

# POOLEY'S

AIR PRESENTATIONS

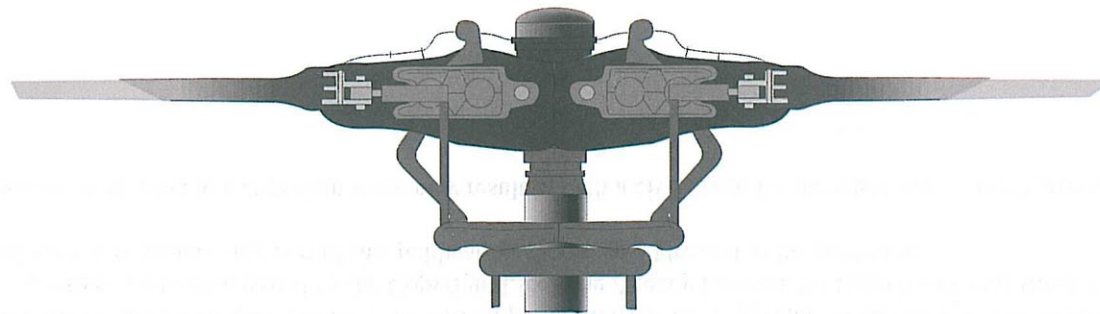


## Pre-Flight Briefing (Helicopters)

Civil Aviation Authority, LASORS recommended

PILOT'S WORK BOOK

Complies with JAR-FCL and National PPL Training Syllabus



## **Student Pilot's Work Book (Helicopter)**

### **Student Pilot's Work Book**

Name: \_\_\_\_\_



# Pooleys Pre-Flight Briefing (Helicopter)

These pre-flight briefing notes have been designed as a training aid for both the student and the Instructor. Used correctly they will form an important part of your training, giving you the ability to reflect upon what you have been taught in the air, and allow you to look forward and study for your next lesson. Used in isolation, you will not gain the necessary knowledge, that is to say, you will need good quality study books like the Helicopters Pilot's manual by Norman Bailey or Principles of Helicopter Flight by H.R.Quantick. Then you need your Instructor(s) to impart their KNOWLEDGE and EXPERIENCE. Your Instructor will use a combination of training aids i.e. these pre-flight briefings, white boards, chalk boards, models and many reference books and other sources of information. Your Instructor will also combine the exercises in this manual to achieve quality training.

**To accelerate your learning and to save you money we suggest the following:** If your flying school runs a ground school program join it. Learning in isolation is not fun, it can leave you with doubts in your mind. The information explanations and experiences that the Instructor will give you are second to none; me talking to other students can also be reassuring. Many assume that ground school is about preparation for your ground exams and not as much fun as flying. In fact, it gives you essential information to do both, that is, pass the ground exams and gives you the knowledge to fly the helicopter safely. **P**rior **P**reparation and **P**lanning will save **P**ossible **P**oor **P**erformance (the 6 **P**'s). Someone should have said, "Prior Preparation and Planning will also save you money". So why do many students arrive for their flying lessons so poorly prepared? Pre-flight briefings, flying lessons and post-flight debriefings are the essential elements of a flying lesson. However, many students think that a pre-flight briefing etc. is the Instructor's responsibility. Well they are! But your performance will be poor if you have not prepared yourself with pre-flight knowledge. This means giving yourself the essential knowledge and preparation well before your lesson. Reading your study books and these pre-flight briefing notes will give you this information. At your pre-flight briefing, be prepared to take further notes. Your Instructor will give you specific information regarding the characteristics of the helicopter, local area etc. Now you will be able to enjoy your flying lesson far more and get more value from it. At your post-flight debriefing your Instructor will cover how well your lesson went. The Instructor will indicate your strengths, weaknesses and what exercises you will be covering on the next lesson. Take notes, and use them to reflect on. As Editor of Pooleys Air Presentations I would like to thank the person who has made these pre-flight briefings possible: Capt Mike Cull (MRAeS) who has been the SME (subject matter expert) for this project. Mike has some 16000 hrs of world wide flying experience covering every aspect of helicopter flying and instruction. Mike was instrumental in the formation of the Army Air Corps Blue Eagles helicopter display team.

**Editors:** Dorothy Pooley FRAeS  
Daljeet Gill

# Contents

## **Exercise 1a**      **Familiarisation with the Helicopter**

|        |                                           |
|--------|-------------------------------------------|
| Page 1 | General characteristics                   |
| Page 2 | Main instrumentation                      |
| Page 3 | Main systems                              |
| Page 4 | Helicopter checklist, drills and controls |

## **Exercise 1b**      **Emergency Procedures**

|        |                               |
|--------|-------------------------------|
| Page 5 | Fire drills                   |
| Page 6 | Triangle of fire              |
| Page 7 | System failure                |
| Page 8 | Emergency equipment and exits |

## **Exercise 2**      **Preparation for and action after flight**

|        |                                                       |
|--------|-------------------------------------------------------|
| Page 9 | Procedures to prepare pilot and helicopter for flight |
|--------|-------------------------------------------------------|

## **Exercise 3**      **Air Experience**

|         |                    |
|---------|--------------------|
| Page 10 | Instructor's Brief |
|---------|--------------------|

## **Exercise 4**      **Effects of Controls**

|         |                                                             |
|---------|-------------------------------------------------------------|
| Page 11 | Cyclic, collective, throttle, RPM governor, yaw pedals etc. |
| Page 12 | Torque reaction                                             |
| Page 13 | Coning angle                                                |
| Page 14 | Effects of airspeed                                         |

## **Exercise 5**      **Power and Attitude Changes**

|         |                                                                     |
|---------|---------------------------------------------------------------------|
| Page 15 | Relationship between controls with changes in attitude and airspeed |
| Page 16 | Power available graph                                               |
| Page 17 | Accelerative and decelerative attitudes                             |

## **Exercise 6a**      **Straight and Level**

|         |                                       |
|---------|---------------------------------------|
| Page 18 | Maintaining straight and level flight |
|---------|---------------------------------------|

## **Exercise 6b**

|         |
|---------|
| Page 19 |
| Page 20 |

## **Exercise 6c**

|         |
|---------|
| Page 21 |
| Page 22 |
| Page 23 |
| Page 24 |

## **Exercise 7**

|         |
|---------|
| Page 25 |
| Page 26 |
| Page 27 |

## **Exercise 8a**

|         |
|---------|
| Page 28 |
| Page 29 |
| Page 30 |
| Page 31 |
| Page 32 |

## **Exercise 8b**

|         |
|---------|
| Page 33 |
| Page 34 |

## **Exercise 8c**

|         |
|---------|
| Page 35 |
| Page 36 |

## **Exercise 9**

|         |
|---------|
| Page 37 |
| Page 38 |
| Page 39 |

## **Climbing**

|                                                             |
|-------------------------------------------------------------|
| From straight and level flight climbing with the helicopter |
| Optimum climb speed graph                                   |

## **Turning**

|                                                              |
|--------------------------------------------------------------|
| Placing the helicopter into different turning configurations |
| Turn maintaining constant level                              |
| Climbing and descending turns                                |
| Offset seating effect                                        |

## **Basic Autorotation**

|                                                      |
|------------------------------------------------------|
| Entry to autorotation and recovery from autorotation |
| Recommended take-off profile                         |
| Aerodynamics of autorotation and vortex ring         |

## **Hovering**

|                                      |
|--------------------------------------|
| Effects of controls                  |
| Tail rotor drift                     |
| Surface appreciation (ground effect) |
| Forward running touchdown            |
| F.O.D                                |

## **Hover Taxying, Spot Turns**

|                                            |
|--------------------------------------------|
| Hover taxi and conduct spot turns          |
| Illustrating hover taxying and spot turns. |

## **Hovering, Taxying Emergencies**

|                                                                                                            |
|------------------------------------------------------------------------------------------------------------|
| Procedure in the event of a power failure                                                                  |
| Power failure below 8ft AGL, loss of tail rotor thrust during the hover; power failure while hover taxying |

## **Take-off and Landings**

|                               |
|-------------------------------|
| Take-off and dynamic rollover |
| Ground resonance              |
| Landing from the hover        |



**Exercise 22b**

Page 79

**Navigation Problems at Low Height & Reduced Visibility**

Navigate safely at lower levels and in poor visibility

**Exercise 22c**

Page 80

Page 81

Page 82

**Radio Navigation VOR**

Use of the VOR

320° to the VOR

140° from the VOR

**Exercise 22c**

Page 83

Page 84

Page 85

**Radio Navigation ADF**

Use of the ADF

Illustrating ADF

Homing and Tracking

**Exercise 22c**

Page 86

Page 87

**Radio Navigation VHF/DF**

Procedures of VHF direction finding

VDF Bearing accuracy

**Exercise 22c**

Page 88

Page 89

**Radio Navigation Enroute and Terminal Radar**

Use of en-route/terminal radar

Illustration of Radio

**Exercise 23**

Page 90

Page 91

Page 92

Page 93

**Advanced Take-Off, Landings & Transitions**

Procedures to safely take-off, landing and transition out of wind

Hovering out of wind

Downwind take-off transition

Downwind approach

**Exercise 24**

Page 94

Page 95

Page 96

**Sloping Ground**

Take-off and land on sloping or uneven ground

Other considerations on landing

Take-off on slope

**Exercise 25**

Page 97

Page 98

Page 99

Page 100

Page 101

Page 102

Page 103

Page 104

**Limited Power**

Available power is limited

Vertical take-off

Towering take-off

Cushion creep take-off

Running take-offs

Running Landing

Zero-zero landing

Hover OGE

**Exercise 26**

Page 105

Page 106

Page 107

**Confined Areas**

Procedures and techniques to enter, manoeuvre and leave a restricted site

Spot the errors!

Practice approach and final inspection, final and departing in a confined area

**Exercise 27**

Page 108

Page 109

Page 110

Page 111

**Basic Instrument Flight**

Sensation of flight with sole reference to the instruments and with no external visual reference

Simple scan for airspeed and altitude

Simple scan for heading and balance

Simple scan for vertical speed and turn rate

## Exercise 1a

## Familiarisation with the Helicopter

Part 1/4

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the general characteristics of the helicopter.

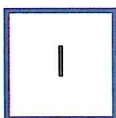
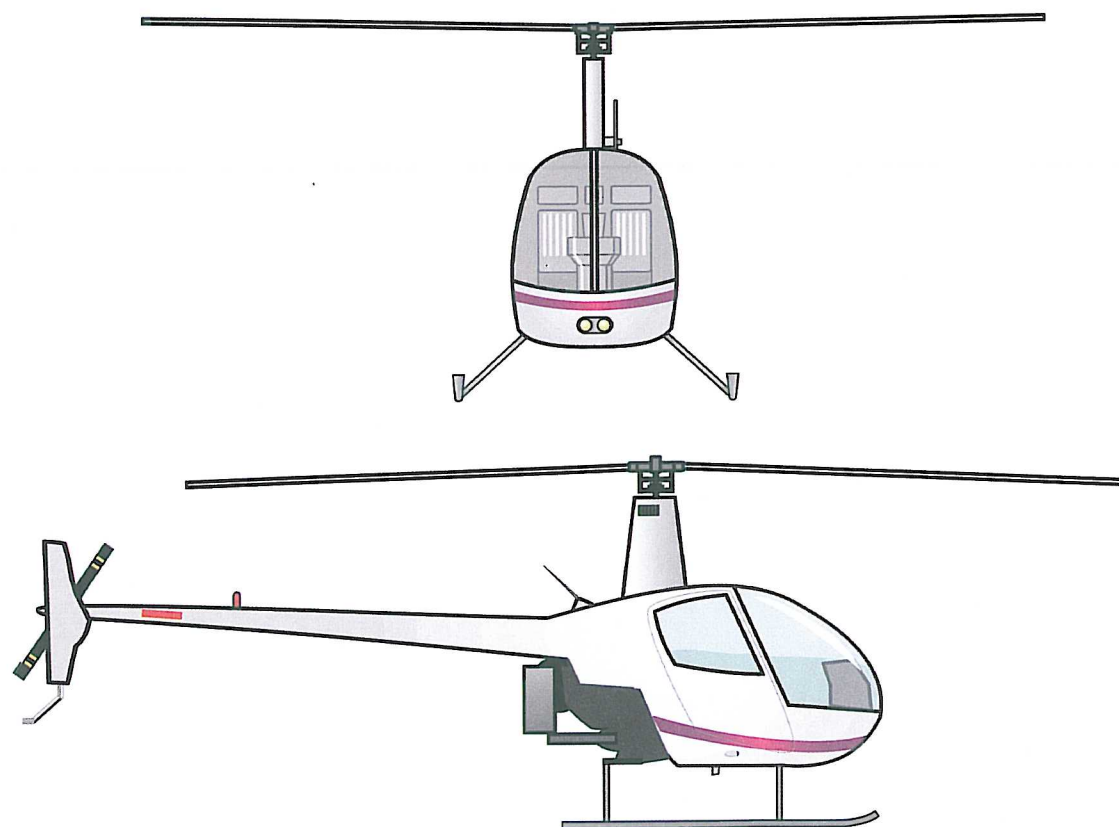
**Lesson Objective:** By the end of the lesson you will be able to state and identify accurately the main characteristics of your training helicopter.

**Airmanship:** Pilot knowledge.

**Air Exercise:** n/a

### Teaching Points:

1. Helicopter type and general characteristics.
2. Description external.
3. Description internal.
4. Helicopter performance - General characteristics.





## Exercise 1a

## Familiarisation with the Helicopter

Part 2/4

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the main instrumentation of the helicopter.

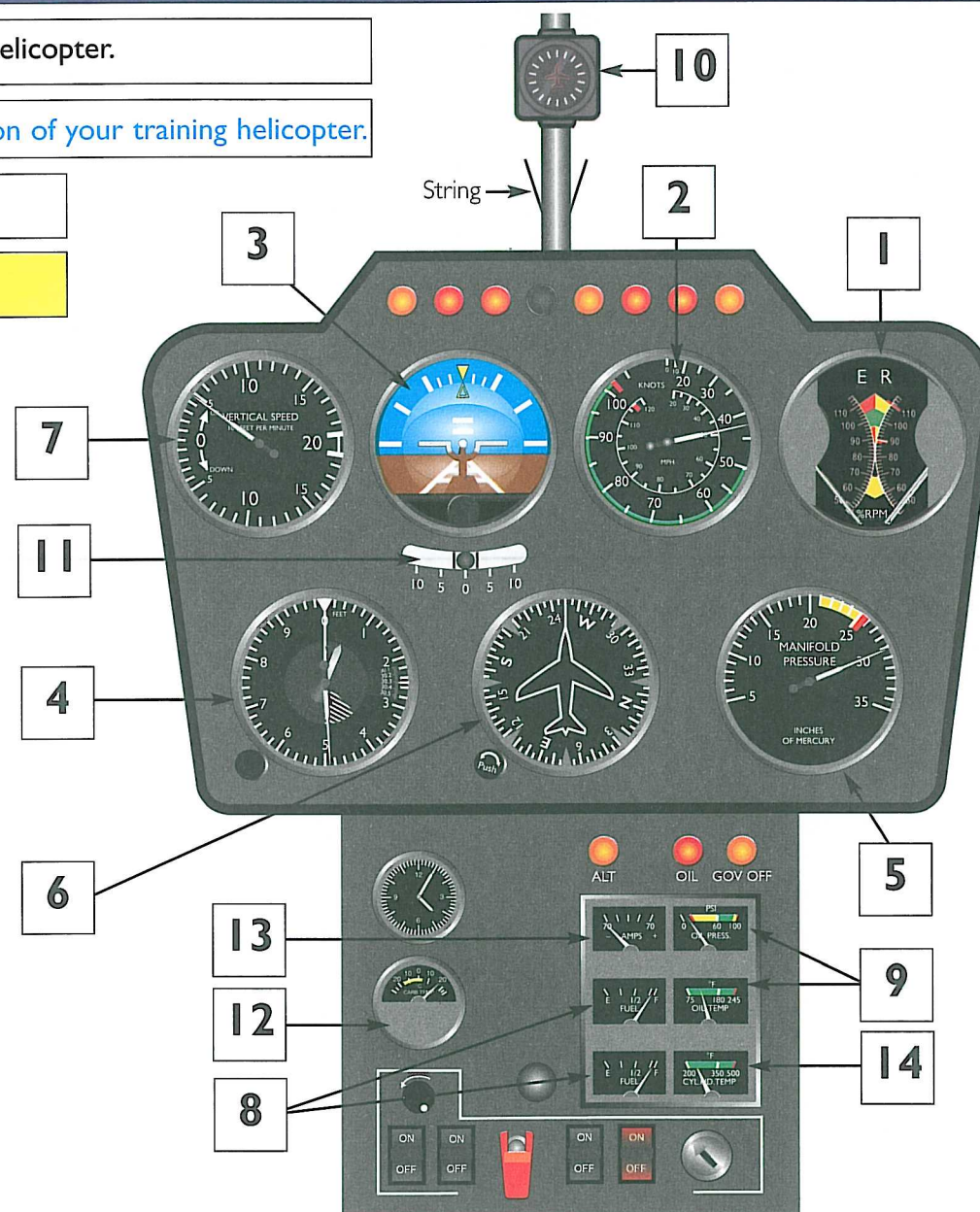
**Lesson Objective:** Accurately identify the main instrumentation of your training helicopter.

**Airmanship:** Pilot knowledge.

**Air Exercise:** n/a

### Teaching Points:

1. Engine and Rotor RPM
2. Airspeed Indicator
3. Attitude Indicator
4. Altimeter
5. Manifold Pressure
6. Directional Gyro
7. Vertical Speed Indicator
8. Fuel Gauges
9. Oil Temperature & Pressure Gauge
10. Magnetic Compass
11. Balance Ball and String
12. Carburettor Temperature
13. Ammeter
14. Cylinder Head Temperature



## Exercise 1a

## Familiarisation with the Helicopter

Part 3/4

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the main systems of the helicopter.

### Lesson Objective:

By the end of the lesson you will be able to accurately identify and use the main systems of your training helicopter.

### Airmanship:

Pilot knowledge. P. O. H.

### Air Exercise:

n/a

## Teaching Points:

### Fuel System:

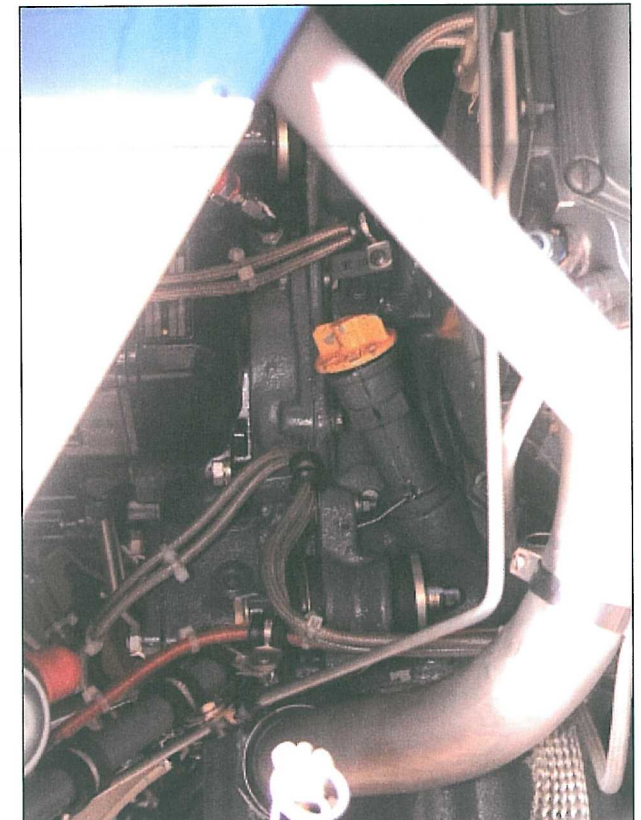
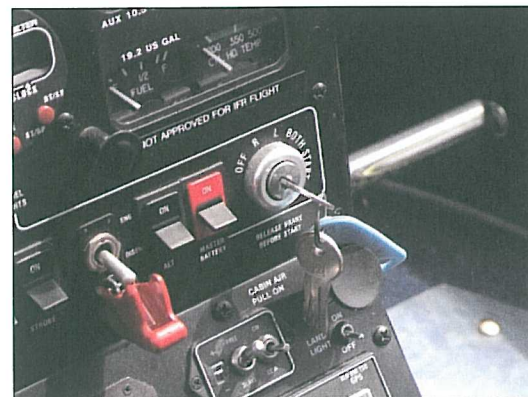
System type, fuel colour, number of tanks, total capacity, usable capacity, approximate endurance (gph).

### Ignition System:

System type, magneto switch, battery(s), magnetos, fuses, circuit breaker.

### Lubrication System:

System type, oil type, oil capacity, oil replenishment.





## Exercise 1a

## Familiarisation with the Helicopter

Part. 4/4

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn to use the helicopter checklists, drills and controls.

### Lesson Objective:

By the end of the lesson you will be able to use the helicopter checklists accurately and demonstrate the associated drills.  
Identify the main controls of your helicopter and demonstrate their use.

### Airmanship:

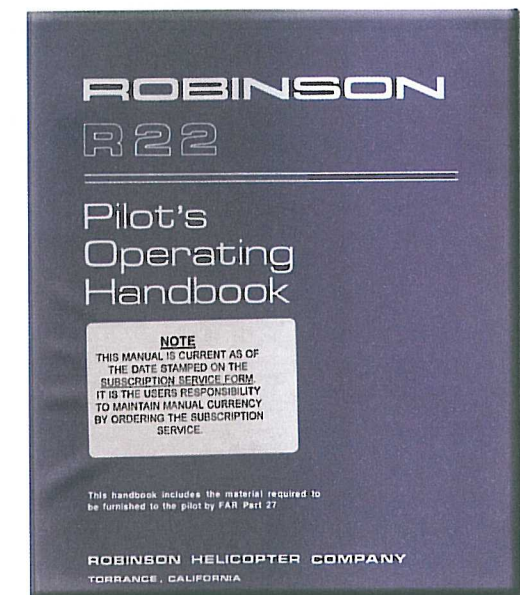
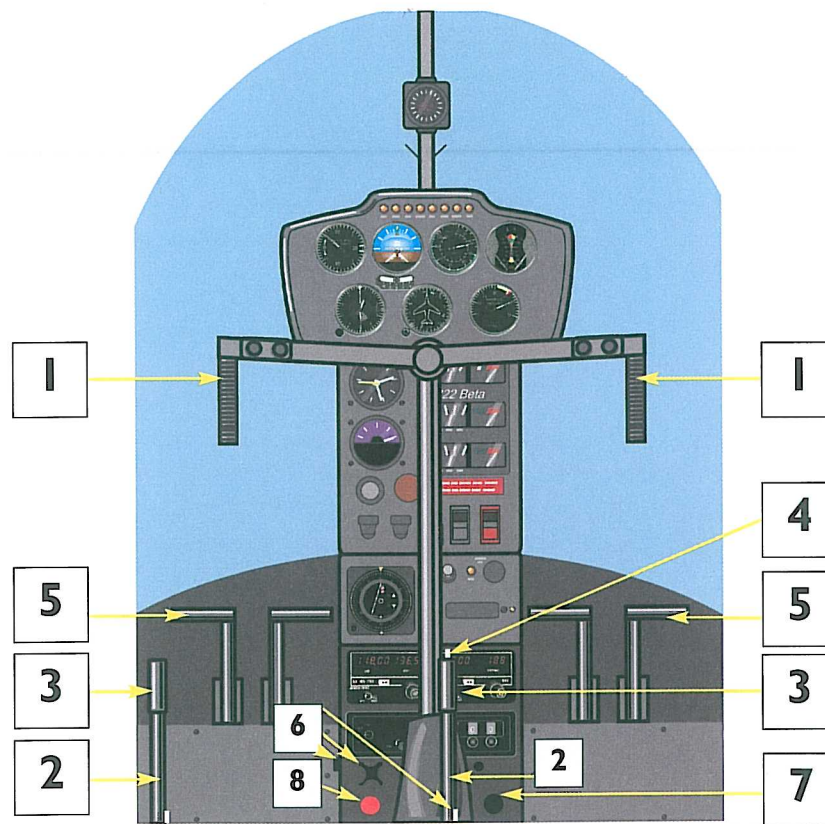
Pilot knowledge.

### Air Exercise:

n/a

## Teaching Points:

- a) Checklist P. O. H.
  1. Cyclic
  2. Collective
  3. Throttle (Twistgrip)
  4. Governor
  5. Yaw Pedals
  6. Frictions
  7. Carburettor Heat
  8. Mixture Control



a



**Lesson Aim:** To learn the emergency fire drills.

**Lesson Objective:** By the end of the lesson you will be able to accurately state the procedures for: Engine fire on start up, engine fire in flight, electrical fire in the flight.

**Airmanship:** No smoking. Thorough pre-flight. Appropriate extinguisher type. Switch off mobile phones. Helicopter checklist.

**Air Exercise:** n/a

## Teaching Points:

### 1. Engine Fire on Start Up *(include groundcrew as part of the start-up scan).*

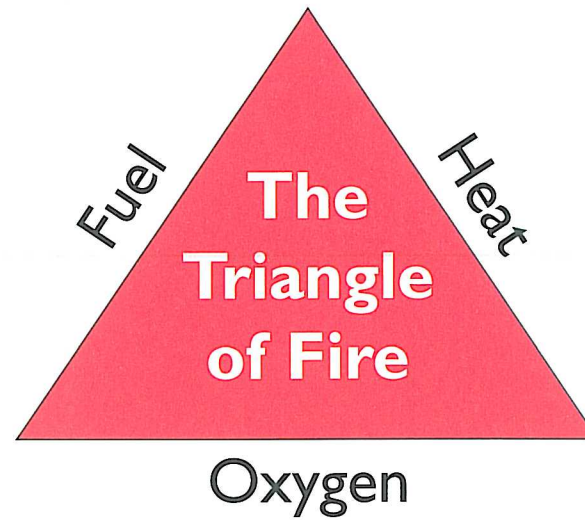
- Cranking - Continue and attempt to start the engine which would suck flames and excess fuel through carburettor into the engine.
- If the engine starts, run at 50-60% RPM for a short time, shut down, and inspect for damage.
- If the engine fails to start, shut off the fuel and the battery master switch.
- Extinguish the fire with a suitable fire extinguisher, wool blanket or dirt.
- Inspect for damage.

### 2. Fire in Flight *(NOTE: CAA Supplement to R22 Flight Manual requires engine to be shut down in flight - see CAA Checklist.)*

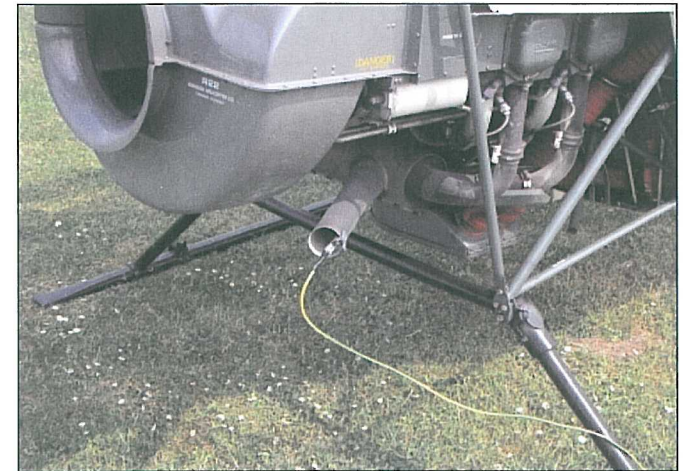
- Enter autorotation.
- Battery master switch OFF (if time permits).
- Cabin heat OFF (if installed & time permits).
- Cabin vent ON (if time permits).
- If the engine is running, perform a normal landing and immediately shut off the fuel valve.
- If the engine stops running, shut off fuel valve and execute an autorotation landing.

### 3. Electrical Fire in Flight

- Battery master switch OFF.
- Alt switch OFF.
- Land immediately.
- Extinguish fire and inspect for damage.



Discuss the Triangle of Fire and the types of extinguishers currently in use.





## Exercise 1b

## Safety Procedures

Part 3/4

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the action in the event of a systems failure.

**Lesson Objective:** By the end of the lesson you will be able to state the procedure to accurately deal with these types of systems failures.

**Airmanship:** Thorough pre-flight. Knowledge of aircraft systems. Knowledge of emergency drills. Helicopter manual.

**Air Exercise:** n/a

### Teaching Points:

1. Water in fuel - checks and drain.
2. Fuse/circuit breakers.
3. Leaking fuel/oil.
4. Oil pressure and oil temperature.
5. Fuel - not applicable on R22.
6. Flat battery.
7. Ammeter.
8. Governor - if governor fails, aircraft must NOT be flown.

FOR INFORMATION ONLY: the throttle twist grip is very sensitive and controls the rotor rpm (RRPM). It is opened by twisting the twist grip away from you. As the lever is raised and RRPM starts to fall off, the throttle must be opened to maintain RRPM at a constant figure. As the throttle is opened, the increasing torque will cause the aircraft to yaw to the right. This must be counteracted with left pedal.



## Exercise 1b

## Emergency Procedures

Part 4/4

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the escape drills, location and use of emergency equipment and exits.

### Lesson Objective:

By the end of the lesson you will be able to state the escape drills, locate and use the helicopter's emergency exits and equipment carried.

### Airmanship:

Thorough pre-flight. Knowledge of helicopter's systems. Knowledge of emergency drills. Knowledge of the helicopter's emergency equipment.

### Air Exercise:

n/a

## Teaching Points:

1. Life jackets if required.
2. Fire extinguisher.
3. Escape routes/hatches.
4. First aid equipment.
5. Dates for the emergency equipment should be checked.
6. Crashworthiness.
7. Brace position for passenger.





## Exercise 2

## Preparation for and action after flight

Part 1/1

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the actions that are required to prepare yourself and the helicopter for flight and actions required after flight.

**Lesson Objective:** By the end of the lesson you will be able to state and demonstrate the procedures to prepare yourself and the helicopter for flight, state and demonstrate the procedures after flight.

**Airmanship:** Airfield procedures. Check list. Helicopter documentation. Mass & balance. ATC liaison.

**Air Exercise:** n/a

### Teaching Points:

1. Your fitness to fly.
2. Clothing.
3. Helicopter documentation
4. Equipment required.
5. Checking the weather, NOTAMS and Royal flights.
6. Booking out.
7. The flight authorisation sheet.
8. Mass and balance.
9. External checks on the helicopter.
10. Internal checks on the helicopter.
11. Engine start up (cold, hot and flooded).
12. Engine after-start checks.
13. Re-emphasise engine fire on start-up (Exercise 1b)
14. Clutch engagement.
15. Starting rotors.
16. Power checks.
17. Use of the carburettor heat.
18. Use of the mixture control.
19. Pre take-off checks.
20. Engine shut down procedures.
21. Parking procedures, security and picketing.
22. Post-flight documentation.

## Exercise 3

## Air Experience

Part 1/1

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To give you the opportunity to get the "feel" of being airborne in a light helicopter and experience the sensations of flying a helicopter.

**Lesson Objective:** By the end of the lesson you will be able to make a judgement to continue to learn to fly or not.

**Airmanship:** Airfield safety procedures. Sitting comfortably. Reaching controls. Handing and taking over control. Following through on controls. Feeling unwell. Lookout. Power; weight ratio of people. Sensitivity of controls, don't let go.

**Air Exercise:** Instructor demonstrates all checks, student shown local area, student tries the controls and assists in lookout, instructor lands, and demonstrates post flight actions.

### Teaching Points:

1. Relax.
2. Fresh air.
3. Communication.
4. Controls.
5. Hand over - take over of controls.
6. Lookout.
7. What to do if you feel unwell.
8. Emergencies.

Actions when handing and taking over control.

I will say: "You have control"  
You say: "I have control"

I will then release the controls.



When I require the controls.



I will say: "I have control"  
You say: "You have control"

you will then release the controls.





## Exercise 4

## Effects of Controls

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the effects of the flying controls of the helicopter in flight.

### Lesson Objective:

By the end of the lesson you will be able to accurately use the cyclic (& trim), collective, throttle (& governor), yaw pedals and carburettor heat of your training helicopter.

### Airmanship:

Handing and taking over of controls, lookout & location.

### Air Exercise:

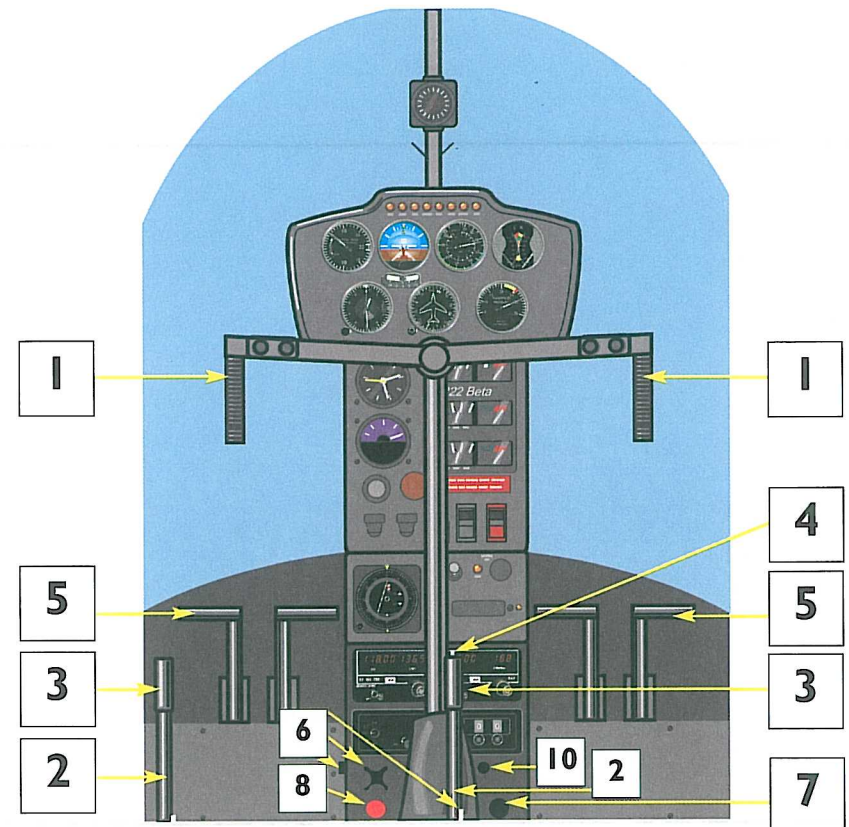
Physical effects of controls and combination of controls.

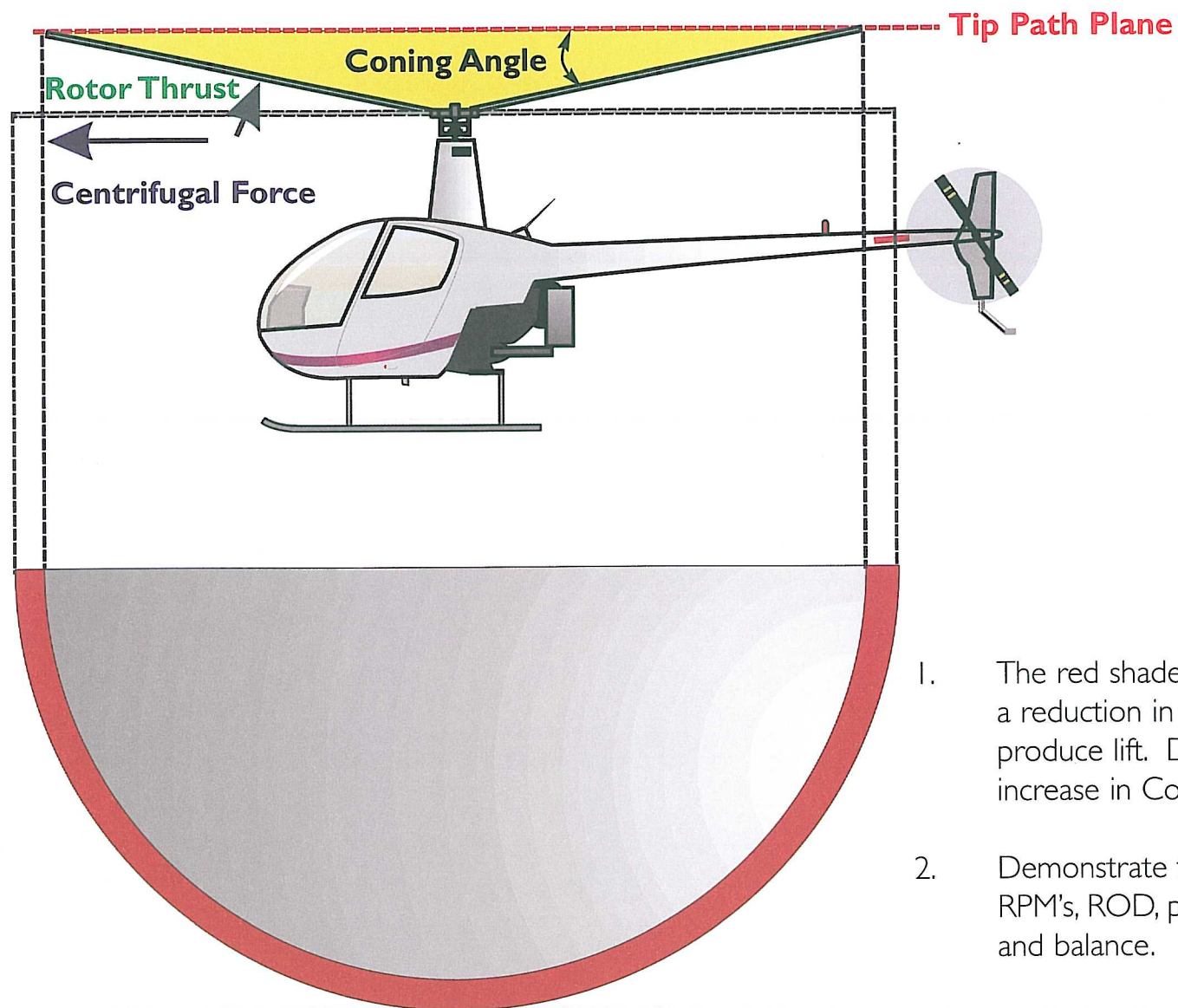
## Teaching Points:

*Smooth progressive use of all controls*

1. Cyclic - purpose & effects.
2. Collective - purpose & effects.
3. Throttle - purpose & effects.
4. RPM governor - purpose & effects.
5. Yaw pedals - purpose & effects.
6. Friction - purpose & effects.
7. Carburettor heat control.
8. Mixture control.
9. Effect of airspeed.
10. Cyclic right trim.

