also Exercise 11A.

3. RECOVERIES AT THE INCIPIENT STAGE

Student practice

STALLING – EXERCISE 10 B (2)

AIM: To learn how to recognise and recover at the first sign of an approaching stall, and the fully developed stall in different configurations.

T.E.M: HASELL Check

AIR EXERCISE N.B. Initially revise 'clean' stall and note 'clean' stalling speed

CONFIG'N	ENTRY	AT THE STALL	RECOVERY
1700 RPM No flap	Select power Maintain height Speed reduces more slowly Longer warning More chance of wing drop	Normal symptoms Reduced stall speed Higher stall attitude Rudder effective, also elevators Wing may drop	S.S.R. to climb Smaller Ht. Loss due to power.
20° Flap 1700 RPM	Select flap Carb heat check Power off, maintain height Speed reduces more rapidly Shorter warning	Normal symptoms Sink. Lower nose attitude More chance of wing drop Reduced stall speed	S.S.R. to climb Avoid exceeding VFE Requires coarser use of controls
Full flap 1700RPM	As above	As above with lower stall speed. Rel. large C.C. movement required for recovery	S.S.R. to climb Take in flap by stages
1700 RPM Full flap	Set power & flap. Landing config'n.	As above with lower stall speed Wing may drop rapidly	S.S.R. to climb Take in flap by stages
1700 RPM Full flap	Repeat in the turn	Ditto re wing drop	Note larger control movements req'd
Full power No flap	From straight climb and a climbing turn to demo unbalance at stall can cause marked wing drop. Demonstration only	F.I. allow yaw to develop	S.S.R. to climb

Student practice various stalls and recoveries from straight and level, climbing and descending flight, including turns. Also to repeat at the incipient stage i.e. when the stall warner operates and before the stall is reached e.g. during Slow Flight.

SPIN AVOIDANCE – EXERCISE 11 A

AIM: To be able to recognise and prevent, but be able to recover in the event of a spin, at the incipient and fully developed stage.

T.E.M: HASELL Checks – Orientation – Minimum Height 4000'

AIR EXERCISE:

1. RECOVERY AT THE INCIPIENT STAGE – FROM S & L FLIGHT

ENTRY	RECOVERY
HASELL/HELL	C.C. centrally forward & rudder to prevent yaw
Set up/slow flight S & L	Power as required
Slowly apply C.C. back pressure without maintaining balance i.e. allow yaw to occur. The wing will normally drop as the aircraft stalls.	Level the wings and regain balanced flight
<u>Note:</u> If reluctant to drop, use more rapid movement of C.C., or more power or rudder.	Return to normal S & L
Delay stall recovery until wing drops between 45° & 60°	Student practice

2. RECOVERY AT THE INCIPIENT STAGE – REPEAT FROM: STRAIGHT DESCENT, CLIMB, LEVEL TURNS, CLIMBING & DESCENDING TURNS

Further FI demos, including dangers of Cross-controls in descending turns. Student practice

Important:

- 1) For the purpose of training, the incipient stage is that period when a wing drops at the stall to more than 45° but not more than 90°. Clean aircraft configuration to be used.
- 2) Prompt recovery is essential. If nose drops well below horizon power should not be applied until initial recovery is effected and nose is being raised towards the horizon. This to avoid height loss.
- 3) Time spent on these exercises must be logged separately.
- 4) At the end of the lesson, if student agrees, suggest F.I. demo a fully developed spin & recovery. Student participation as necessary.

SPINNING – EXERCISE 11 (B) (OPTIONAL EXERCISE)

AIM: To teach the method of spin entry, to appreciate the sensations of spinning, and teach the correct recovery procedure from a developed spin.

T.E.M: HASELL safety checks – Orientation – HELL checks

Essential to maintain safe altitude and recovery by 3000 ft AGL

Re-synchronise D.I. after exercise

AIR EXERCISE:

1. FROM STRAIGHT AND LEVEL

ENTRY	MAINTAINING THE SPIN	SPIN RECOVERY
Safety checks Reduce power/yaw C.C. back pressure maintain height, allow speed to reduce to figure for a/c type. Apply full rudder and then move C.C. fully back, smoothly Aircraft will now enter the spin	Full rudder C.C. fully back Ailerons neutral Throttle closed Confirm direction of spin <u>Note:</u> Nose moves around horizon in direction of spin <u>Instruments</u> I.A.S. Low reading TC Direction of Spin V.S.I.: High R.O.D.	Confirm direction of spin Ailerons neutral Throttle closed Flaps raised 1) Apply full opposite rudder (slight pause) 2) Move C.C. forward progressively until rotation stops 3) Centralise rudder 4) Level wings with aileron 5) Recover from the dive 6) Regain Height lost

Note: Aircraft manual to be checked for correct recovery procedure and to ensure if spin entries with 'power on' are permitted.

2. FROM OTHER ATTITUDES OF FLIGHT

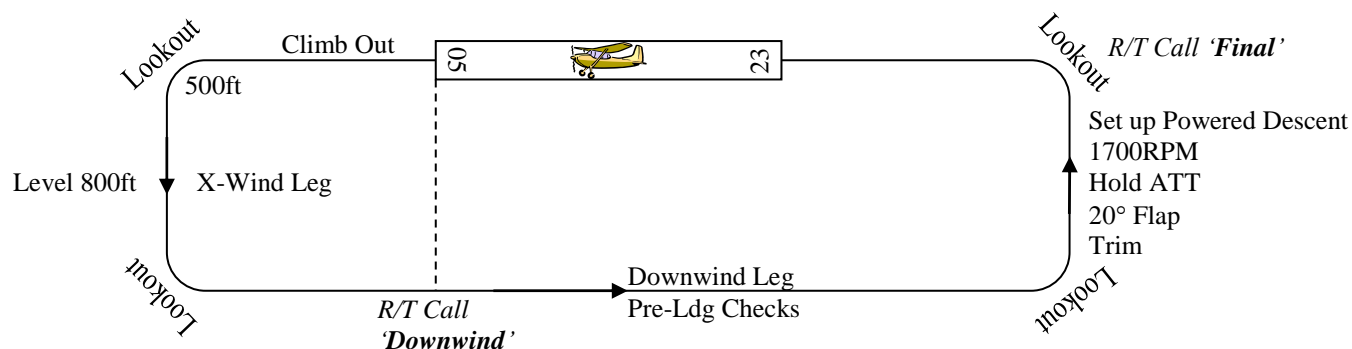
Instructor to demonstrate as required especially 'accidental' spins. For example, making a 'final' turn with crossed controls, using clean configuration.

TAKE-OFF AND LANDING – CIRCUITS – EXERCISE 12 & 13

AIM: To teach you how to take off and land the aircraft safely

T.E.M: Lookout – Pre-landing checks – Ts & Ps - RT

AIR EXERCISE:



- | | | |
|---|---|---|
| 1. BEFORE TAKE-OFF CHECKS
Taxy checks
Power checks
T.O. checks
R/T call | 2. TAKE-OFF
Line up/check W/V
DI with runway
Full power/yaw
Checks
C.C. back pressure
35 – 40 k
Rotate 55 k
Safety speed
Climb 65 k (clean)
Check drift | 3. CLIMB
Lookout
300' checks
400' lookout
500' turn
Climbing rate 1 turn
onto x-wind leg
Drift allowance
Level at 800' |
| 4. DOWNWIND
Lookout
Allow for drift
Height 800'
R/T call
Pre-landing checks | 5. FOR BASE LEG
When threshold falls
behind wing tip 45°
– turn
Check drift | 6. APP. & LANDING
Threshold at 45° to a/c
Reduce power 1700rpm,
balance
20° of flap
Trim 65/70 kts
Check drift/height
Re-adjust power a/r
Turn final between 500'
and 700'
Radio call
Check 65 k
Decision height 200'
Threshold approx. 55 k |
| 7. GO-AROUND
Decision 200'
Overshoot action:
Full power
Cold air
Cl. attitude
Flap in by stages
Trim | | |

Note: This is a brief for powered approach. It can be modified to suit other approaches.
The long briefing to include relevant noise abatement procedures.

ENGINE FAILURE/EMERGENCIES DURING & AFTER TAKE-OFF - EX. 12 E

AIM: To teach the procedures to be adopted in the event of emergencies occurring during or after the take-off run.

T.E.M: Normal considerations apply but care to be taken during practice to maintain safety and to avoid annoyance to people/livestock.

AIR EXERCISE:

1. DURING TAKE-OFF

If any of the following occurs:-

- Loss of power
- Abnormal oil pressure or temperature
- Low fuel pressure
- Vibration or rough engine running
- Nil ASI reading
- Door problem
- Any doubt of aircraft integrity

Proceed as follows:-

- Close throttle fully
- Maintain directional control
- Apply brakes a/r but take care to avoid skidding etc.
- Report to ATC over radio
- Return to parking area

IMPORTANT: If the aircraft over-runs the runway complete the Crash Checks

2. AFTER TAKE-OFF

If an engine failure occurs shortly after take-off:-

- Lower nose and adopt glide 65 k
- Trim
- Warn passenger Close throttle
- Look ahead either side of the nose say +/- 30°, and select best landing area.
- Maintain speed and set up glide approach to chosen area.
- If time, transmit Mayday call
- Flap a/r

WARNING: DO NOT TURN BACK!