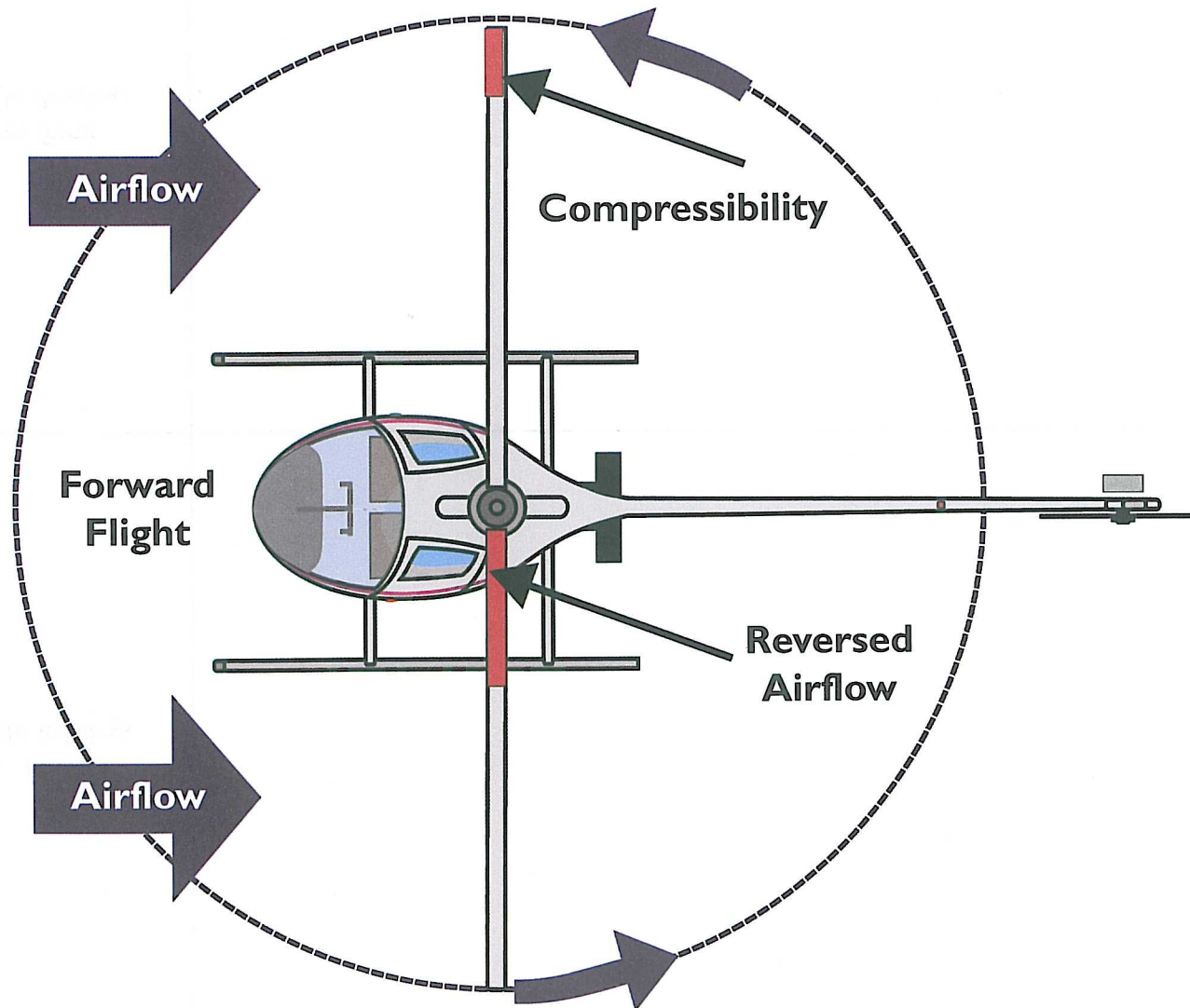
II





1. The red shaded area represents a reduction in area available to produce lift. Due to the increase in Coning Angle.
2. Demonstrate the effects on RPM's, ROD, power required and balance.





1. Demonstrate the effects of airspeed in forward flight.
2. Demonstrate the effects of air speed in rearwards flight.
3. Demonstrate the effects of wind from the left or right.
4. Explain the further effects of increasing sideways or rearwards flight speeds.

## Exercise 5

## Power and Attitude Changes

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn how to change power and demonstrate the relationship of attitude and airspeed.

**Lesson Objective:** You will understand the limitations of the correlator and the relationship between attitude and airspeed.

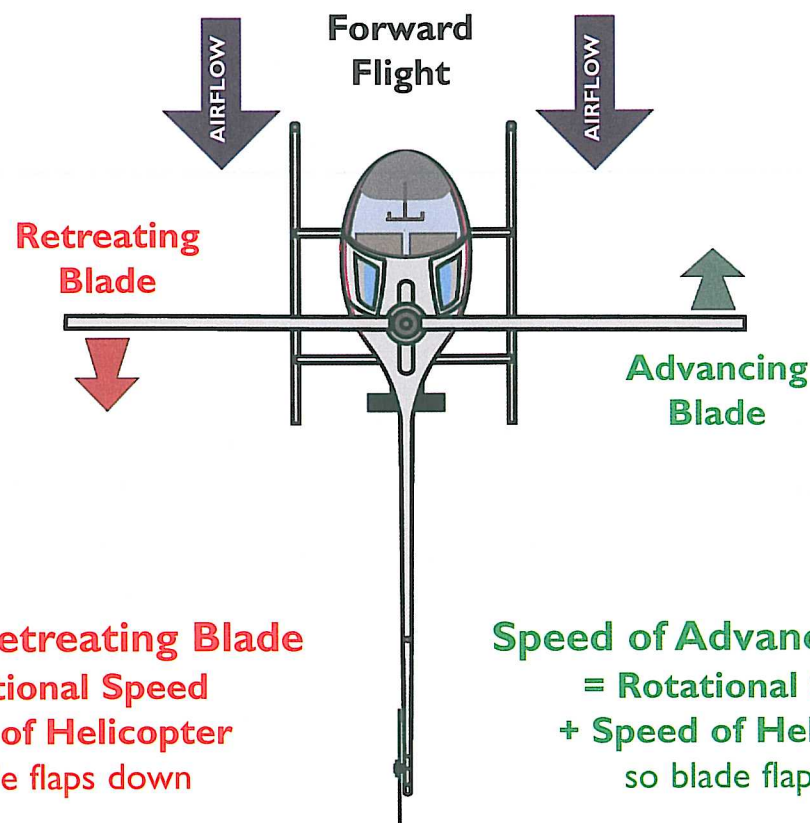
**Airmanship:** Handing and taking over control. Lookout & location. Temperatures, pressures and warning lights. Limitations.

**Air Exercise:** Attitude changes at constant power, power changes at constant RPM & RPM changes at constant power.

### Teaching Points:

1. Relationship between cyclic control position, disc attitude, fuselage attitude, airspeed.
2. Flapback - Flapforward.
3. Balance/Use of pedal.
4. Engine and airspeed limitations.

NB: The governor must be OFF to demonstrate the finer points convincingly. The governor MUST be on for normal flight (see pilots operating handbook).



**Speed of Retreating Blade**  
= Rotational Speed  
– Speed of Helicopter  
so blade flaps down

**Speed of Advancing Blade**  
= Rotational Speed  
+ Speed of Helicopter  
so blade flaps up

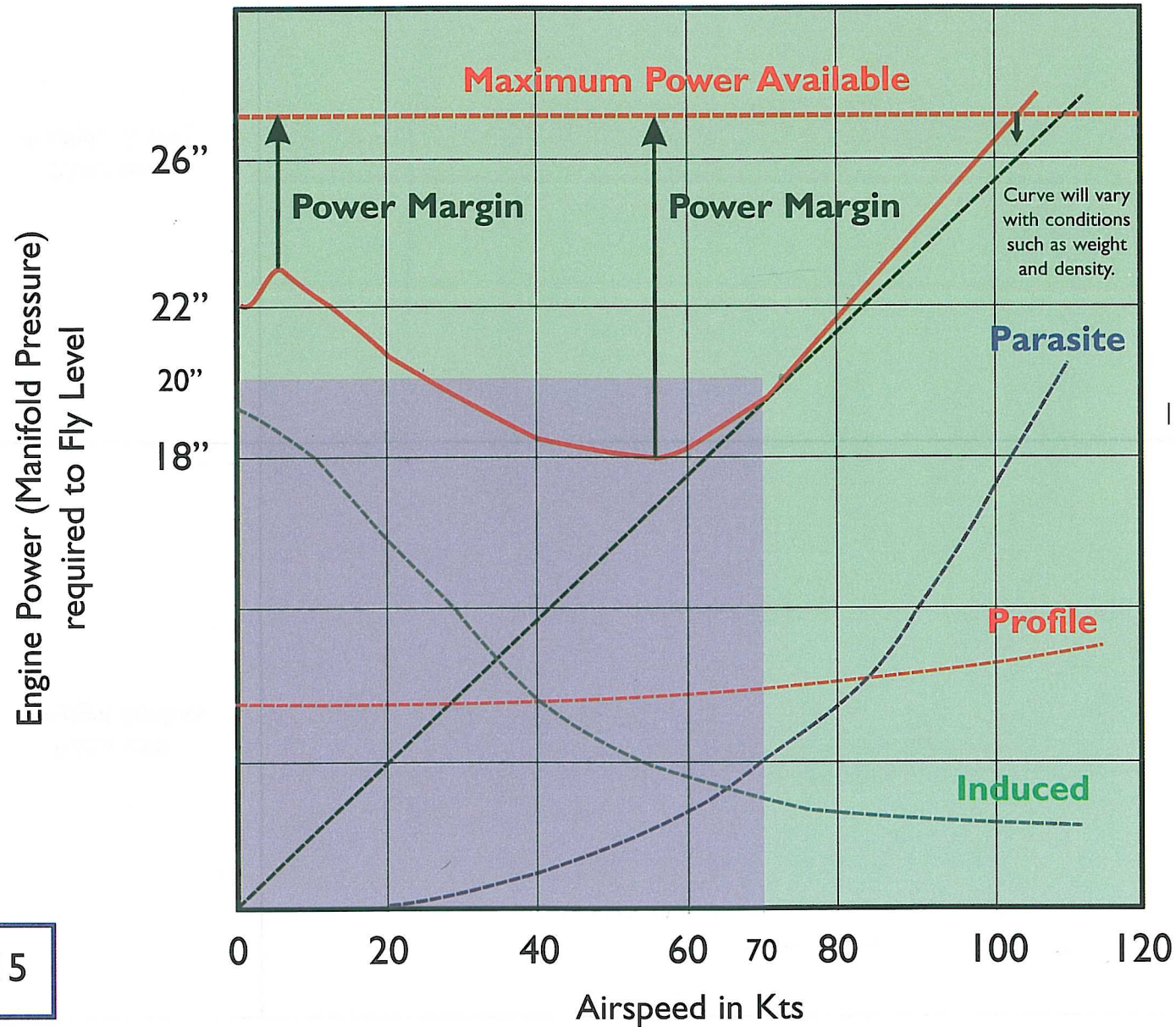


## Exercise 5

## Power and Attitude Changes

Part 2/3

POOLEY'S  
AIR PRESENTATIONS



1. Explain the effects of altitude, temperature on maximum power available and power used.

## Exercise 5

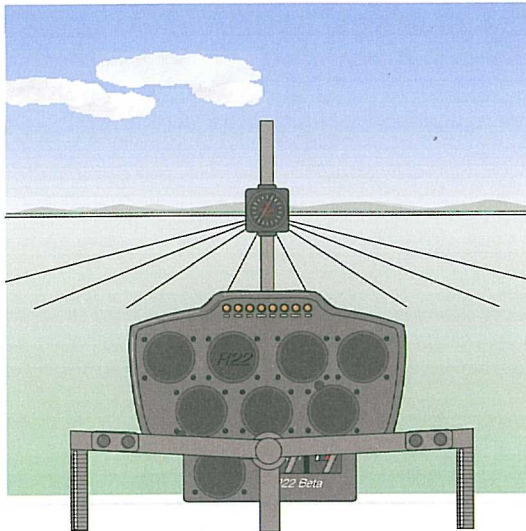
## Power and Attitude Changes

Part 3/3

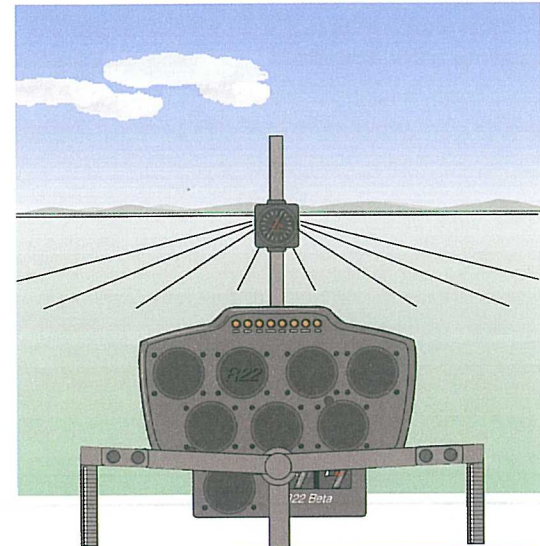
POOLEY'S  
AIR PRESENTATIONS



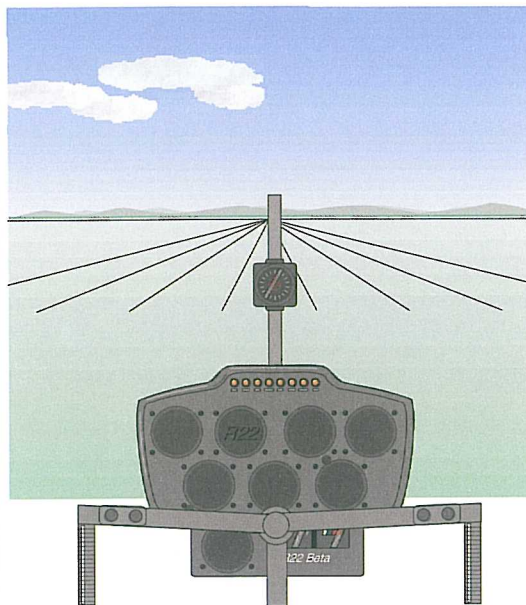
**60 kts Attitude**



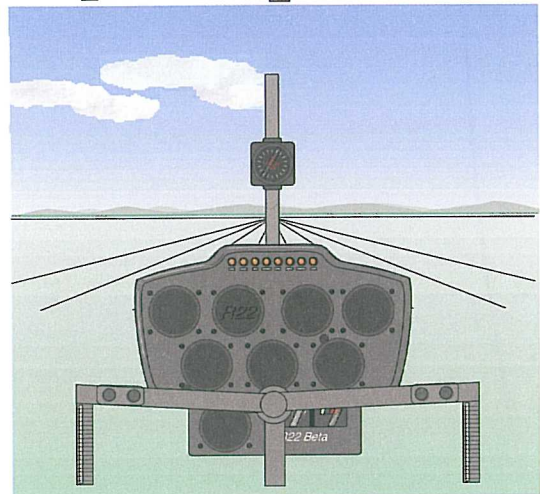
**80 kts Attitude**



**Accelerative  
Attitude**



**Decelerative  
Attitude**





## Exercise 6a

## Straight and Level

Part 1/1

POOLEY'S  
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**Lesson Aim:** To learn how to fly the helicopter in straight and level flight.

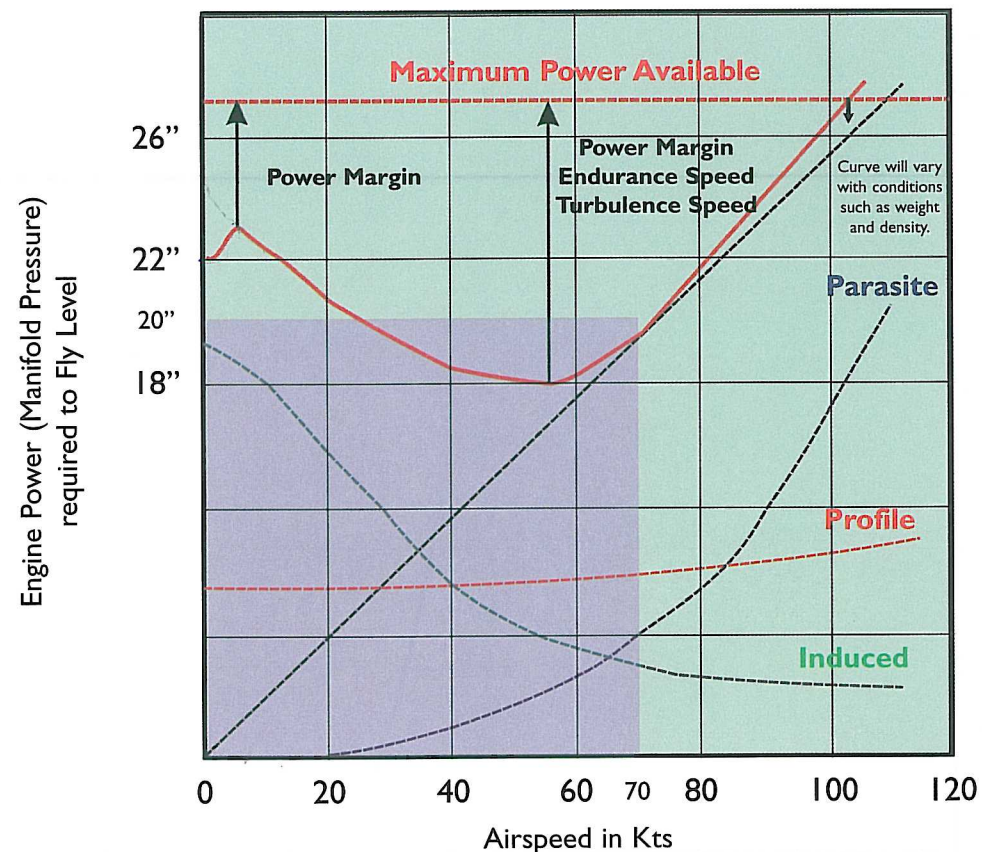
**Lesson Objective:** By the end of the lesson you will be able to demonstrate your ability to fly the helicopter straight and level at a constant airspeed.

**Airmanship:** Handing and taking over control. Lookout & location. Temperatures, pressures and warning lights.

**Air Exercise:** Level flight @ 70kts with approx 20" manifold pressure.

### Teaching Points:

1. At normal cruise power, maintaining straight and level flight.
2. Control in pitch, control friction.
3. Maintaining direction and balance.
4. Setting power for selected airspeed(s) and speed changes. Use of collective friction.
5. Using instruments for precision.
6. Discuss "Power Cruise" v "Airspeed Cruise".



## Exercise 6b

## Climbing

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and controls to place the helicopter into a climb.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate safely and correctly your ability to place the helicopter into different climbing configurations.

**Airmanship:** Lookout & location. Engine considerations. Blind spot. Cloud. Airspace. Power Available.

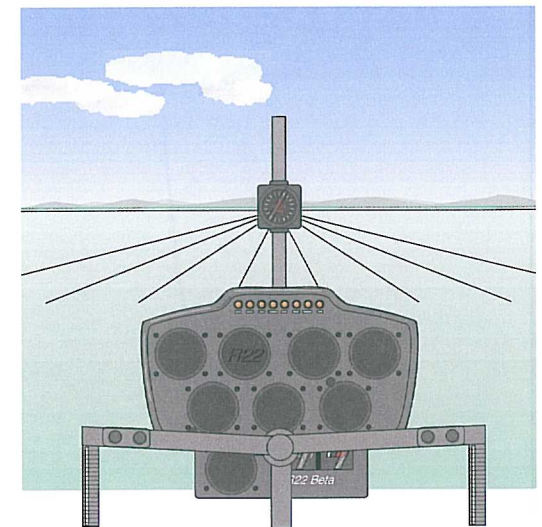
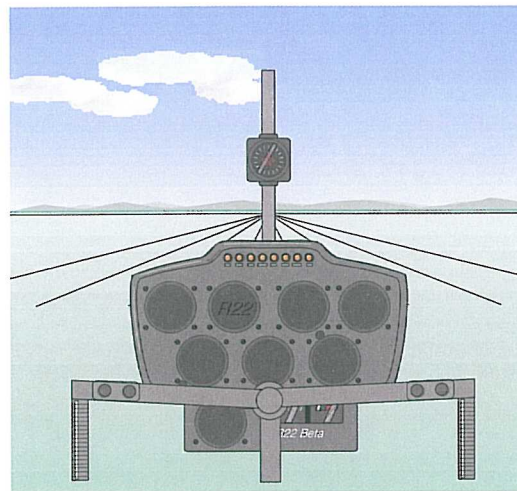
**Air Exercise:** Climbing.

### Teaching Points:

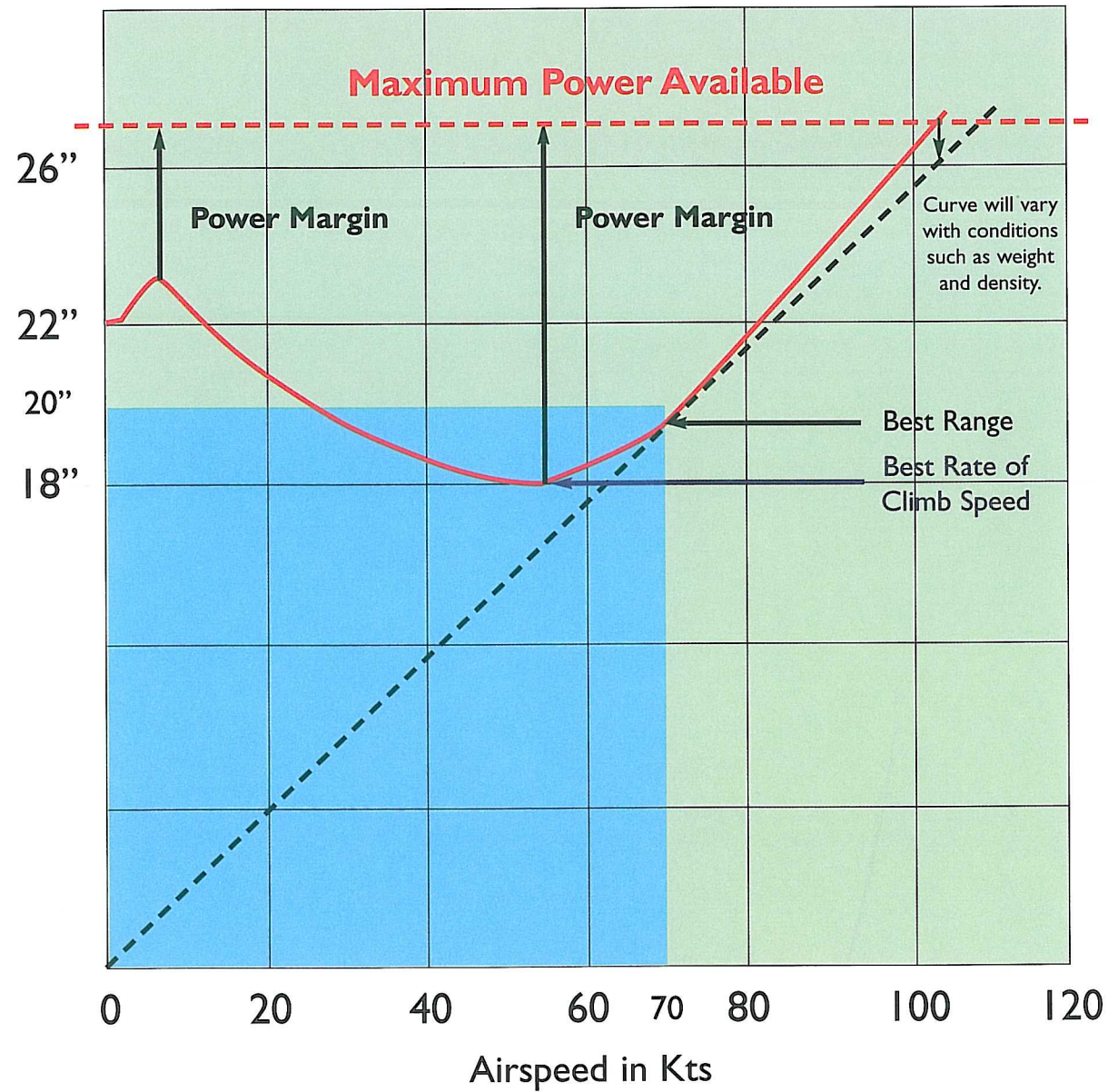
Entry from Straight & Level @ 70kts & approx 20" MP

1. Lookout, is it safe to climb?
2. Carburettor heat as required.
3. Select 60 kts attitude (aft cyclic) flap forward.
4. Raise the collective & set approximately 23" of manifold pressure, correct yaw-left pedal.
5. Continually check and adjust in combination - attitude, manifold pressure, RPM, ASI, VSI & altimeter.
6. Continuous lookout during the climb.
7. Anticipate returning to level flight.
8. At approximately 50 ft before the required height, set attitude for 70 kts - flapback.
9. Obtain 70 kts IAS then bring manifold pressure to approx 20", correct yaw-right pedal.  
Attitude + Power = Performance.
10. Check RPM.

**Attitude - Power - Trim**







## Exercise 6c

## Descending

Part 1/1

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and controls to place the helicopter into a descent.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate safely and correctly our ability to place the helicopter into different descending configurations.

**Airmanship:** Lookout and location. Engine considerations. Blind spot. Cloud. Airspace. CH.

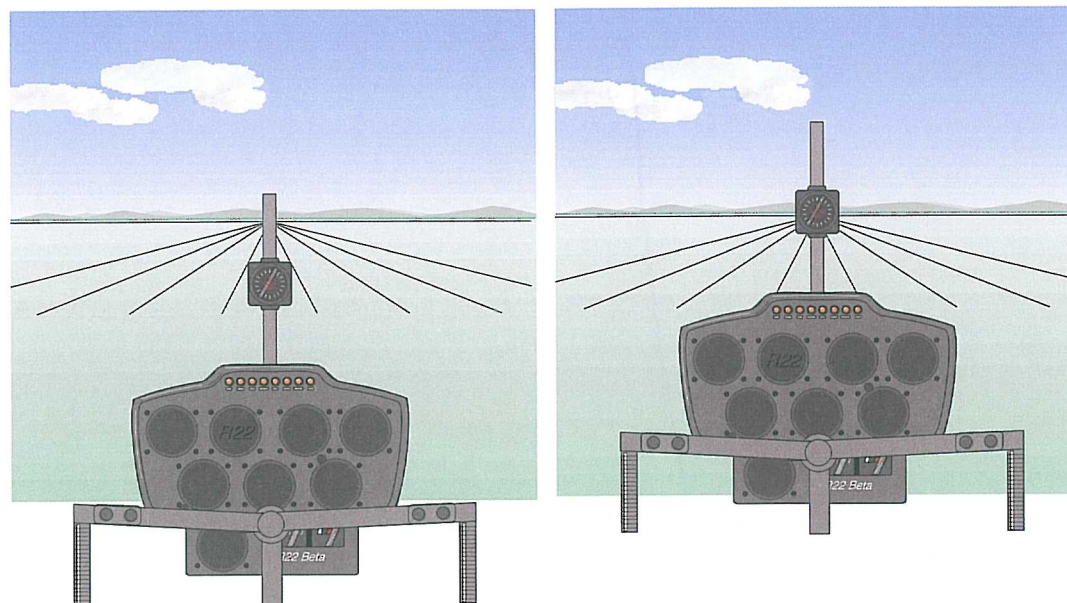
**Air Exercise:** Descending, Lookout and Location.

### Teaching Points:

### Power - Attitude - Trim

Entry from Straight & Level @ 70kts & approx 20"MP

1. Lookout, is it safe to descend?
2. Carburettor heat ON. Full 20 secs before reduction.
3. Lower the collective & set approximately 15" of manifold pressure, correct yaw-right pedal.
4. Select 60 kts attitude (aft cyclic) flap forward.
5. Continually check and adjust in combination - attitude, manifold pressure, RPM, ASI, VSI & altimeter.
6. Continuous lookout during the descent.
7. Anticipate returning to level flight.
8. At approximately 50 ft before the required height, raise the collective back to 20" set attitude for 70 kts - flapback, correct yaw-left pedal.
9. Carburettor heat cruise position.





## Exercise 6d

## Turning

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and controls to place the helicopter into a turn.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate safely and correctly your ability to place the helicopter into different turning configurations.

**Airmanship:** Lookout & Location. Engine considerations. Blind spot. Cloud. Airspace. Power. Balance.

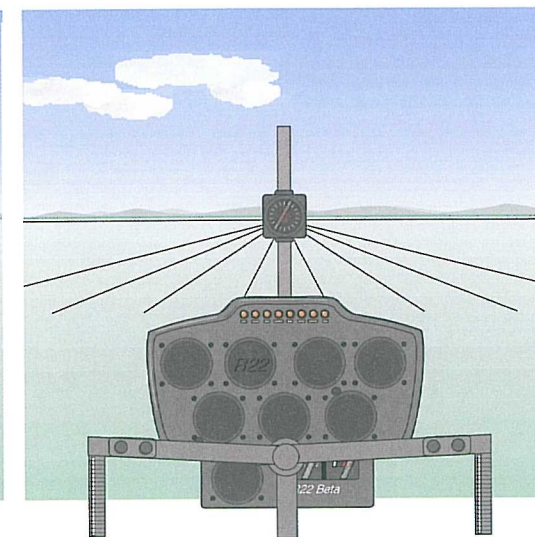
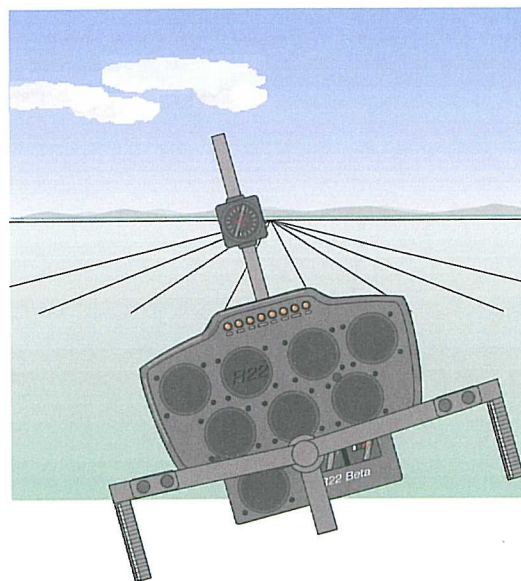
**Air Exercise:** Medium turns at 15 to 20 degrees of bank. Climbing and descending turns.

### Teaching Points:

#### Entry from Straight & Level @ 70kts & approx 20" MP.

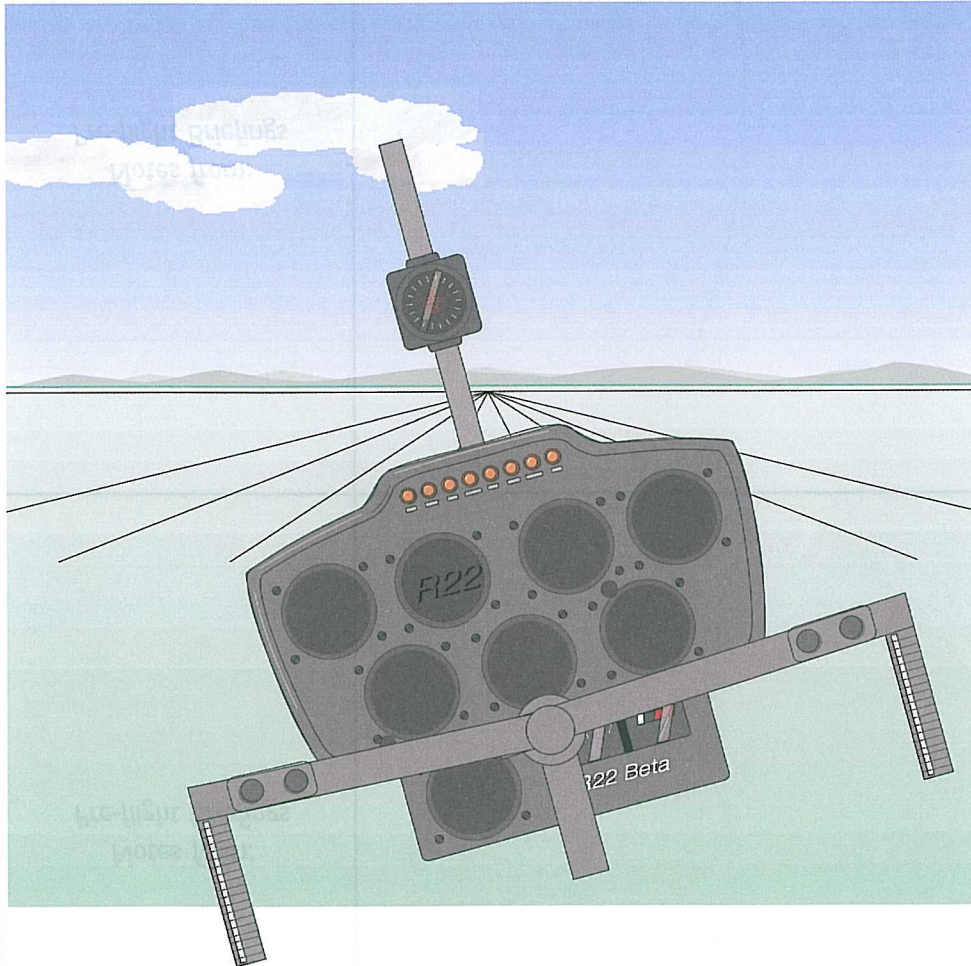
1. Lookout, is it safe to turn?
2. Use a reference point.
3. Move cyclic in the required direction to achieve a 15-20 degree angle of bank.
4. Adjust lever to maintain level flight.
5. In turn pedal to maintain balance.
6. Allow for offset seating.
7. Continually check and adjust in combination - attitude, manifold pressure, RPM, ASI, VSI & altimeter.
8. Maintain your lookout.
9. Anticipate heading required or reference point.
10. Move cyclic in the required direction and adjust lever to maintain straight and level flight.
11. Opposite pedal to maintain balance flight.

#### Turn maintaining Constant Level

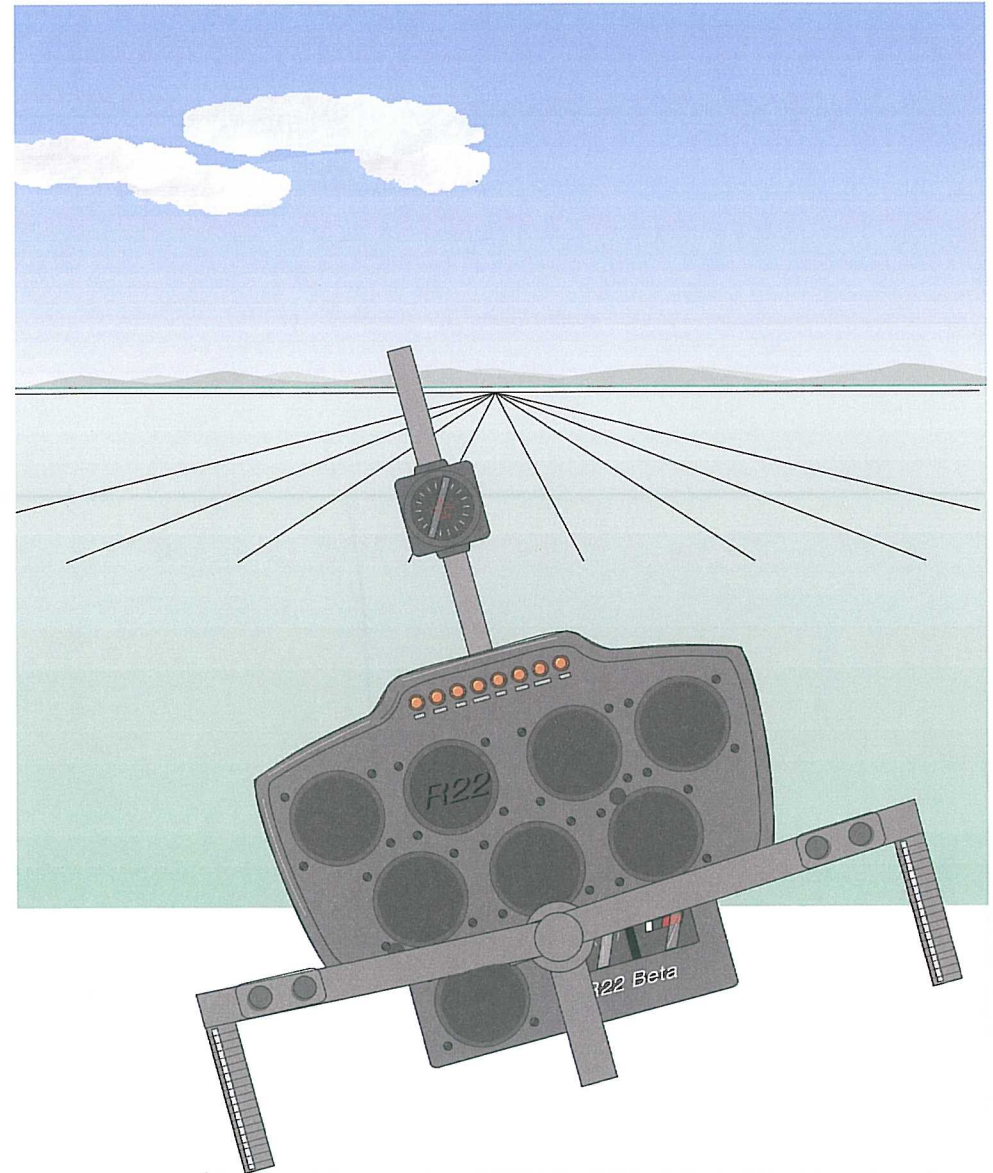




## Climbing Turns



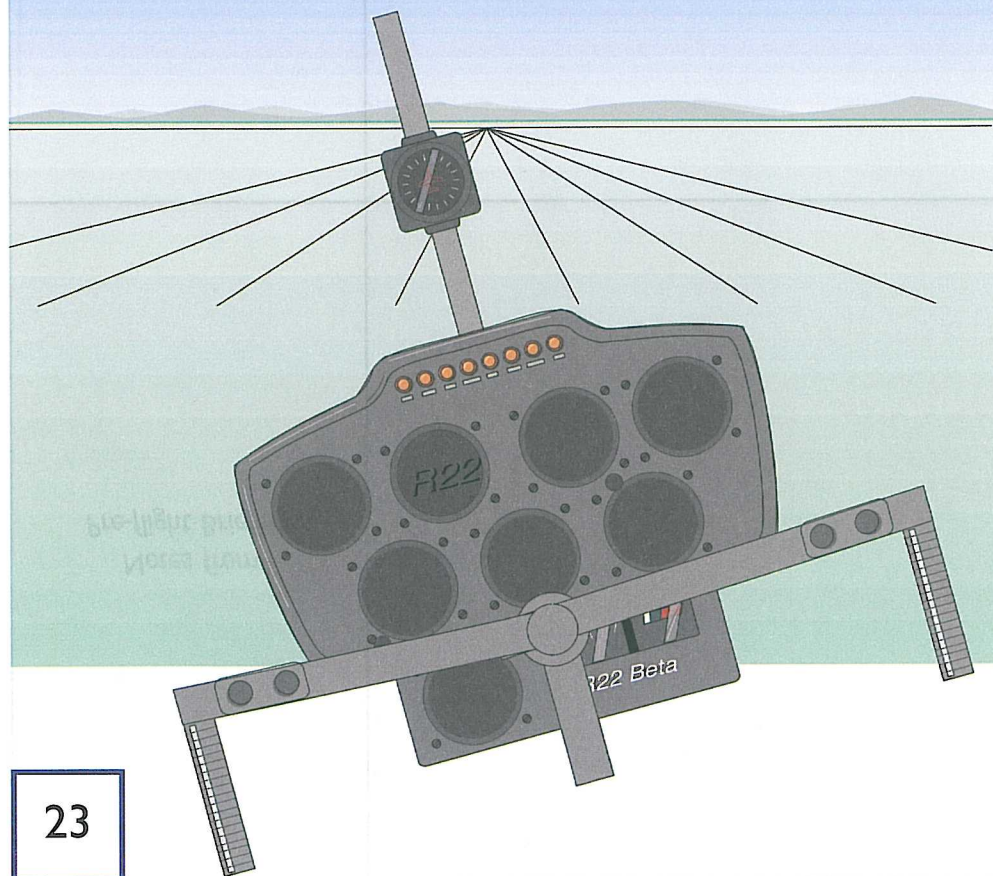
## Descending Turns



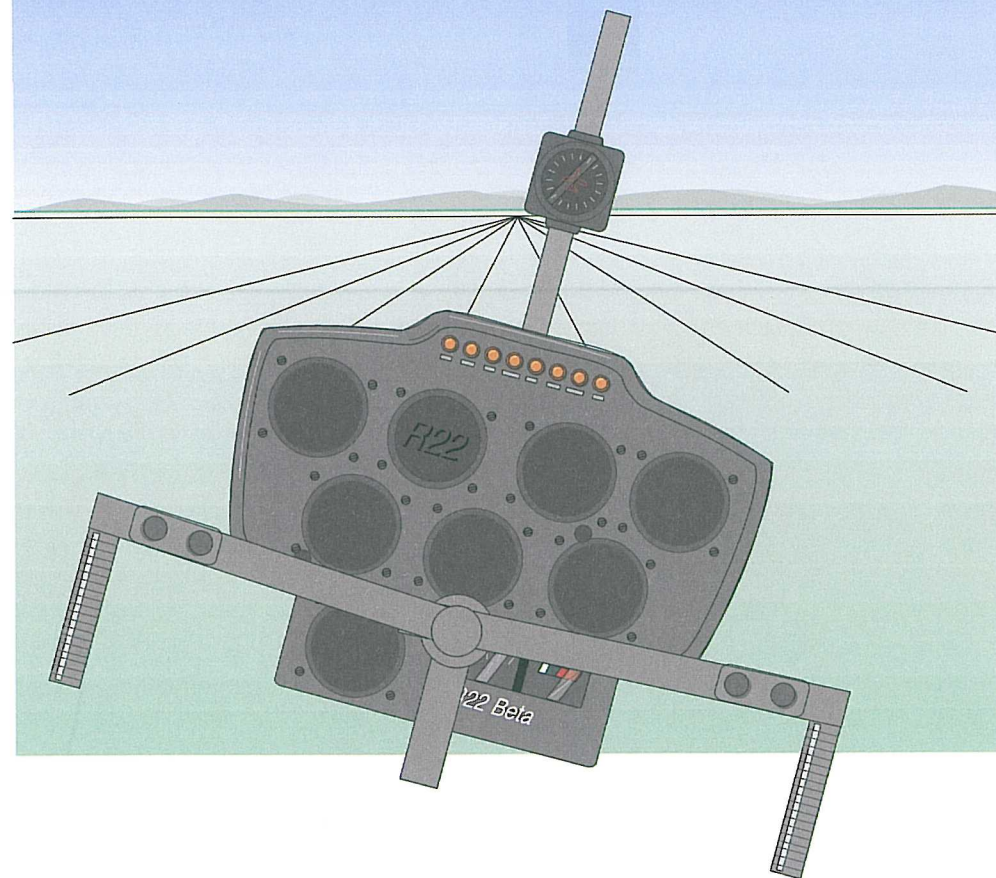


## Offset Seating Effect

During a left hand turn the pilot can pick up on the wrong visual clues and think the helicopter is accelerating.