Carry out crash checks:-

- Throttle closed
- Ignition off
- Fuel – all off (2)
- Flap a/r
- Hatches – unlatched
- Harness tight
- Mayday a/r
- Master switch off

- Touchdown with full flap, holding off, if possible, to achieve slow touchdown speed
- After touchdown evacuate a/c promptly

Note: During practice (dual only) check carb heat a/r and recover in good time. Remember 500ft rule and avoid annoyance re people and livestock.

CAUTION: During practice, on the recovery, it is essential to avoid slam opening of the throttle: engine failure can occur if this advice is ignored.

GO-AROUND – EXERCISE 13 E

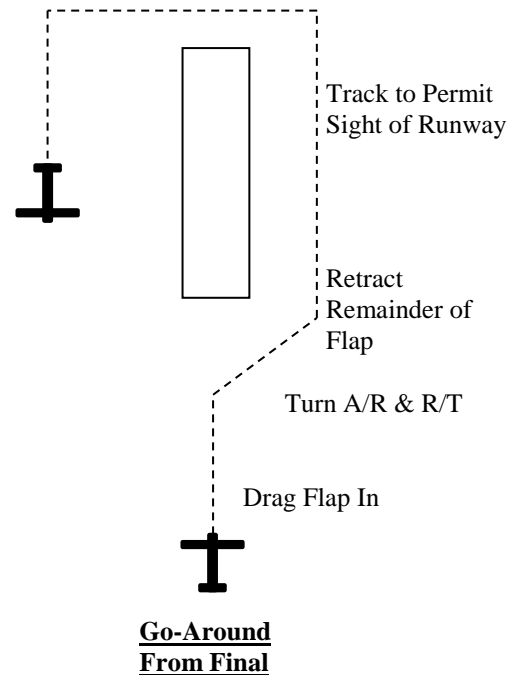
AIM: To teach the student pilot how to discontinue an approach and climb back to the downwind position.

T.E.M: Lookout – normal aspects apply – engine handling – VFE – ATC liaison

AIR EXERCISE

1. GO-AROUND FROM FINAL APPROACH

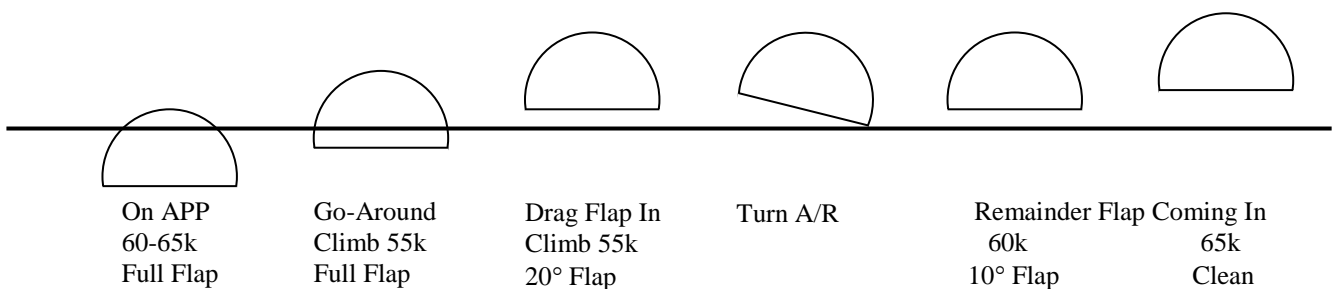
Lookout
 Select Cold air a/
 Full power, prevent yaw, maintain balance
 Select climb attitude (for the flap setting)
 Check positive climb, correct IAS achieved,
 raise first stage flap i.e. drag flap. Trim.
 Once drag flap is retracted, R/T call, clear the
 runway overhead to maintain visibility
 Select next flap stage, next IAS, and trim
 Retract remainder of flap, select required attitude
 trim
 Climb away
 Level out at circuit height, turn cross-wind. Lookout



2. GO-AROUND FROM MIS-LANDING

Lookout
 Full power and select safe climb attitude (for the flap setting)
 Carb Heat Cold
 Climb straight ahead
 With positive climb rate, correct IAS, and above approx. 100ft retract drag flap. Then 55k.
 R/T call if appropriate
 Climb away
 At 300ft retract remainder of flap, trim
 Resume normal climb-out and continue in circuit

FROM FINAL APPROACH



CROSSWIND APPROACH & LANDING – EXERCISE 12, 13 (2)

AIM: To teach the procedure and control technique to take-off and land safely during cross-wind conditions.

T.E.M: All normal considerations apply.
Check aircraft manual for crosswind limitations (12kts)
Solo student limitations – 10kts

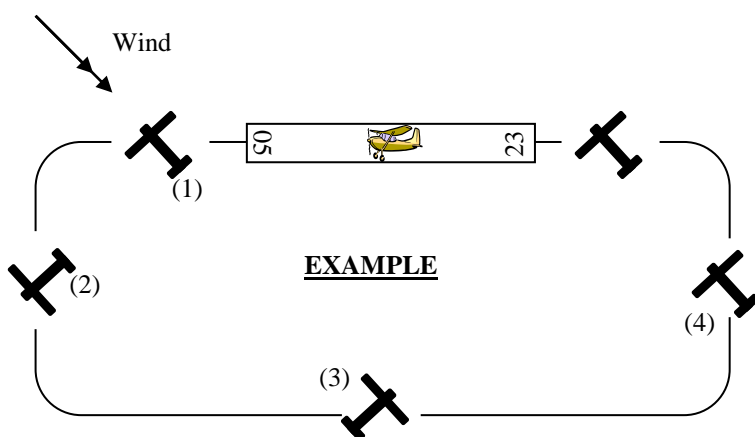
AIR EXERCISE:

1. PRE-TAKE-OFF Calculate crosswind component, line-up, CC into wind
2. TAKE-OFF Progressively centralise stick as speed increases to maintain lateral level. Keep straight with rudder, beware of weathercock effect. Do not raise nose wheel until take-off speed. Lift off cleanly at 55 - 60 k, make immediate allowance for drift.
3. CLIMB AND CIRCUIT Maintain extended runway centre-line on climb-out. Normal circuit pattern plus allowance for drift.
4. APPROACH AND LANDING Approach as normal, flap as required, allow for drift, round out as normal, just before touchdown yaw aircraft into centre line direction, CC into wind to counteract any roll. After touchdown lower nose immediately – but gently – to assist with directional control. Keep CC into wind during ground roll.

Note: The lift-off speed should be a few knots higher than normal during cross- wind conditions. Hence the different speed quoted above

Student Practice

Note: Instructor to follow-up with demonstration of combined 'CRAB' and 'WING DOWN' method.



- 1) Follow extended centre line by turning into wind to allow for drift.
- 2) Note increased ground speed.
- 3) Allow for drift by turning towards the wind.
- 4) Note reduced ground speed necessitating higher power setting and a later turn.

TAKE-OFF 30° out of wind...crosswind component	50%	wind strength
TAKE-OFF 45° out of wind...crosswind component	75%	wind strength
TAKE-OFF 60° out of wind...crosswind component	90%	wind strength
TAKE-OFF 90° out of wind...crosswind component	100%	wind strength

FLAPLESS APPROACH & LANDING – EXERCISE 13 (1)

AIM: To teach the technique of approach and landing without flap.

T.E.M: Normal considerations apply.

AIR EXERCISE

1. DOWNWIND LEG

If surface wind is light it is permissible to fly further downwind due to flatter angle of approach, but see 3. Below.

2. BASE LEG

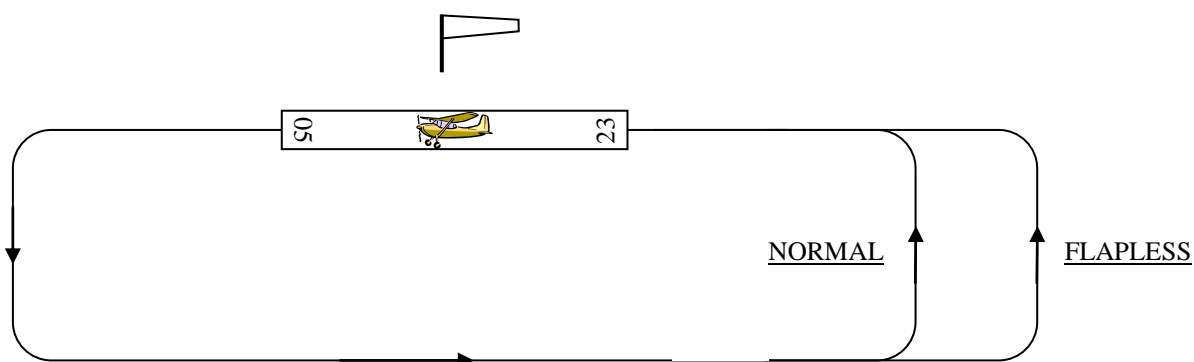
Establish descent in good time using less power than normal. No flap. Trim 70 k Turn 70 k

3. FINAL APPROACH

Speed 65 k. It is preferable to aim for a normal approach slope as a flatter approach path will result in a restricted forward view. Small power adjustments are to be used to maintain descent path. Cross the hedge at approx. 60 – 55 k.

4. LANDING

A shallower round out will be required. The higher speed will involve a longer 'float' and landing run. Touchdown approx. 50 k. Be prepared to use brakes



GLIDE APPROACH AND LANDING – EXERCISE 13 (3)

AIM: To teach how to complete a successful approach and landing from a pre-determined position without the use of power. This exercise forms the basis for forced landing procedure.

T.E.M: Normal T.E.M considerations apply – Engine handling

AIR EXERCISE

1. DOWNWIND LEG

As for normal circuit but earlier turn on to base leg. Select aiming point upwind of the intended point of touchdown.

2. BASE LEG

Check drift/ w/v and decide when to close throttle.

Select/check carb heat and close throttle, when sure of reaching touchdown point.

Trim for glide 65 k. No flap.

The w/v will determine the position for establishing the glide.

Better late than early.

Maintain heading, look at selected aiming point and assess if High or Low.

If very high – Lower one stage flap.

If high – Turn away 10° approx.

If low – Turn towards runway 10° approx.

If unsure. - Hold heading, then re-assess

That is, the flight path is adjusted by turning towards or away from the field.

3. FINAL APPROACH

Ensure maintain correct speed on final turn. Lower nose as necessary. Caution re wind gradient effect in strong winds. Lower further stages of flap as required to reach intended landing point.

Caution: If undershooting on this exercise do not 'Stretch the Glide'.

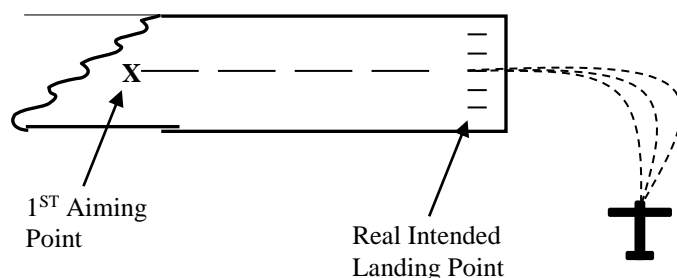
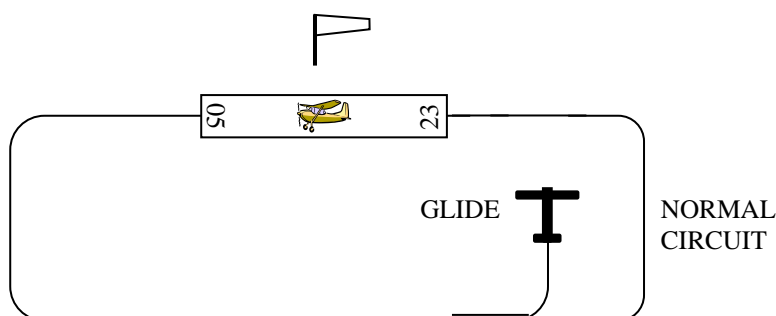
Add power, full if necessary, to re-establish on the correct glide path.

If high, or if not on the ground by the first main intersection, initiate a 'go-around'.

4. LANDING

Initiate round out in good time due to high rate of descent and large attitude change.

Student Practice to achieve a high standard due to application re forced landing procedure.



SHORT FIELD/SOFT FIELD TAKE-OFF & LANDING – EX. 12, 13 (4)

AIM: To teach take-off and landing techniques where the field length is restricted or the surface is soft due to grass, mud, snow, slush etc.

T.E.M: Normal considerations apply – consult Flight Manual for performance.

AIR EXERCISE

1. SHORT FIELD

Take-off

Having determined best take-off path re obstacles, surface slope, wind etc. Take-off checks complete, align a/c with selected path using max run available. 10° flap to be used.

Open up to max. power against the brakes; check RPM, T & P's. If satisfactory release the brakes for take-off. Be prepared for swing and raise nose wheel at 50 k. Climb away at 55 k for the best angle of climb if obstructions exist; otherwise when clear of obstacles at a safe altitude raise flaps, climb at 65 k. Trim.

2. SOFT FIELD

Take-off

Having determined the best take-off path etc., take-off checks complete and the flap selected as above, align the a/c and select full power. If the ground is very soft a rolling start may be desirable. The C.C. should be held back to permit the a/c to leave the ground at the lowest possible speed. As the a/c does so, the C.C. back pressure should be relaxed and the aircraft flown parallel to the ground and allowed to accelerate to 55 k prior to climb out which is as for Short Field.

Student Practice

Landing

Initial approach as for standard circuit but in light winds turn on to base slightly later.

When established on final select full flap and make precision approach to selected touchdown point. Adjust attitude for 55 k. Descent controlled with power and speed with elevator. As touchdown is approached, adjust a/c attitude, apply power as required to reduce the speed to 50k.

Power should be maintained throughout the round out and the throttle closed just before or as the main wheels contact the ground.

There should be no 'float'. After landing, gently lower the nose wheel and apply brakes.

Landing

The approach is as above and the touchdown is to be made with the nose wheel held clear of the ground as long as possible. If the landing distance permits a trickle of power may be left on to improve elevator control and minimise weight on the nose wheel both during landing roll and taxiing.

**CONSOLIDATION FLYING – EXERCISE 14 B
(FIRST SOLO FLIGHT 14 A)**

AIM: To prepare the student for local flights away from the base aerodrome following circuit consolidation.

T.E.M: Relevant documentation Radio and Navigation Local landmarks

AIR EXERCISE:

1. PROCEDURES FOR LEAVING AND JOINING THE CIRCUIT:

Reference to school Operations Manual – circuit directions and procedures regarding effect of parachuting, glider and microlight activities.
Re-join procedures – radio and non-radio.
ATC liaison

2. ORIENTATION IN LOCAL TRAINING AREA:

Awareness of training area boundaries, and local features such as Wellington Monument, Upottery and Culmhead disused airfields, Stockland Hill TV mast, Honiton town, M5 motorway, coastline, North Hill gliding site etc.
Ability to 'guesstimate' compass headings to return to base, plus knowledge of compass turning errors.
If south of Honiton call Exeter on 128.975.
Knowledge of SSR equipment, for routine and emergency use.
Need to equip with kneeboard, navigation and radio information

3. OBTAINING QDM'S, RADAR ASSISTANCE, AND PAN CALLS:

Knowledge of lost or uncertain of position procedures i.e. how to obtain QDM's and Radar assistance.
Practice Pan call to be made.

IMPORTANT: The above exercises will require several dual flights. Solo flying in the local area is to be carried out only after completion of exercises 15, 16, 17, 18A and 19.

ADVANCED TURNING – EXERCISE 15 (1)

AIM: To teach how to turn the aircraft at angles of bank between 30° and 60° in level flight and to improve the pilot's co-ordination and competency.

T.E.M: Lookout

AIR EXERCISE:

1. STEEP TURN (45° bank) FROM LEVEL FLIGHT AT CRUISE SPEED)

ENTRY	IN THE TURN	ROLL OUT
Lookout turn complete	Lookout	Lookout/anticipate
Cruise speed	Maintain	Apply aileron & rudder
Entry as for normal turn	B Angle bank – ailerons	opposite to turn whilst
gradually increase power	A Attitude – elevators	decreasing power to cruise
whilst inc. bank to 45°	B Balance – rudder	RPM as bank decreases.
Same time CC back pressure	S Airspeed – power & CC	Apply forward CC pressure to
to maintain alt.		prevent altitude gain.
Rudder for balance	Nose moves round	
	horizon at great rate.	

Student practice L & R initially using slow rate of entry and recovery.

Then repeat for 60° bank/max. rate turn using full power i.e. full power, up to the buffet.

2. FAULTS IN THE TURN – RECOVERY FROM SPIRAL DIVE

ENTRY	IN THE TURN	RECOVERY
Check for clear area and	Note rapid increase of speed	Close throttle
height AGL	and alt. loss	Roll wings level (firm
Set cruise power (or less)	CC back pressure ineffective	pressure)
Enter steep turn, allow nose	in raising nose at large bank	Ease out of dive
to drop	angle	
Student Practice		

3. STALL ENTRY AND RECOVERY IN THE TURN

INCIPIENT STAGE	DEVELOPED STAGE
Safety checks and lookout.	As for incipient stage but apply CC pressure until
Enter steep turn delaying power increase	the developed stall occurs.
Raise nose, and when below $V_s \times 1\frac{1}{2}$ increase CC	
back pressure until stall symptoms occur.	
Note higher airspeed.	<u>Recovery:</u> Positive fwd. movement of CC
<u>Recovery:</u> Release back pressure and continue	Prevent further yaw with rudder.
turn.	Adjust power as required
Student Practice	If nose is low reduce power
<u>Note:</u> Rate of turn decreases markedly just	If nose is high or level increase power.
before the stall also that V_s is increased by 100%	Repeat to show the higher stalling speeds.
at 75° of bank.	