During a right hand turn the pilot can pick up on the wrong visual clues and think the helicopter is decelerating.





## Exercise 7

## Basic Autorotations

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to enter and control the helicopter in autorotation.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate safely and correctly your ability to enter and control the helicopter in autorotation at a given speed, maintain rotor RPM and how to recover to the climb.

**Airmanship:** Lookout & location. Blind spot. Correct response with the controls. HASEL check.

**Air Exercise:** Autorotation from level flight, demonstrating the effects of airspeed variation and disc loading. Control of RPM using the collective, turns and recovery to powered flight.

### Teaching Points:

#### Entry to Autorotation

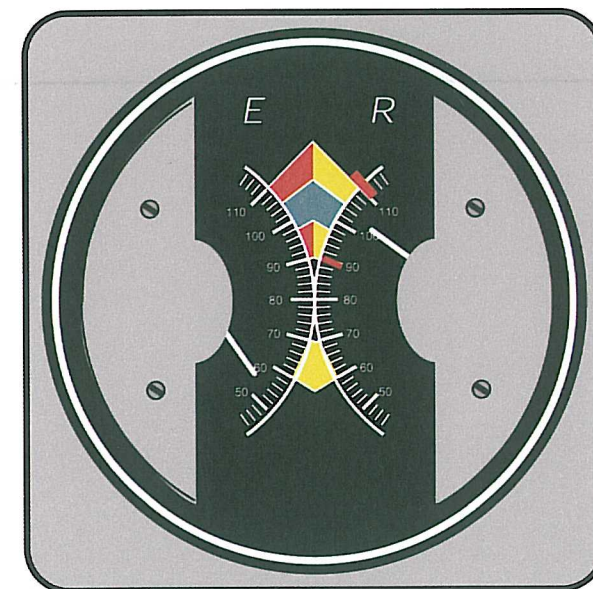
(Discuss entry with & without the governor).

1. Straight & level @ 2000ft AGL, 70kts approx 20" manifold pressure.
2. Carburettor heat to ON full.
3. HASEL checks. "practice autorotation".
4. Select reference point allowing you to keep the helicopter straight.
5. Gently, fully lower the collective.
6. The helicopter will yaw to the left and pitch down.
7. Control input-right pedal and aft cyclic.
8. Gently flare the helicopter to 65 kts.
9. Control rotor RPM with the collective.
10. Control engine RPM with the throttle to below governed range < 80%.

#### Recovery from Autorotation:

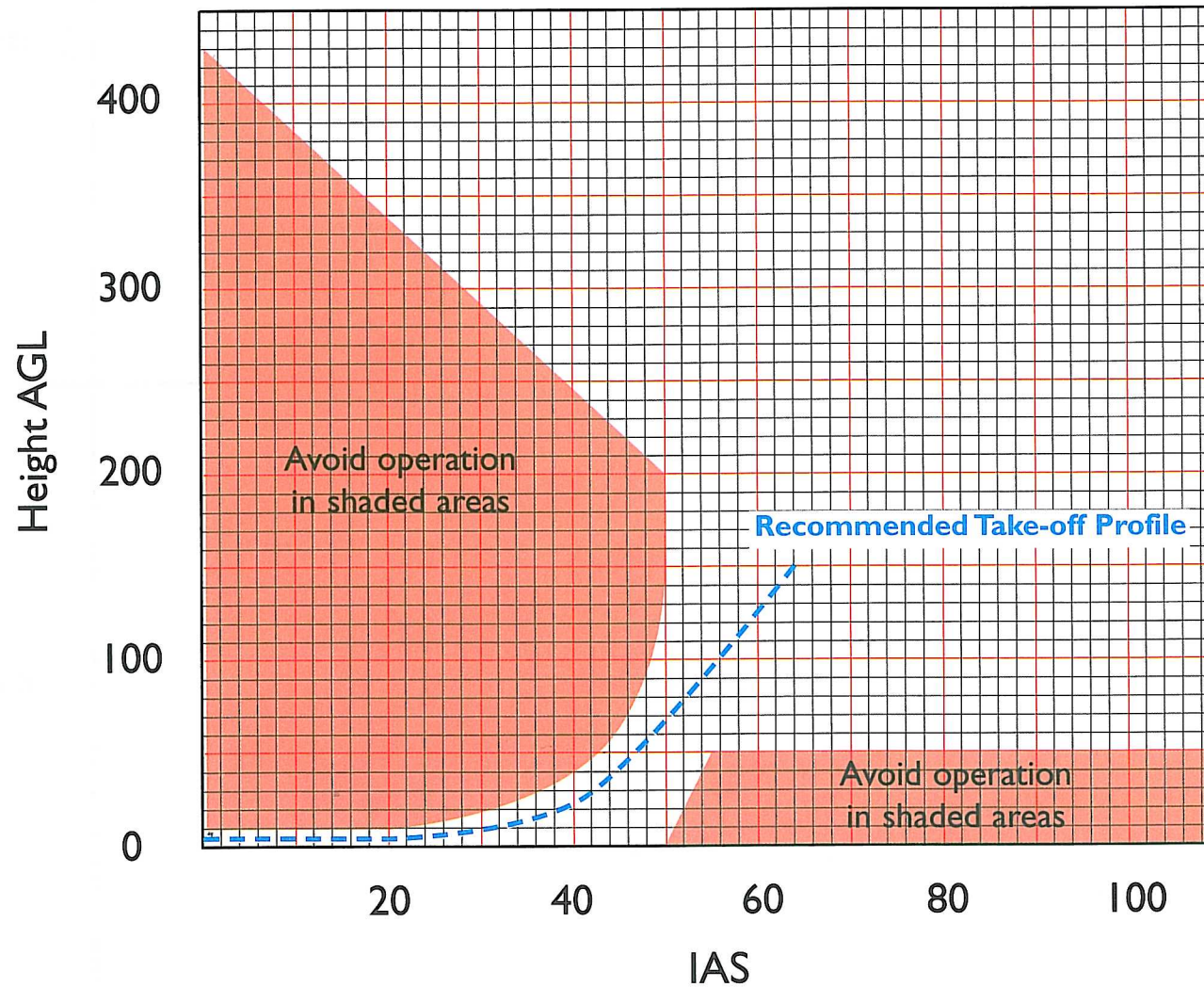
1. Lookout, is it safe to climb?
2. Ensure rotor RPM is within engine RPM limits by using the collective < 104%.
3. Engine RPM to 80% by using the throttle and let governor take over.
4. Raise the collective for 23" manifold pressure.
5. Correct yaw - left pedal. Hold attitude.
6. Maintain RPM in green with the throttle/governor.
7. Forward cyclic to maintain 60 kts attitude.
8. Carburettor heat pre-selected - check/adjust RPM.
9. Ensure governor on.
10. Climb away - maintain lookout.

Note: If governor is switched OFF then engine RPM is 70% and correlator will join ERPM and RRPM as lever is raised.

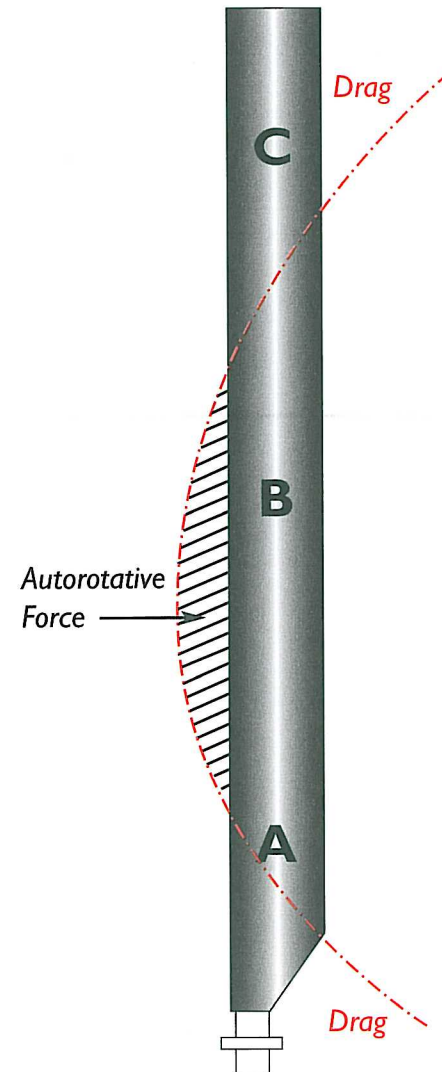
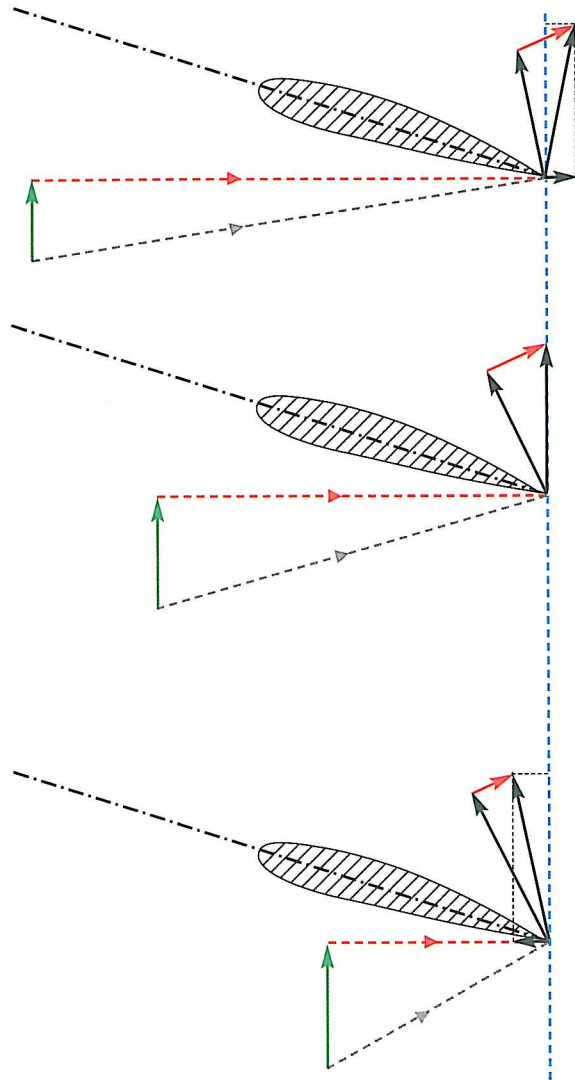




Not for Operational Use 'Training Aid Only'



## Aerodynamics of Autorotation



Annotate & Discuss:

RAF  
A/A  
POR  
T/R  
LIFT  
DRAG  
ROD AIRFLOW



## Exercise 8a

## Hovering

Part 1/6

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to hover the helicopter.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate safely and correctly your ability to hover the helicopter holding a given position relative to the ground, maintaining constant heading, height and RPM.

**Airmanship:** Lookout & Location. Engine considerations. Wind speed & direction. Downwash. Tail rotor clearance.

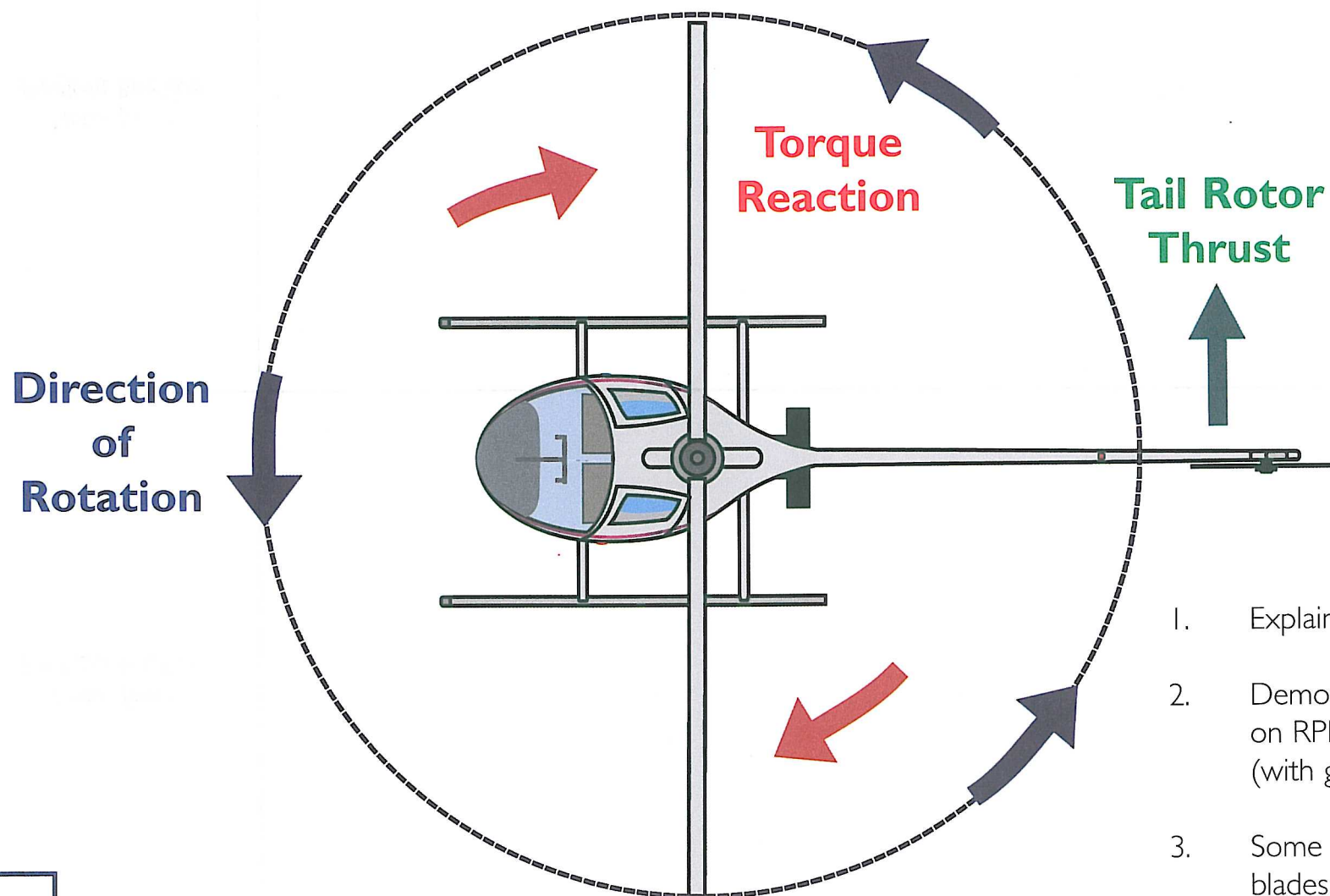
**Air Exercise:** Control handling, demonstration of ground and wind effect, demonstration of gentle forward running touchdown. FOD.

### Teaching Points:

**The Robinson R22 tends to hover left skid low - Why?**

1. Collective - controls height over the ground, normally 4-5 feet.
2. Yaw pedals - controls heading.
3. Cyclic - controls attitude and therefore position over the ground.
4. Control lag.
5. Control sensitivity.
6. Ground effect.
7. Wind effect.
8. FOD.





1. Explain the 'Left Pedal'
2. Demonstrate the effects on RPM's by applying 'Left Pedal' (with governor OFF)
3. Some helicopters may have blades that rotate in the opposite direction.



## Tail Rotor Drift results in Tail Rotor Roll

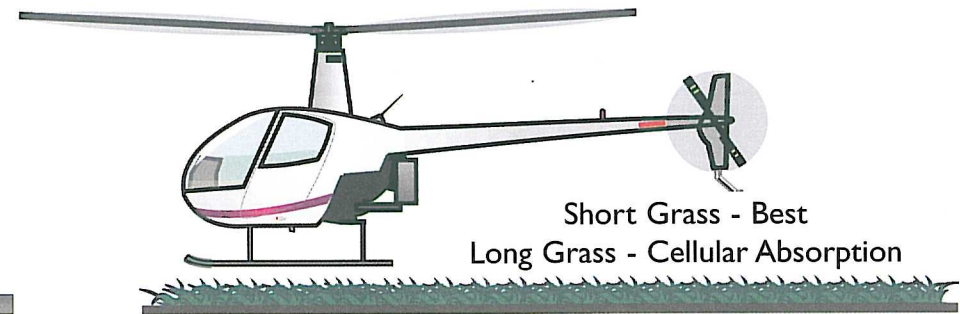
Compensation for tail rotor drift can be provided for by either installing the main rotor drive shaft with a small tilt from the vertical and away from the drift direction, or by permanently biasing the pilot's control system so that when the cyclic is in the centre position the rotor disc is actually tilted by the correct amount.



## Surface Appreciation (Ground Effect)



The wind will distort the ground cushion down wind.  
Any **slope** will spill the ground cushion down slope.



Dispersing Ground Effect



Good Ground Effect (except when hot)



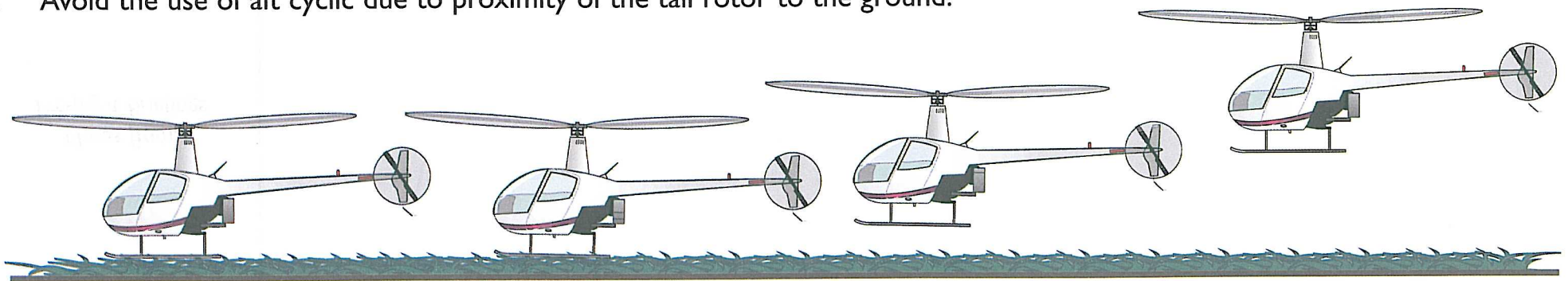
Dispersing Ground Effect

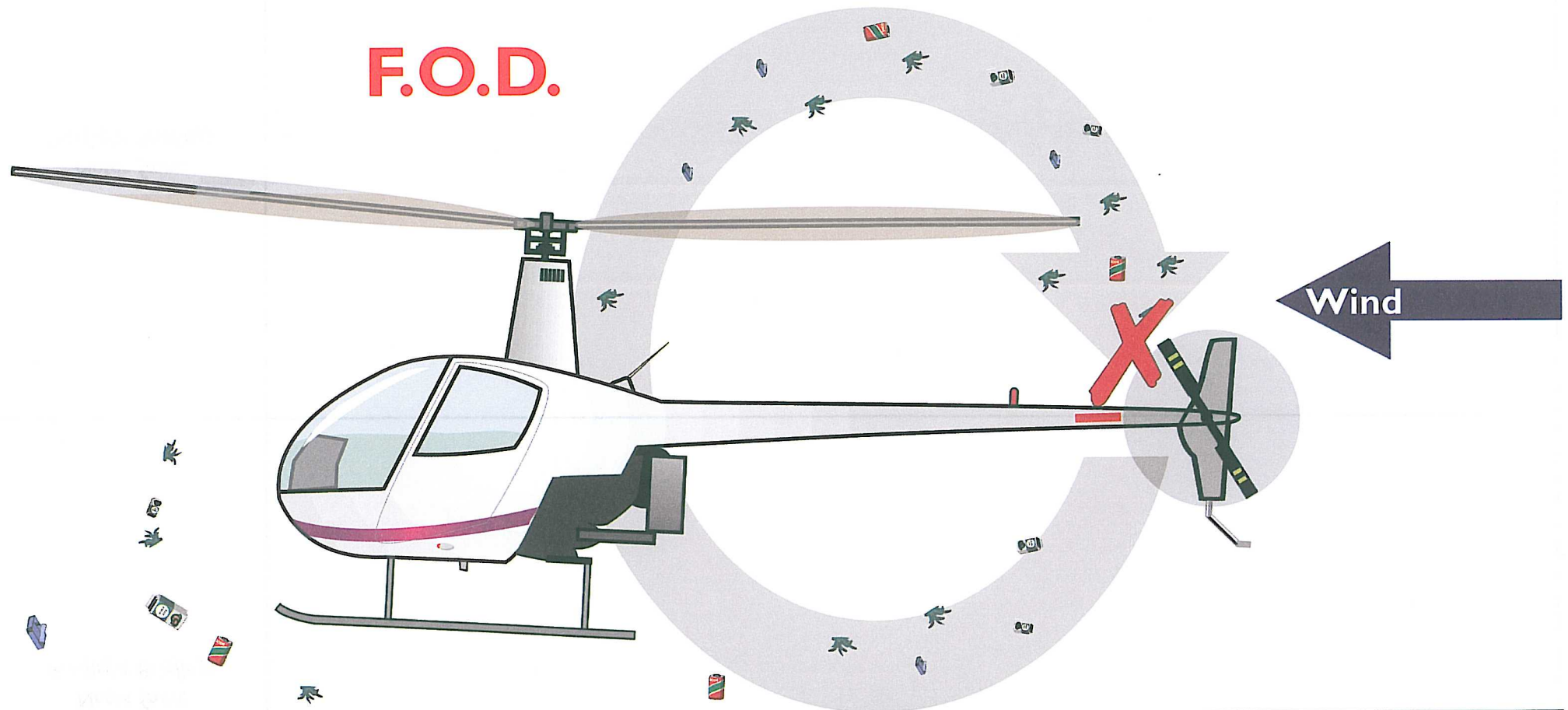


## Forward Running Touchdown

### Teaching Points:

1. Ensure ground ahead is suitable for touch down.
2. Progress at a slow walking pace.
3. Check pedal availability (left pedal leading).
4. Choose a reference point in the middle distance and use pedals to maintain direction.
5. Progressively lower the collective until skids make contact with the ground.
6. DO NOT use the collective as a brake.
7. Allow the helicopter to stop naturally.
8. Avoid the use of aft cyclic due to proximity of the tail rotor to the ground.





**Warning:** When hover taxiing downwind recirculation of FOD, snow or dust is a particular hazard.



## Exercise 8b

## Hover Taxying, Spot Turns

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to hover taxi and conduct spot turns.

**Lesson Objective:** By the end of the lesson you will be able to hover taxi the helicopter to a given position on the airfield, turn the helicopter whilst in the hover, maintaining height and co-ordination of the controls.

**Airmanship:** Lookout & Location. Engine considerations. Wind speed and direction. Tail rotor considerations.

**Air Exercise:** Control handling, demonstration of ground and wind effect, spot turns, introduction of gentle forward running touchdown.

### Teaching Points: Revision

1. Collective - control height over the ground.
2. Yaw pedals - controls heading.
3. Cyclic - controls position over the ground.
4. Control lag.
5. Control sensitivity.
6. Ground effect - grass/tarmac.
7. Wind effect.
8. FOD.

#### *Additional information:*

9. Two reference points should be used.
10. Ground speed should be kept to a normal walking pace.
11. Wind speed and direction will affect the helicopter/weather-cocking.
12. Turbulence from buildings and trees.

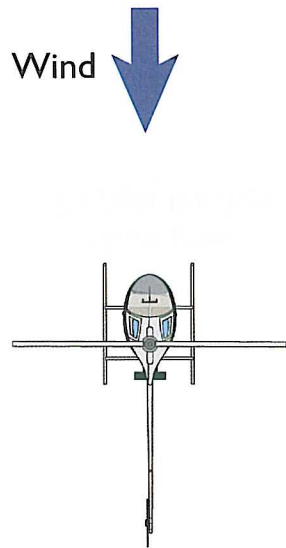


## Exercise 8b

## Hover Taxying, Spot Turns

Part 2/2

POOLEY'S  
AIR PRESENTATIONS

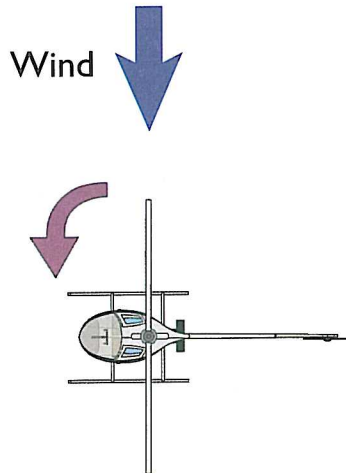


**Cyclic** - forward into wind.

**Pedal** - more left pedal required in the hover.

**Collective** - power as required to hover @ 5 feet.

**Throttle** - as required to maintain RPM.

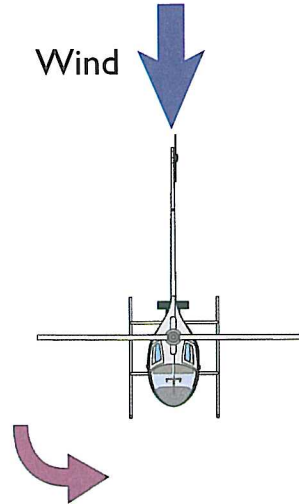


**Pedal** - considerable pressure required to initiate the turn.

**Cyclic** - right pressure into the wind.

**Collective** - as required to maintain a 5ft hover.

**Throttle** - as required to maintain RPM.

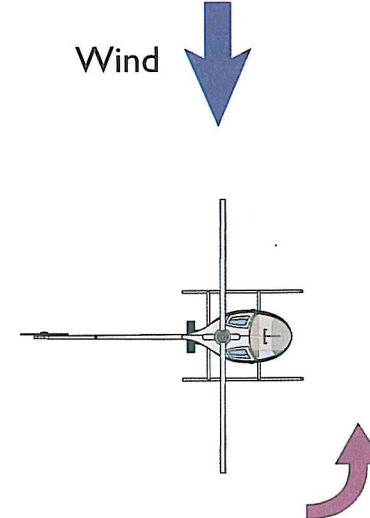


**Pedal** - changing from left pedal pressure to right pedal pressure (pedal sensitivity).

**Cyclic** - rearwards into wind (tail rotor considerations).

**Collective** - as required to maintain a 5ft hover.

**Throttle** - as required to maintain RPM.

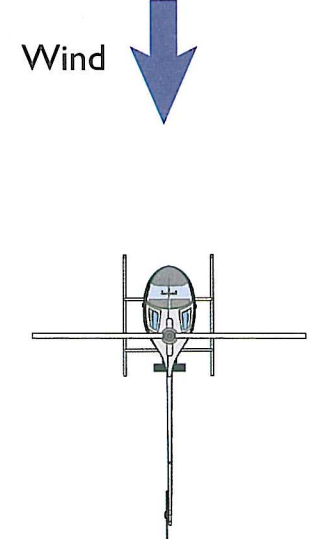


**Pedal** - pressure as required to complete the turn (pedal becomes less sensitive).

**Cyclic** - left pressure into wind.

**Collective** - as required to maintain a 5ft hover.

**Throttle** - as required to maintain RPM.



**Cyclic** - forward into wind.

**Pedal** - Some right to stop the turn, then left to maintain the heading.

**Collective** - increasing as left pedal applied to maintain a 5ft hover.

**Throttle** - as required to maintain RPM.



## Exercise 8c

## Hovering, Taxying Emergencies

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedure in the event of a power failure.

**Lesson Objective:** Demonstrate safely and correctly your ability to land the helicopter after a power failure whilst in the hover and when hover taxiing.

**Airmanship:** Lookout & Location. Wind speed and direction. Safety.

**Air Exercise:** Demonstration of simulated engine failure in the hover and in the hover taxi. Demonstration of mis-handling and over-pitching.

### Teaching Points:

1. A power loss can be caused by either engine or drive system failure and you will notice sink or a yaw if engine fails or if tail rotor fails, a spin to right.
2. An engine failure may be recognised by a change in the noise level, the nose yaws to the left, oil pressure and alternator warning lights illuminate and engine RPM decreases.
3. A drive system failure may be recognised by an unusual noise or vibration, the nose yaws to the right or left, or rotor RPM decreasing while engine RPM increases.
4. Over-pitching can best be demonstrated at maximum all-up weight or high altitude. Overpitching can occur downwind when the throttle is fully open in a normally aspirated helicopter such as the R22/R44.



#### CAUTION:

Avoid using aft cyclic during touchdown or during ground slide to prevent the possibility of the blade striking the tailcone.

## Teaching Points:

### Power Failure below 8 feet AGL:

1. Apply the appropriate pedal to prevent yawing.
2. Allow aircraft to settle.
3. Raise collective just before touchdown to cushion the landing.
4. Touch down with skids level and nose straight ahead.

### Loss of Tail Rotor Thrust during the Hover:

1. Failure is usually indicated by the nose yawing to the right which cannot be stopped by applying left pedal.
2. Immediately roll the throttle off into overtravel spring and allow the helicopter to settle.
3. Raise the collective just before touchdown to cushion the landing.

### Power Failure while Hover Taxying:

1. Before demonstrating this exercise, especially in the R22, instructors must ensure that they have sufficient right pedal available to counteract the loss of torque after an engine failure.
2. Beware of **DYNAMIC ROLLOVER**.



#### **CAUTION:**

Aft cyclic is required when collective is lowered at high speed and forward CG.



## Exercise 9

## Take-Off and Landings

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and controls used to take-off and land the helicopter.

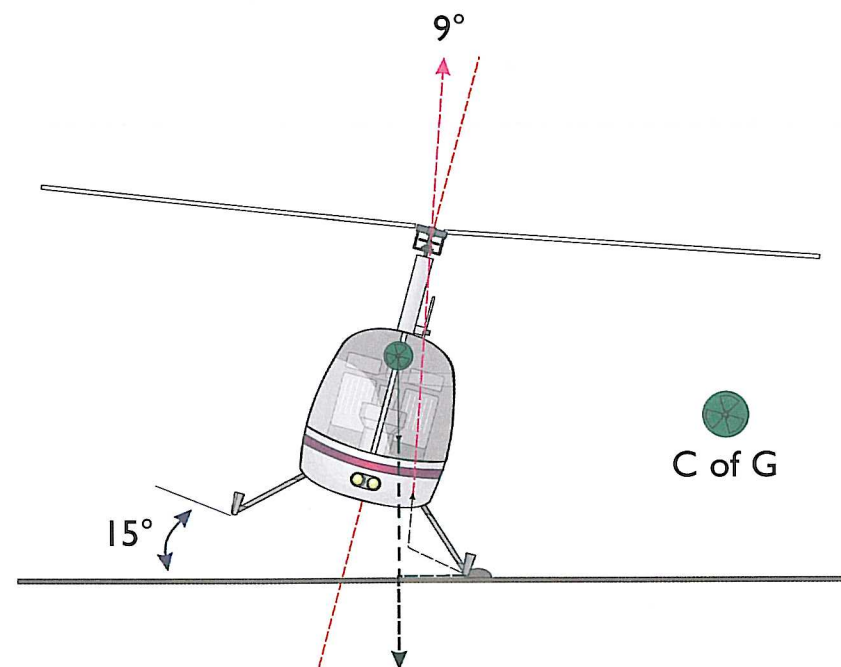
**Lesson Objective:** Demonstrate safely and correctly your ability to take-off and land the helicopter into wind.

**Airmanship:** Lookout & Location. Engine considerations. Wind speed and direction. Downwash. Surface type.

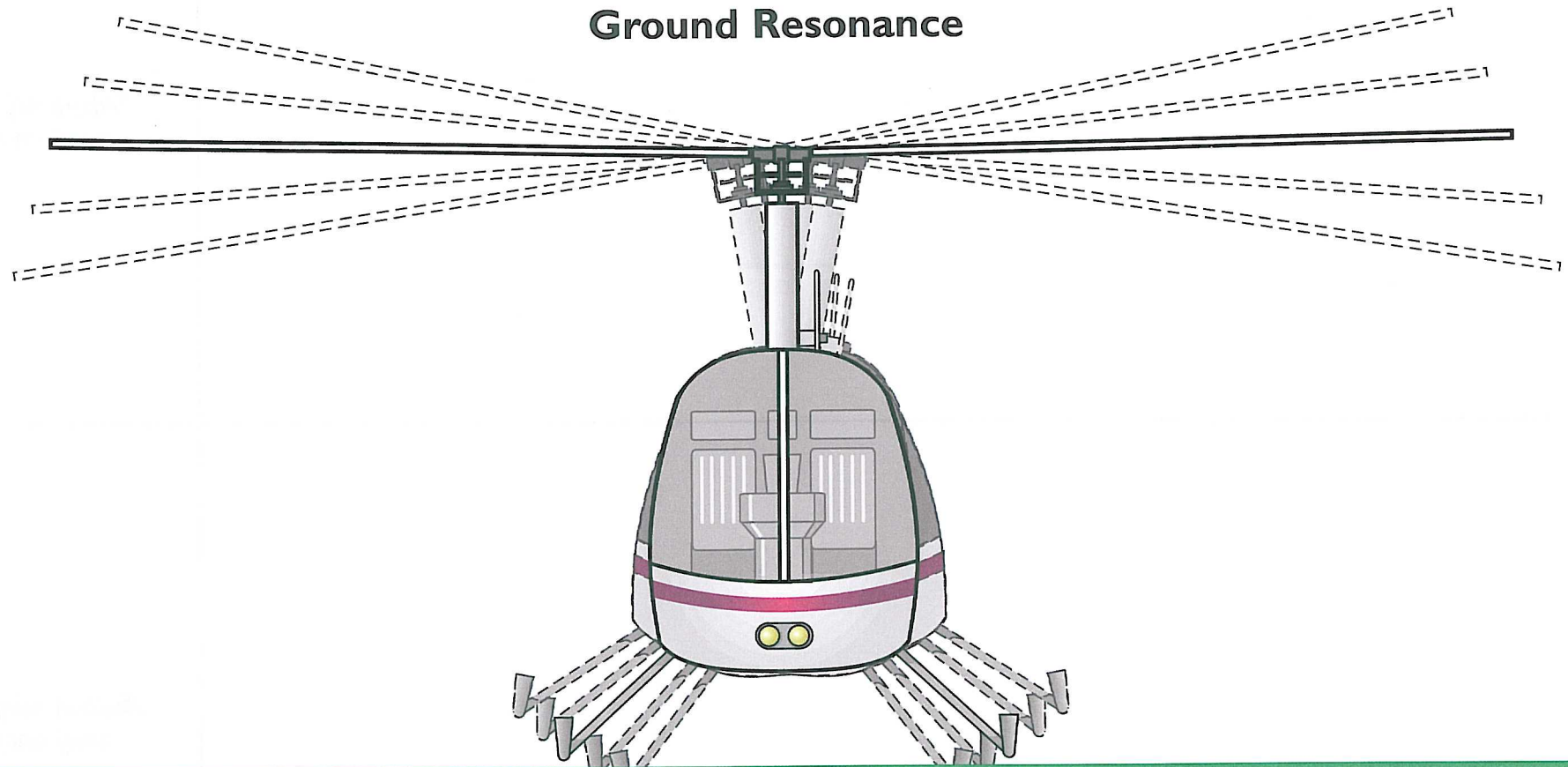
**Air Exercise:** Take-off into wind, landing into wind and dangers of mishandling. Abandoned take-off and landings. Landing cross wind & downwind.

### Teaching Points:

1. Pre take-off checks and drills.
2. Lookout.
3. Lifting to the hover.
4. After take-off checks.
5. Dangers of horizontal and rearwards movement near the ground.
6. Dangers of mishandling and over-pitching.



## Ground Resonance



**Note:** Although the R22 is not susceptible to ground resonance other helicopter types can be, especially three bladed rotors.



## Teaching Points:

### Landing from the Hover:

1. Establish the helicopter in a steady hover.
2. Lower the collective and FLY the helicopter to the ground.
3. Perform a positive landing without sideways or backwards movement.
4. On ground contact further slowly lower the collective to avoid any possibility of a bounce, a small amount of right pedal is usually needed.
5. Further lower the collective maintaining RPM in the green by using the throttle.
6. When the collective is fully down reduce the RPM with the throttle to 80%.
7. After landing checks and drills.
8. The secret of a good landing is to focus on the middle distance and use the pedals to maintain direction.



## Exercise 10

## Transition from Hover to Climb & Approach to Hover Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and controls used to achieve a transition from the hover to a climb and from a descent back to the hover.

**Lesson Objective:** Demonstrate safely and correctly your ability to enter a transition from the hover and climb the helicopter to a given height, then descend the helicopter and enter a hover.

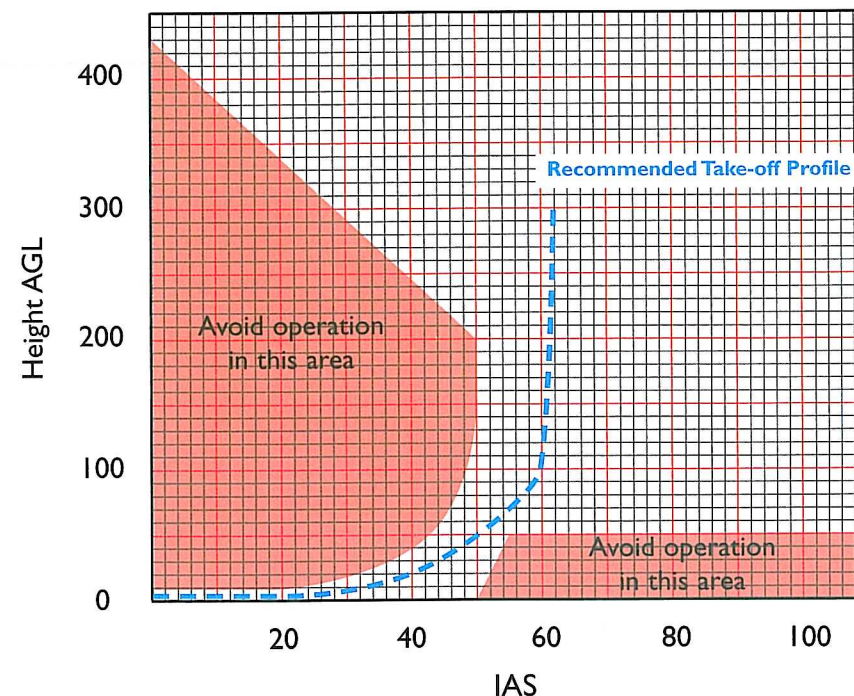
**Airmanship:** Lookout & Location. Engine considerations. Wind speed and direction. Downwash. Surface type. Helicopter limits.