ADVANCED TURNING – EXERCISE 15 (2)

AIM: To teach how to make descending and climbing steep turns and how to recognise and recover from stalls and incipient spins in these turns.

T.E.M: HASELL checks – Orientation – Safe altitude

AIR EXERCISE: (After revising level steep turns)

1. DESCENDING STEEP TURNS

With partial power in straight descent 75 knots, lookout complete, enter level steep turn 45°/50° bank. Monitor/maintain. Tendency to increasing airspeed to be controlled by bank reduction and increase in CC back pressure. For 60° banked descent turns use 85 k.

Student Practice

Repeat from the glide using idle power. Note the higher R.O.D.

Student Practice

Repeat with stall and recovery at the incipient and developed stages.

Entry and recovery as for level steep turn.

Student Practice

2. CLIMBING STEEP TURNS

From the climb at 75 k, lookout complete, enter climbing steep turn using full power, bank angle 40° approx. If necessary, reduce bank to give reasonable R.O.C.

Student Practice

Note: Such turns are not a recommended operational procedure but are useful co-ordination exercises.

Repeat with stall and recovery at the incipient and developed stages.

Entry and recovery as for level steep turn.

Student Practice

3. STEEP TURNS AND INCIPIENT SPINS

Spin recoveries at the incipient stage are to be carried out from level and climbing steep turns.

After completing safety checks carry out steep turn entries, delaying power increase and raising the nose slightly to reduce speed below $V_s \times 1\frac{1}{2}$. Final look out.

Ensure positive yaw and unbalance (using rudder a/r), increase CC back pressure until stall with wing drop occurs. Recover before full spin develops.

Recovery: Standard recovery as for previous turns but greater control movements involved. If developed spin occurs use full recovery procedure as Flight Manual.

Student Practice

ADVANCE TURNING – EXERCISE 15 (3)

AIM: To teach how to recover from unusual flight attitudes.

T.E.M: HASELL – Engine Handling – Safe altitudes

AIR EXERCISE:

1. RECOVERY FROM UNUSUAL ATTITUDES – NOSE HIGH

Orientation/lookout complete

Adopt steeply banked attitude, with nose high and low airspeed

Recovery: Ease gently forward on CC whilst simultaneously levelling wings and adding full power
Return to straight and level flight and cruise RPM

Student Practice

2. RECOVERY FROM UNUSUAL ATTITUDES – NOSE LOW

Orientation/lookout complete

Adopt steeply banked attitude, with nose low and increasing airspeed

Recovery: Close throttle
Level wings. (without raising nose)
Ease gently out of the dive
Return to straight and level flight and cruise RPM as speed stabilises

Student Practice

FORCED LANDINGS – WITHOUT POWER – EXERCISE 16

AIM: To teach how to carry out a safe descent, approach and landing in the event of complete or partial engine failure in flight.

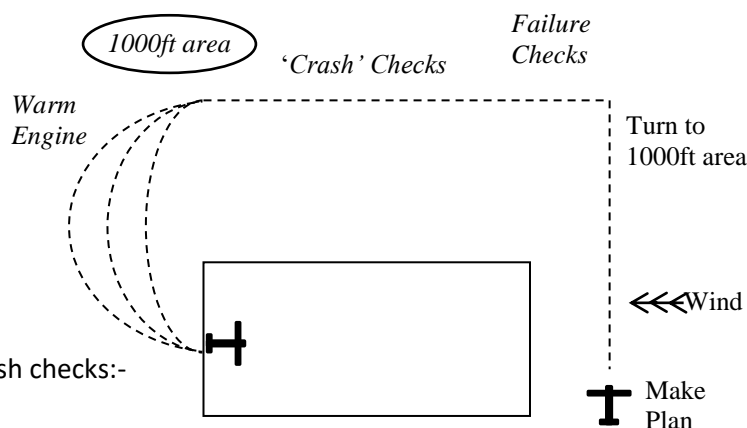
T.E.M: Lookout – Engine considerations – not fly below 500 ft above ground level.
In practice avoid annoying people and livestock.

AIR EXERCISE: Simulated engine failure at 2500ft above ground level
en route remind student re selecting a forced landing area.

Carb Heat! Instructor to close throttle and say:-
'Simulated forced landing. You have control'.
Glide attitude and trim. Check w/v. Select landing area.
Plan 1000ft area and circuit pattern. Turn a/c as required.

Carry out failure checks:-

Fuel contents	:	Sufficient
Fuel selector	:	Check ON
Mixture	:	Rich
Carb heat	:	Change mode
Magnetos	:	Both
T & P's	:	Check
Primer	:	Locked



If committed – Mayday/Transponder 7700 and crash checks:-

Throttle	:	Closed
Ignition	:	Off
Fuel	:	Off & mixture cut-off
Hatches	:	Door unlatched
Harness	:	Tight
Master	:	Leave ON

Check approach. Adjust pattern at 1000ft area to land mid-field (with no flap)
Continue as for normal glide approach
On final when sure of reaching landing area aim to land first third, using full flap
Check Master switch OFF

If high on Finals, with flap selected, could include glide speed. If too high, new field.

Note: All checks are touch checks during practice but carb heat hot and engine every 500ft. Overshoot not lower than 500ft above ground level.

Student practice: Same field, then different field(s), then from various heights.

Instructors Notes:

1. Never turn so that the pilot's back is towards the landing area
2. If very high at 1000ft area continue through extended centreline and make wide S-turn
3. If engine failure at approx 2500ft : Plan as above
4. If well above 2500ft say 4000ft : Circle the area with chosen field near the aircraft
5. If engine failure at 1500ft : Turn downwind or base leg heading
6. If engine failure at 1000ft : Turn on to base leg heading
7. Glide distance less with dead prop
8. Ensure student and F.I. both know which field and 1000 ft area are to be used when demonstrating this exercise. Later, F.I. to build in realism SAFELY!
9. Later, practice plus sim. engine fire drill

FORCED LANDING (WITH POWER) – EXERCISE 17

AIM: To learn how to make an emergency/precautionary landing away from a normal aerodrome when power is available.

T.E.M: Lookout Low flying (500') rule Slow cruise

AIR EXERCISE: Selecting a suitable field and demonstrating forced landing procedure in the event of becoming lost, deteriorating weather, lack of fuel/daylight, pilot illness, partial power

1. INITIAL PROCEDURE

Seek assistance by R/T if possible
Check fuel state/light/weather and decide time for search. FREDALLL
Fly down wind for max. coverage a/r
Note w/v and select field if no aerodrome available

Considerations: Size
Surface
Slope
Obstructions
Near communications

Overfly the area in slow safe cruise 60 65 - 70 k, flap 20°
Note hdg (M) and best landing run

2. INSPECTION PROCEDURE

First Circuit 500ft AGL or depending on cloud base
Note landmarks down wind and final
Pre-landing checks and set up approach for inspection run
Approach field and overshoot areas at 300ft
Check any obstructions and drift

If satisfactory:-
Second Circuit
Repeat, still slow cruise, pre-landing checks and set up app. for second inspection run approx 100 ft on R.H. side of field to re-assess approach, ldg area, and overshoot area. Max. T.O. flap

If still satisfactory:-

Complete third circuit for approach and landing.

3. APPROACH & LANDING

Repeat approach with intention of making short field approach and landing if surface still satisfactory
Full flap 30°

Aim to land one third way into field

During practice overshoot at safe height and avoid annoyance to people and livestock

4. AFTER LANDING

Only release harness when a/c comes to rest
Normal shut down
Not taxi a/c until ground inspected

Move a/c as necessary for shelter
Tie down/protect from damage by people and livestock

Inform Base/Police

Not take-off again. Report situation and obtain further instructions

Student Practice

PILOT NAVIGATION – EXERCISE 18 A

AIM: To teach all aspects of Pilot Navigation, ground pre-flight preparation and in-flight procedures.

T.E.M: Success depends on good flight planning – weather appreciation – good cockpit organisation in flight.

Note: There is no fixed format, but attention to the u/m points plus reference to the Solo Navigation Briefing Certificate should suffice.

1. Pre-flight action by the pilot
Can the flight be safely made? Weather, route, altitudes, aircraft state, legal requirements, met., Notams, A.I.P., selection of route and maps, maps marked up – timings 5° and 10° lines etc. Raise nav flight plan and log (to be checked by F.I.). Booking out procedure, Nav. equipment to aircraft (several pencils or biros, accessible etc.).
2. Nav log, departure action and setting course procedure
Entering departure time, inserting ETA 1st sector. Relevant altimeter setting. Decide method of setting course: on climb-out or overhead the field. R/T a/r.
3. En route pilot nav. – maintenance of flight log, track keeping, 1 in 60 rule
Method of maintaining constant heading and altitude – constant monitoring of DI and compass – log keeping – lookout and track maintenance – corrections to track – updating ETA's -. Remember: at 90 k nominal 2/3 the n.m.'s = minutes.
4. Altimeter settings
Altimeter Setting Regions
5. Flying for Range
6. R/T
If necessary, write message format on bottom of flight log. Remember Time/Turn/Talk.
7. Action if lost or uncertain of position
Essential learn this procedure. Know method re plotting circle of uncertainty. Awareness of facilities available on 121.5 mhz.
8. Weather problems and diversion to alternate airfield
Ability to estimate Track (M) to an alternate airfield, plus mental D.R. re ETA's. Awareness of need to divert etc.
9. Descent and joining at destination airfield
Knowledge of cruise descent, calc. of ROD's etc. Must have all relative information re destination airfield available (chart or copy on back of log). Alt. settings, Circuit directions etc., Parking. Security of aircraft. Refuelling. Booking in.
10. Cross-Country Routes
A typical sequence would be as follows:-
 - 'Round the Blackdowns' – Dual,
 - 'MATZ/Control Zone, plus landing away' – Dual
 - 'Compton Abbas/Kemble landing away' – DualThen assuming completion Ex's 14B, 15, 16, 17, 18A, 18B, and 19, plus completion of the solo x-country certificate the student pilot can be authorised to fly solo the above routes already flown dual. The 150 nm PPL or 80 nm LAPL triangular/landing away routes would then be flown dual & solo. A final navigation flight test will be flown as part of the Skill Test for the PPL/LAPL.

NAVIGATION AT THE LOWER LEVELS – EXERCISE 18B

AIM: To teach the correct flying techniques and engine handling when forced to fly low e.g. below 1000ft AGL due to bad weather or other operational reasons.

T.E.M: Cockpit safety checks – Lookout for other a/c and obstructions – ATC considerations – Weather appreciation – Avoid annoyance to people and livestock.

AIR EXERCISE:

1. **AIRCRAFT SAFETY CHECKS**
(After T.E.M decision and prior to descent).
Fuel adequate
Radio – correct frq. vol. turned up
Engine T & P's, carb heat etc.
DI synchronised
Altimeter – latest setting
Harness tight
Loose articles stowed
Location – know position
Low safe cruise configuration
Lights on. Implement course of action
Could use: F R E D A L L L L for checks
Descent using power is better than glide
Sharpen lookout
Keep hand on throttle
 2. **DIFFERENT ASPECT OF FEATURES** Simulate join plus BWC, hold off or divert.
Oblique view gives changed aspect, need to 'guesstimate' Ht. Agl
Visually fly contours – use extra power a/r.
Note apparent high speed
Possibly added turbulence
Observe 500' rule. Keep 200' below cloud.
Map reading
Lookout, hazardous obstructions
Contour Flying: Ensure ground does not climb faster than a/c – watch for fixed bearing! Note that the alt. is not a lot of use except that it will give a good datum for S & L and for Min. Safe Alt.
Pilot must judge height above ground.

STUDENT PRACTICE
'S' turns along a road/line feature
360° turns around a fixed object.
Useful for para. 4(1)
 3. **NEED FOR ACCURATE FLYING**
Demo! Across line feature.
Upwind G/S slow.
Crosswind drift
Turning slipping/skidding
Downwind G/S high
Do not correct for 'apparent slip or skid'
Add power for turns and anticipate power when contour flying.
 4. **SIMULATE BAD WEATHER RETURN TO BASE WITH B.W. CIRCUIT**
(3 typical cases)
 - 1) Heavy shower activity possible hold off
 - 2) Low cloud good visibility
 - 3) Low cloud poor visibility
- CONSIDERATIONS
ATC
Good decision-making
Good lookout
Avoidance of noise-sensitive areas in training

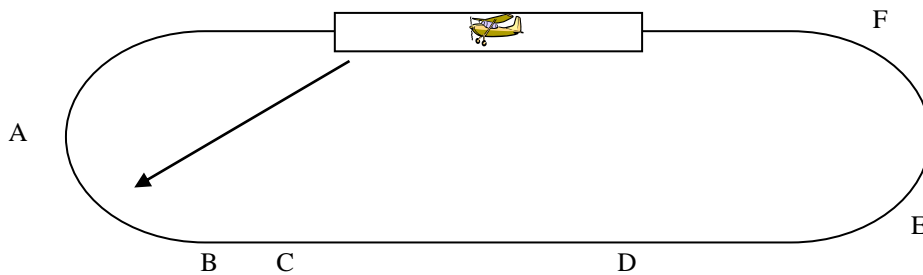
OPERATION AT LOW LEVEL– EXERCISE 18 B(1)
BAD WEATHER CIRCUIT

AIM: To teach how to manoeuvre the aircraft in the event of having to make a circuit at low level e.g. under a low cloud base and/or in poor visibility.

T.E.M: Normal aspects apply – 500 ft rule etc. in training – LSC configuration – Avoid annoyance to people and livestock, in training

AIR EXERCISE: (Either at an aerodrome or in the countryside in conjunction with Exercise 17)

Note: The u/m is the recommended training procedure to cover the worst case i.e. poor visibility and low cloud. In the cases of poor visibility and no low cloud, or good visibility and low cloud, the circuit pattern and height can be modified to suit. Where practicable, for best 'lookout' a left hand circuit is advisable.



Downwind Turn

(The letters in the text, apply to the letters shown in the diagram)

- A. In poor visibility, a 180° rate 1 turn is about right to position the aircraft on the downwind leg. This gives about the right radius for a poor visibility circuit. The angle of bank could be modified slightly in the case of a crosswind. The a/c should not normally be lower than, say, 400 ft AGL and not closer to the cloud base than 200 ft.

Downwind Leg

- B. The distance out from the field or runway should be close enough to retain sight of the field in poor visibility but far enough out to make a safe base turn.
- C. Downwind checks as normal include 20° flap (C152) for low safe cruise configuration. In training at an airfield, the R/T call would be 'Downwind low level' or similar. Also, pilot should select a landmark ahead as in poor visibility.
- D. Study ground track of base turn and final approach, and 'fix' landmark on final approach where pilot can aim to reach at say 300 ft., wings level, ready for final lowering of flap, ready for landing.
- E. Descending turn – R.O.D. less than for normal circuit due small height to be lost.
- F. Set up for final approach. In training, at an airfield, aim for short field landing.

RADIO NAVIGATION – EXERCISE 18 C

AIM: To teach the use of Radio Navigation equipment in the aircraft. At least VHF/DF, SSR (Transponder), VOR and ADF must be taught. Other facilities such as DME, GPS can be taught as required

T.E.M: Pre-flight AIP references & Notams to be checked – Equipment to be set up/checked after start up and in the air – application to Skill Test and subsequent PPL flying - ATC liaison.

AIR EXERCISE:

1. VHF/DF
Refer CAP 413 – R/T Procedures
AIP – frequencies
Student Practice
Obtain bearings, orientation
2. SSR (TRANSPONDER)
Refer CAP 413
AIP – application
Student Practice
Every flight
3. VHF Omni Range – VOR
Refer AIP – availability/frequencies
After start and in the air – Select, Identify
Check display
F.I. demo: TO & FROM indications
Orientation
Intercepting & Maintaining Radial(s)
VOR passage
Obtaining a fix
Student Practice
To repeat F.I. demos

Note

For detailed information, reference should be made to attached Sheet 18C (1) VOR tracking.

4. AUTOMATIC DIRECTION FINDING EQUIPMENT – ADF (optional)
Refer AIP – availability/frequencies
After start and in the air – Select, Identify, Check display
F.I. demo: Orientation and method of obtaining QDM's
Homing to a beacon
Station Passage
Tracking from beacon
Obtaining fix if other aids available
Student Practice
To repeat F.I. demos

Note: For detailed information reference should be made to attached Sheet 18C (2) ADF Tracking and Position Finding.

5. DME/GPS
To be demonstrated/practise as required.

VOR TRACKING – EXERCISE 18C(1)

Aim: To teach how to track/intercept a track to and from a VOR

T.E.M: A/c Lookout – Safety altitude- FRIEDAL- AIP latest info

General Notes:

The ground radio facility is known as the VOR (VHF omni-range) Station each station transmits signals in all directions, hence the term omni-directional. The signals are arranged to produce an infinite number of courses or tracks, 360 of which can be selected and identified by the VOR receiver in the aircraft. Each bearing from a station is called a radial. The audio signals from the station carry an identification feature and sometimes an ATIS transmission. As stated, VHF band is used (between 108MHz and 117.95MHz), the signals are line of sight and are relatively free from interference.

Basically, the aircraft equipment comprises antennae, receiver, frequency selector, and course deviation indicator (CDI). Warning 'flag' device is fitted to show when the equipment readings are likely to be unreliable. Likely range of the equipment is as follows-

<u>A/c Altitude</u>	<u>Approx. Range</u>
1,000	40 nm's
2,000	55 nm's
4,000	78 nm
8,000	110 nm

It should be realised that each radial subtends an arc of approx. 1nm at 60 nm from the station, so intercepting a radial some distance from the station can require a larger closing angle than when close in.