**Air Exercise:** Hover to flapback & translational lift, transition from hover to climb, transition from approach to hover.

### Teaching Points:

1. Ground effect, translational lift and its effects.
2. Flapback and its effects.
3. Effects of wind speed/direction during transitions from/to the hover.
4. The constant angle approach.
5. Demonstration of variable flare simulated engine off landing.

Not for Operational Use 'Training Aid Only'



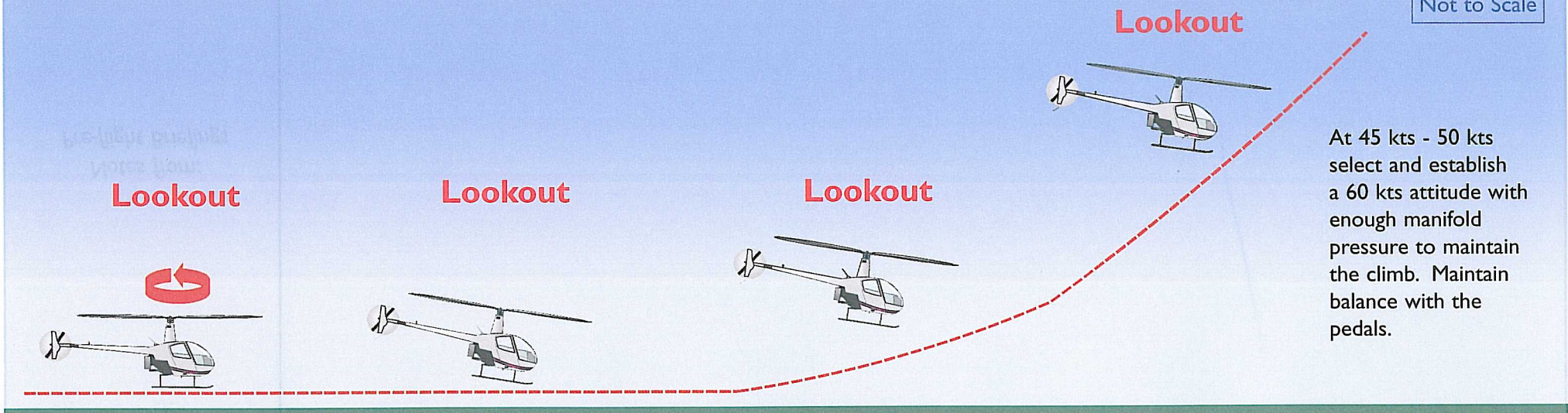


## Exercise 10

## Transition from Hover to Climb & Approach to Hover Part 2/3

POOLEY'S  
AIR PRESENTATIONS

Not to Scale



1. Pre transitional checks.
2. Lookout turn.
3. RT call.
4. Select reference point.

1. Accelerative attitude - cyclic gently forward, ready with the collective to prevent sink (loss of ground cushion).
2. Ground effect will be lost around 5 kts - 10 kts, ready with collective to prevent sink.

1. About 12 kts - 15 kts helicopter starts to gain effective translational lift, cyclic gently forward to prevent climb.
2. As forward speed increases to 45 kt both the main and tail rotor will become more efficient, RPM will increase slightly adjust the throttle as required.
3. As the helicopter's speed increases, adjust for flapback with forward cyclic.
4. Maintain the helicopter's heading with the pedals.
5. Maintain the helicopter's accelerative attitude, keeping level with the cyclic.

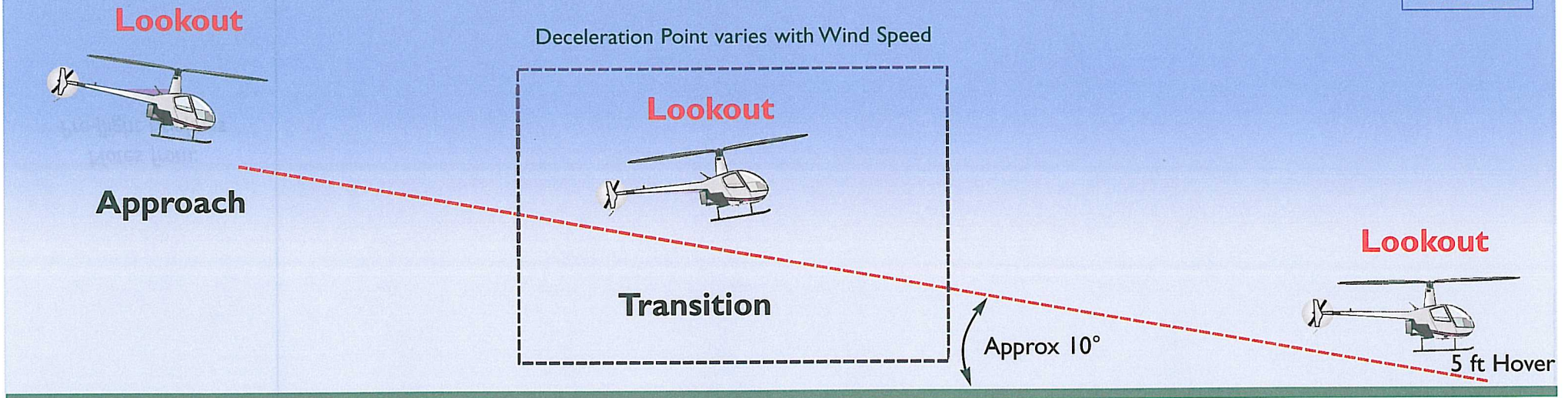


## Exercise 10

## Transition from Hover to Climb & Approach to Hover Part 3/3

POOLEY'S  
AIR PRESENTATIONS

Not to Scale



1. Pre descent checks, **carburettor heat to full**.
2. Lookout.
3. Approach at 60 kts maintaining a constant attitude with cyclic.
4. Maintain constant angle of descent with collective.
5. At approximately 200 ft AGL **carburettor heat to cold**, check and adjust RPM as required.
1. At the deceleration point (varies with wind speed) adopt a decelerative attitude to reduce the helicopter's approach speed to a fast walking pace.
2. To prevent ballooning, use the collective as required and pedal to maintain balance. The eyes should be focused on the landing point to maintain heading over the ground.
3. As translational lift is lost be ready with the collective and the pedals. The eyes should now be focused on the middle distance to the horizon.
4. When ground speed reduces to nil, select the hover attitude (5 ft) with the cyclic, maintaining height with collective and control the yaw with pedals.
5. Check and adjust RPM as required, **carburettor heat as required**.



## Exercise 11a Circuit, Approach and Landing

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and techniques to fly a helicopter circuit and land.

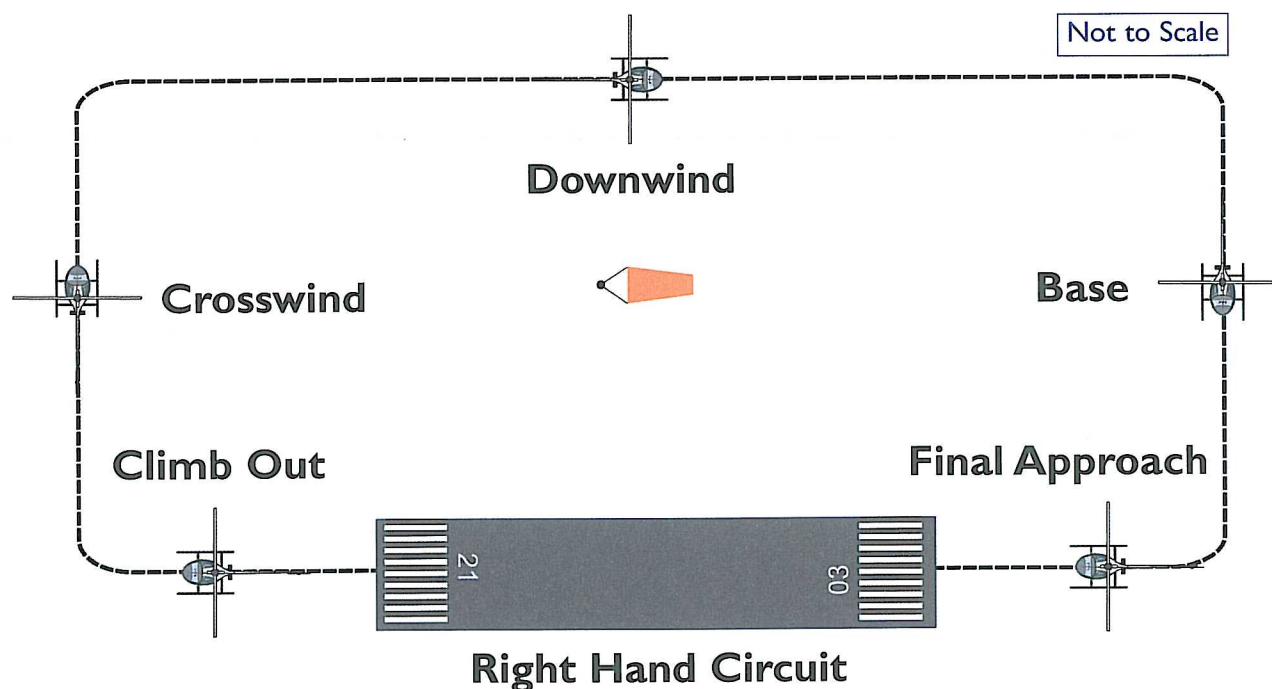
**Lesson Objective:** Demonstrate safely and correctly your ability to fly a helicopter circuit both right & left handed then land the helicopter.

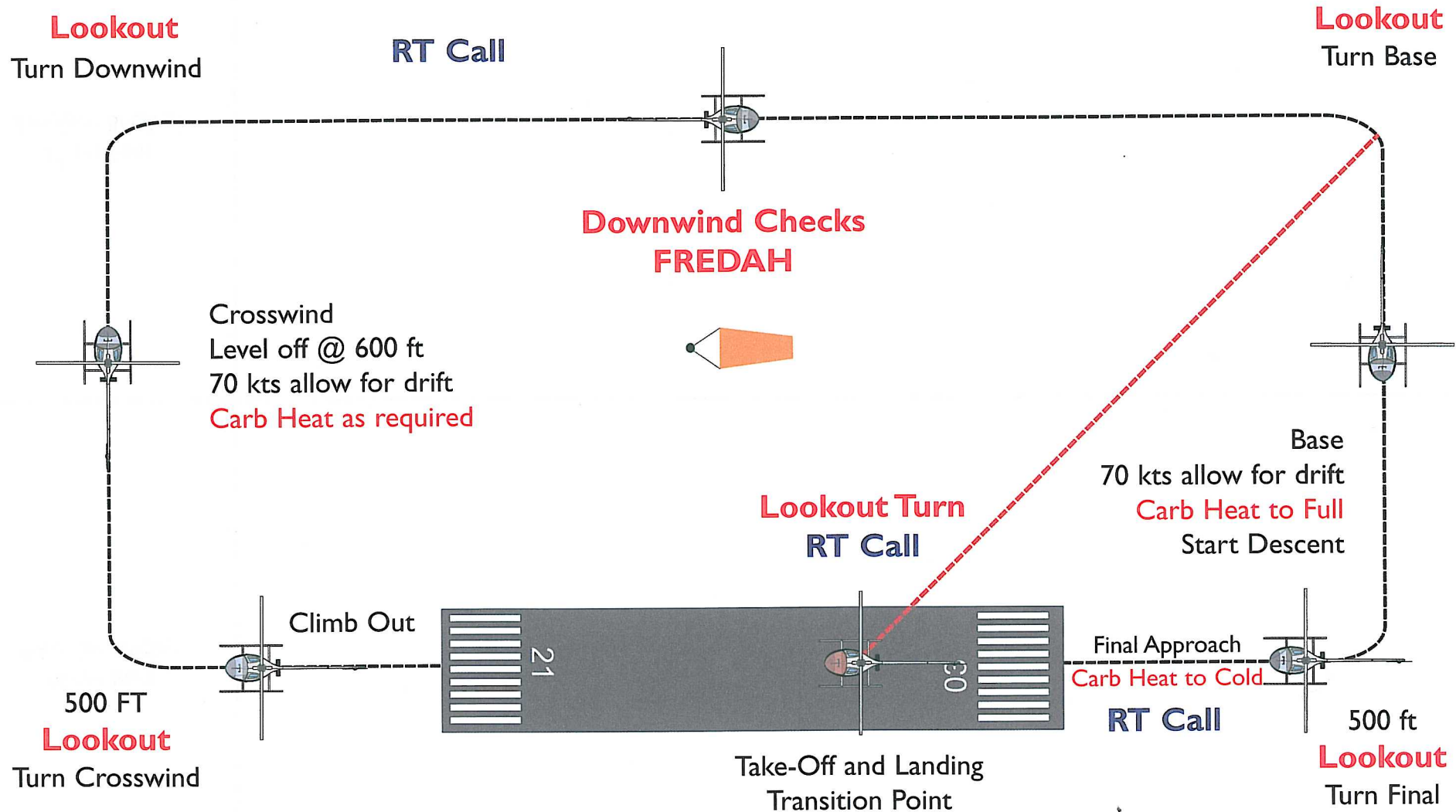
**Airmanship:** Lookout & Location. Engine considerations. Wind speed and direction. Circuit height and direction. Lookout before turns.

**Air Exercise:** Pre take-off checks, transition from the hover to climb, cross wind, downwind, base, approach & landing.

### Teaching Points:

1. General circuit procedures.
2. Specific circuit procedures.
3. Take-off, approach and landing with power.
4. Pre-landing checks.
6. Effect of wind on approach and IGE hover.
7. Go round.
8. Variable flare simulated engine-off landings (demonstration).
9. Noise abatement procedures.
10. **Carburettor heat** discipline.

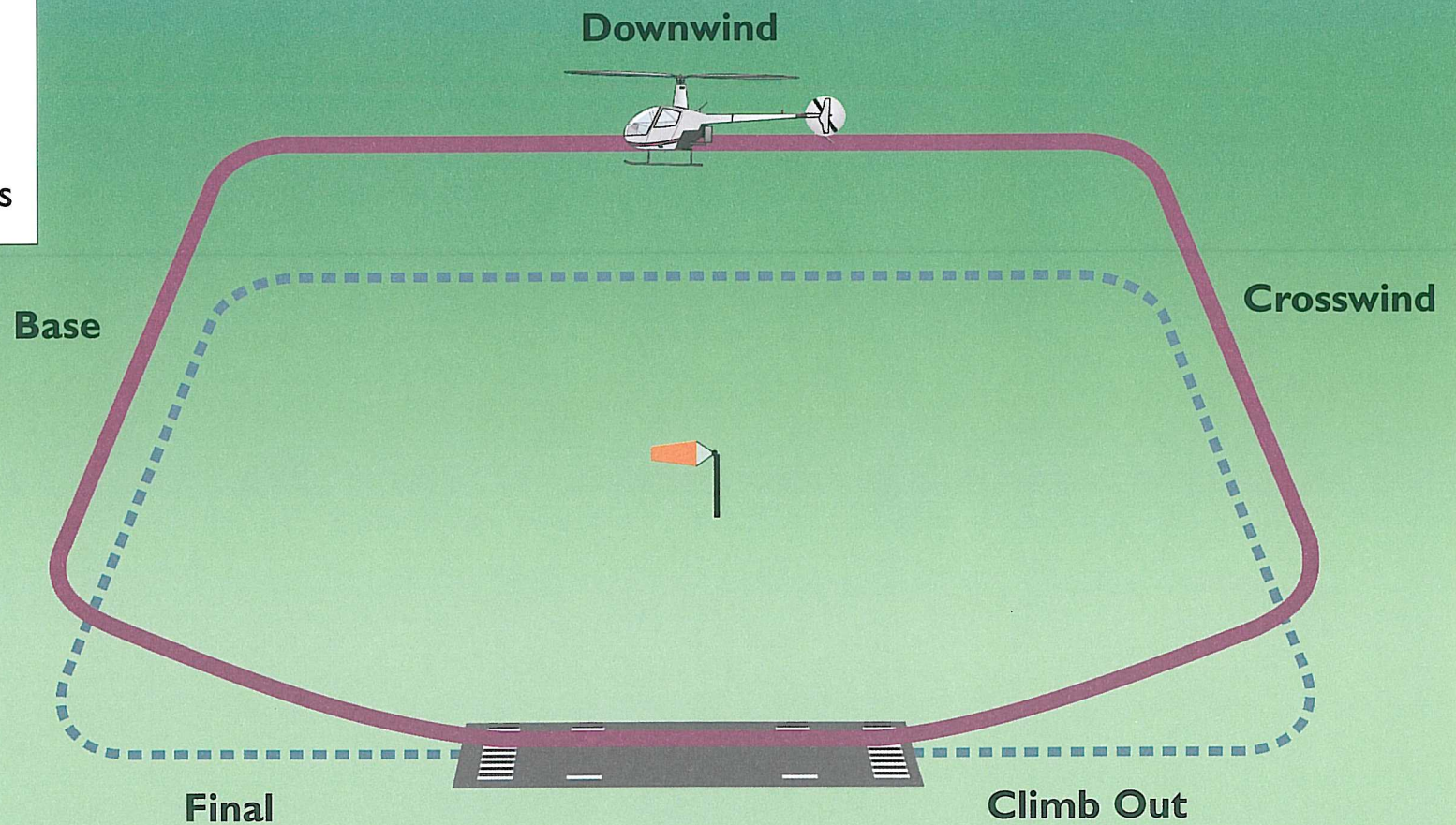






**F**uel  
**R**adio  
**E**ngine (T & P's)  
**D**irection  
**A**ltimeter & Altitude  
**H**atches & Harnesses

## Left Hand Circuit





## Exercise 11b

## Steep and Limited Power Approaches & Landing

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the procedures and techniques to fly a helicopter in a steep and/or limited power landing.

### Lesson Objective:

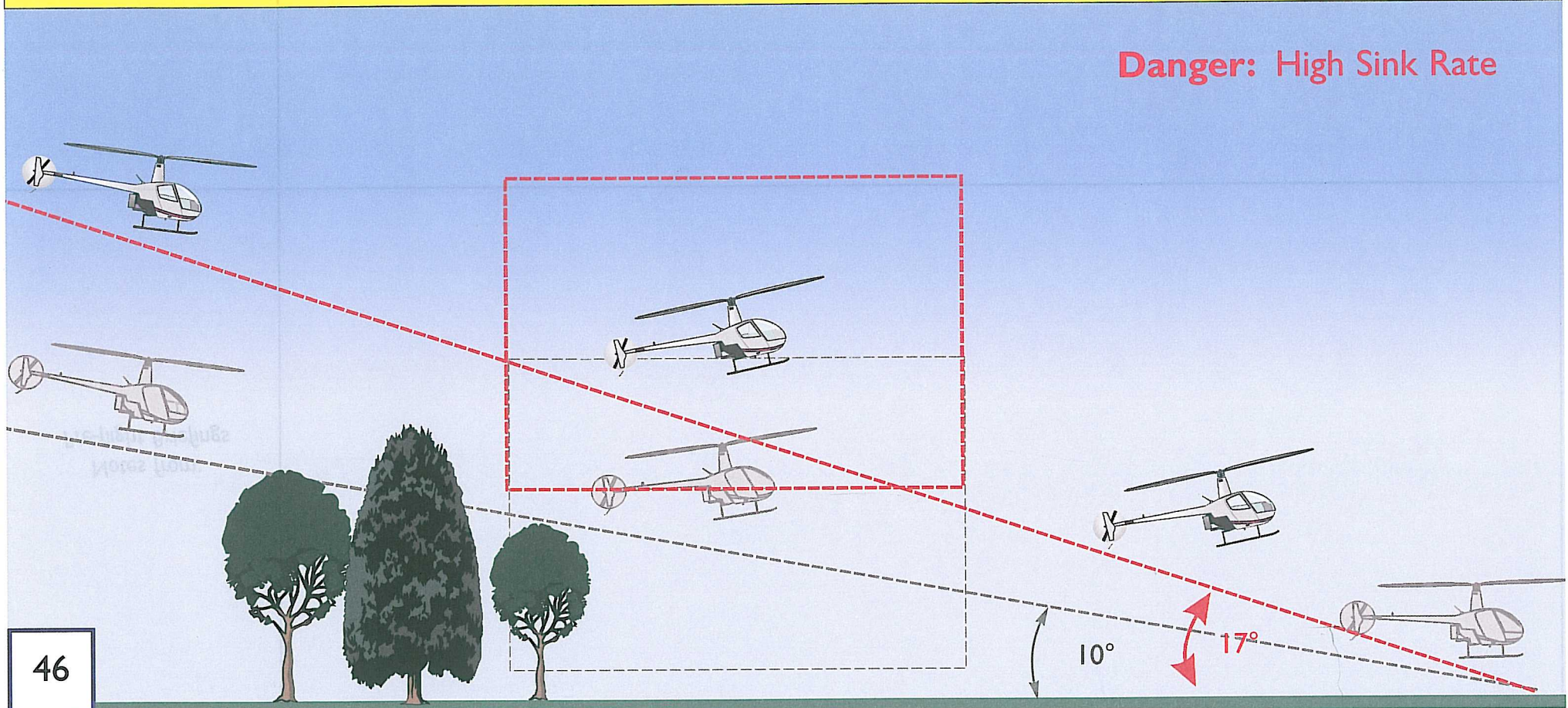
Demonstrate safely and correctly your ability to fly a helicopter in a steep and/or limited power landing.

### Airmanship:

Engine considerations. Wind speed and direction. High sink rates. High touch down speeds

### Air Exercise:

Steep & limited power approach & landings.





## Teaching Points:

### Landing Power Checks:

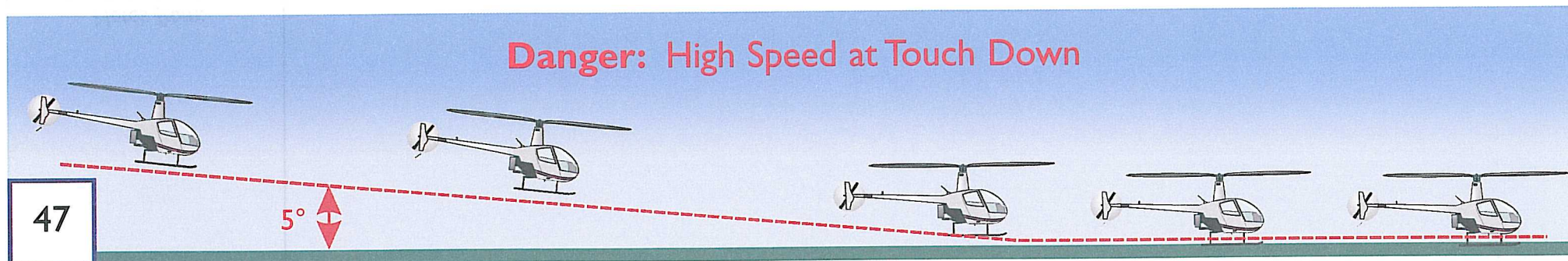
1. Fly at 50 kts and check manifold pressure for level flight.
2. Raise the collective to check maximum power available (no more than limits).
3. The difference between the two figures is the available "power margin".
  - a) A 7" margin gives the helicopter full vertical performance.
  - b) 6" hover OGE.
  - c) 5" hover IGE.
  - d) Less than 4" a running landing will be required.

### Zero - Zero Landing:

1. Fly a shallow approach to minimise the rate of descent.
2. Maintain 30kts airspeed until you are at the committal height.
3. Carefully judge the reduction of airspeed, height loss and application of power.
4. You should reach full power just as aircraft reaches zero airspeed with the skids on or just above the ground.
5. Gently lower the collective to place aircraft firmly on the ground.

### Running Landing:

1. Fly a shallow approach to minimise rate of descent.
2. Slow down to a walking pace ground speed..
3. Raise the collective and lose TL progressively.
4. Raise the collective to within 1" of maximum.
5. Level the skids just prior to touchdown and use remaining 1" of manifold pressure to cushion the landing.
6. Allow the aircraft to run on and maintain heading with pedals.



**Lesson Aim:** To learn the procedures and techniques to fly the helicopter safely in the event of an emergency in the circuit.

**Lesson Objective:** Demonstrate safely and correctly your ability to fly the helicopter safely when you abandon the take off, require to go round, have an engine failure anywhere in the circuit and when any warning light illuminates.

**Airmanship:** Lookout & Location. Engine considerations. Wind speed and direction. Circuit height and direction. Lookout before turns.

**Air Exercise:** n/a

## Teaching Points:

### Abandoned Lift-Off:

1. Firmly lower the collective.
2. Re set and start again.

### Missed Approach/Go Around:

1. Set and maintain 60 kts attitude.
2. Apply full power for the climb.
3. Lookout above.
4. Check temperatures, pressures, warning lights & fuel.
5. Carburettor heat as required, check RPM.
6. Adjust track as required to avoid other circuit traffic.
7. RT call.
8. Level off at the correct circuit height and rejoin a normal circuit pattern.

### Loss of Tail Rotor Thrust during forward flight:

1. Failure is usually indicated by nose right yaw which can not be corrected by applying left pedal.
2. Immediately enter autorotation.
3. Maintain at least 70 KIAS airspeed if practical.
4. Select landing site, roll the throttle off into overtravel spring and perform autorotation landing.

### Loss of Tail Rotor Thrust during the Hover:

1. Failure is usually indicated by a nose right yaw which cannot be corrected by applying left pedal.
2. Immediately roll the throttle off into overtravel spring and allow the helicopter to settle.
3. Raise the collective just before touchdown to cushion the landing.



## Teaching Points:

### Main rotor temperature light or chip light, tail rotor chip light illuminates:

1. Turn towards the landing area.
2. High possibility of a power failure, PAN call if time permits.
3. Perform a normal power on landing.
4. Shutdown immediately.

### Severe vibration or banging noise:

1. Check airspeed and trim and adjust as required.
2. If the vibration or noise continues turn towards the landing area.
3. High possibility of a power failure, PAN call if time permits.
4. Perform a normal power on landing.
5. Shutdown immediately.

### Oil warning light illuminates:

1. Cross check with oil pressure gauge.
2. PAN call.
3. Shorten the circuit pattern as instructed by ATC.
4. Land immediately.
5. Shut down.
6. **DO NOT HOVER TAXY.**

### Low fuel warning light illuminates:

1. PAN call.
2. Shorten the circuit pattern as instructed by ATC.
3. Land immediately.
4. Normal shut down.
5. **DO NOT HOVER TAXY.**

### Clutch warning light illuminates (more than 5 seconds or is flickering):

1. Pull clutch circuit breaker.
2. PAN call.
3. Shorten the circuit pattern as instructed by ATC.
4. Land immediately.
5. Normal shut down.
6. **DO NOT HOVER TAXY.**

### Both RPM needles fail:

1. Check circuit breaker.
2. If a governor is fitted ensure it is switched on.
3. Normal circuit pattern.
4. Land.
5. Shut down.
6. **DO NOT HOVER TAXY.**
7. If the governor is not available the correlator will maintain sufficient RPM control.

## Teaching Points:

### Rotor or Engine RPM Needles Fail:

1. Check circuit breakers.
2. Continue with a normal circuit.
3. Use remaining needle.
4. Land & report.

### Alternator Warning Light illuminates:

1. Recycle alternator off/on for one second, if light remains on.
2. Check circuit breakers.
3. Continue with a normal circuit.
4. Land & report.

### Governor Failure:

1. Check circuit breaker.
2. Continue with normal circuit.
3. Keep E & RRPM needles in green area by careful throttle movements.
4. Land and report.

### Gauges Malfunction:

1. Check circuit breakers.
2. Continue with a normal circuit.
3. Land & report.

### Radio Failure:

1. Check circuit breakers.
2. Transponder to 7600.
3. Continue blind radio calls.
4. Superior lookout.
5. Look for light signals from ATC.
6. Land & report.



## Prior to the Student's First Solo Flight the following should apply:

1. Instructor qualifications should be correct.
2. Club/school's weather limitations should be observed (normally 10 kts maximum wind and 1000 ft cloud base).
3. Careful assessment of the student's abilities, mental attitude and confidence.
4. The following emergencies should have been covered.

### Engine Failure on:

- a) Take-off.
- b) Crosswind.
- c) Downwind.
- d) Base leg.
- e) Final approach.
- f) Hover.
- g) Hover taxi.

### Action in the Event of Fire:

- a) Engine.
- b) Cabin.
- c) Electrical.

### Failure of:

- a) Radio.
- b) Tacho.
- c) Electrical.
- d) Generator.
- e) Tail rotor.

Please note that some clubs/schools will have additional or slightly different competencies to those shown. **Safety**, however, is the aim of ALL instructors.

## Exercise 13

## Sideways and Backwards Hover Manoeuvring

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and techniques to fly the helicopter in sideways and backwards flight in ground cushion.

**Lesson Objective:** Demonstrate safely and correctly your ability to fly the helicopter in sideways and backwards flight with the wind coming from various directions.

**Airmanship:** Lookout. Engine considerations. Wind speed and direction.

**Air Exercise:** Sideways flight with the wind from various directions, backwards flight with the wind from various directions.

### Sideways Flight into Wind:

1. From a well established 5 ft hover.
2. Lookout. Aiming Point.
3. Ease cyclic in the direction you want to move the helicopter, keep the helicopter into wind.
4. The cyclic controls the speed over the ground, the speed should be kept to a walking pace (flapback or possible loss of directional control).
5. Maintain height with collective as the helicopter may tend to sink in one direction and climb in the other.
6. Maintain direction with the pedals as the helicopter will yaw in the direction of travel.
7. Maintain a good lookout.
8. To stop the sideways flight place the helicopter into a hover attitude.

### Backwards Flight into Wind:

1. Superior lookout - 90° turn.
2. Climb to a 10 ft hover.
3. Lookout.
4. Ease cyclic in the direction you want to move the helicopter.
5. The cyclic controls the speed over the ground, the speed should be kept to a walking pace.
6. Maintain height with collective as the helicopter may tend to sink.
7. Maintain direction with the pedals as the helicopter will yaw, the pedals are more sensitive in backwards flight.
8. Maintain a good lookout.
9. To stop the backwards flight place the helicopter into a hover attitude.
10. Return to a 5 ft hover.
11. **Never** attempt backwards or sideways flight in a dispersal area without the assistance of a marshaller.



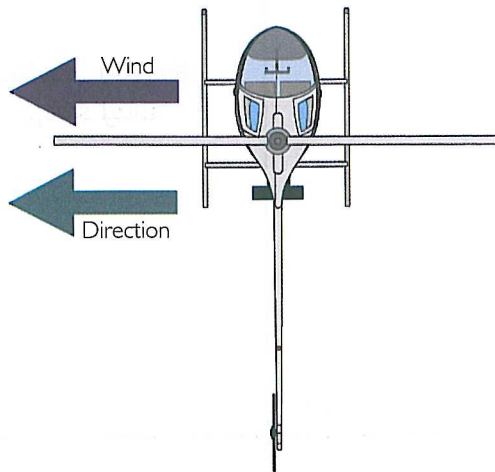
## Exercise 13

## Sideways and Backwards Hover Manoeuvring

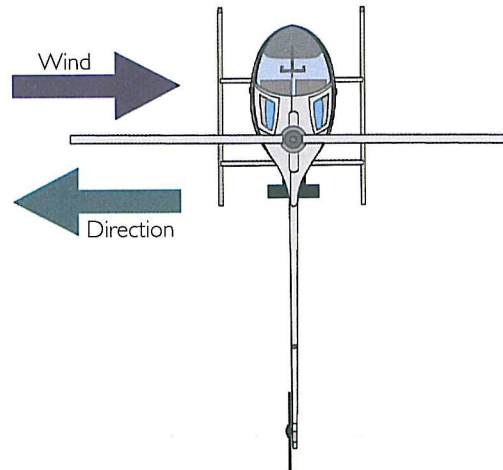
Part 2/2

POOLEY'S  
AIR PRESENTATIONS

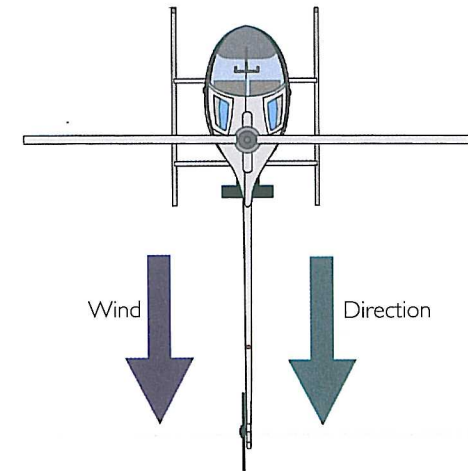
Helicopter Sinks and Yaws to the Left



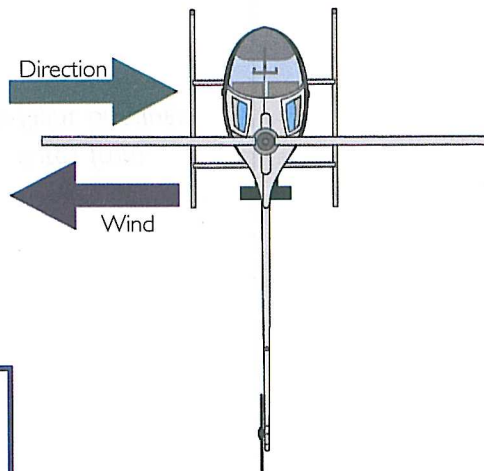
Helicopter Climbs and Yaws to the Left



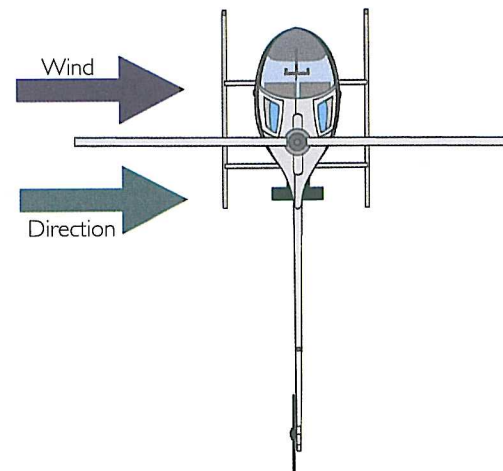
Helicopter Sinks, is Stable in Yaw, and tends to pitch nose down



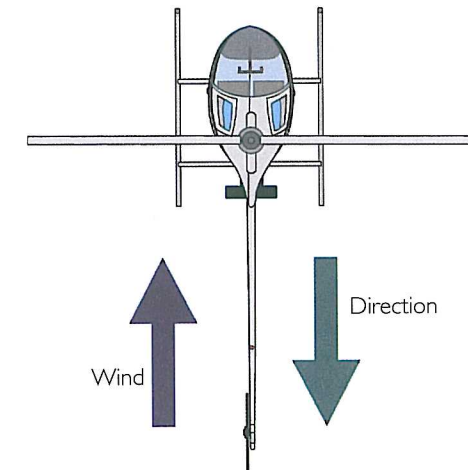
Helicopter Climbs and Yaws to the Right



Helicopter Sinks and Yaws to the Right



Helicopter Climbs, is Unstable in Yaw, and tends to pitch nose up



## Exercise 14

## Spot Turns

Part 1/4

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the procedures and techniques to fly the helicopter in spot turns.

### Lesson Objective:

Demonstrate safely and correctly your ability to fly the helicopter through 360 degrees, around the pilot's position, around the tail rotor, around the helicopter's geometric centre and fly parallel heading square.

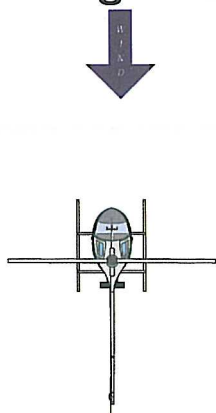
### Airmanship:

Lookout. Engine considerations. Wind speed and direction.

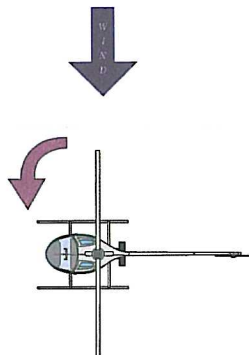
### Air Exercise:

360 degree turn, turns around the pilot's position, turns around the tail rotor, turns around geometric centre, constant heading square.

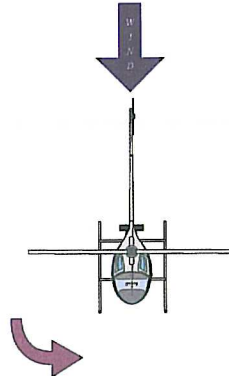
### Teaching Points: Geometric Centre



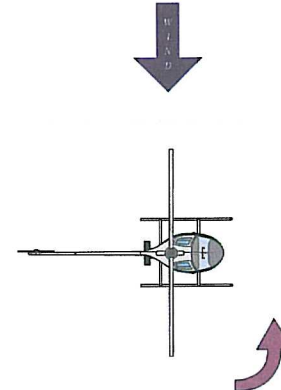
- Cyclic** - forward into wind.
- Pedal** - more left pedal required in the hover.
- Collective** - power as required to hover @ 5 feet.
- Throttle** - as required to maintain RPM



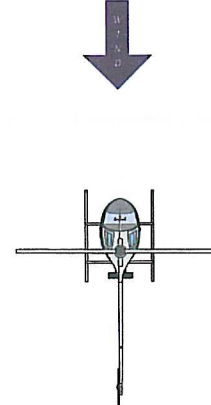
- Pedal** - considerable pressure required to initiate the turn.
- Cyclic** - right pressure into the wind.
- Collective** - as required to maintain a 5ft hover.
- Throttle** - as required to maintain RPM



- Pedal** - changing from left pedal pressure to right pedal pressure (pedal sensitivity).
- Cyclic** - rearwards into wind (tail rotor considerations).
- Collective** - as required to maintain a 5ft hover.
- Throttle** - as required to maintain RPM.



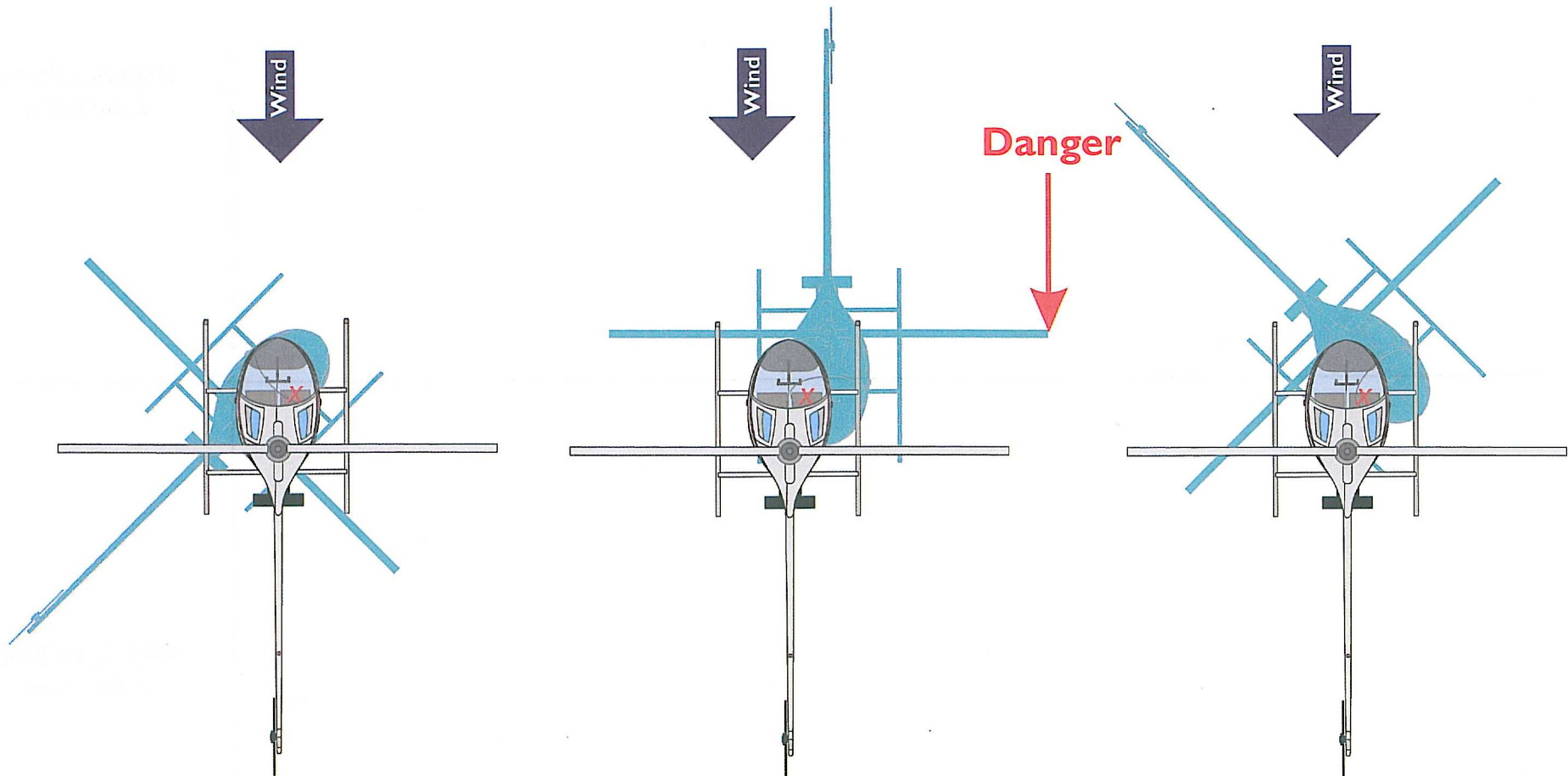
- Pedal** - pressure as required to complete the turn (pedal becomes less sensitive).
- Cyclic** - left pressure into wind.
- Collective** - as required to maintain a 5ft hover.
- Throttle** - as required to maintain RPM.



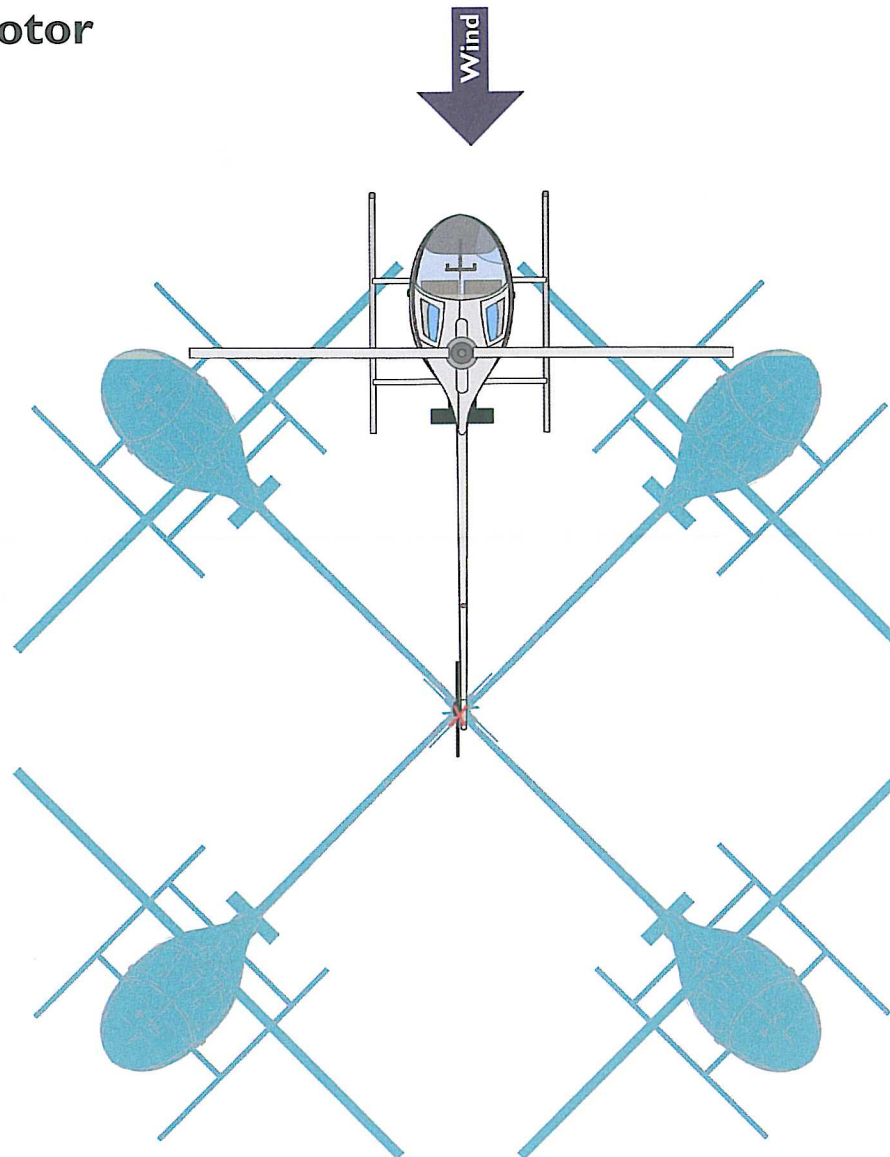
- Cyclic** - forward into wind.
- Pedal** - Some right to stop the turn, then left to maintain the heading.
- Collective** - increasing as left pedal applied to maintain a 5ft hover.
- Throttle** - as required to maintain RPM.



## Turns around the Pilot's Position



Turns around the Tail Rotor





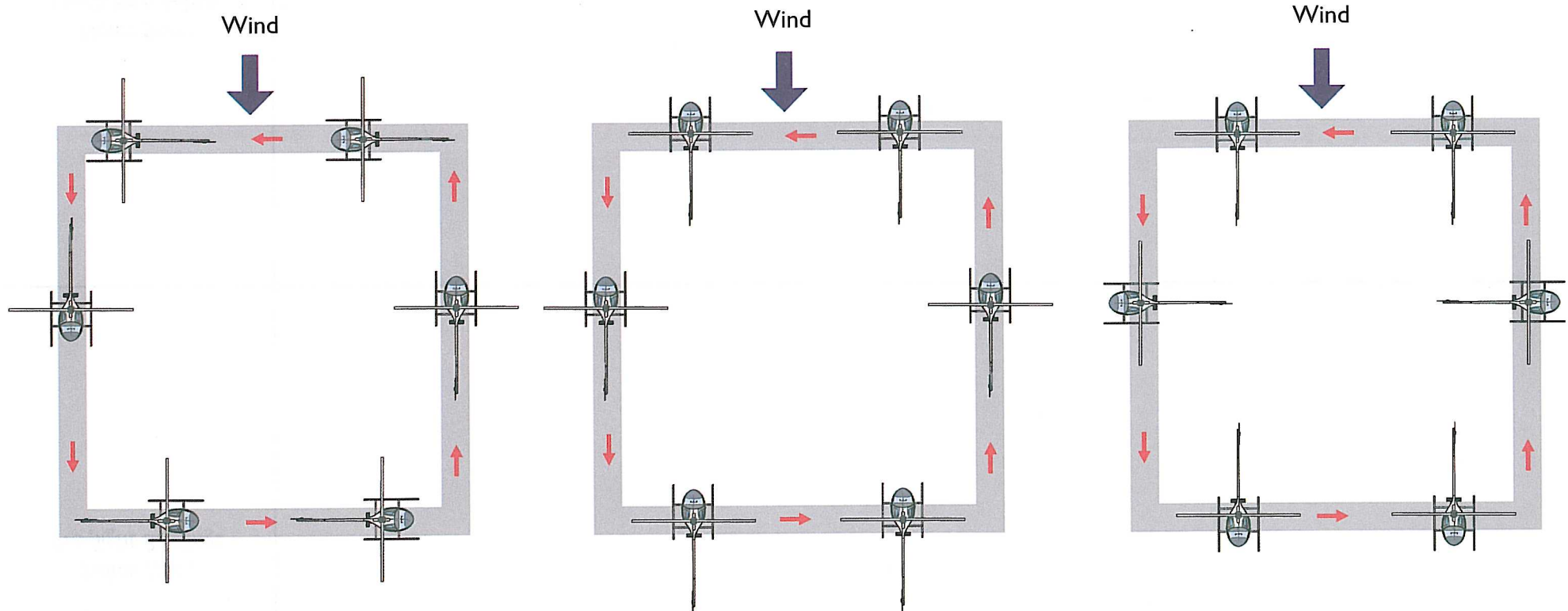
## Exercise 14

## Spot Turns 4 of 4

Part 4/4

POOLEY'S  
AIR PRESENTATIONS

### Turns around a Parallel Square



## Exercise 15

## Hover out of Ground Effect, Vortex Ring

Part 1/1

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the flight conditions and symptoms of a vortex ring.

**Lesson Objective:** Demonstrate safely and correctly your ability to recognise the flight conditions and symptoms of a vortex ring.  
Demonstrate the recovery procedure.

**Airmanship:** Lookout. HASEL checks. 2000 ft AGL. Engine considerations. Wind speed and direction.

**Air Exercise:** This exercise is only to be practised with an instructor present, it is to be taken to the incipient stage only.

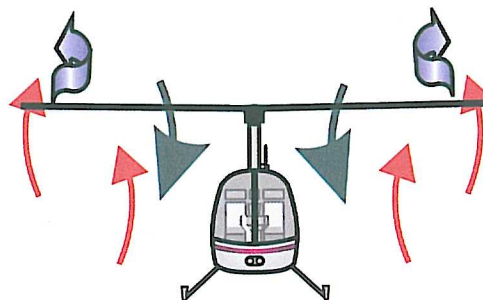
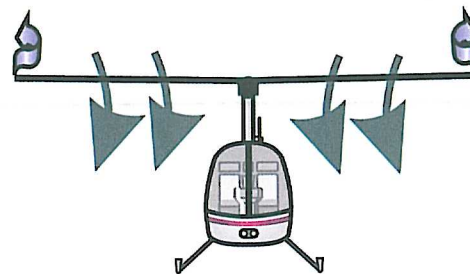
### Teaching Points:

#### Flight Conditions that produce a Vortex Ring:

1. Airspeed below 15 kts.
2. Rate of descent more than 300 ft per minute.
3. Power applied 20% or more  
- (18" Manifold pressure R22).

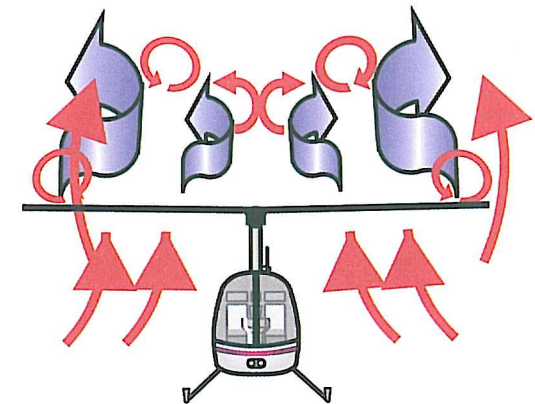
#### Recovery:

1. Cyclic forward to increase the airspeed.
2. Maintain heading with the pedals.
3. Manifold pressure as required to regain the climb.
4. Continue this attitude until a satisfactory forward airspeed is achieved.
5. Adopt a normal climb.



#### Symptoms of a Vortex Ring:

1. Airframe judder.
2. Random yaw, pitching and rolling.
3. Increased rate of descent.





## Exercise 16

## Simulated Engine Off Landings

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the correct technique for conducting a safe autorotative landing.

**Lesson Objective:** Demonstrate safely and correctly your ability to conduct an autorotative landing without the use of engine power.

**Airmanship:** Only to be conducted with your instructor. Rotor RPM limits. Lookout. HASEL checks. Wind speed and direction. 10 gallons of fuel maximum (R22 recommendation).

**Air Exercise:** EOL from the hover/taxi, EOL from circuit height. Flare power recovery.

### Teaching Points:

#### Entry:

1. Helicopter at circuit height, 70 kts & 20" manifold pressure.
2. Governor OFF (optional).
3. Line up with the runway if it is possible but preferably into wind.
4. Verbal warning: **"PRACTICE AUTOROTATION - GO"**
5. Maintain 60-65 kts RRPM in the green.

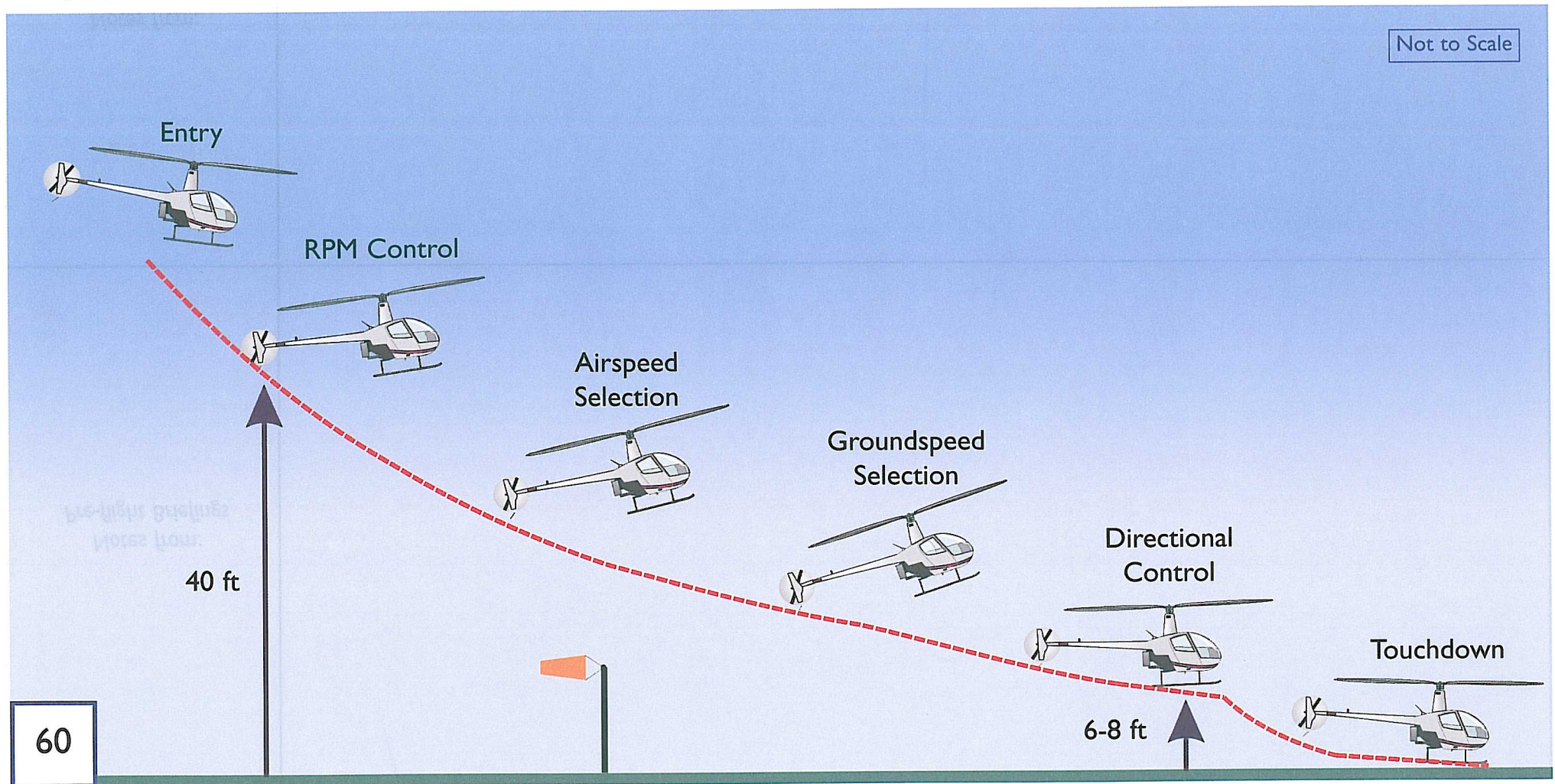
#### Committal Point:

200-300 ft, air speed 65 kts, RRPM in the green, into wind and area suitable.

#### Procedure:

1. Fully close the throttle into "DETENT" position (against overtravel spring).
2. At about 40 ft start gentle cyclic flare, maximum rotor RPM 110%.
3. Progressively flare controlling RRPM with the collective as necessary.
4. The flare reduces forward air speed and rate of descent and increases rotor RPM.
5. Maintain heading with pedals.
6. As the helicopter starts to settle (6-8 ft) level the skids and raise the collective at the same time to cushion the ground contact and maintain heading with the pedals.
7. On touchdown apply slight forward cyclic.
8. As the helicopter runs on keep straight with the pedals.
9. When the helicopter stops lower the collective fully.

## Standard Engine Off Landing (EOL)





## Exercise 17

## Advanced Autorotation

Part 1/4

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the correct technique for conducting safe advanced autorotation manoeuvres.

### Lesson Objective:

Demonstrate safely and correctly your ability to change airspeed, RRPM and conduct turns whilst in an autorotative condition. This will vary the distance covered over the ground allowing a greater selection of landing areas.

### Airmanship:

Lookout. Wind direction & speed. HASEL checks. RRPM limits. 500 ft rule. Verbal warning of exercise.

### Air Exercise:

*Demonstration of the various distances travelled using different techniques during autorotation.*

## Teaching Points:

### "S", 90 & 180 degree turns in autorotation:

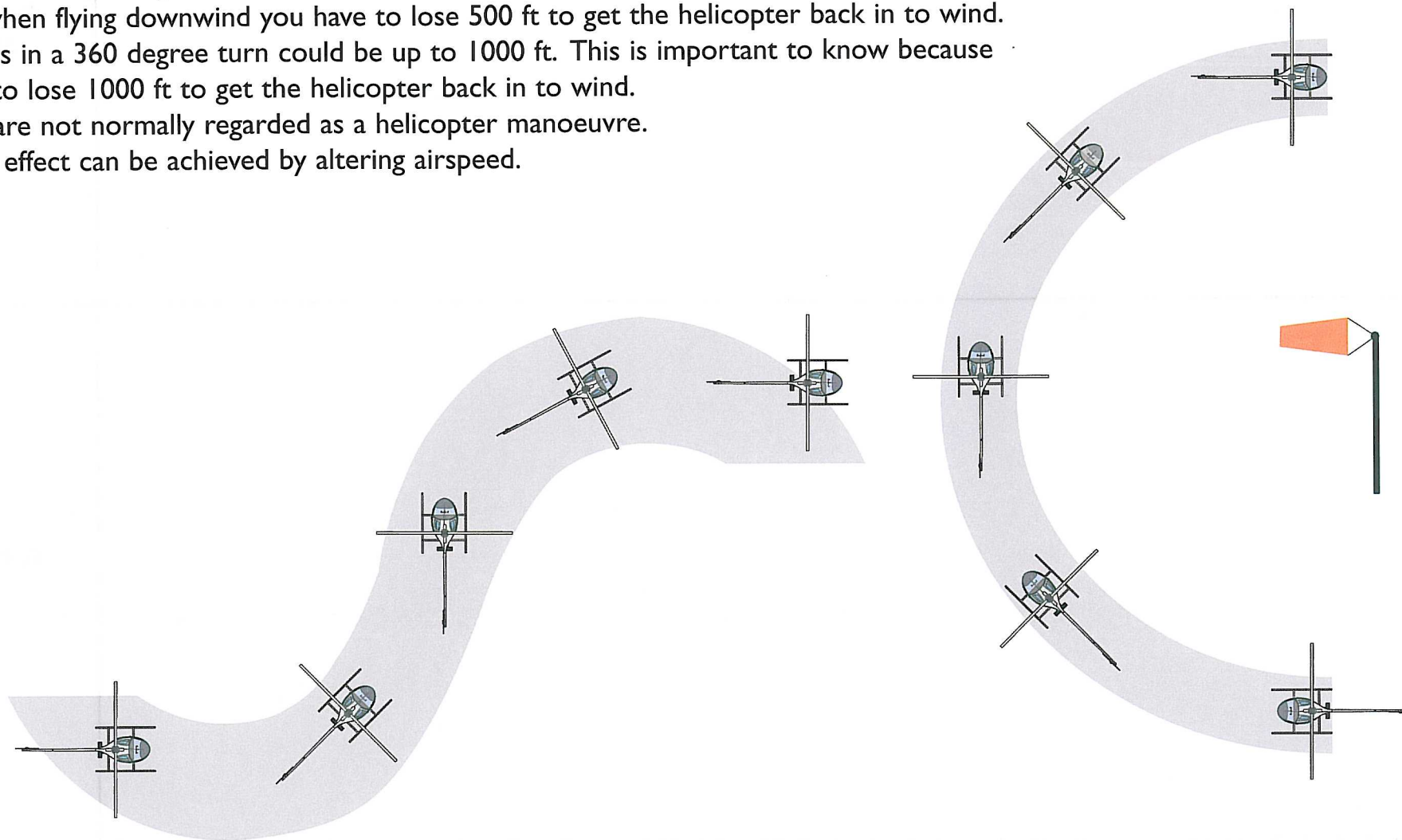
1. Turns should be made at 55-60 kts maintaining RPM in the green.
2. The exercise is to allow the helicopter to face into wind from either a cross wind position (90 degree turn required) or from a down wind position (180 degree turn required) or to lose height for a specific reason.
3. The steeper the turn the greater the rate of descent (ROD) and a consequent height loss.
4. Control the RRPM with the collective (disc loading).
5. If the collective has been used in the turn it must be lowered on rolling out of the turn.

### 360 degree turns in autorotation:

1. If possible make the turn to the right (safer due to superior observation).
2. Air speed must not decay below 45 kts.
3. The steeper the turn the greater the ROD and a consequent height loss.
4. Control the RRPM with the collective.
5. If the collective has been used in the turn it must be lowered on rolling out of the turn.

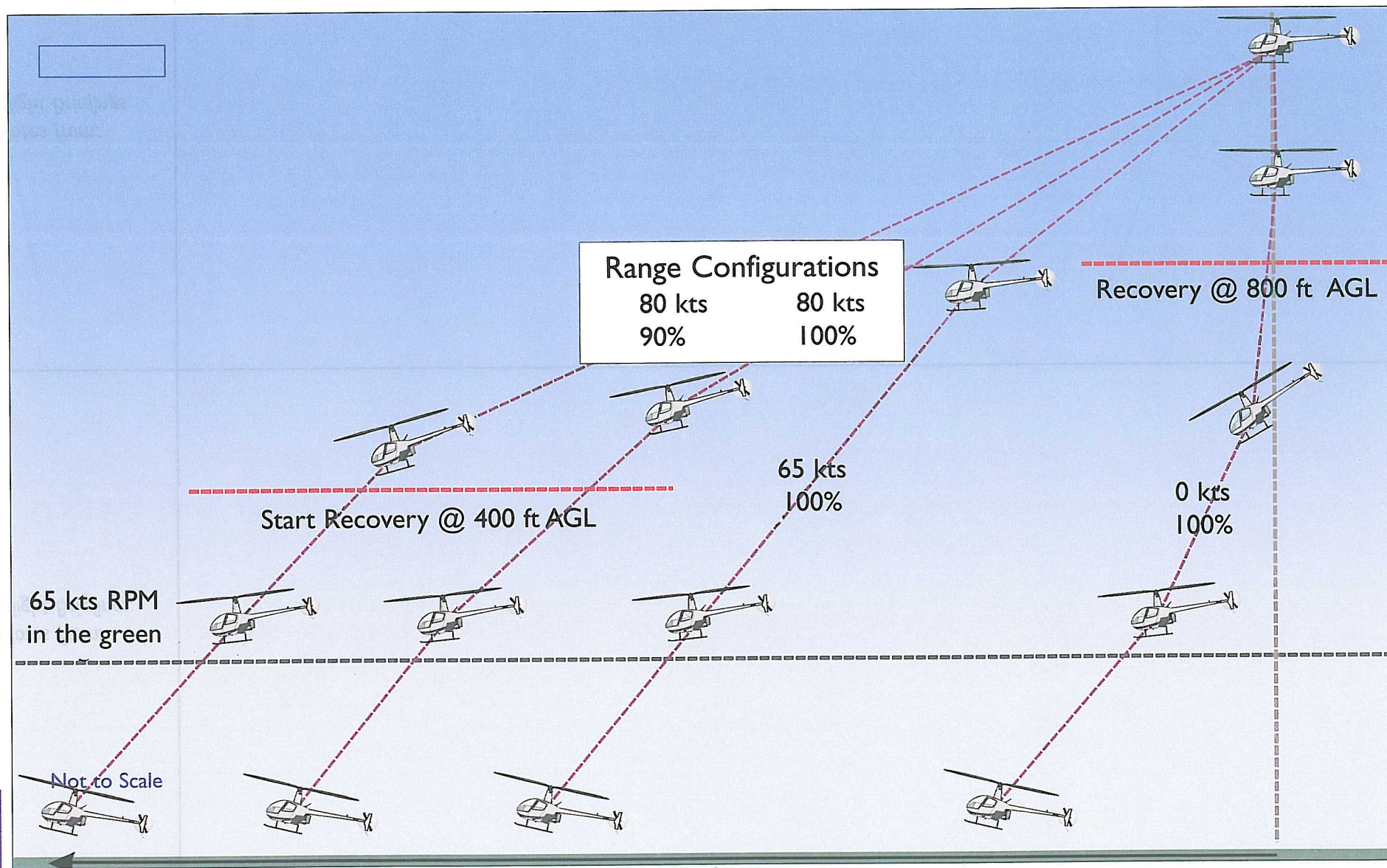
## "S" Turn which naturally incorporates a 90 degree turn - 180 degree turn:

1. Height loss in a 180 degree turn could be up to 500 ft. This is important to know because when flying downwind you have to lose 500 ft to get the helicopter back in to wind.
2. Height loss in a 360 degree turn could be up to 1000 ft. This is important to know because you have to lose 1000 ft to get the helicopter back in to wind.
3. "S" turns are not normally regarded as a helicopter manoeuvre. The same effect can be achieved by altering airspeed.





### Changes in Airspeed/RRPM v Distance covered in Autorotation

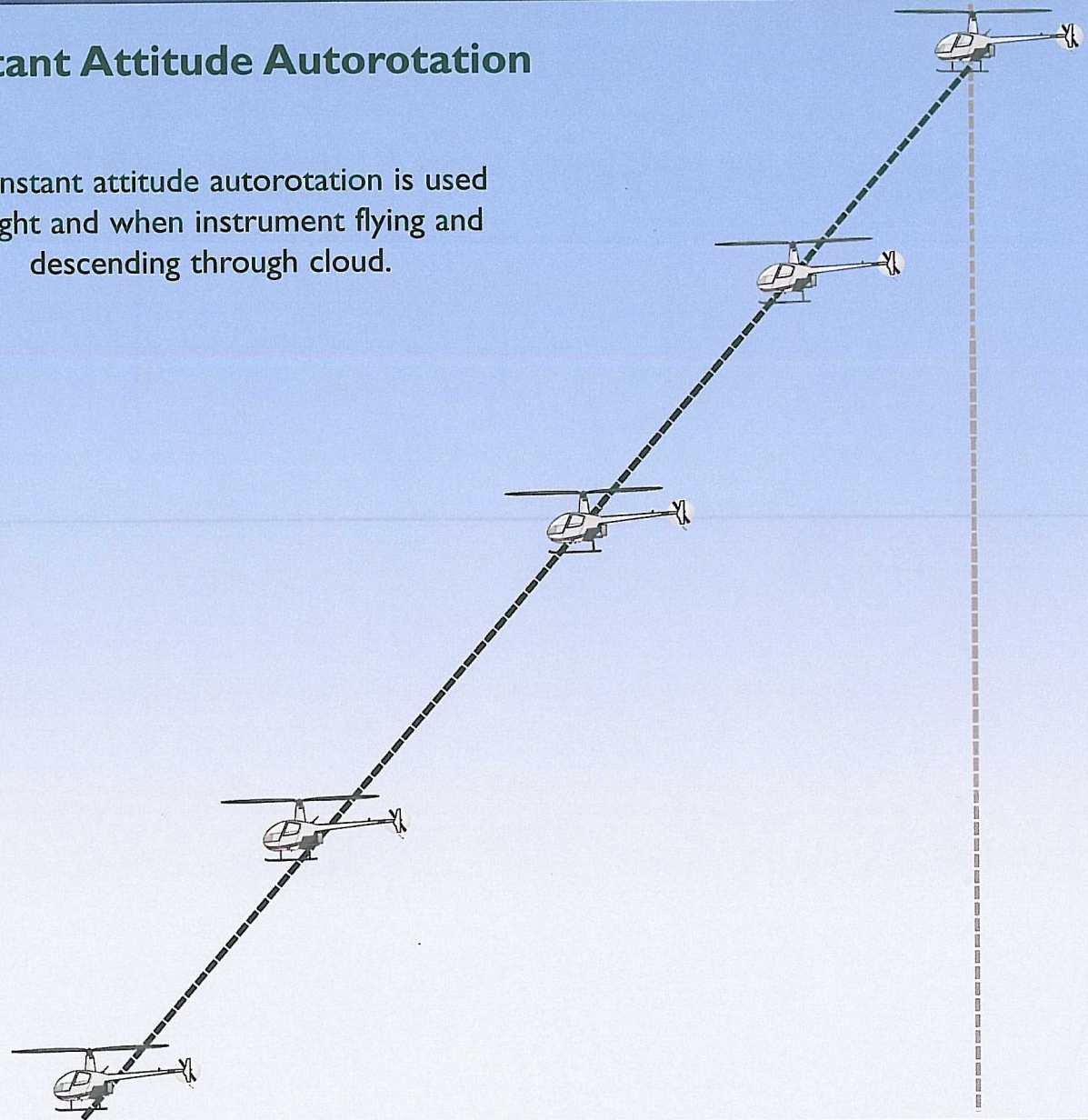




Not to Scale

## Constant Attitude Autorotation

A constant attitude autorotation is used at night and when instrument flying and descending through cloud.





## Exercise 18

## Practice Forced Landings

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the correct technique and procedures for conducting a safe forced landing.

### Lesson Objective:

Demonstrate safely and correctly the techniques and procedures to make a forced landing after an engine failure and the re-engagement and go around.

### Airmanship:

Lookout. Wind direction & speed. Selection of approach and landing site. HASEL checks. 500 ft rule. Cables.

### Air Exercise:

*Demonstration of the techniques, procedures and the required judgement to land safely. The re-engagement & go-around procedures.*

## Teaching Points:

### Power Failure Above 500 ft:

1. Lower the collective immediately to maintain RPM and enter normal autorotation.
2. Establish a steady glide at approximately 65 KIAS.
3. Adjust collective to keep RPM in green arc or apply full down collective if light weight prevents attaining above 97%.
4. Select landing spot and, if altitude permits, manoeuvre so landing will be into wind.
5. A restart may be attempted at the pilot's discretion if sufficient time is available.
6. If unable to restart, turn off unnecessary switches and shut off fuel.
7. At about 40 feet AGL, begin cyclic flare to reduce rate of descent and forward speed.
8. At about 8 feet AGL, apply forward cyclic to level the helicopter and raise the collective just before touchdown to cushion the landing. Touch down in a level attitude with nose straight ahead.

**NOTE:** *If power failure occurs at night, do not turn on landing lights above 1000 feet AGL to preserve the battery power (R22).*

## Teaching Points:

### Power Failure between 8 ft and 500 ft AGL:

1. Takeoff operation should be conducted per the height-velocity diagram.
2. If a power failure occurs, lower the collective immediately to maintain rotor RPM.
3. Adjust the collective to keep RPM in green arc or apply full down collective if light weight prevents attaining above 97%.
4. Maintain airspeed until ground is approached, then begin cyclic flare to reduce rate of descent and forward speed.
5. At about 8 ft AGL, apply forward cyclic to level the helicopter and raise the collective just before touchdown to cushion landing. Touch down with skids level and nose straight ahead.

### Maximum Glide Distance Configuration:

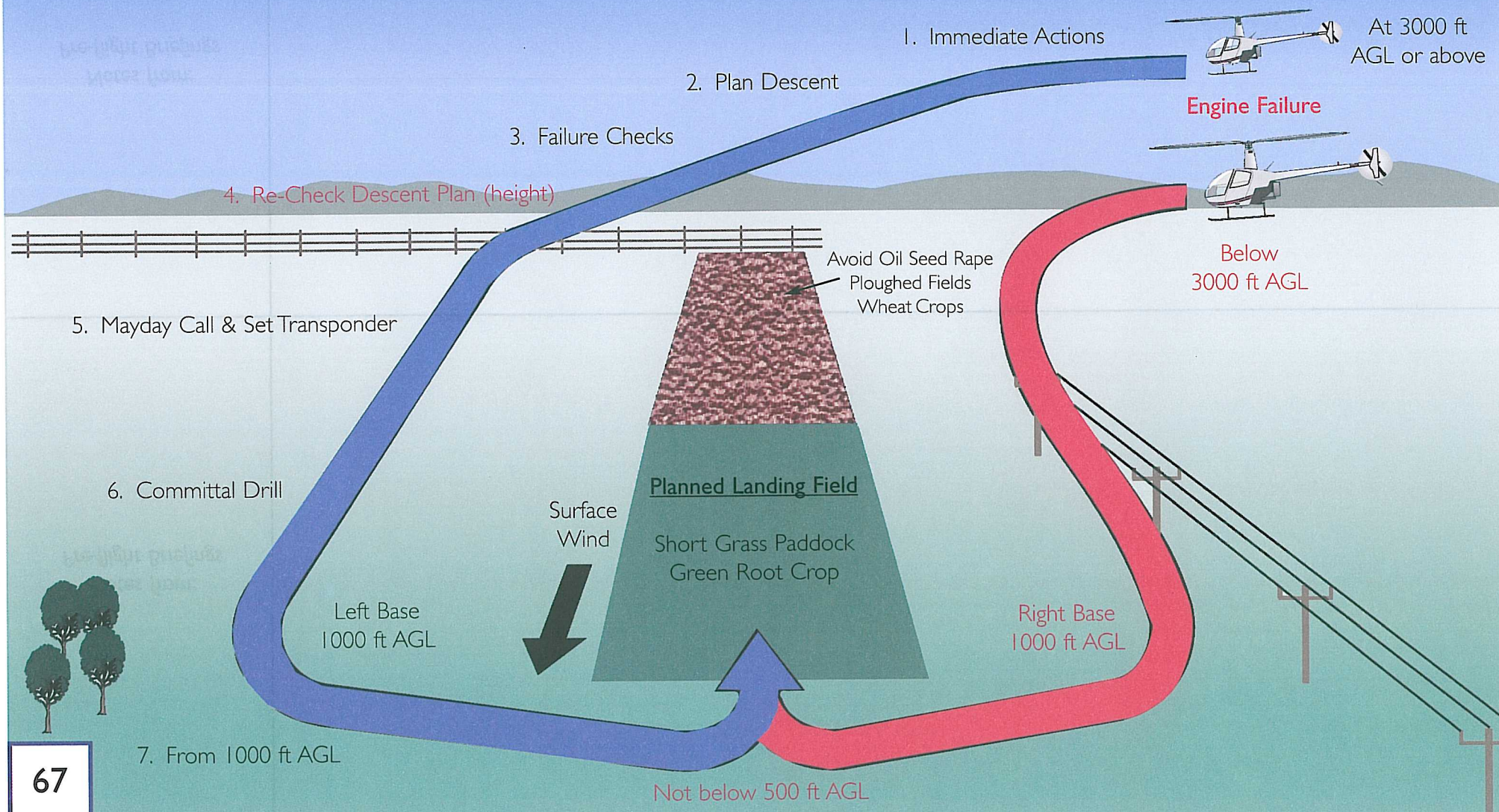
1. Airspeed approximately 75 KIAS.
2. Rotor RPM approximately 90%.
3. The best glide ratio is about 4:1 or one nautical mile per 1500 ft AGL.

### Air Restart Procedure:

1. **Do not** attempt a restart if an engine malfunction is suspected or before a safe autorotation is established.
2. Mixture fully rich.
3. Primer (if installed) down and locked.
4. Throttle closed, then slightly opened.
5. Attempt to restart (left hand).



**Your actions will vary with the circumstances and conditions.  
This diagram is only one of many possible actions.**





**Lesson Aim:** To learn the correct technique and procedures to turn the helicopter steeply.

**Lesson Objective:** Demonstrate safely and correctly the techniques and procedures to turn the helicopter steeply in normal powered flight and autorotative flight keeping the airspeed and RRPM constant.

**Airmanship:** Superior lookout. Position, references & orientation. RPM limits in powered flight. RRPM limits in steep turns in autorotation.