The VOR station's signals- one fixed and one rotating- are in phase when aligned with Magnetic north. Thus all bearings or radials are in degrees Magnetic.

To 'Track' to a station

Having checked before flight in the UK Air Pilot (AIP) and obtained 'frequency', 'ident.', 'hours of operation', 'precise location', and 'designated operational coverage', the user should, having tuned and identified the station, continue:-

Select reqd. radial on the CDI.

Confirm no warning flag.

Ensure correct TO/FROM indication (i.e. A/C hdg and CDI reading similar).

Maintain hdg and CDI needle L or R will indicate which to turn.

The number of dots that the needle is off will show the amount of track error.

Assess track error, multiply by 3, plus drift allowance. And select new hdg.

A normal 'bite' would be 30 degrees.

As the needle moves to the centre reduce the angle.

Remember, full needle deflection is 10 degrees.

As A/c nears the station the radial width will reduce considerably.

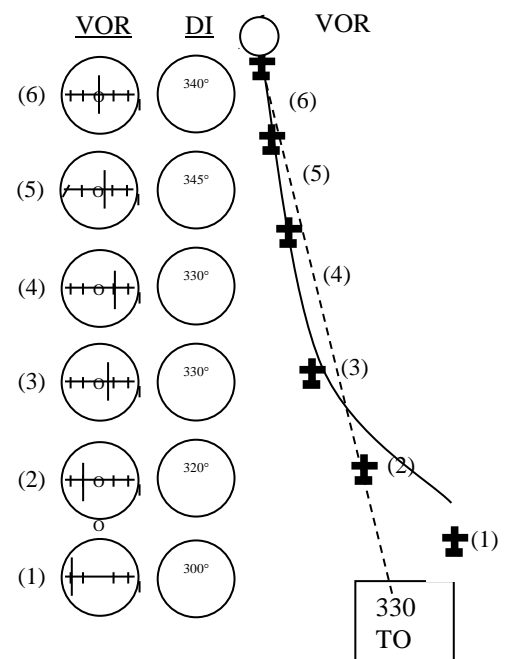
When very close in, it becomes impractical to fly CDI.

Best to fly hdg established.

Example

If CDI needle shows 2 dots to the left this means deflection of 4 degrees; times 3 = 12 degrees.

So change hdg 12 degrees to left (+ or -) wind allowance.



VOR TRACKING – EXERCISE 18C(1)

To track from a station

As, before and having tuned and identified the station, continue-

Select the require radial on the CDI

Confirm no warning flag

Ensure a correct TO/FROM indication i.e. CDI says FROM and both the CDI reading and the a/c hdg. are similar.

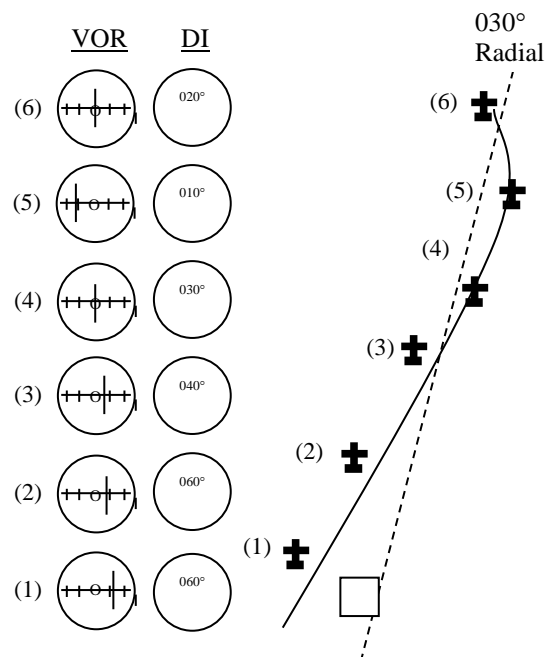
Maintain hdg. and CDI needle either left or right will indicate which way to turn.

The number of dots that the needle is off will show the track error.

Assess the error, multiply by 3, plus or minus a drift allowance and select a new hdg. A normal 'bite' would be 30 degrees.

Note: if the needle was deflected fully to one side, the safest way to assess the track error is to find the QDR by rotating the Obs knob in order to centralise the needle. The difference between the QDR and the reqd. track will be the track error. Reassess, return the CDI to the reqd. radial, and fly the new reading. As the needle centres, reduce the 'bite'.

Remember, as the a/c flies away from the station the radial will widen, and accuracy becomes important.



To assess time to a station

After tuning and identifying the station as before, assuming it is wished to establish the approx. time to the station proceed as follows:-

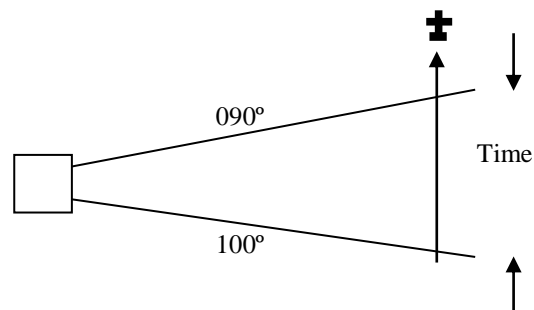
Turn the a/c so that it is flying at 90 degrees to the radial being tracked

Centre the CDI and note the time

As soon as the CDI starts to move, turn the Obs to set a new radial 10 degrees ahead.

When the needle centres again, note the elapsed time.

Then apply the formula:-



$$\frac{\text{Time (secs)}}{\text{Degs. Of change (10 in this case)}} = \text{Minutes from station}$$

ADF TRACKING AND POSITION FINDING – EXERCISE 18C (2)

Aim: To teach how to track to & from a N.D Beacon, also how to plot the aircraft position using NDB & VOR.

T.E.M: Normal aspects apply - Lookout – Safety altitude – Must have instinctive idea of QDM's.

General Notes: The student must understand the different type of beacon emissions and appreciate that if an a/c 'homes' on to a beacon without allowing for drift i.e. flies the a/c with the ADF needle centred the a/c will reach the station but not it's original track but pointing upwind!

Air Exercise (Initially, practice in the clear, then under the hood)

1. Flying a pre-selected track to a station

Normally the pilot would have verified before flight the frequency, ident, hours of operation, range, position, type of emission etc.

The ADF would have been tuned, identified, and set to ADF. Needle operation would have been 'tested'. A fixed ADF card is assumed. A R.M.I would be easier. Two methods are given:-

Method 'A'

1. Check ADF needle and turn a/c so needle reads zero. Ensure DI and compass synchronised.
2. The hdg on DI is the QDM to Stn.
3. Maintain. Any deviation of ADF needle shows drift and the way to turn.
4. To regain original track, turn twds the wind (same side as needle) until the ADF needle is the same no. of Degr on the other side of the nose.
5. Maintain, until needle moves twice as far away from the nose. This confirms that the original track has been regained. Turn part way towards the station by a suitable amount to allow for drift.
6. Maintain new hdg. If it is right, the ADF needle will not move.
7. In pxtice, it will be necessary to correct further, as needle moves one way or the other. If needle does move then must correct. Pilot must decide if dr. allce. is too much or too little. Repeat 4) to 6). Then make new dr. allce. Maintain.

Remember: The dir. of needle swing will show which way to turn. Also, no need for too much arithmetic: to find actual QDM – either turn the a/c to centre the ADF needle and read the hdg. or read the needle and add (if R of centre) or subtract (if L) re the a/c hdg. See diagram.

8. If the QDM is not the one required, alter hdg. as necessary: i.e. decide dir. and the 'bite', select new hdg until the needle reading + or – hdg = QDM. See example.

Method 'B'

1. Refer to ADF needle
2. Ensuring DI/compass synchronised, mentally transpose ADF needle to DI face. The transposed position is the a/c QDM. Decide if the QDM is as reqd or if a/c requires hdg change to intercept reqd track.
3. If need to intercept, decide if to turn L or R, and the amount of 'bite' e.g. attack at 30° or whatever.
4. Turn the a/c to the new hdg.
5. Mentally transpose the needle and find the QDM. Initially, it will be the same until the new hdg has had time to 'work'.

Remember: The difference between the a/c and the reqd track will be shown by the ADF needle when the a/c is on the reqd track.

Example: (say) Steering 300°, looking for 270°, will be on track when needle says 30°. (As the needle approaches 30° the 'bite' can be reduced.)

6. By this method, the Pilot constantly knows his QDM, without maths. As a/c reaches req'd track a new hdg can be 'guesstimated' to take care of any drift.
7. When the a/c is on the new hdg. the position of the ADF needle must be noted. This is essential. Note as ... Degr (minus) if L of zero, or ... Degr (plus) if R.
8. If the needle remains fixed, the drift has been cancelled. If the needle moves (L or R) the a/c hdg must be corrected first to regain the reqd track, then again to try a new drift allowance.

Remember: The needle will show which way to turn, and say again the saying at 5) above.

ADF TRACKING & POSITION FINDING – EXERCISE 18C (2)

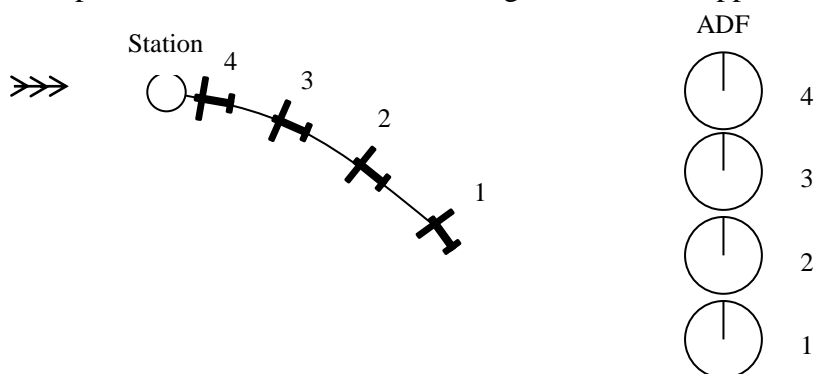
1. Tracking to a station (cont'd)

Whichever of the two methods is used, the pilot must remain 'orientated' at all times. The ADF needle is the key to where the station is and if the a/c is drifting to or from its required track..



2. What happens if you don't allow for drift

If no allowance is made for drift i.e. the pilot just flies to the station by constantly flying to keep the needle centred, the following shows what happens.



The a/c starts with the best of intentions but will end up at the station headed into the wind and not on the required track, or from the intended direction. This last could be important if one was trying to avoid high ground! To achieve a required track the track must be intercepted, then maintained, by making a precise allowance for drift.

3. Overflying the Station/Beacon

If a careful track is maintained with the corrections 'sharpened' up as the a/c approaches the station (but the heading alterations kept small) the a/c should make a good station passage. The needle will oscillate/fluctuate as the station is approached but if a fairly accurate passage is made the needle will swing fairly quickly through 180° and point to the rear. If a transit is made just to one side, the needle will move fairly smartly through 180° without too many oscillations. If a transit is made well to one side, the needle will reverse much more slowly and finish up not quite pointing to the rear of the a/c. So the pilot will be able to infer a lot of useful information from the behaviour of the needle.

4. Measuring time-to-the-Station

This can be done using the principle outlined in VOR TRACKING leaflet. This aid is, however, not quite so accurate. Remember: The time taken for a change of 1° of bearing measured in seconds = minutes to the station. In practice, of course, one would have to measure over 10° or more.

5. Obtaining a fix using 2NDB's and a VOR

Tune and identify the 2 stations in turn, or if using 1 NDB & VOR simultaneously and obtain bearings from the station(s).

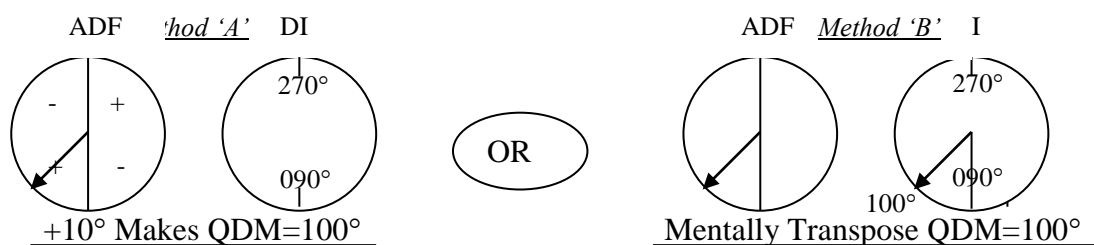
In the case of NDB, this means obtaining QDM as outlined above in para. 1, then deducting the variation, and taking the reciprocal. Plot this figure as a QTE. In the case of VOR i.e. with Variation, plot 'as is' from the VOR rose datum.

In either case, the fix lies where the two bearings cross, assuming that the bearings were taken simultaneously or within, say, 30seconds of each other. Anything more will give a measurable error.

ADF TRACKING & POSITION FINDING EXERCISE 18C (2)

6. Tracking from a station

The methods outlined in para 1 can be used. Either treat the ADF dial as a 'plus and minus indicator' to find the QDM (which is now opposite to the aircraft heading) or mentally transpose the ADF needle to find the QDM: -



To intercept a given QDM turn the a/c in the same direction that the needle is moving (assuming that it is moving and the a/c is not on the required QDM). As for tracking to a station a definite 'bite' or attack angle must be used: the bite will to some extent depend upon the wind (direction & strength). Then wait for the new heading to 'work' and maintain until the a/c is on the new QDM, or nearly so, adjust as reqd to maintain the new required QDM. Tracking from a station requires sharper thinking due to the QDM and heading being opposite. But the principles are the same. If using the ploy: the difference between the a/c heading and reqd track will be on the ADF indicator when on the reqd track still works, but one has to use the reciprocal of the new heading selected.

Example

In the above sketch, if the ADF needle moved left by another 10° i.e. QDM 110° this means that the a/c has drifted to the right, and needs a correction of heading to the left – say, steer 240°, take the reciprocal 060°. Then the ploy: 'the difference between 060° and the reqd track 100° = 40°. When steering hdg 240° the ADF needle will initially show +50° (at the bottom of the ADF indicator) and as the new heading 'bites' the ADF needle would move (if the wind is not too strong) towards +40°. Then the a/c is back on track. If the needle doesn't move, a bigger 'bite' is required.

Once on the track again, it would be necessary to fly another heading, say try 260°. In which case the ADF needle would move to +20°. If the new heading were exactly right, the ADF needle would not move, hopefully, indicating that the a/c remained on the required track. I not, 'per ardua ad astra'.

Important

If the pilot is unsure, at any time, steer the heading of the required track and even though the aircraft may not be on the required track the ADF needle will show immediately which side of track the aircraft is, and also which way to turn. This works irrespective of whether the needle is pointing ahead or behind the aircraft.

BASIC INSTRUMENT FLYING – I.F. APPRECIATION – EXERCISE 19

AIM: First to demonstrate that the aircraft cannot be safely controlled without reference to the flight instruments when outside visual references are lost and secondly to ensure that it is fully appreciated that sustained instrument flight cannot be safely undertaken without a proper course of training.

T.E.M: All normal aspects apply – need to complete careful pre-flightcheck of aircraft antenna etc – emphasise need for student pilot to avoid weather conditions necessitating I.F. – importance of taxiing instrument check.

AIR EXERCISE:

1. PHYSIOLOGICAL SENSATIONS

Student to close eyes, head down, and attempt to interpret a/c movements through physical sensations. Instructor to fly a/c. Conclusion: Sensations derived from motion and posture can become confused.

2. INSTRUMENT INDICATIONS

<u>Instruments</u>	<u>Demonstration</u>	<u>Conclusion</u>
AH (AI) Alt. VSI ASI	<u>Pitch:</u> AH index aircraft one bar width up and one bar width down. Note large change of speed & altitude.	AH shows direct and instant ind's of pitch. Small movements of index a/c in pitch will result in large changes of a/c att. Hence need to make small control movements. The 3 press. insts. give indirect ind's of pitch.
AH Alt.	<u>Bank:</u> (Revise markings a/r) Then bank AH index a/c until 10° is reached. Hold. Adjust pitch att. to maintain constant alt. Return to S & L. Re-adjust pitch as required. Repeat for 15° and 20° both L & R return to S & L Re-adjust pitch as required.	AH shows immediate and accurate indication of bank or lateral level. This inst. is only inst. to show direct indic. of both pitch & bank and is called the Master Instrument.
AH DI (HI) TC/Bal. Ind.	<u>Heading & Balance:</u> Fly the a/c S & L. The insts. show lat. level hdg. & balance. Demo if small bank (faulty AH) but hdg maintained – out of balance. Or if slight yaw but lateral level maintained – out of balance.	It is essential to fly a/c laterally level and with no yaw i.e. in bal. The DI gives direct & instant indic. of hdg.; and TC/Bal. Ind. gives direct & instant indic. of balance.

I.F. APPRECIATION – EXERCISE 19 Continued

Student practice, then with hood: maintaining aircraft attitude by reference to the AH only: laterally level and constant pitch attitude. F.I. to mention attitude flying, also control Instruments and Performance Instruments.

3. ATTITUDE INSTRUMENT FLIGHT

(The student can be reminded that the establishment of given pitch and bank attitudes accompanied by a specific power setting gives a predictable aircraft performance and that when these are established by reference to the flight instruments then the result is Attitude Instrument Flying).

Effect of power changes whilst maintaining level flight

<u>Instruments</u>	<u>Demonstration</u>	<u>Conclusion</u>
AH RPM Gauge DI (HI) ASI VSI Alt.	Effects of changing power: Increase power whilst maintaining level attitude. Apply control pressure to hold constant altitude. As speed increases, note increased CC pressure needed. Also changes in hdg. & balance.	Initially, changes in alt. & speed, but esp. early VSI response. Hdg. & balance affected plus a/c inertia.

Student practice using external and instrument references to maintain altitude, heading and balance, whilst changing power and speed.