**Air Exercise:** *Demonstration of the techniques & procedures for steep turns.*

## Teaching Points:

### 30 Degrees of Turn with a Constant Airspeed:

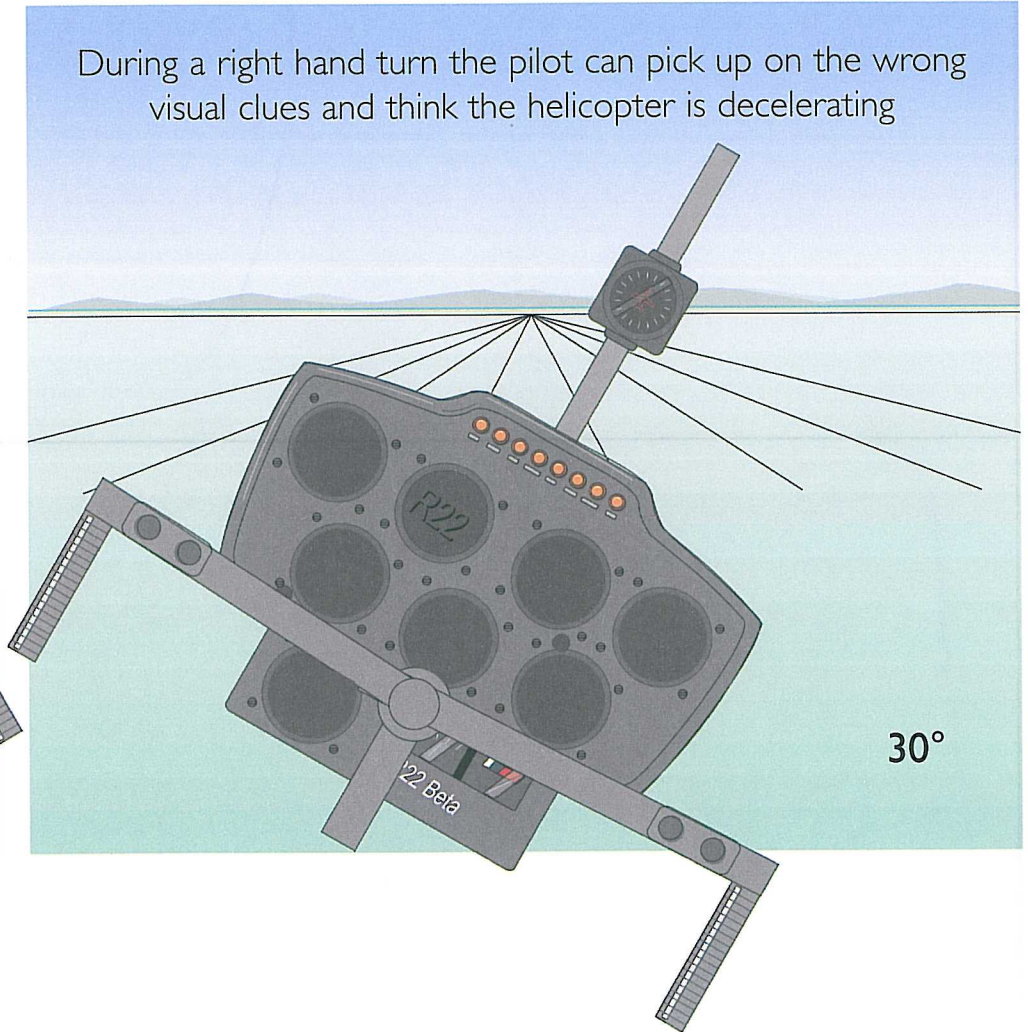
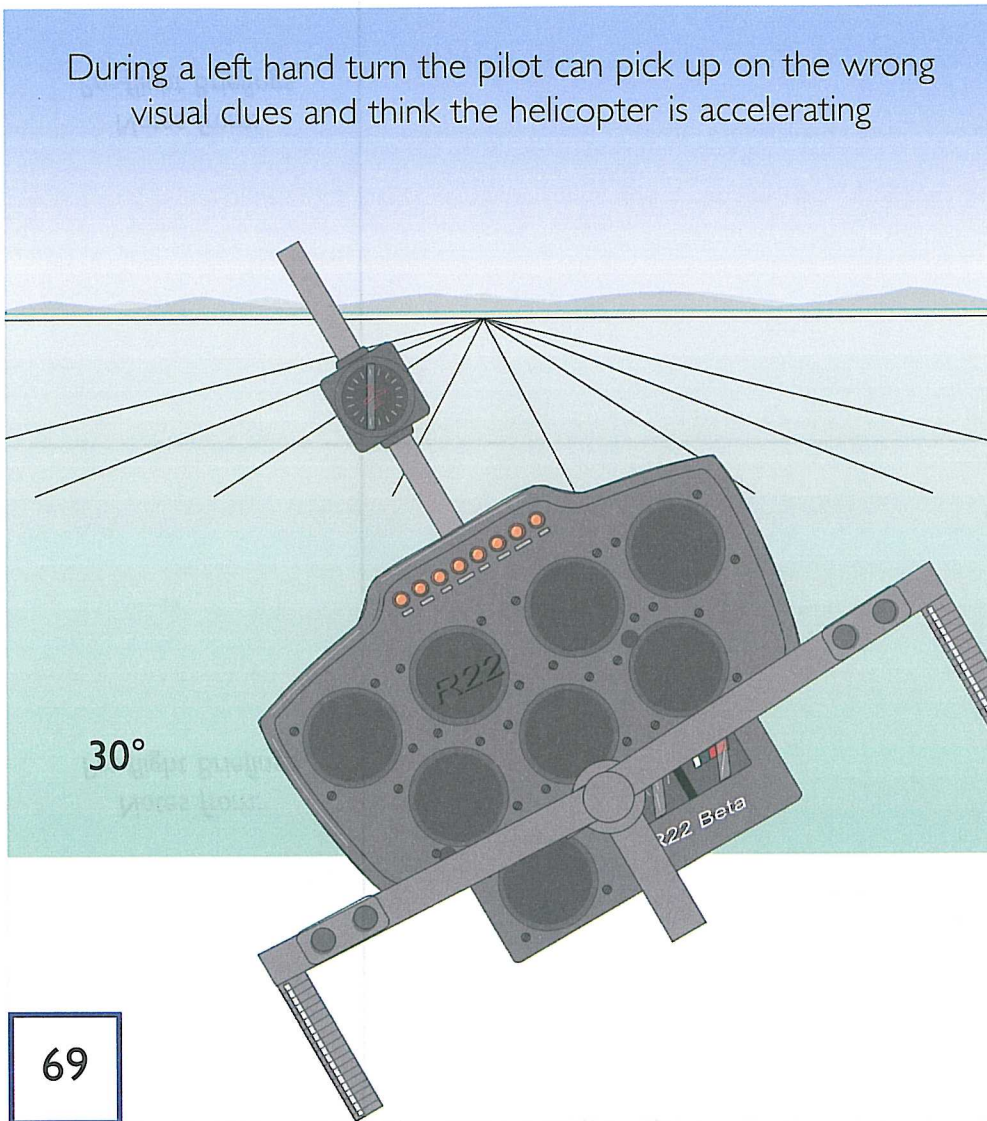
1. NO loose items in the cockpit.
2. Superior lookout, 70 kts and approximately 20" MP no lower than 1000 ft AGL.
3. Choose a reference point.
4. Set the RPM in the lower green area (disc loading) discuss governor on/off.
5. Start a 360 degree turn with 30 degrees of bank.
6. Maintain pitch attitude with cyclic, balance with the pedals and height with the collective.
7. Maintain a superior lookout.
8. Checking RPM, MP, ASI, VSI, temperatures and pressures, attitude and balance.
9. Anticipate roll out.
10. In a co-ordinated turn the helicopter will remain in balance and the RPM should only increase or decrease slightly depending on the direction of the turn.
11. Check and adjust RPM and MP.



## Offset Seating Effect

During a left hand turn the pilot can pick up on the wrong visual clues and think the helicopter is accelerating

During a right hand turn the pilot can pick up on the wrong visual clues and think the helicopter is decelerating



## Teaching Points:

### 45 Degree Turns Constant Airspeed:

1. NO loose items in the cockpit.
2. Superior lookout, 70 kts and approximately 20" MP not lower than 1000 ft AGL.
3. Choose a reference point.
4. Set the RPM in the top half of the green area (discuss governor on/off).
5. Start a 360 degree turn with 45 degrees of bank, allow the nose of the helicopter to rise slightly maintaining not less than 60 kts.  
At this stage moderate vibration may be felt. Control this with the use of the cyclic.
6. Maintain pitch attitude with cyclic, balance with the pedals & height with the collective, more may be needed.
7. Maintain a superior lookout.
8. Checking RPM, MP, ASI, VSI, temperatures and pressures, attitude & trim.
9. Anticipate roll out.
10. In a co-ordinated turn the helicopter will remain in balance and the RPM will only increase or decrease slightly depending on the direction of the turn.
11. Check and adjust RPM and MP.
12. Steep turns at low level should be discussed regarding the effects of wind (airspeed v ground speed).

### Autorotative Turns:

1. At least 1500 ft AGL for this exercise.
2. Select a reference point and enter autorotation (HASEL checks).
3. Start a 45 degree turn maintain 50-60 kts and RRPM in the green.
4. Disc loading at this stage will be most severe and close monitoring of RRPM is required.
5. Maintain attitude with the cyclic (with reference to the horizon).
6. Maintain a superior lookout and monitor RRPM, attitude and ASI.
7. Anticipate the roll out.

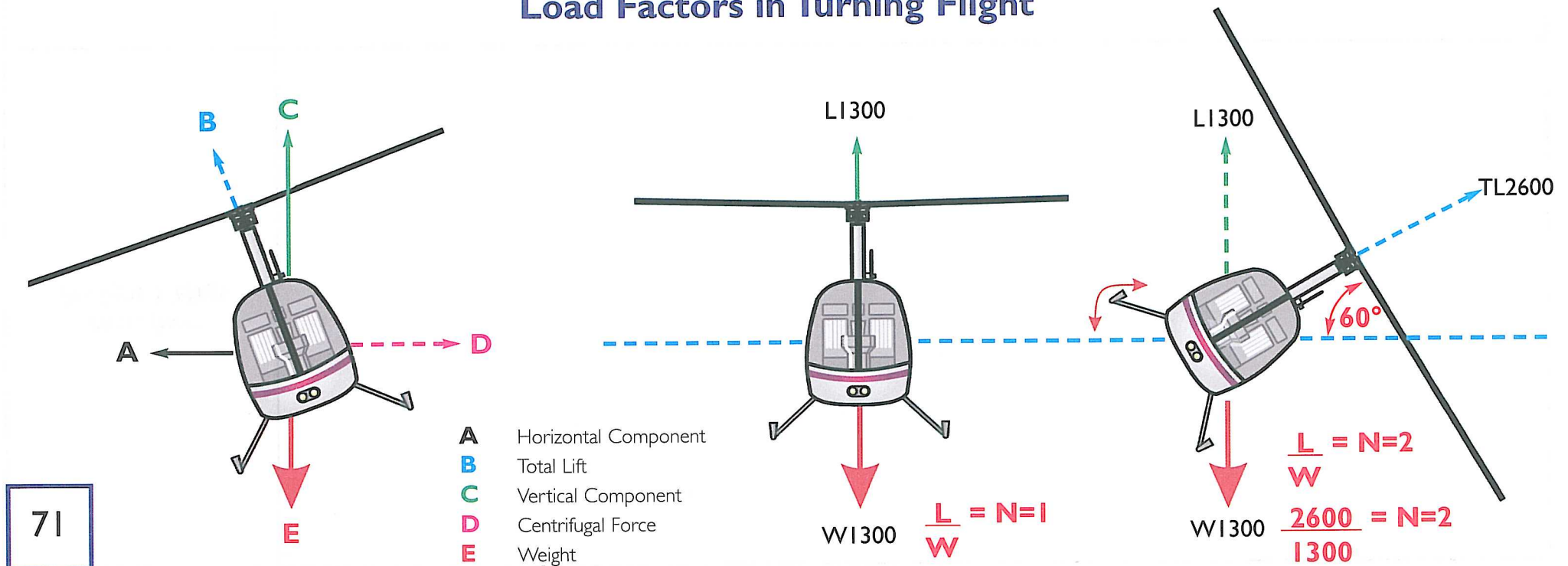


## Teaching Points:

## Flapback - Flap forward:

1. During a left hand turn the speed of the advancing blade increases and the speed of the retreating blade decreases (tip path plane). This causes flapback which gives the helicopter the tendency to raise its nose and there is a loss of air speed.
2. During a right hand turn the speed of the retreating blade increases and the speed of the advancing blade decreases (tip path plane). This causes flap forward which gives the helicopter the tendency to lower the nose and the air speed increases.

## Load Factors in Turning Flight



## Exercise 20

## Transitions

Part 1/1

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the correct technique and procedures for transitions from the hover to the hover.

### Lesson Objective:

Demonstrate safely and correctly the techniques and procedures to place the helicopter in transitional flight from the hover then return the helicopter back to the hover, while maintaining the helicopter at constant height and direction.

### Airmanship:

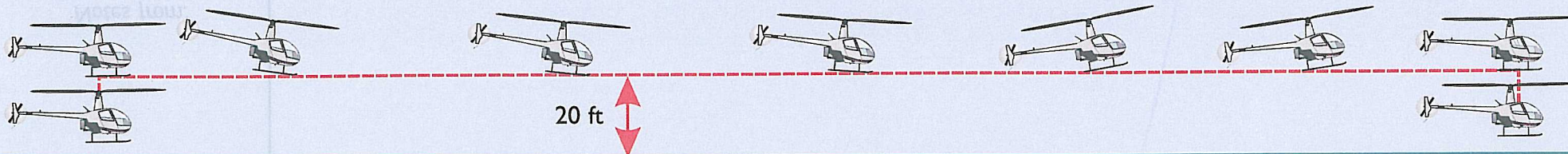
Lookout. Wind speed and direction. Engine considerations. Height AGL.

### Air Exercise:

From a 5 ft hover raise the helicopter to 20 ft and enter transitional flight to a speed of 50 kts. Return to a 20 ft hover and then lower the helicopter to a 5 ft hover.

1. Lookout turn from a 5 ft hover:
2. Raise the helicopter into a 20 ft hover:
3. Start the transition maintaining a height of 20 ft and control the direction.
4. As the effects of translational lift starts, lower the collective and correct with pedals.
5. Adjust RPM's as required to prevent overspeed.
6. Accelerate to the required speed controlling height with collective.
7. Attitude controlled by the cyclic.
8. Gently flare the helicopter with the cyclic, lowering the collective to prevent ballooning and be ready to adjust the balance.
9. As translational lift is lost, prevent the sink with the collective.
10. The nose of the helicopter tends to pitch up with the increase of power. Forward cyclic may be needed to prevent excessive flapping.
11. At zero ground speed and in a 20 ft hover, lower the helicopter into a 5 ft hover:

Not to Scale





## Exercise 21

## Quickstops

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the correct technique and procedures to enter a hover rapidly from a high forward airspeed.

**Lesson Objective:** Demonstrate safely and correctly the techniques and procedures to enter a hover rapidly from a high forward airspeed into wind. Downwind quick stops which entail a turn and flare to end up in an into wind position.

**Airmanship:** Lookout. Wind speed and direction. Engine considerations. Height AGL.

**Air Exercise:** From a 5ft hover accelerate to 50kts and climb to 20ft AGL. Rapid slow down maintaining 20ft AGL then returning to a 5ft hover.

### Teaching Points:

#### Quick Stops into Wind:

1. Lookout turn, start a normal transition and aim for 20 ft AGL @ 50 kts.
2. On the command "cables, quick stop go".
3. Start a gradual flare at the same time lowering the collective (ballooning) and be ready with the pedals.
4. Tighten the flare to achieve zero ground speed.
5. Maintain the height with the collective.
6. As translational lift is lost the helicopter will tend to sink; be ready with the collective and the pedals.
7. Once a 20 ft controlled hover has been established move slowly forward and down to establish a 5 ft hover.

#### Warnings:

1. VORTEX ring.
2. High disc loadings.
3. The R22 has a low inertia rotor system, so it may be necessary to initiate the quick stop by leading with the collective, thus avoiding ballooning.



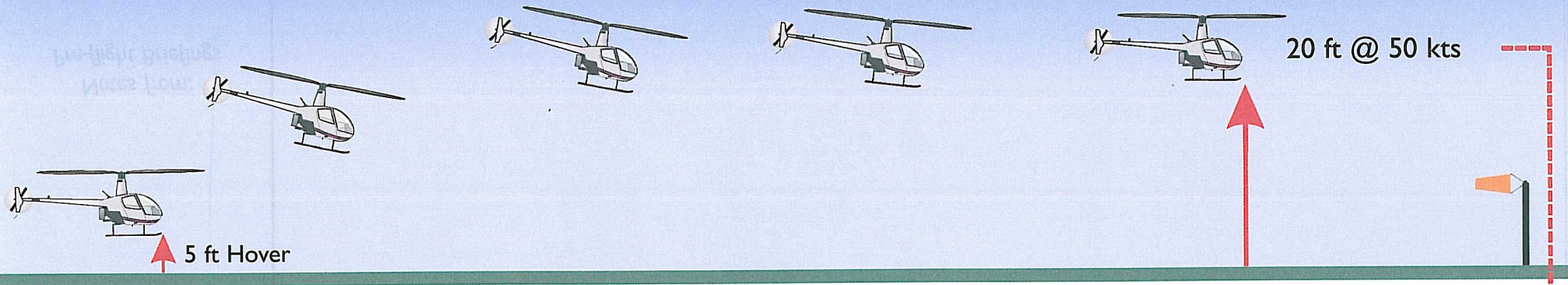
## Exercise 21

## Quickstops

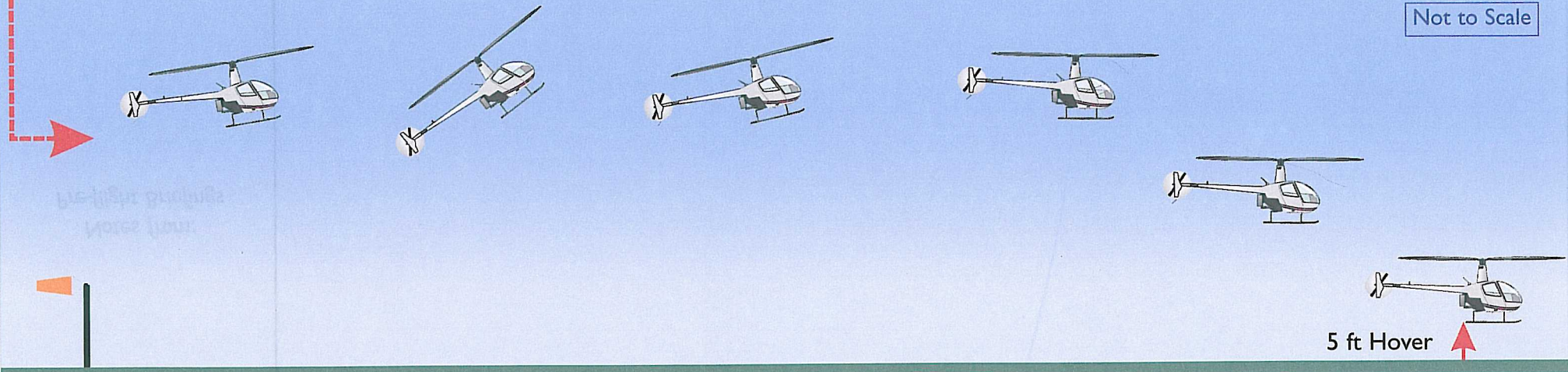
Part 2/3

POOLEY'S  
AIR PRESENTATIONS

Not to Scale



Not to Scale





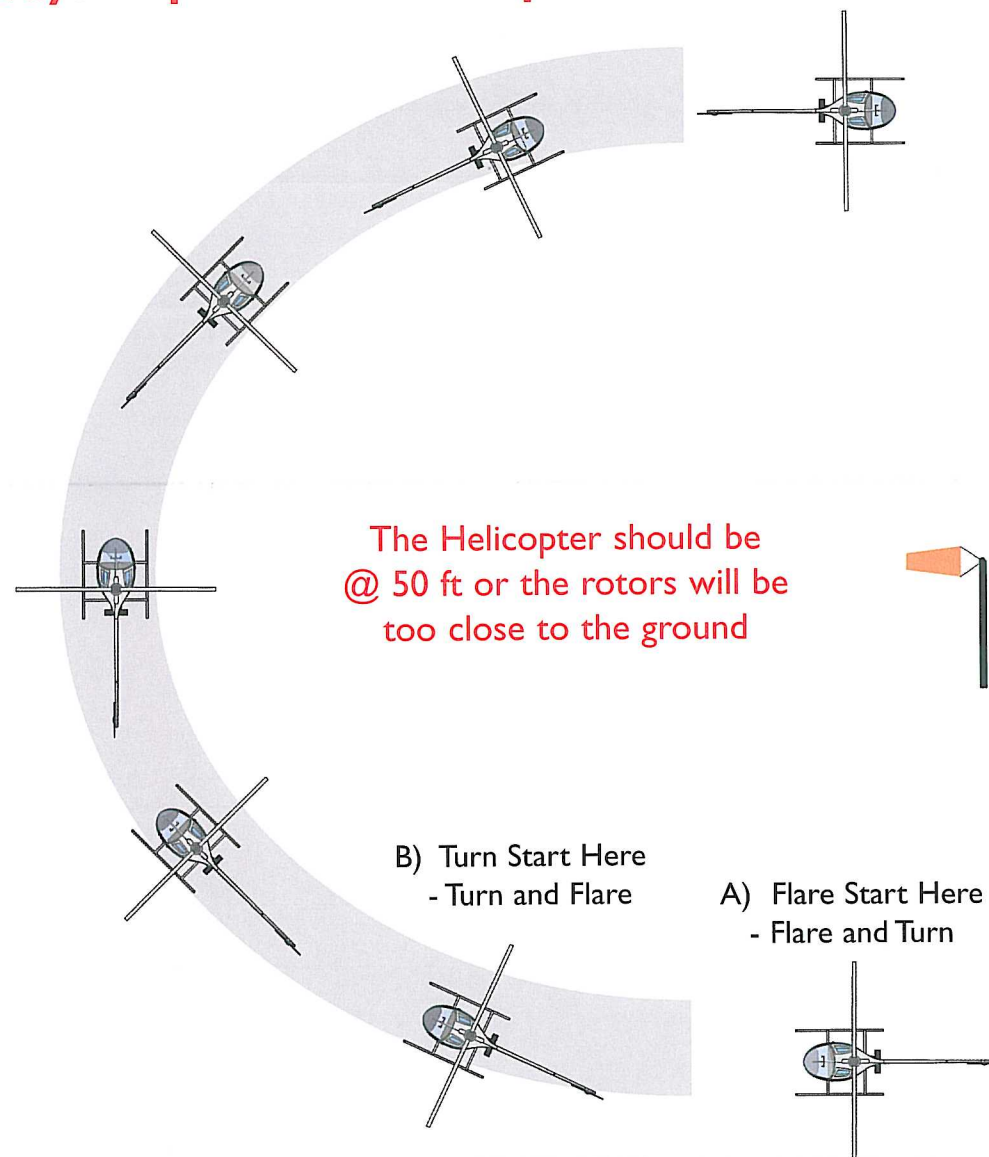
**Quick stops downwind, the object is always to place the helicopter into wind**

## A) Flare & Turn:

1. Start the flare at 50 kts downwind.
2. Check and adjust RPM as required avoiding overspeed.
3. As the airspeed decays enter a turn of some 25-30 degrees.
4. Maintain a minimum of 30 kts in the turn until the helicopter is within 30 degrees of the wind. Maintain balance **THROUGHOUT**.
5. Maintain height and flare aiming to come to the hover into wind.
6. Move forward slowly lowering the helicopter to a 5 ft hover.

## B) Turn & Flare:

1. Start the turn at 50 kts downwind.
2. Check and adjust RPM as required avoiding overspeed.
3. Start the flare during the turn, maintaining a minimum of 30 kts in the turn until the helicopter is within 30 degrees of the wind.
4. Check and adjust RPM as required avoiding overspeed.
5. Maintain height and flare aiming to come to the hover into wind.
6. Move forward slowly lowering the helicopter to a 5 ft hover.





## Exercise 22a

## Navigation

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to safely complete a cross country flight.

**Lesson Objective:** Demonstrate your ability to identify the basic requirements of flight planning to ensure safe navigation of a helicopter on a cross country flight.

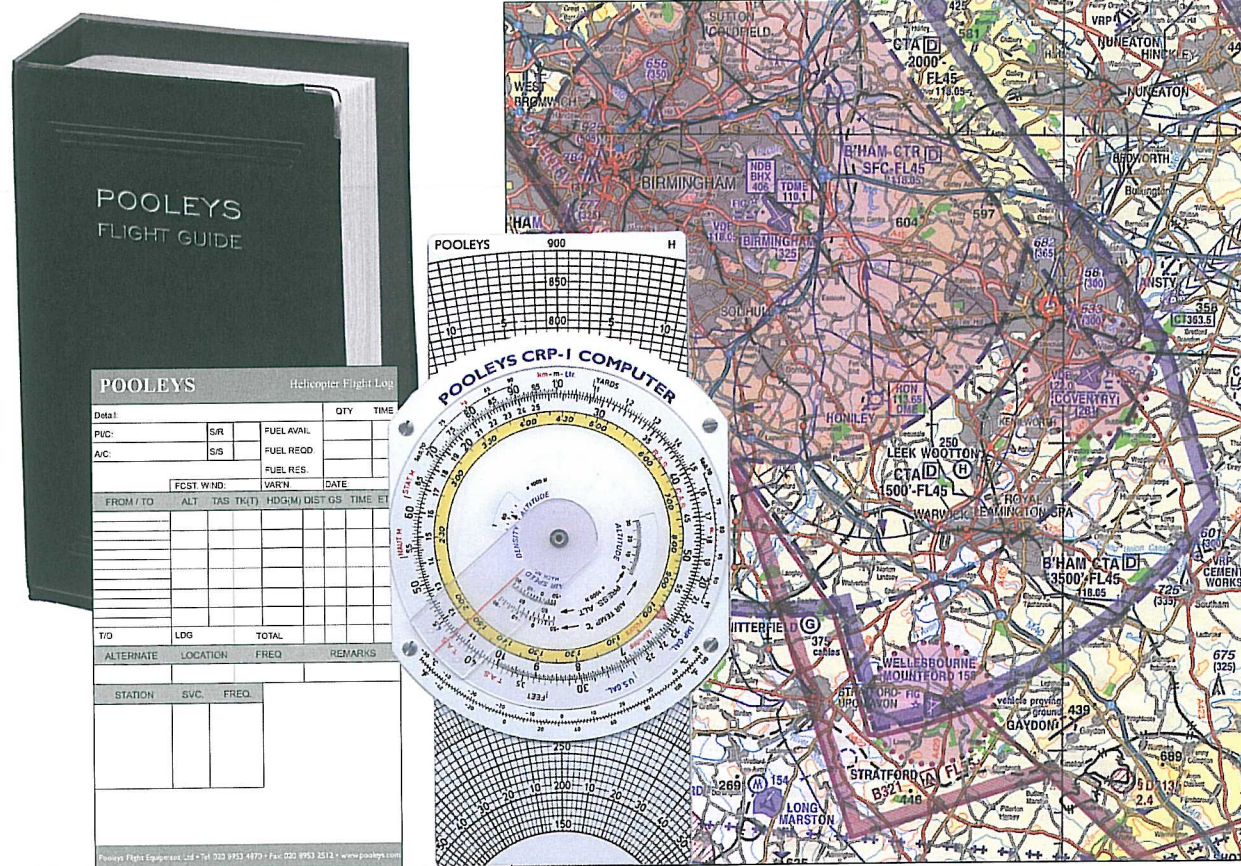
**Airmanship:** Checks. Lookout. Planning.

**Air Exercise:** To complete a cross country flight.

### Teaching Points:

### Personal Navigation Equipment:

1. A good watch that is clear and easy to read.
2. Up to date charts for the route.
3. CRP-I Computer.
4. Scales (ruler).
5. Protractor.
6. Pens, pencils, lumocolor or chinograph.
7. Up to date flight guide.
8. Flight log, which should be accurate, easy to use and clear.





## Teaching Points:

### Considerations:

1. **Weather** - Check TAFs and METARs and any SIGMETs for the route and at your destination airfield.
2. **Altimeter Setting Regions** - Check which ASRs you will be flying through.
3. **NOTAMs, AICs, AIPs & Royal Flights** - Study them, note relevant information.
4. **Route** - Check for any obstacles at least 10 nm either side of track, high ground, notified airspace, prohibited, restricted or danger areas, MATZs and ATZs and active airfields.
5. **Radio** - You should have up to date airfield and route frequencies. Safety Altitude
6. **Safety Altitude** - Calculate as 1000 ft above the highest obstacle within 10 nm of track. Enter it on the flight log for each leg.
7. **Cruising Altitude** - Determined by weather, obstacles and careful planning.
8. **Calculations** - RAS, TAS, W/V etc. Check, then check again (remember sensible information in, sensible information out) then get your instructor to check.
9. **Map** - Fold the map so you can see the route and at least 20 nm each side of it, Mark on the map. 10 nm or 10 min markers also 5 and 10 degree drift lines. Half and quarter way marks.
10. **Fuel** - Calculate the fuel required for the route and add 10% then add your diversion fuel. Finally add 30 min fuel for holding.
11. **Weight and Balance** - Calculate using information on the weight of fuel, crew, passengers and luggage.
12. **Take-Off and Landing Performance** - Having calculated the weight and balance, check the runways to be used and the W/V with regard to safe take off and landing performance.
13. **Booking Out** - Book out and or file a flight plan as necessary.
14. **Helicopter Documentation** - Check that the helicopter will be legal for the duration of the flight. Note any defects from the previous flight. Complete any required paperwork and sign the flight authorisation sheet. Be sure YOU are authorised.
15. **Arrival Airfield** - Study and check joining procedures, circuit procedures. Runway information i.e. all frequencies that will be required i.e. approach, tower, ground etc.

## Teaching Points:

### Diversion to Alternate Airfield:

1. Be positive about the diversion. Flying into deteriorating weather **will** kill you. A passenger may need medical attention or feel ill, it's your responsibility.
2. Inform ATC.
3. Mark the new track on the map and estimate the new heading and distance.
4. Turn onto the new heading and record the time.
5. Positively identify a ground feature to ensure the heading is correct.
6. Map read accurately and check the ground features. Counter for any drift and calculate ETA.
7. Correct track and time errors at the halfway point if possible.

### Uncertain of your Position:

1. Log your compass heading, DI heading and time.
2. Check your DI against the compass.
3. Check you are steering the heading in your flight log.
4. Calculate the approximate distance travelled since last known ground feature.
6. Identify a major landmark.
7. Inform ATC.
8. Ask for help without hesitation.

### Procedure when Lost:

1. Flying around aimlessly will waste fuel and valuable time.
2. Stay calm, and remember your training, the situation will only get worse if you panic.
3. Inform ATC and ask for help, or make a PAN call on 121.5.
4. Maintain your heading.
5. Check DI, compass and flight log.
6. Check the fuel remaining and sunset time.
7. Is the compass being affected by an object placed near it?
8. Consider requesting a QDM or QTE or radar steer.
9. Start checking from last known position regarding heading and time.
10. Read the map from ground to map, is there a unique feature?
11. **Check the safe altitude and proximity of any controlled airspace.**
12. Estimate the distance flown from your last known position and apply it to the track plus or minus 10% then draw 30 degree drift lines either side of your track. This should denote the area you are in.
13. Follow the necessary instructions from ATC or from the distress and diversion cell.
14. In the worst event carry out a **precautionary landing**.



## Exercise 22b

## Navigation Problems at Low Height and Reduced Visibility

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn how to navigate safely at lower levels and in poor visibility.

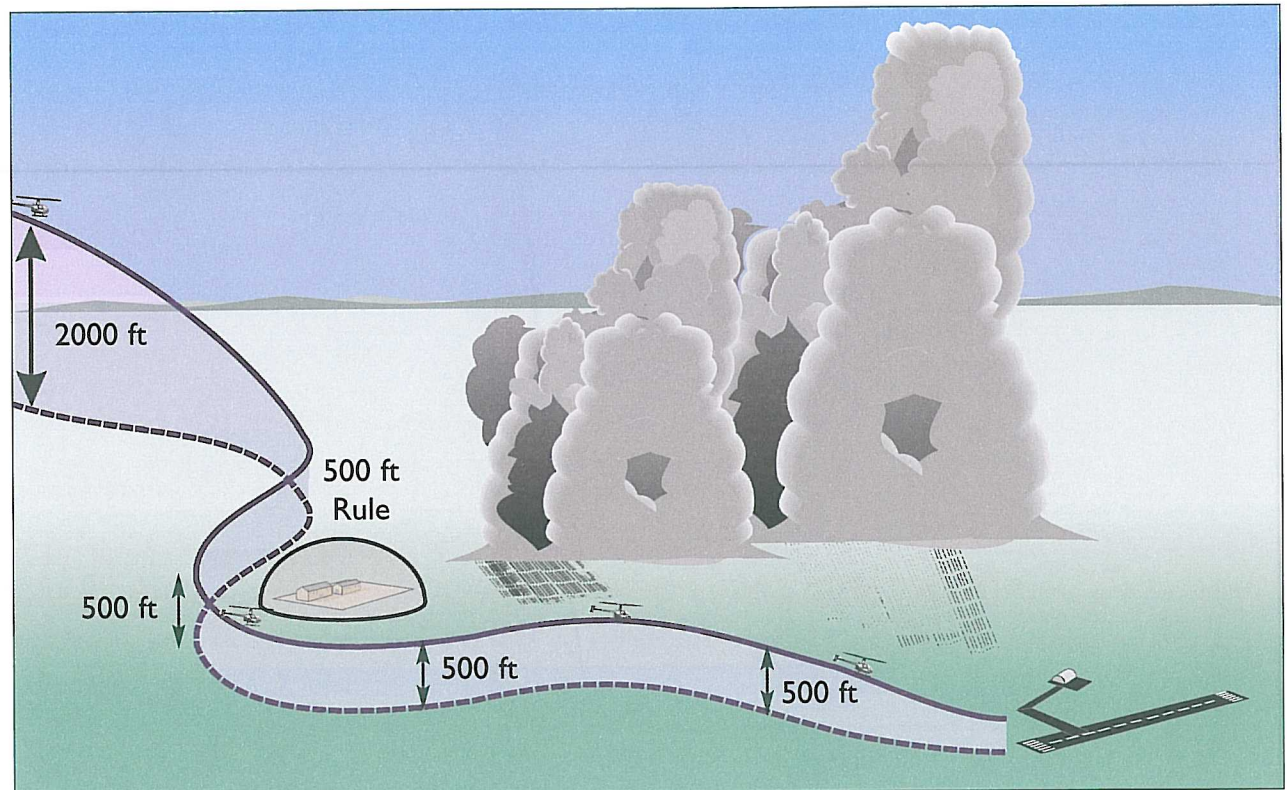
**Lesson Objective:** Demonstrate your ability to navigate the helicopter safely at lower levels and to know the procedures to use when the visibility has reduced/and or the cloud base is lowering.

**Airmanship:** Lookout. Location. Weather. Safe altitudes. High ground & obstacles. Effect of drift/groundspeed.

**Air Exercise:** To simulate poor weather, darkness approaching and the problems of low level navigation.

### Teaching Points:

1. Pre-descent checks, engine, high ground, lights on, etc.
2. High work load at low levels.
3. Inform ATC. Poor or no reception at low level.
4. Obstructions below 300 ft not on chart, remember the 500 ft rule.
5. Air speed slow safe cruise.
6. Visual impressions and height maintenance keeping difficult at low level.
7. Difficult map reading at low level.
8. Turbulence and wind shear greater at low level.
9. Heavy rain cuts down visibility, large droplets cause refraction.
10. Military aircraft fly low level.
11. Precautionary landing sooner rather than later.





## Exercise 22c

## Radio Navigation VOR

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to use the VOR.

**Lesson Objective:** By the end of the lesson you will be able to use the main features of the VOR accurately to permit safe radio navigation.

**Airmanship:** Lookout. Location. Frequencies. Morse Code.

**Air Exercise:** To fly the VOR. **F** - Select Correct Frequency. **I** - Ident. **B** - Bearing, radial selected and display in correct sense.

### Teaching Points:

#### Intercepting a chosen Radial:

1. F.I.B.
2. If tracking TO the station select the required magnetic track inbound using the OBS. Check that the TO flag is showing.
3. Steer heading to intercept chosen radial eg. track +/- 30/45/60 degrees.
4. Monitor rate of track closure and aim to turn on track with needle centred.

#### Tracking TO a VOR:

1. Once intercepted, check TO flag is showing and the correct QDM is set under course index.
2. If CDI to the right, fly right, if CDI to the left, fly left, to intercept required track.  
**Fly the D.I. not the C.D.I.**

#### Tracking FROM the VOR:

1. F.I.B.
2. Select required magnetic track on course index.
3. Check the FROM flag is showing.
4. If C.D.I. right, fly right, if C.D.I. left, fly left.  
**Fly the D.I. not the C.D.I.**

#### Obtaining a VOR Position Fix:

1. Select 2 VORs as close to a 90 degree cut as possible.
2. Frequency and ident check.
3. Rotate OBS to centre the C.D.I. with FROM flag showing.
4. Plot radial on chart and repeat with second VOR to give fix.
5. Estimate your position.
6. Does it make sense?



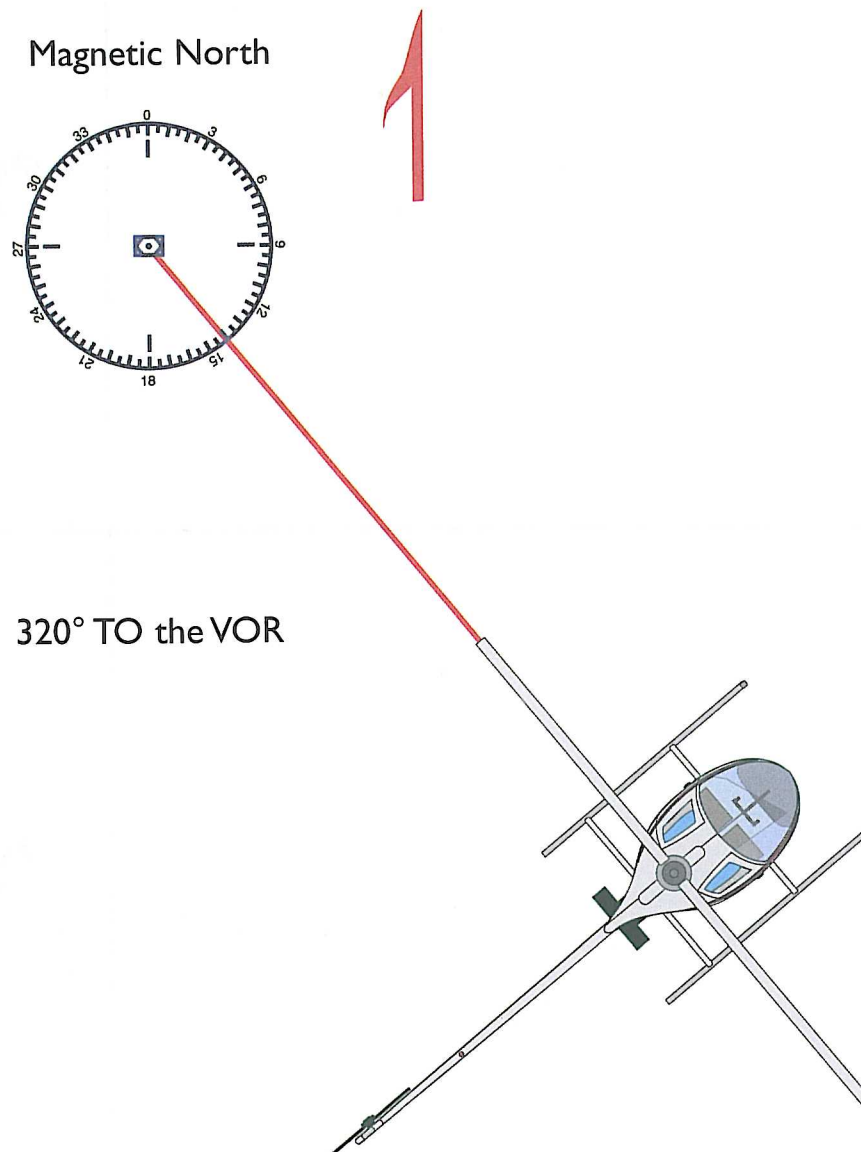


## Exercise 22c

## Radio Navigation VOR

Part 2/3

POOLEY'S  
AIR PRESENTATIONS



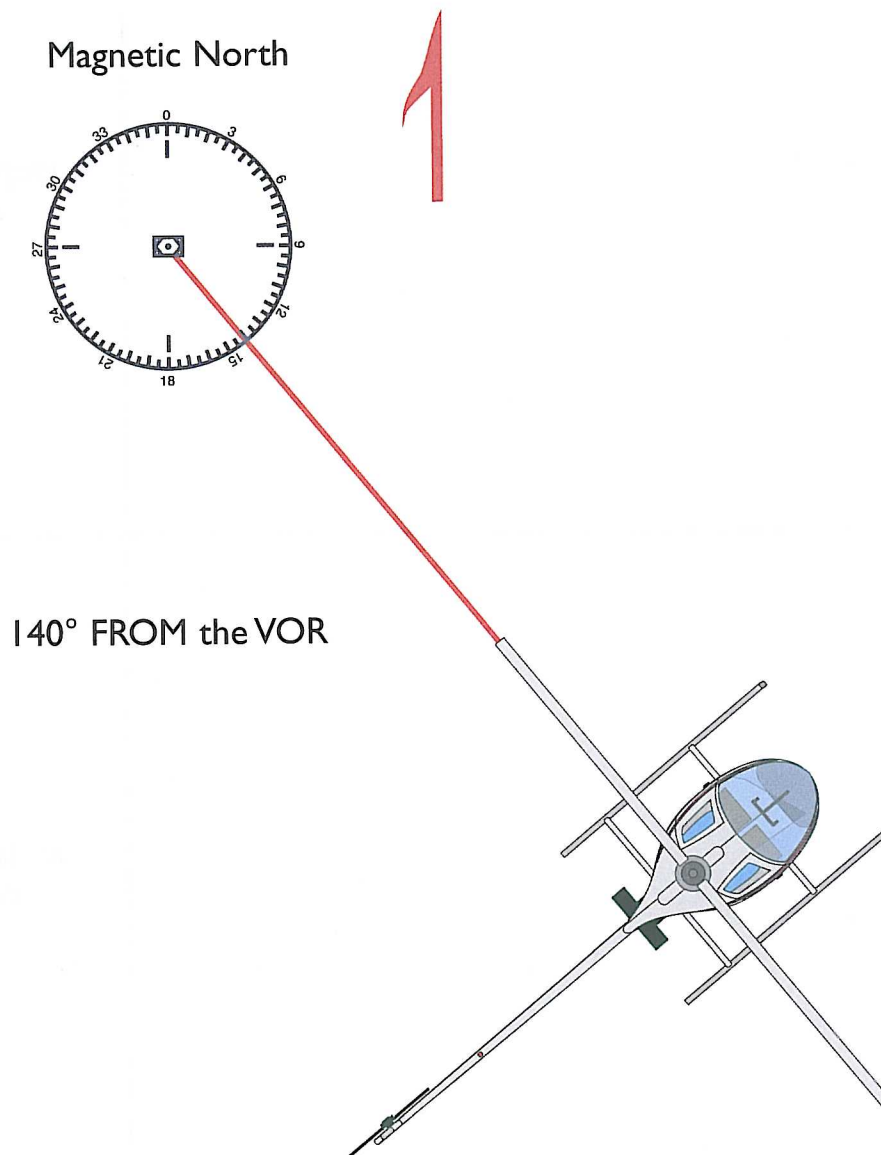
To determine your course from your present position **TO** a VOR station, tune into the station and turn the OBS knob until the CDI needle centres with **TO** indication.

## Exercise 22c

## Radio Navigation VOR

Part 3/3

POOLEY'S  
AIR PRESENTATIONS



To determine your present direction **FROM** a VOR station, tune into the station and turn the OBS knob until the CDI needle centres with a **FROM** indication.



## Exercise 22c

## Radio Navigation ADF

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to use the ADF equipment fitted to the helicopter.

**Lesson Objective:** By the end of the lesson you will be able to use the main features of the ADF accurately to permit safe radio navigation, and allow you to home to and away from an NDB.

**Airmanship:** Lookout. Location. Frequencies. Range. Limitations.

**Air Exercise:** To fly the ADF. **F** - Select Correct Frequency. **I** - Ident. **B** - Bearing, radial selected and display in correct sense.

### Teaching Points:

#### Tracking to the Beacon:

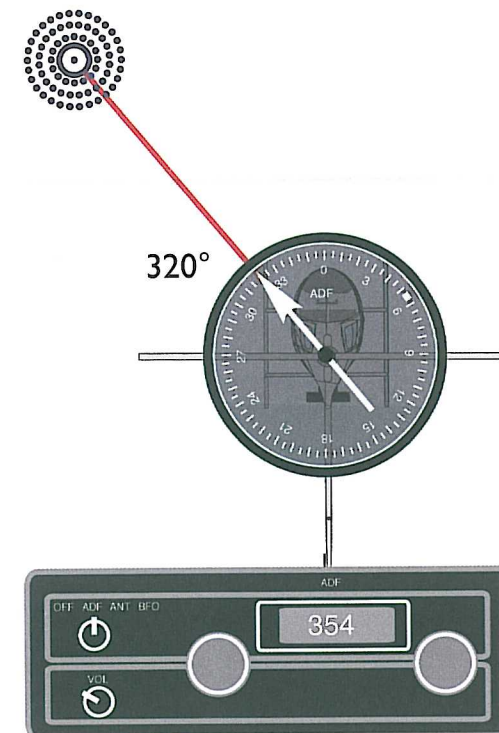
1. F.I.B. and regular compass DI checks are required.
2. Orientate the helicopter and fly the heading to intercept the chosen radial/QDM.
3. Once the radial has been intercepted, initially fly the same heading as track.
4. If the head of the needle moves LEFT the helicopter is RIGHT of track.
5. If the head of the needle is 10 degrees LEFT, turn LEFT 20 degrees (Track -20 degrees).
6. Fly the new heading until the needle shows +20 degrees.
7. Turn the helicopter back on to track and allow for drift.

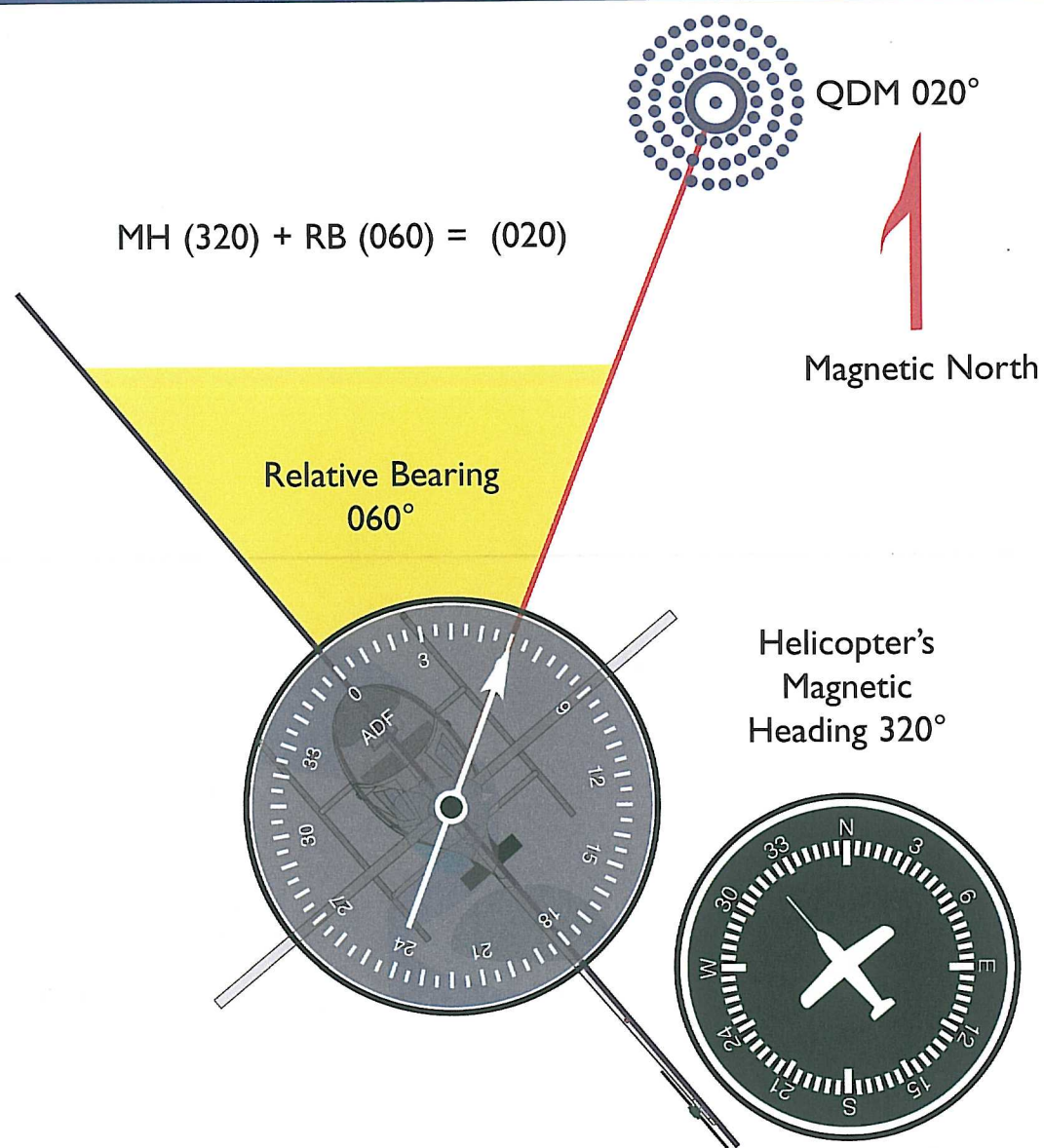
#### Tracking from the Beacon:

1. Use the same procedure as above, however, the needle now points back.

#### Points to Remember:

1. If the head of the needle moves LEFT - TURN LEFT.
2. If the head of the needle moves RIGHT - TURN RIGHT.
3. Regular FREDA checks.





**Note:** By mentally superimposing the ADF needle on top of the DI - this will show your QDM and QDR.

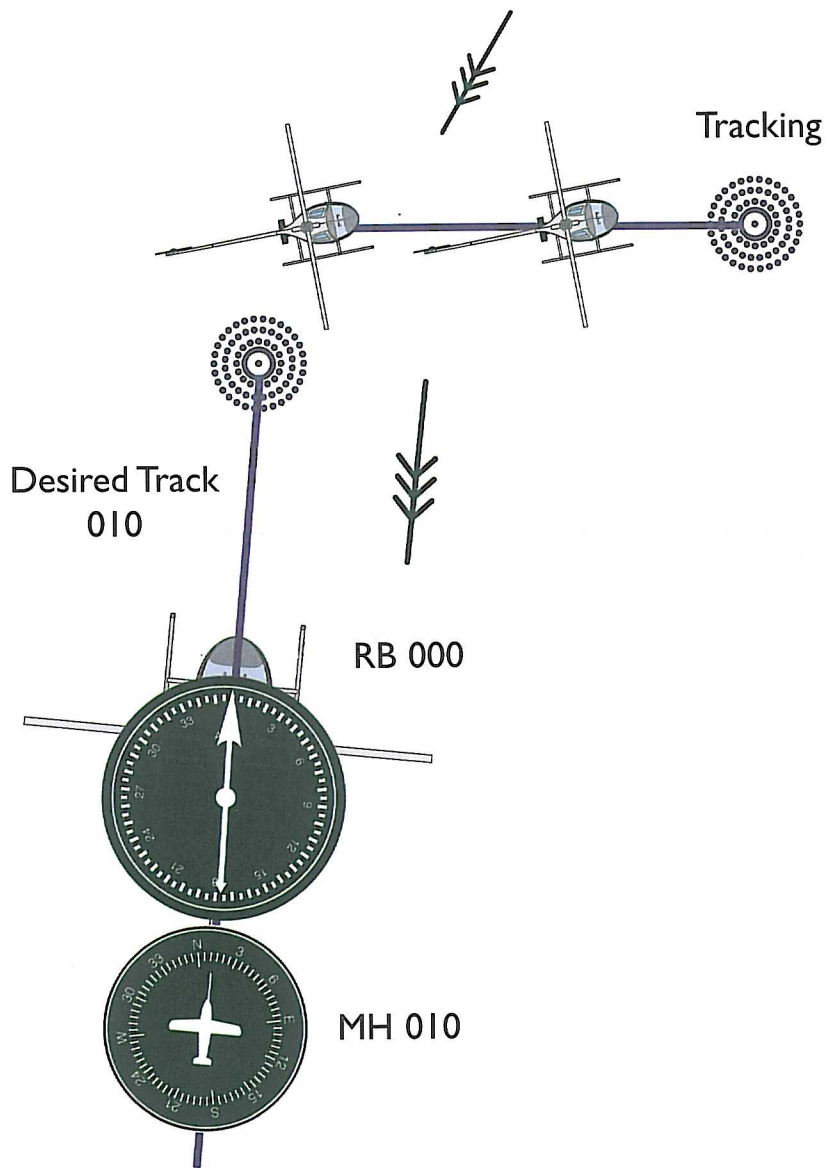
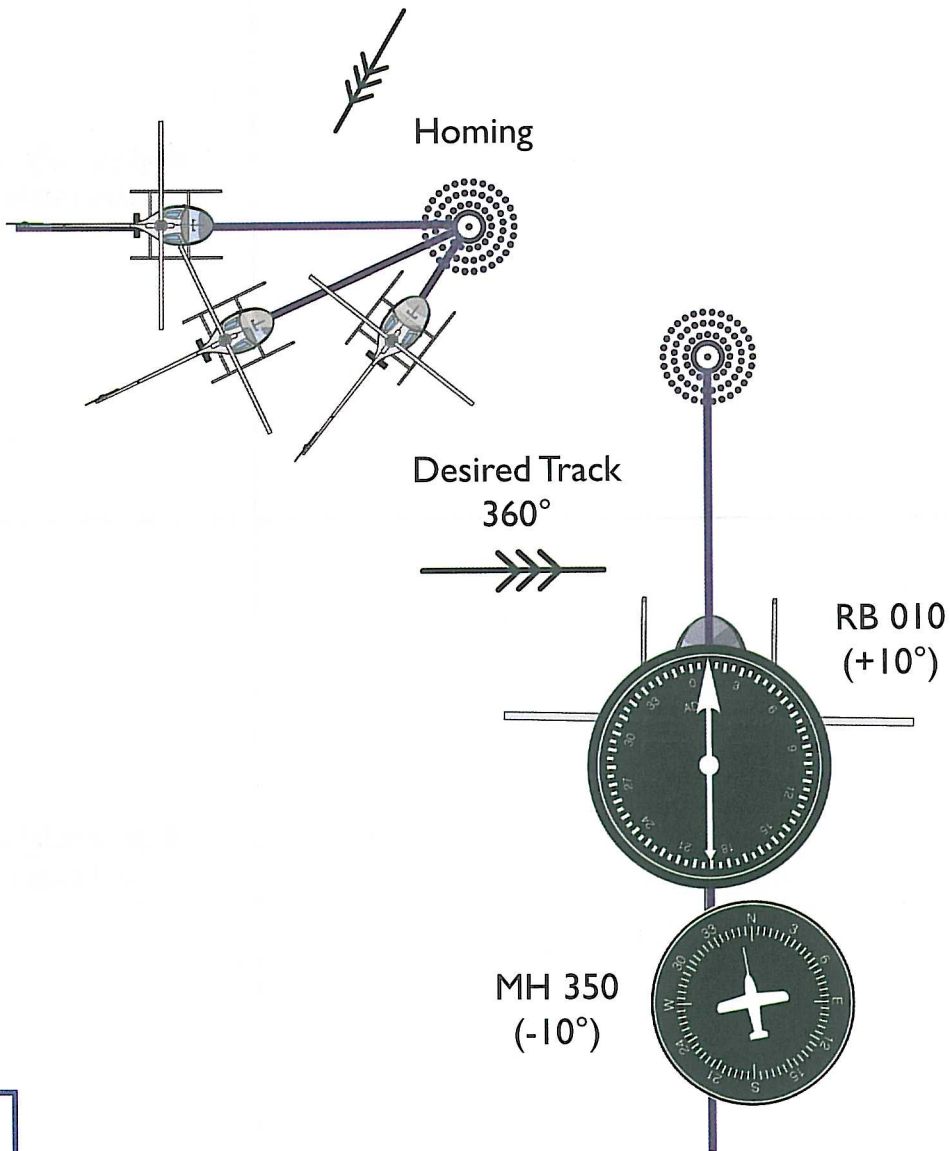


## Exercise 22c

# Radio Navigation ADF

Part 3/3

POOLEY'S  
AIR PRESENTATIONS



## Exercise 22c

## Radio Navigation VHF/DF

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn to use the procedures of VHF direction finding.

**Lesson Objective:** By the end of the lesson you will be able to use the procedures and services of VHF direction finding accurately to permit safe radio navigation.

**Airmanship:** Lookout. Location. Frequencies.

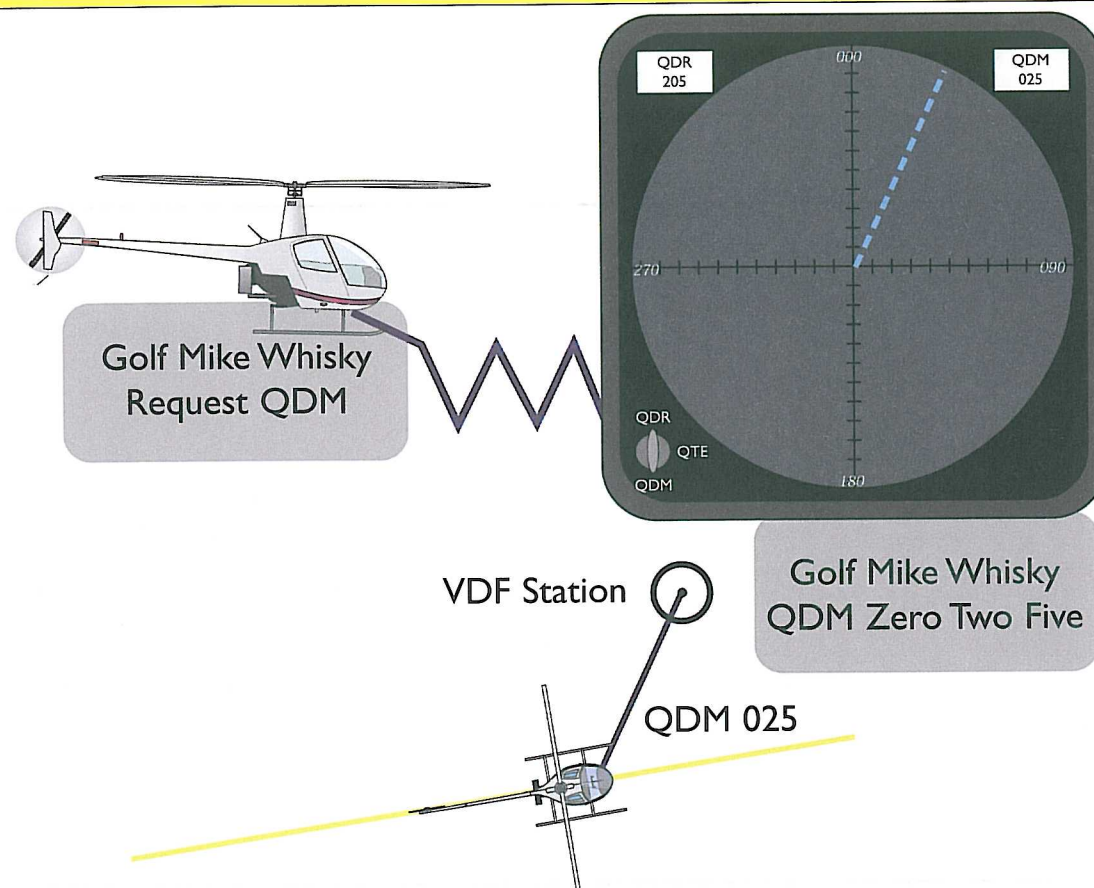
**Air Exercise:** To fly a QDM and homing.

### Teaching Points:

1. Use of VHF direction finding.
2. Availability, AIP, frequencies.
3. R/T procedures and ATC liaison.
4. Obtaining a QDM and homing.

### VDF Bearings:

1. QDM magnetic bearing **TO** the station.
2. QDR magnetic bearing **FROM** the station (reciprocal of QDM).
3. QTE true bearing **FROM** the station.





## Teaching Points:

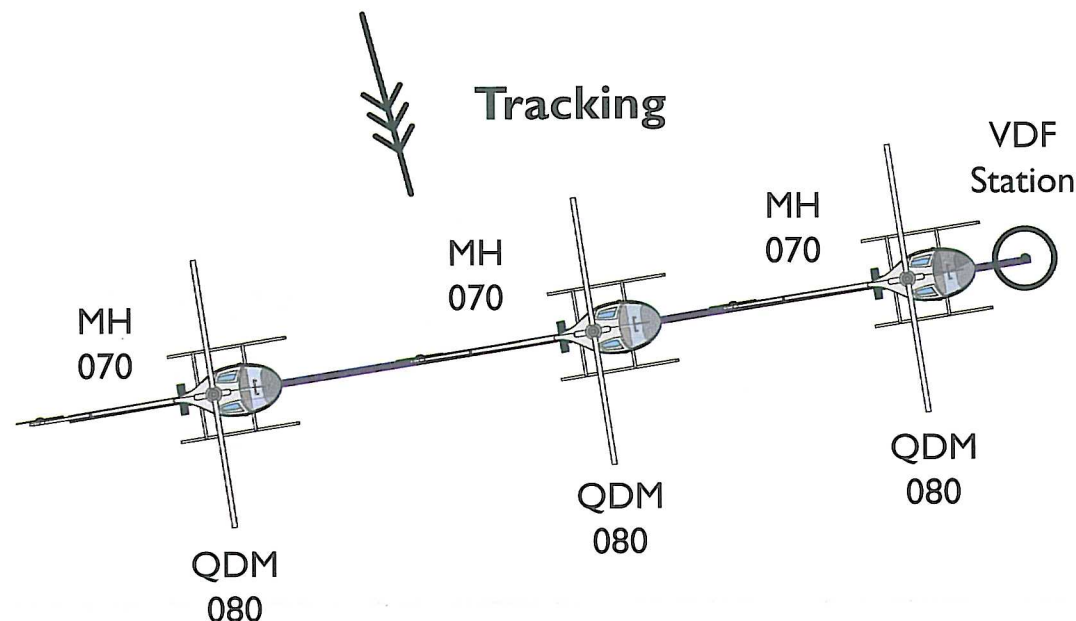
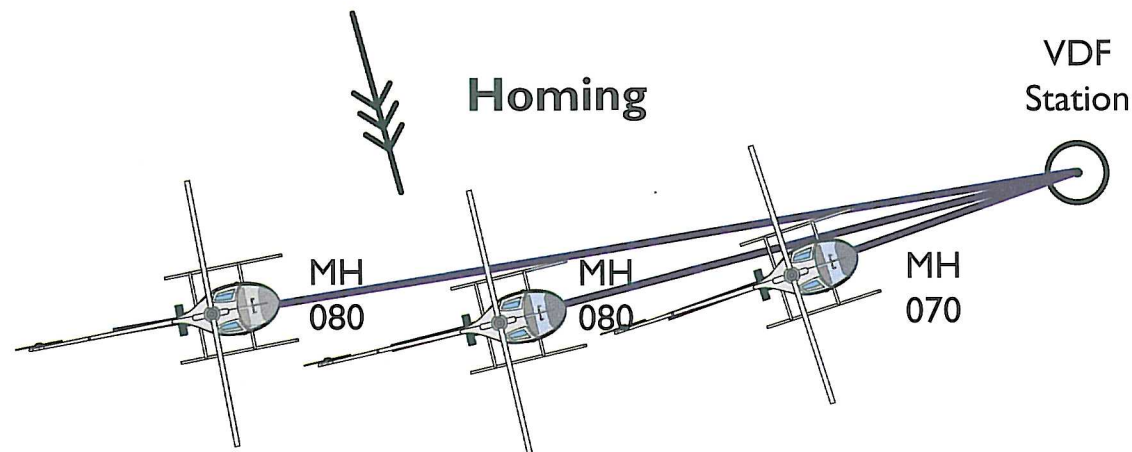
Modern equipment is generally accurate to  $\pm 2^\circ$  degrees, however accuracy may be decreased by:

**VDF Site Errors:** such as reflection from nearby uneven ground, buildings, aircraft or vehicles.

**VHF Propagation Errors:** caused by irregular propagation over differing terrain, especially if the helicopter is at long range from the VDF ground station.

### VDF Bearing Accuracy:

- Class A.** Accurate to within  $\pm 2$  degrees.
- Class B.** Accurate to within  $\pm 5$  degrees.
- Class C.** Accurate to within  $\pm 10$  degrees.
- Class D.** Less accurate than class C, CAP 46 lists some class D VDF stations with accuracy less than  $\pm 10$  degrees.



## Exercise 22c

## Radio Navigation Enroute and Terminal Radar

Part 1/2

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the use of en-route/terminal radar.

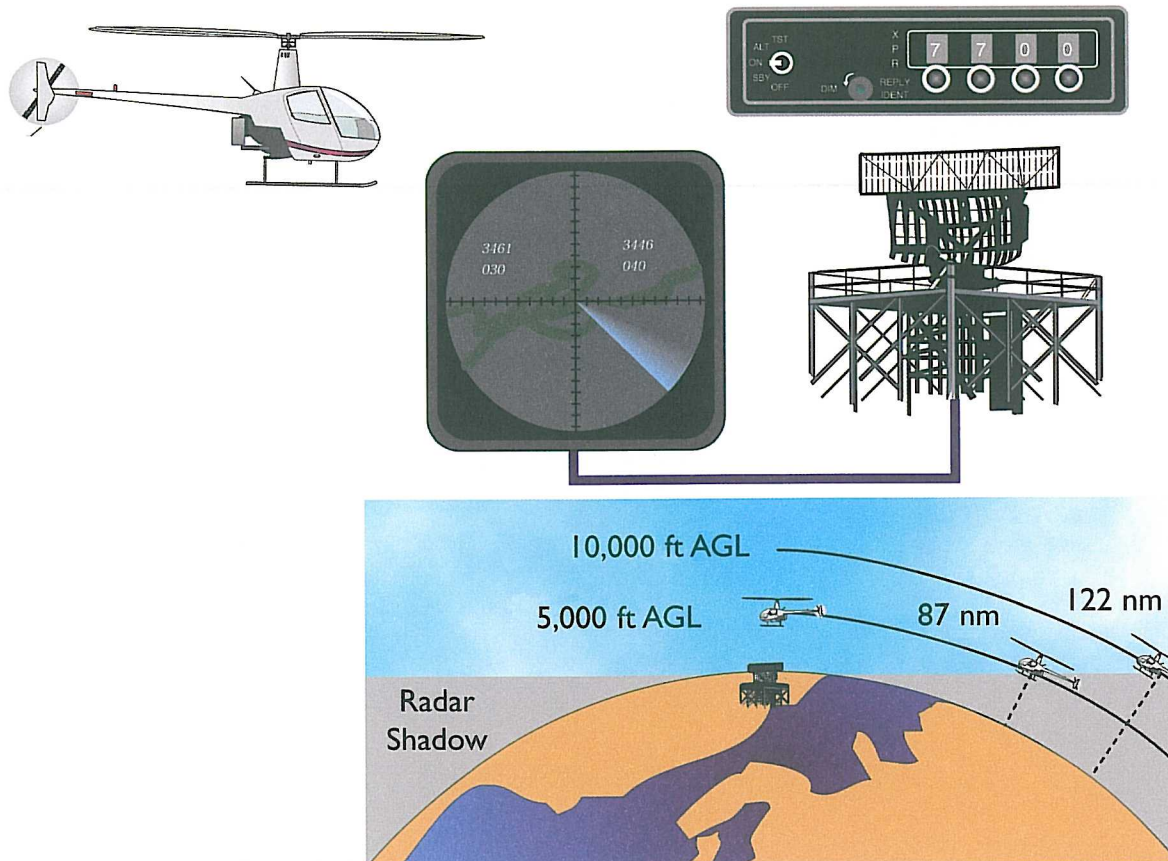
**Lesson Objective:** By the end of the lesson you will be able to use the procedures and services of en-route/terminal radar accurately to permit safe navigation.

**Airmanship:** Lookout. Location. Airspace, prohibited, controlled, restricted and safe altitudes. Frequencies.

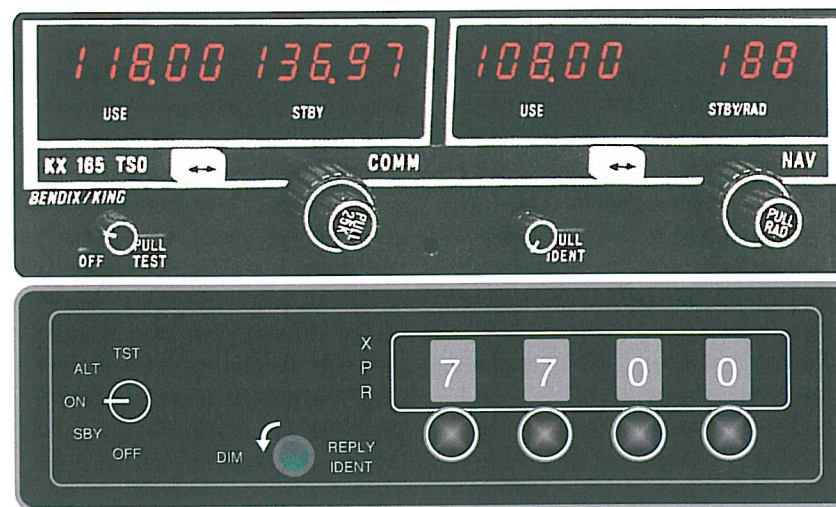
**Air Exercise:** Use radar services.

### Teaching Points:

1. Use of en-route/terminal radar.
2. Availability, AIP, frequencies.
3. R/T procedures and ATC liaison.
4. Pilot's responsibilities.
5. Secondary surveillance radar.
6. Transponder code selection, interrogation and reply.







**Function Selector Knob:** Enables the crew to select the various operating modes.

**OFF:** Switches off the transponder.

**SBY:** Allows the transponder to warm up ready for use.

**ON:** Transmits the selected code in mode "A" (helicopter identification mode).

**ALT:** Altitude reporting capability mode "C" (if fitted to the helicopter).

**TST:** Tests the correct operation of the transponder by generating a self interrogation signal. Success illuminates the reply monitor light (some models).

**Code Selection Knobs:** Crew should select standby when selecting or altering codes.

**Reply Monitor Light:** Flashes to indicate the transponder's response to interrogation.

**Ident Button (Switch):** Allows positive identification by radar controller, squawk ident.

#### Special Transponder Codes:

|             |                                 |
|-------------|---------------------------------|
| <b>2000</b> | Crossing International Boundary |
| <b>7000</b> | Conspicuity                     |
| <b>7500</b> | Unlawful Interference or Hijack |
| <b>7600</b> | Radio Failure                   |
| <b>7700</b> | Emergency                       |

## Exercise 23

## Advanced Take-Off, Landings and Transitions

Part 1/4

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and techniques to safely take-off, landing and transition out of wind.

**Lesson Objective:** By the end of the lesson you will be able to demonstrate your ability to safely take-off, land and perform a transition out of the wind.

**Airmanship:** Lookout. Wind strength. Surface and obstructions.

**Air Exercise:** Take-off, landing, transition & hover out of wind.

### Teaching Points:

#### General Limitations R22:

1. The cyclic has restrictive control limits in the aft position compared to forward movement.
2. Flight when surface winds exceed 25 kts, including gusts, is prohibited (*unless the pilot has 200 hrs logged, of which 50 hrs should be on type*).
3. Flight when surface wind gusts exceed 15 kts is prohibited.
4. Continued flight in moderate, severe or extreme turbulence is prohibited.
5. Demonstrated X-wind component 17 kts.

This is a Light Helicopter. It is better looking up at the sky wishing you were up there amongst the birds, than being amongst the birds and wishing to **HELL** that you were safely on the ground.

#### Lift-off (out of wind):

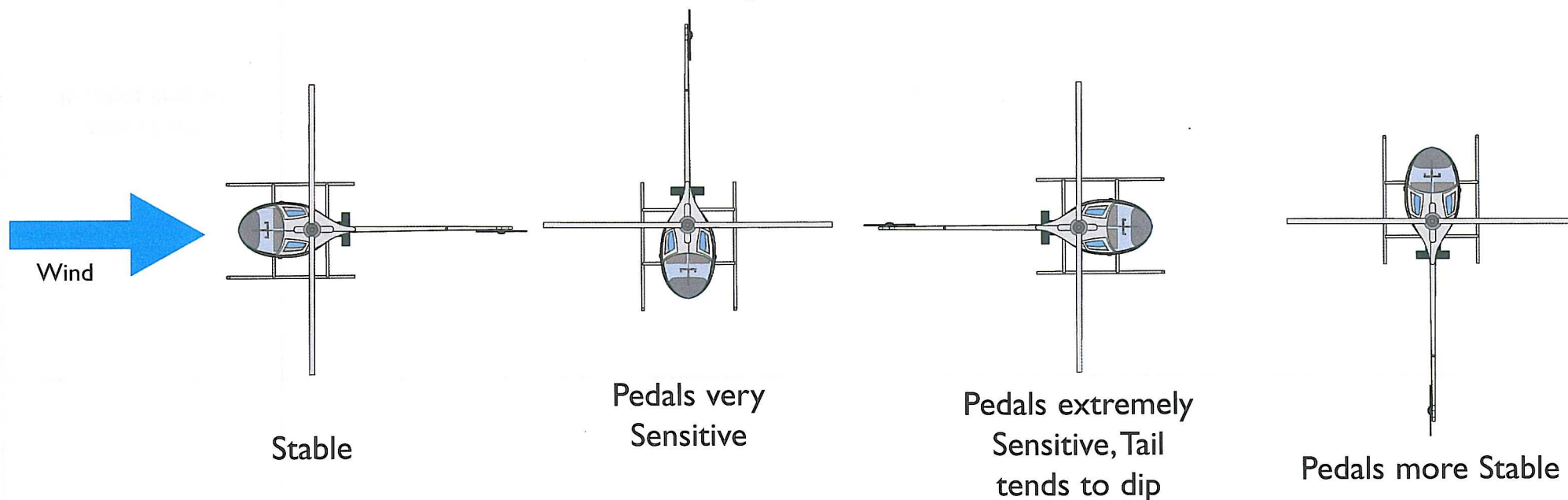
1. Anticipate the wind and offset the cyclic in to wind.
2. Perform a normal lift-off: Pedals will be more sensitive.
3. Dynamic rollover may occur if you allow rotation about one skid.

#### Landing:

1. Stabilise the helicopter in a well established hover.
2. Control heading with pedals and ground position with the cyclic.
3. There must be NO backwards or sideways travel (*dynamic rollover*).
4. Lower the collective and perform a POSITIVE landing.
5. Maintain control, the helicopter has not landed until the collective is fully down and the cyclic centralized.



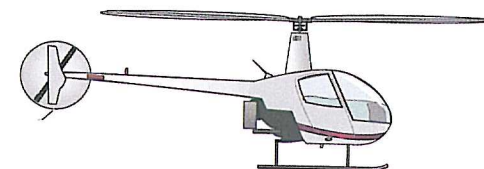
## Hovering Out of Wind



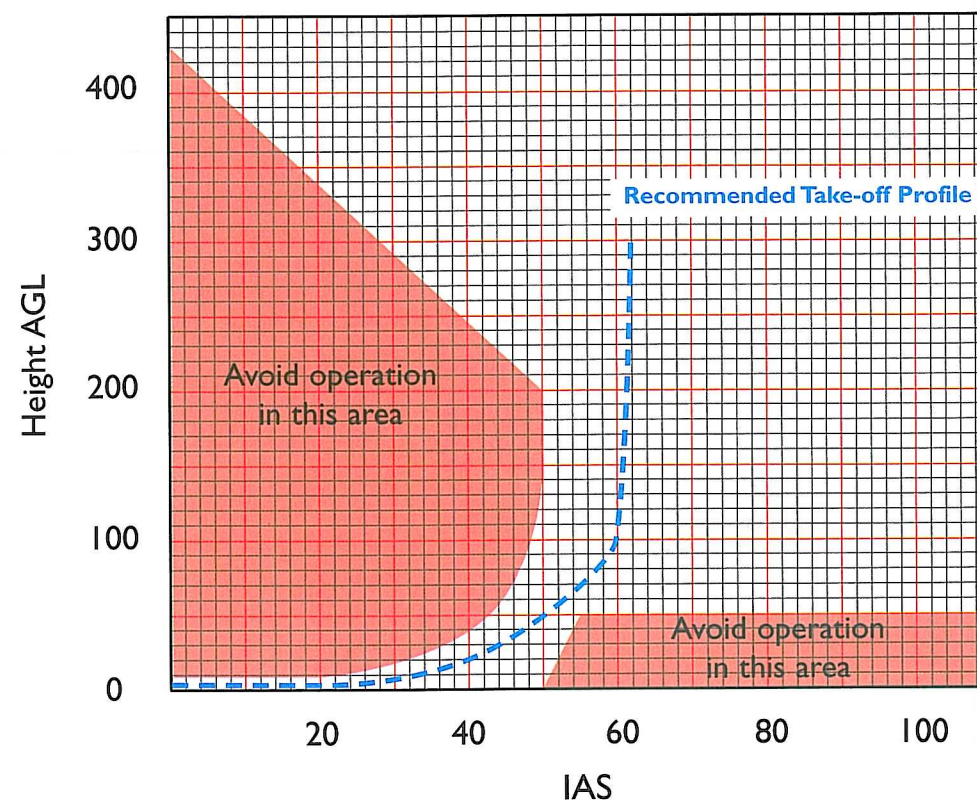
## Teaching Points:

### Downwind Take-Off Transition:

1. The helicopter will be in the avoid curve longer.
2. The downwind component should not exceed 10 kts.
3. In the event of an abandoned take-off you will need a suitable area ahead to complete a run on landing.
4. The climb will be shallow, obstructions are a great danger.
5. Ensure you have a reasonable power margin.
6. The transition should be gentle, slowly accelerating the helicopter making small attitude changes, it will take longer to attain translational lift. Ground speed will be high at this point.
7. Use power as required maintaining RPM control.
8. Prevent a height loss by the use of the collective.
9. Transition as normal to 40 kts and continue climbing at 60 kts.



Not for Operational Use 'Training Aid Only'





## Exercise 23

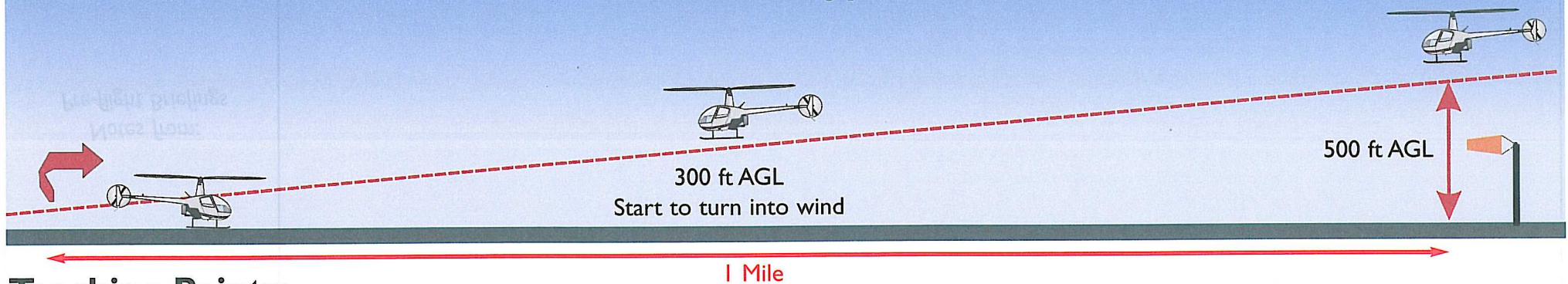
## Advanced Take-off, Landings & Transitions

Part 4/4

POOLEY'S  
AIR PRESENTATIONS

Not to Scale

### Downwind Approach



### Teaching Points:

#### Downwind Landing Transition:

1. The downwind component should not exceed 10 kts.
2. The approach will be shallow, obstructions are a great danger.
3. Ensure you have a reasonable power margin.
4. There is a danger of entering the vortex ring if the rate of descent is not controlled.
5. Rate of descent is controlled with the collective.
6. Angle of descent is controlled with the cyclic.
7. The landing should always terminate into wind.

#### Go Around if in doubt or:

1. Cyclic approaches aft stop.
2. Difficulty in directional control.
3. Power margin too low.
4. Rate of descent becomes high and the helicopter's airspeed becomes low.

## Exercise 24

## Sloping Ground

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the procedures and techniques to take-off and land on sloping or uneven ground.

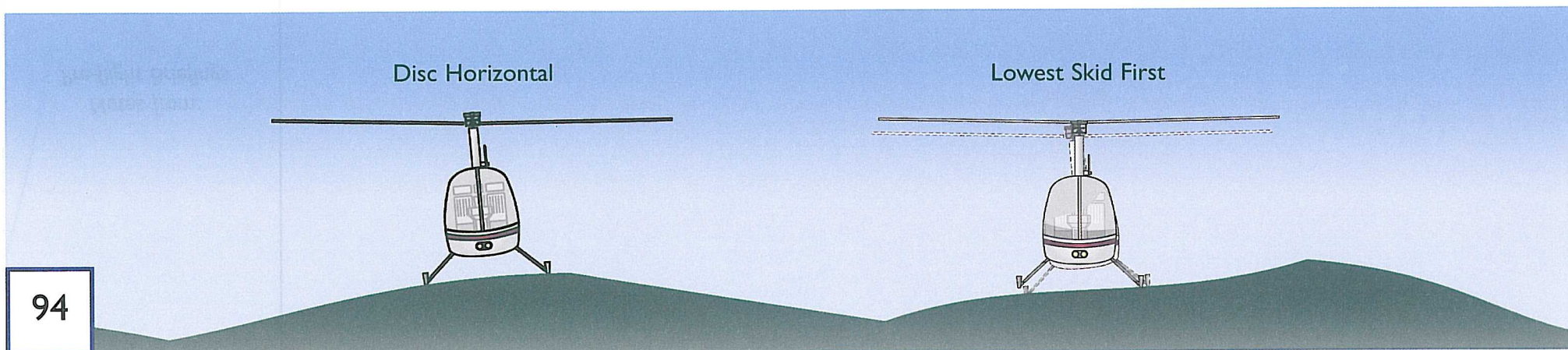
**Lesson Objective:** By the end of the lesson you will be able to demonstrate your ability to safely take-off and land on sloping or uneven ground.