Introduction of selective radial scan

Selective radial scan, using hood. AH Alt.	Student practice Selective Radial Scan whilst maintaining constant alt.	To scan from AH to Alt. and back to AH. Maintain alt. by adjusting pitch att. of index a/c. Adjustment: max ½ bar width.
AH DI	As above whilst maintaining constant hdg.	To scan from AH to DI and back to AH. Maintain by control adjustments to hold wings level and constant hdg.
AH DI Alt.	As above whilst maintaining constant altitude <u>&</u> heading	Develop scan technique radiating from AH to DI and back to AH. Then to Alt. and to AH. Hence termed 'Sel. Rad. Scan'

As proficiency is gained the scan can be widened to bring in the secondary supporting instruments.

IMPORTANT This I.F. appreciation exercise must be preceded by a briefing on the under-mentioned topics:-

Reasons for I.F. Training: Statistics re accidents, responsibility in law, weather minima etc..

The Instrument Panel: Instruments and their basic operation, Master, primary, and secondary

Flying Techniques: Attitude flying, trimming, small control movements, selective radial scan, standard rate turns.

BASIC INSTRUMENT FLYING – EXERCISE 19(1)

AIM: To teach how to control the aircraft in straight and level flight by sole reference to instruments.

T.E.M: All normal T.E.M considerations apply but care must be taken re controlled airspace and/or weather considerations if IMC flight involved.
Introduction of FREDAL and Suction Gauge checks.

AIR EXERCISE

1. ACHIEVING & MAINTAINING S & L FLIGHT, NORMAL CRUISE (85/90 K)
From a condition other than S & L and using internal and external references:-

<u>Achieving</u>	<u>Maintaining</u>	<u>Correcting</u>
Select approx S & L att. using AH. Set cruise power. Initially scan AH, Alt., DI then trim. Widen scan to include sec. supp. instruments. Re-trim.	When S & L achieved the primary supporting insts. will be DI and VSI. If turbulent use DI and Alt.	Technique: change-check-hold-adjust-trim.
If wings are level and Hdg is constant a/c will be in balance.	For small errors in Alt. use pitch changes.	Pitch changes: max ½ bar width.
If wings level, a/c in balance, but hdg is changing, could be u/s AH.	For larger errors re-adjust power using alt. as supp. inst. Scan to include the Suction Gauge.	Hdg changes: max bank ½ of hdg error in degrees. Max rate one.
		Alt. in excess +/- 100 ft: re-adjust power and pitch.

Student repeat, then with hood.

Note: Accurate trimming essential. Better to prevent instrument deviations than to 'cure' !

2. ACHIEVING AND MAINTAINING Ss & L FLIGHT AT VARIOUS AIRSPEEDS AND IN VARIOUS CONFIGURATIONS

Repeat the previous exercise in level flight for fast cruise, slow cruise, slow safe cruise i.e. with flap. Scan will be as before but glances at RPM gauge will be involved. Remember that pitch changes of one bar width equals a change of IAS of some 10 k and vertical speed of some 300'/min.

Student practice, then with hood

BASIC INSTRUMENT FLYING – EXERCISE 19(2)

AIM: To teach how to control the aircraft in climbing and descending flight by sole reference to instruments.

T.E.M: All normal T.E.M considerations apply but care must be taken re controlled airspace and/or weather considerations if IMC flight is involved. Introduction of FREDAL and suction gauge checks.

AIR EXERCISE

1. **ACHIEVING & MAINTAINING THE CLIMB (70 K) LEVELLING OFF AT 85/90 K**
From S & L condition, using internal and external references:-

<u>Achieving</u>	<u>Maintaining</u>	<u>Correcting</u>
Smoothly apply full power and prevent yaw. Then with wings level place the index a/c in approx climb attitude. Scan: AH, DI, RPM and trim. Then scan includes ASI. Re-adjust pitch attitude to achieve correct speed. Max pitch change $\frac{1}{4}$ - $\frac{1}{2}$ bar width. Re-trim. Check balance.	Maintain correct pitch on AH. Scan plus DI and ASI. Monitor the Alt. and anticipate levelling out by 10% of R.O.C. and lower index a/c so that S & L is reached at the correct alt. Hold. Reduce to cruise power and use scan as for S & L plus ASI. Trim. <u>Remember tendency for a/c to climb during levelling out.</u> Scan Suction Gauge.	Technique: change-check-hold-adjust-trim. Hdg changes: max bank $\frac{1}{2}$ of error in degrees. Max Rate one. Pitch changes: max $\frac{1}{4}$ - $\frac{1}{2}$ bar width.

Student repeat, then with hood

2. **ACHIEVING & MAINTAINING PWRD DESCENT 70 K, LEVELLING OFF 85/90 K**
From S & L condition, using internal and external references:-

<u>Achieving</u>	<u>Maintaining</u>	<u>Correcting</u>
With correct Alt setting and having decided IAS and R.O.D. (400 fpm) hold pitch attitude whilst reducing power as required. Include ASI in the scan and re-adjust index a/c as IAS is achieved. Check wings level, balance, & trim. Refer to VSI and adjust power and pitch a/r. Check balance and re-trim.	Having achieved correct R.O.D. maintain correct pitch on AH. Scan to include DI, ASI & VSI. As approaching levelling off Alt scan Alt and anticipate by 10% of R.O.D. smoothly add cruise power and return to S & L. The index a/c should be raised so that S & L is reached at correct Alt and trim. Scan as for S & L using ASI as primary support inst. until IAS is obtained. Check balance and re-trim a/r. Scan Suction Gauge	As for climb above.

Student repeat, then with hood.

BASIC INSTRUMENT FLYING – STANDARD RATE TURNS EXERCISE 19(3)

AIM: To teach how to turn in level, climbing, and descending flight by sole reference to instruments.

T.E.M: All normal instrument flying aspects apply.

AIR EXERCISE

1. RATE ONE LEVEL TURNS

Initially, using external and internal instrument references from S & L flight at 85/90 k:-

<u>Entry</u>	<u>In The Turn</u>	<u>Returning to S & L</u>
Grad. bank a/c until 15° is shown on the AH. Maintain balance with rudder. Apply C.C. back press. to slightly raise index a/c to maintain altitude. Primary Supp. Insts:- VSI and TC If turbulent use Alt.	The primary Supp. Insts. are VSI and TC. Rate of turn is shown on the TC. DI will be sec. supp. then primary as hdg is reached.	Anticipate recovery by ½ the bank angle. Adjust the rate of roll-out so that wings are level as recovery heading is reached. Prime Supporting Insts. are DI, VSI and TC (Balance)

Student practice, then with hood, both left and right turns, especially 180° turns to simulate return to VMC after inadvertent entry into cloud.

2. RATE ONE CLIMBING TURNS

Initially, using external and internal instrument references from a straight climb at 70 k:-

<u>Entry</u>	<u>In the Turn</u>	<u>Returning to Climb</u>
Maintaining pitch att. bank the a/c until the AH pointer indicates 15°. Maintain balance with rudder. During the entry, primary supp. insts. ASI and TC (Bal). Lower index a/c to maintain correct speed.	Primary supp. insts. are VSI and TC. The DI will be a Sec. Supp. inst. then primary as hdg is approached. Check for tendency to over-bank in cl. turns especially to the left.	As for recovery from level turn. Primary supp. insts. are DI, ASI and TC (Balance).

Student practice, then with hood, both left and right turns.

3. RATE ONE DESCENDING TURNS

Initially, using external and internal instrument references from a straight descent at 70k

<u>Entry</u>	<u>In the Turn</u>	<u>Returning to Descent</u>
As for level turn above. But extra power may be required to maintain the original ROD and the VSI brought in to the scan.	As for level turn.	As above.

Student practice, then with hood, both for left and right turns, including 180° turns as above.

BASIC INSTRUMENT FLYING – RECOVERY FROM SPIRAL DIVE – EXERCISE 19(4)

AIM: To teach how to recover from a descending spiral dive by sole reference to instruments.

T.E.M: Normal instrument flying aspects apply – observe adequate terrain clearance.

AIR EXERCISE

<u>Entry</u>	<u>Recognition</u>	<u>Recovery</u>
From S & L apply steep bank and allow nose to drop. Power to be reduced to say 1900 RPM at commencement to avoid exceeding RPM limitations.	AH shows steep bank and low nose att. ASI shows increasing speed. Alt. shows rapid ht. loss. TC shows full deflection. Engine RPM increasing. Flying controls heavy.	Close throttle and roll wings level by firm use of ailerons. (AH). Centralise aileron control. Raise the a/c nose to a level attitude (AH). As the speed decreases to normal restore cruise RPM. During the recovery the primary supp. instruments will be the ASI and the TC. Then the DI.

Student practice, initially with external and internal instrument references, then with hood, both left and right spiral dives. Excessive C.C. back pressures must be avoided during the recoveries which might cause possible aircraft structural damage and/or spatial disorientation.

IMPORTANT

The student pilot must have demonstrated reasonable competence in Basic Instrument Flight before being authorised for first solo cross-country flight.