**Airmanship:** Lookout. Wind strength & direction in relation to the slope. Surface and obstructions.  
Dangers of dynamic roll over. Use other landing area.

**Air Exercise:** Take-off & landings on sloping ground.

### Teaching Points:

1. Helicopter limitations.
2. Assessing slope angle.
3. Effect of helicopter C of G when on slope.
4. Ground effect on slope.
5. Power required.
6. Right skid up slope.
7. Nose up slope.
8. Avoidance of dynamic rollover  
- avoid sideways movement into slope.
9. Dangers of sideways sliding on soft ground on touchdown.
10. Danger of striking main/tail rotor by harsh control movements near the ground.





## Exercise 24

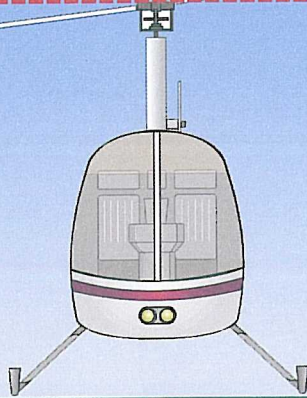
## Sloping Ground

Part 2/3

POOLEY'S  
AIR PRESENTATIONS

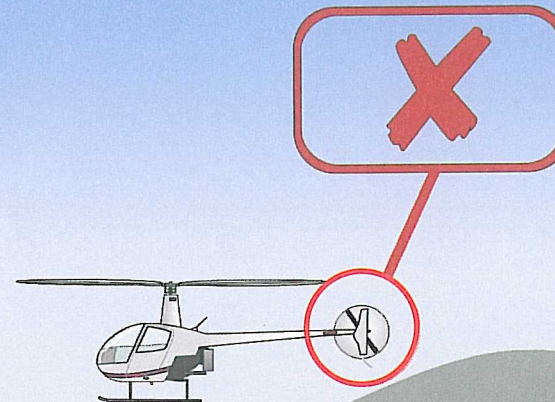
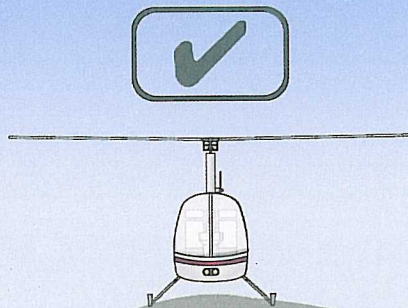
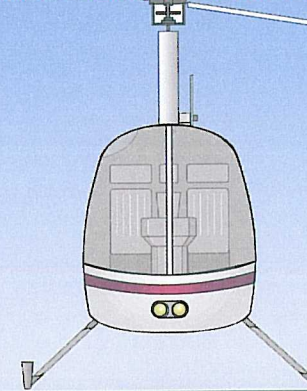
### Other Considerations on Landing

8°

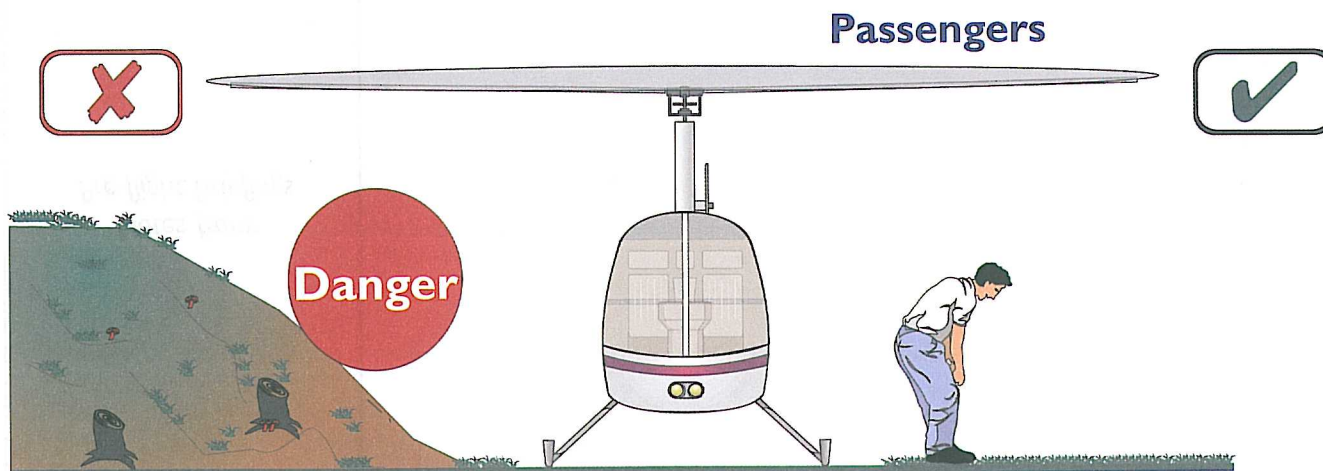


Lateral Cyclic Deflection  
Control Limitations

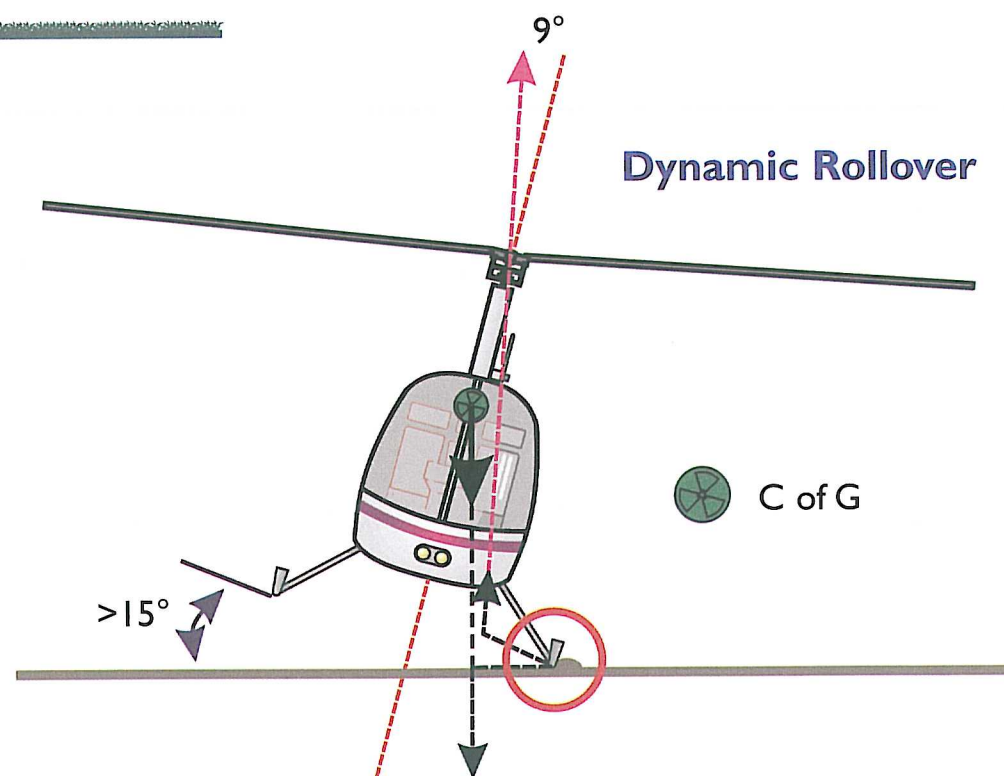
10°





**Take-Off:**

1. Pre take-off checks, increase RPM to the top of the green.
2. Ease cyclic gently towards the slope & into wind.
3. Gently raise the collective until the lower skid lifts off from the ground.
4. Cyclic to maintain the disc horizontal, maintain heading with the pedals.
5. DO NOT let the upper skid rotate about an obstruction.
6. Continue to raise the collective until the helicopter is horizontal with relation to the disc.
7. As the upper skid leaves the ground continue to raise the collective and be ready with the cyclic to adopt the hover attitude which should be higher than normal.





## Exercise 25

## Limited Power

Part 1/8

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the the procedures and techniques when the available power is limited.

### Lesson Objective:

By the end of the lesson you will be able to demonstrate your ability to safely hover, take-off, climb and land when the power is limited.

### Airmanship:

Lookout. Weight. Humidity. Altitude. Performance charts. Engine performance. Obstructions.

### Air Exercise:

Hover, take-off, climb & landing.

## Teaching Points:

### Take-Offs:

#### Power Available Checks:

1. Lift to a 2ft hover and check manifold pressure.

|            |   |                               |
|------------|---|-------------------------------|
| 2" or more | = | vertical take-off capability. |
| 1"         | = | towering take-off capability. |
| 0"         | = | cushion creep capability.     |
| -1"        | = | running take-off.             |
| -2"        | = | possible running take-off.    |
| -3"        | = | GO HOME.                      |

### Landings:

#### Power Available Checks:

1. Fly at 53 kts check MP for level flight. Accuracy is important to produce stable figures. Raise the collective to check for maximum power available. The difference between the two figures is your **Power Margin**.

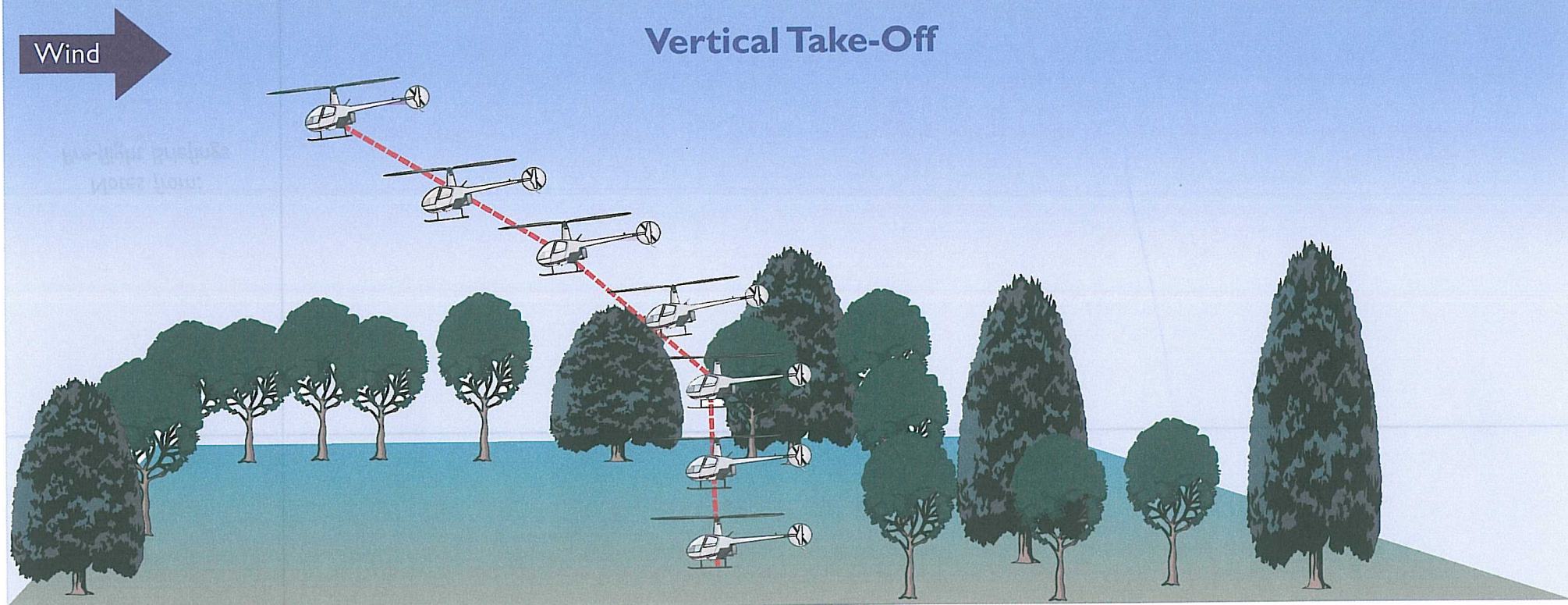
|              |   |                                           |
|--------------|---|-------------------------------------------|
| 7"           | = | helicopter has full vertical performance. |
| 6"           | = | helicopter will hover OGE.                |
| 5"           | = | helicopter will hover IGE.                |
| 4"           | = | Zero-Zero landing.                        |
| Less than 4" | = | running landing.                          |

## Exercise 25

## Limited Power

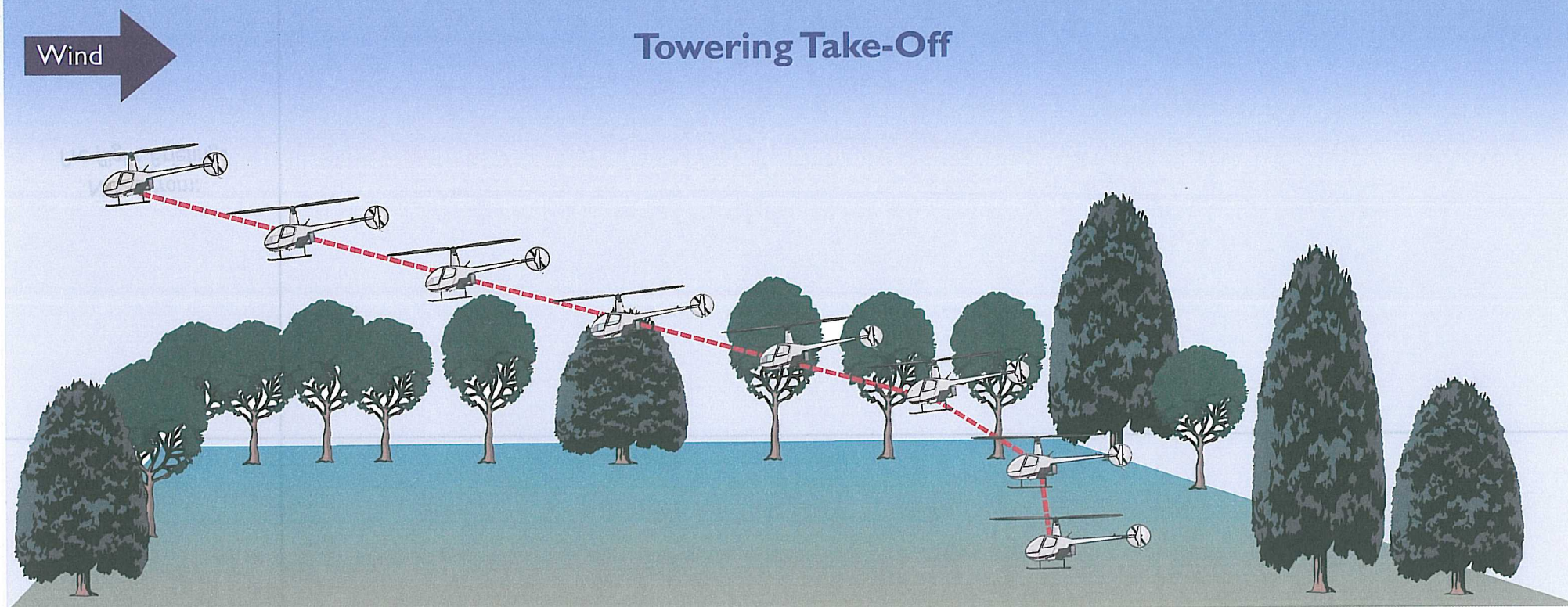
Part 2/8

POOLEY'S  
AIR PRESENTATIONS



1. Good lookout.
2. Select reference markers in your forward and lateral vision.
3. Smooth application to full power.
4. Just below the tree line expect turbulence.
5. Lift to a safe height above the trees (obstacles).
6. Gradually into transition without loss of height.
7. Climb as normal.
8. Do not start forward transition until well clear of the obstacles.
9. Plan for a power loss.

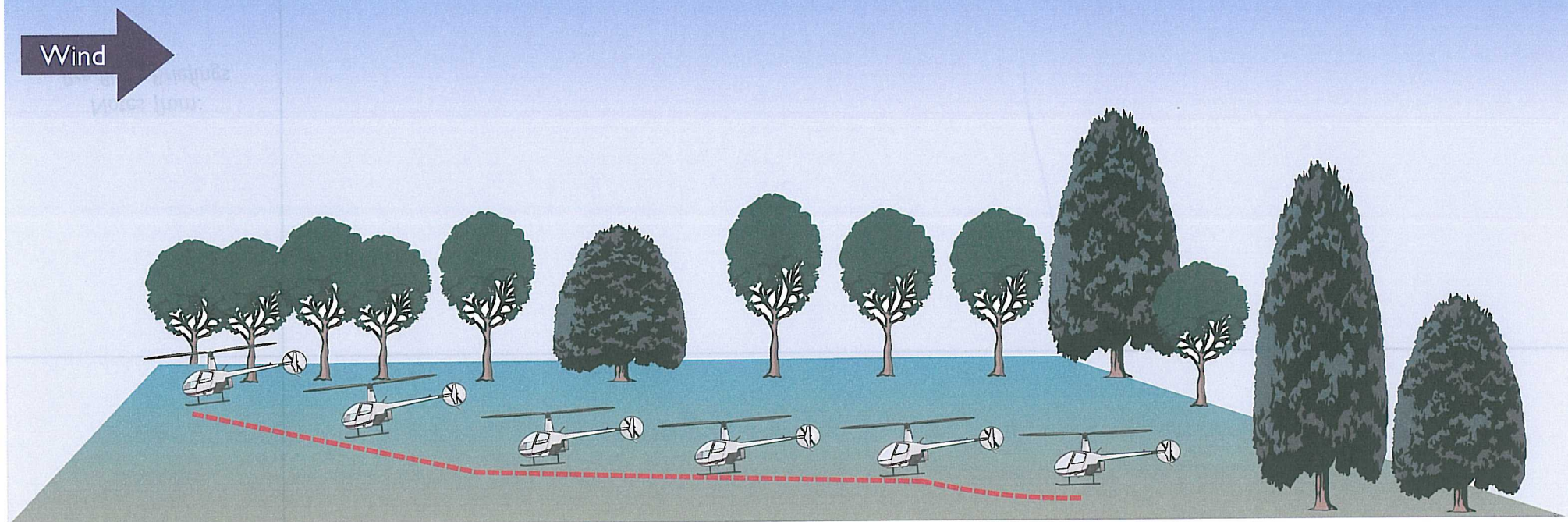




1. Position the helicopter as far away as possible from the obstacles in the intended flight path.
2. Good lookout.
3. Hover the helicopter in the ground cushion.
4. Select reference markers in your forward and lateral vision.
5. Use the helicopter's ground cushion as a spring board.
6. Smooth application to full power and vertical take-off. Do not go into forward flight until you are sure of clearing the obstruction.
7. Just below the tree line expect turbulence or recirculation.
8. As the rate of climb begins to decay start transition.
9. If the rate of climb stops abandon the take-off, return to the hover.
10. Climb @ 30 kts until clear of the trees (objects).
11. When clear of the trees (objects) normal climb @ 60 kts.



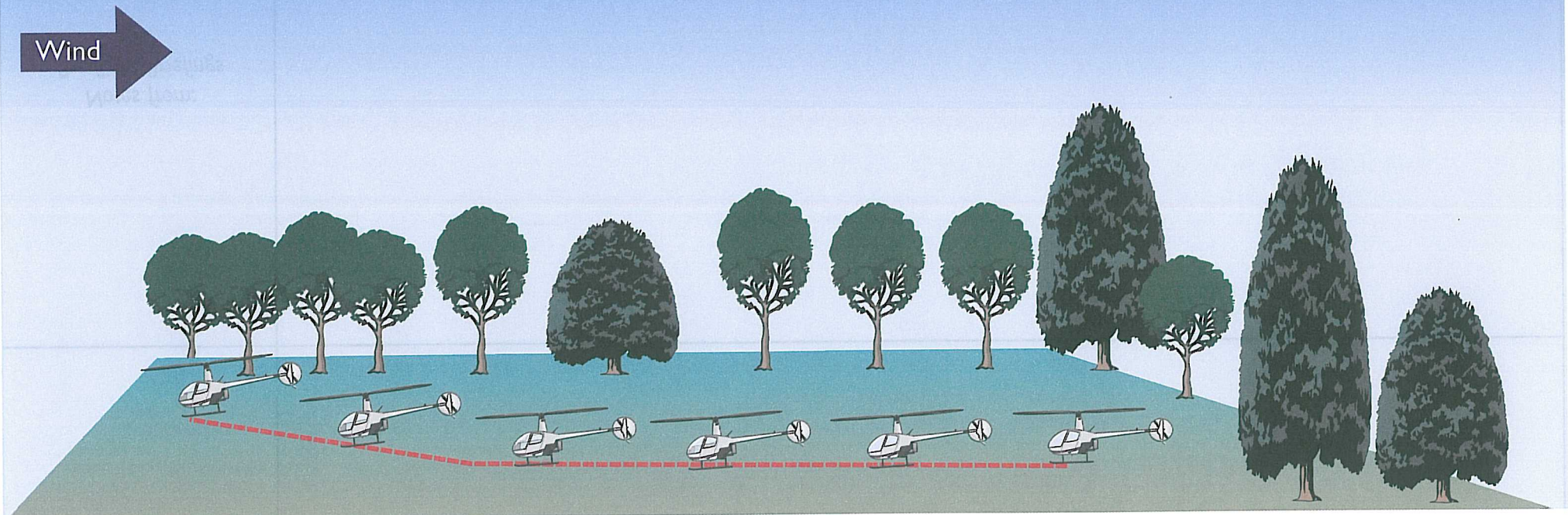
## Cushion Creep Take-Off



1. Ensure that the take-off path is clear of obstacles. Try to remain on the ground cushion as long as possible.
2. Ensure you have a suitable surface for run on landing, the helicopter may settle as it loses the ground cushion.
3. From a low hover start a very gentle transition.
4. Smoothly apply full power.
5. As the helicopter achieves translational lift initiate the climb.
6. Best angle of climb speed 25-30 kts, climb away at 30 kts then accelerate to a normal climb speed of 60 kts.
7. Plan for a power loss.



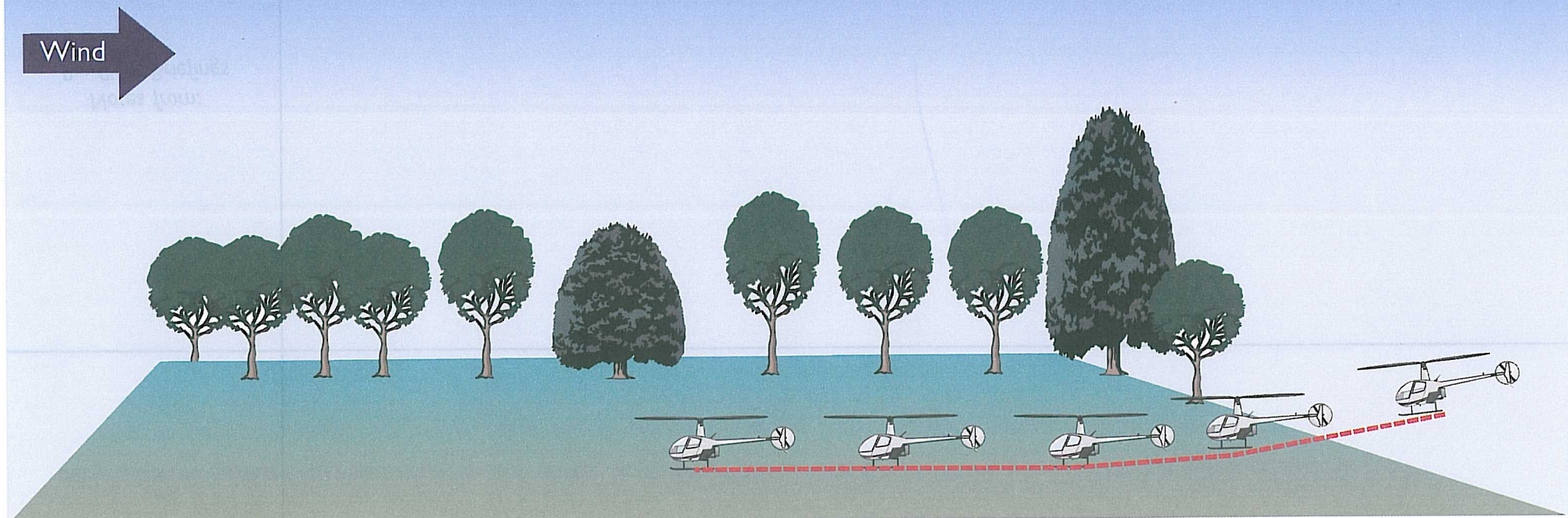
## Running Take-Off



1. Ensure that the take-off path is clear of obstacles.
2. Ensure you have a suitable surface for running take-off, one where your skids will slide.
3. Smoothly apply full power and gently move the cyclic forward to accelerate the helicopter. You may have to operate pedals to "unstuck" the helicopter. This is known as "Duck wagging"!
4. Keep the helicopter straight with the pedals and ease the cyclic forward against flapback.
5. As the helicopter increases speed to translational lift gently ease the cyclic back and allow the helicopter to fly off the ground.
6. Check and adjust the RPM as required.
7. Climb away initially at 30 kts, then accelerate to a normal climb at 60 kts.
8. Plan for a power loss.



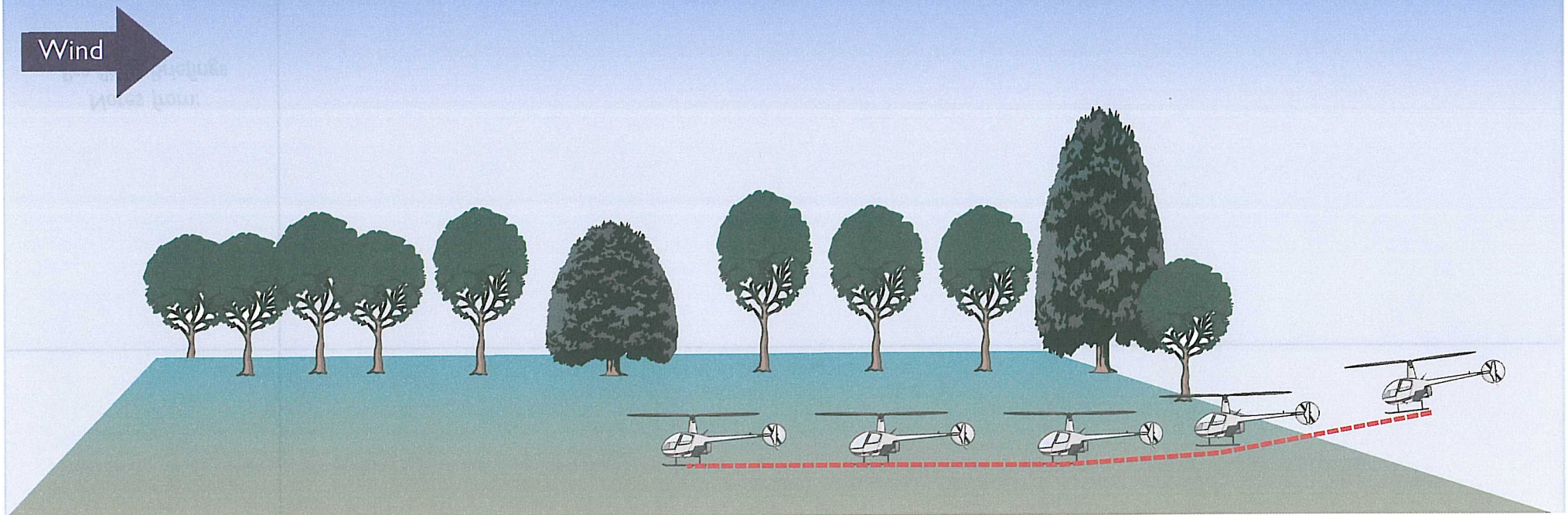
## Running Landing



1. Re-check power available.
2. Fly a shallow approach to minimise the helicopter's rate of descent.
3. Slow down as the landing site approaches maintaining translational lift.
4. Raise the collective and progressively lose translational lift.
5. Raise the collective to within 1" of maximum.
6. Level the helicopter just prior to touchdown and then use the remaining 1" to cushion the landing.
7. Allow the helicopter to run on maintaining the heading with the pedals.



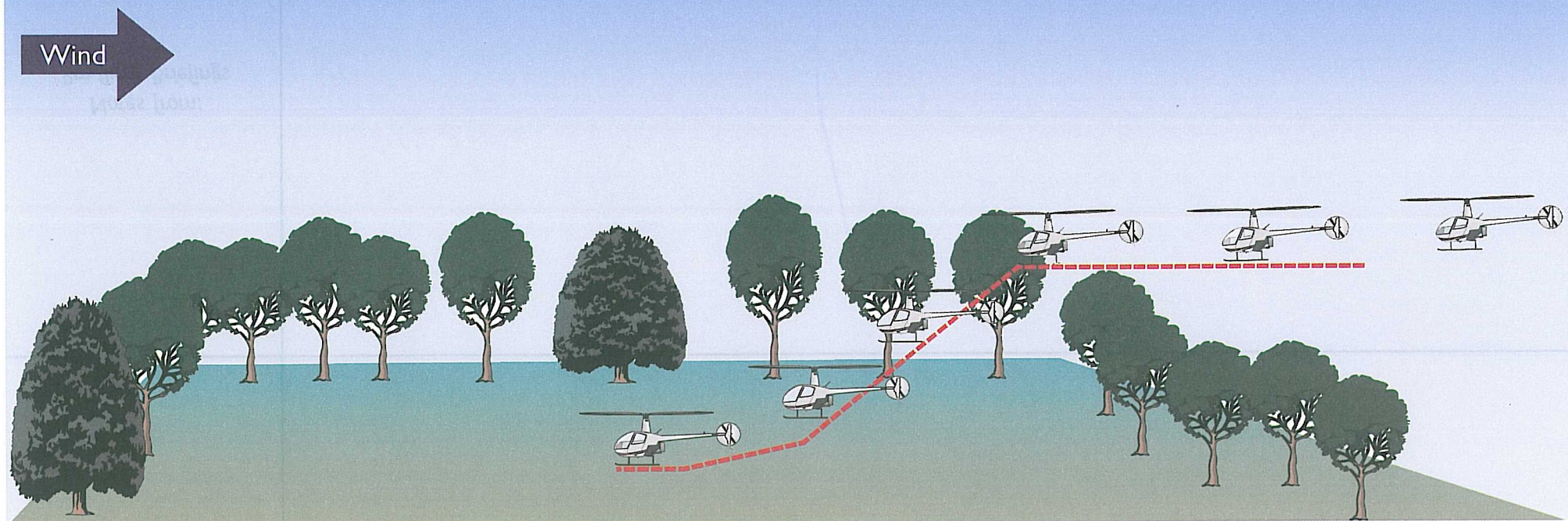
## Zero-Zero Landing



1. Fly a shallow approach to minimise the helicopter rate of descent.
2. Maintain 30 kts until you have reached your committal height.
3. Once committed, continue to reduce airspeed and height together using all the available power.
4. Just before touchdown the helicopter should have achieved zero ground speed and full power applied.
5. Gently lower the collective to place the helicopter firmly on the ground.
6. Difficult to demonstrate accurately - beware rearwards flight on touchdown.



## Hover OGE



1. Establish a free air hover above the obstruction.
2. **Do Not** hover above any obstruction unless vertical power is available.
3. **Caution** beware of the VORTEX ring on descending from a high hover.
4. Remember the "AVOID CURVE" - plan for a power loss.



## Exercise 26

## Confined Areas

Part 1/3

POOLEY'S  
AIR PRESENTATIONS

### Lesson Aim:

To learn the the procedures and techniques to enter, manoeuvre and leave a restricted site.

### Lesson Objective:

By the end of the lesson you will be able to demonstrate your ability to conduct safely a high reconnaissance of a restricted site. Enter, manoeuvre and leave a restricted site area.

### Airmanship:

Lookout. Wind direction and speed. Turbulence from obstructions. Surface & obstructions. Tail rotor. Helicopter limitations.

### Air Exercise:

Take-off & landings in a confined area.

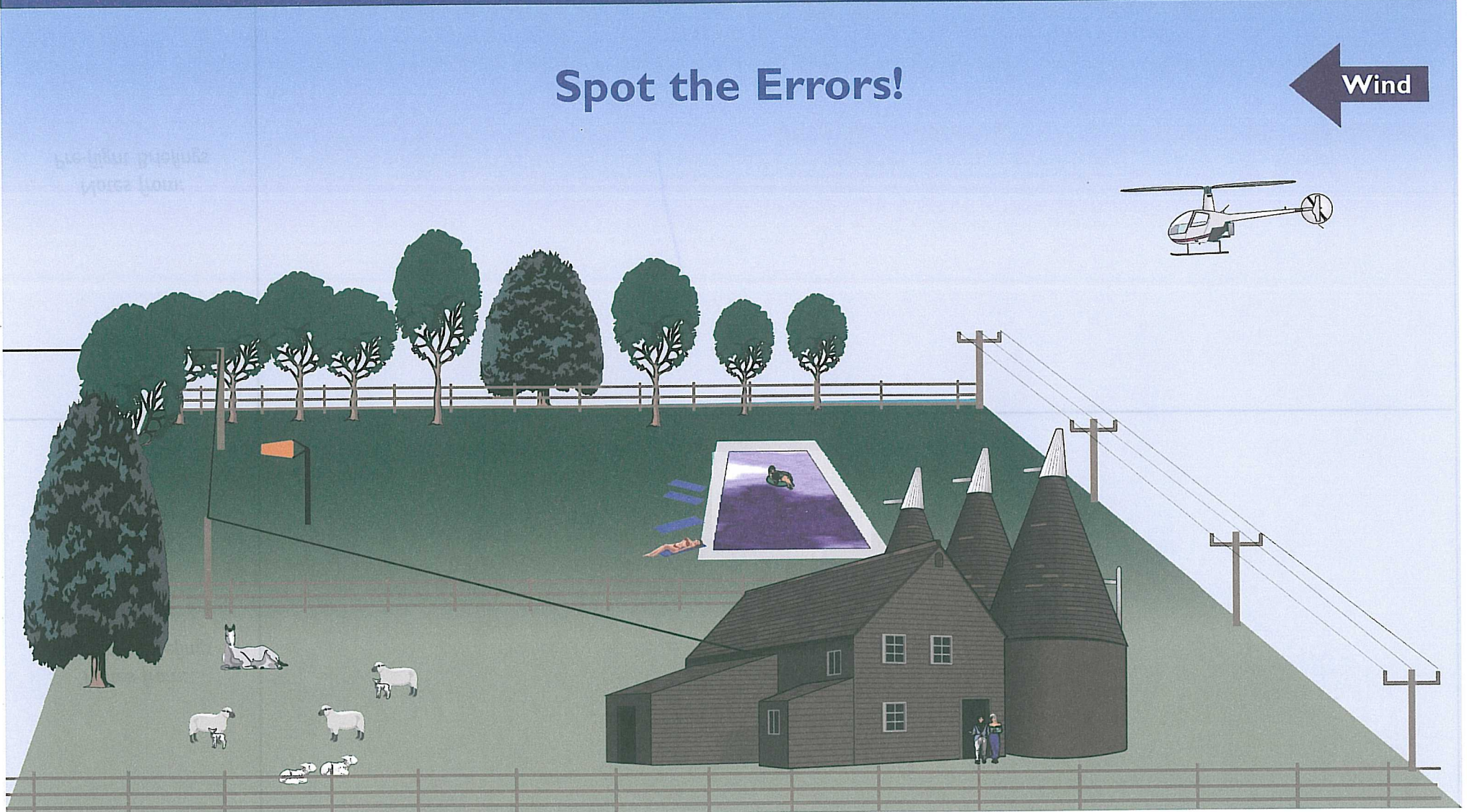
## Teaching Points:

### High Reconnaissance:

1. Inspect the site at 500 ft AGL @ 60 kts. You may need to perform two inspections to fully establish the suitability of the site. Consider noise nuisance.
2. Consider: **S**ize, **S**lope, **S**urface type, **S**hape, **S**urrounding area.
3. Wind speed & direction (smoke, flags, trees etc.) and beware of recirculation in the area.
4. Obstacles such as telephone wires are very difficult to see, consider animals, people, FOD etc.
5. Consider the circuit: approach path, final departure path, circuit turning points, go-round areas and escape routes.
6. Perform a power check to ensure you have the power margin available.
7. If in doubt, remember your training and **DO NOT exceed your experience or ability.**



Spot the Errors!





## Teaching Points:

### Practice Approach & Final Inspection (Low Reconnaissance):

1. Full carburettor heat before the descent, make a shallow approach with a speed of 45-50 kts.
2. Reduce the speed to 30-35 kts on final, remain above the height of all obstacles.
3. This is a final approach practice, it will allow you to see obstacles that may have been obscured or not obvious at 500 ft (cables, animals, people running out to see the helicopter); carburettor heat as required.
4. Go-round, and where necessary, reconsider your options.
5. If you consider a Safe Landing is viable, re-establish your circuit and complete your landing checks.

### Final:

1. Carburettor heat off RPM 104%, if you have less than 2" MP at committal height abandon the landing and go around.
2. DO NOT exceed 200 ft min ROD.
3. Ensure the tail rotor remains clear of obstacles.
4. Use a constant angle approach if the site is large enough. If the site is restricted a double angle approach or hover OGE may be necessary.
5. The helicopter should be placed into a high hover about half way into the landing area. Inspect the site and choose the most suitable area for a landing.
6. WARNING if you are turning in a confined area do spot turns around the tail.

### Departing in a Confined Area:

1. Assess the power margin available and decide the most appropriate take-off method.
2. If the site is restricted always try to leave vertically.
3. Hover taxi to the downwind end of the site to give as much space as possible, always consider your tail rotor.
4. Superior lookout, carburettor heat off RPM 104%.
5. Depart the area safely - plan for a power loss.

## Exercise 27

## Basic Instrument Flight

Part 1/4

POOLEY'S  
AIR PRESENTATIONS

**Lesson Aim:** To learn the sensation of flight with sole reference to the instruments and with no external visual reference.

**Lesson Objective:** Demonstrate your ability accurately and safely to use the instruments to fly basic manoeuvres without outside reference.

**Airmanship:** Spatial disorientation. Physiological sensation.

**Air Exercise:** Straight and level at various airspeeds and configurations. Climbing and descending, standard turns, turning onto selected headings.

### Teaching Points:

**Warning:** Various instrument configurations are available. Make sure you are fully familiar with your helicopter's instruments before instrument flight is attempted.

### The Causes of Poor Instrument Flying are:

1. Poor and/or incorrect method of reading the instrument panel.
2. Not understanding the information given by the instruments (singly and collectively).
3. Heavy control inputs.
4. Poor application of power/attitude flight techniques to achieve the required helicopter performance.
5. Not fully trusting the instruments and trying to use your senses.
6. Not relaxing.

**Attitude + Power = Performance**





## Exercise 27

## Basic Instrument Flight

Part 2/4

POOLEY'S  
AIR PRESENTATIONS

TRAINING AID ONLY

Simple Scan for Airspeed



Simple Scan for Altitude



TRAINING AID ONLY

## Simple Scan for Heading



## Simple Scan for Balance





## Exercise 27

## Basic Instrument Flight

Part 4/4

POOLEY'S  
AIR PRESENTATIONS

TRAINING AID ONLY

### Simple Scan for Vertical Speed



### Simple Scan for Turn Rate



III

**Instructor will explain the expansion of a Simple Scan**