Exercise 12 –Takeoff & Landing

AIM: To learn how take-off from the ground into the hover and land from the hover

T.E.M.: LOOKOUT, Checks, T's & P's, Surface, Wind Velocity

TAKEOFF:

5ft Hover:

- Clean break from ground continue straight up into 5ft stable hover
- Collective = Height
- Cyclic = Position
- Pedals = Heading
- After Take-off Checks

Skids Light:

- Correct any yaw (Pedals)
- Correct any slide or roll (Cyclic)
- Continue to raise Collective

On the ground:

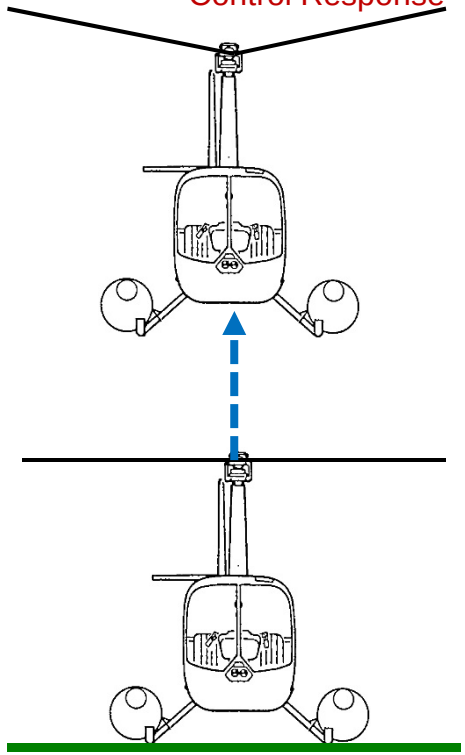
- Pre-take off Checks
- Look out ahead of aircraft
- Slowly Raise Collective
- Prevent Yaw tendency with slight Left Pedal
- Cyclic to keep Disc level

ABORT Take-off if:

- Uncontrolled roll, slide or yaw
- Collective Full Down
- Beware of Dynamic Rollover

After-take off Checks:

Warning Lights
RPM Stable
MAP. Reading
Control Response



Pre-take off Checks:

T's & P's
Warning Lights
RPM
Governor ON
Frictions OF
Hydraulics ON
Wind Direction
Lookout

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LANDING:

5ft Hover:

- Stable Hover
- Pre-landing Checks
- Note Wind Direction
- Lower Collective slightly
- Right Pedal to prevent yaw
- Cyclic controls ground position
- Aircraft starts to descend
- Continue until skids touch

Skids Touch:

- Left Skid Low (dual)
- Right Pedal to prevent yaw
- Cyclic controls roll or slide
- Continue to lower Collective

Ground Contact:

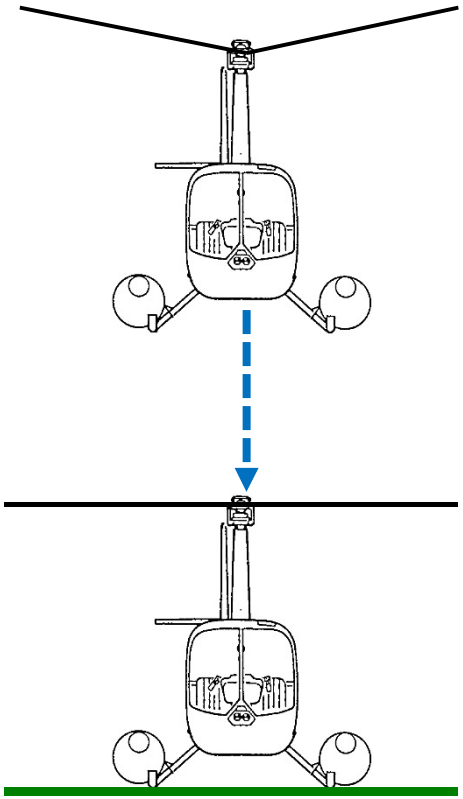
- Lower Collective all way to bottom
- Prevent Yaw with right pedal
- Cyclic to prevent roll or slide
- After landing checks

ABORT Landing if:

- Unstable movement in hovering descent
- **NO SIDEWAYS OR BACKWARDS MOVEMENT**
- Collective Up
- Rise back up to 5ft and stabilise hover

Pre-landing Checks:

Suitable Surface
Wind
RPM
T's & P's



After landing Checks:

Throttle down 75%
Frictions ON

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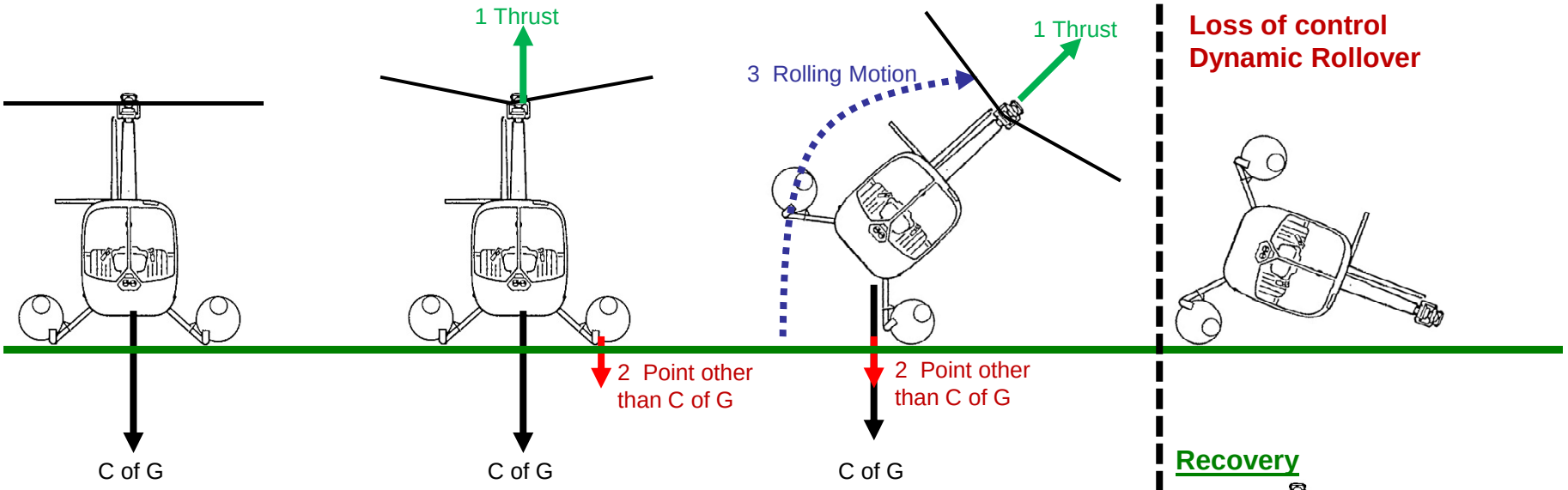
Exercise 12 – Take-off & Landing
Dynamic Rollover

3 Factors for Dynamic Rollover:

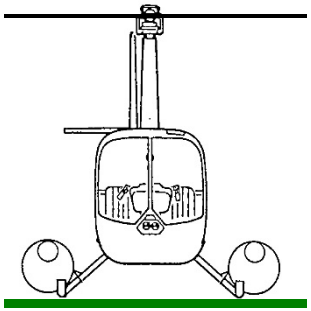
1. Lift greater than Weight (THRUST)
2. Movement around a point other than Centre of Gravity
3. Rolling Motion

You must have ALL 3 for Dynamic Rollover to occur



Loss of control
Dynamic Rollover

Recovery



COLLECTIVE FULL DOWN

Notes:

- This can happen very quickly
- Beware of Sideways & Backwards movement
- DO NOT RAISE LEVER
- Once passed certain point it cannot be prevented

Recovery:

- **FULL DOWN COLLECTIVE**

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Exercise 12 –Takeoff & Landing

AIM: To learn how take off from the ground into the hover and land from the hover

Over pitching

The Helicopter engine is used to overcome Blade drag, the engine is turning the blades
If the Collective, and hence blade pitch, is set at too high an angle there may be insufficient power from the engine to overcome drag, this will mean that the blades will slow down. There are “over pitched”

Symptoms:
Low Engine & Rotor RPM
Aircraft Sinking

Recovery:
Lower Collective to reduce blade pitch
Increase Throttle to increase engine RPM

Notes:
Whilst recovering from Over pitching the Rate of Descent may increase, close to the ground may result in a heavy and uncontrolled landing.

The R44 is more susceptible to Over Pitching when the helicopter is operating:

- **Hot – Low Density**
- **High – Low Density**
- **Humid – Low Density**
- **Heavy – More pitch to give lift is required**
- **Downwind – More pitch to overcome wind**

Uncommanded Yaw:

The R44 has a very effective tail rotor which can easily overcome surface friction. This can result in an uncommanded or inadvertent spin. This must be alleviated by keeping the aircraft in trim with the pedals at ALL times, when on the ground with reduced RPM pedals must remain neutral.

Common Causes:
Pedal Deflection on Take Off – if the pedals are not in the neutral position before increasing throttle above 80% the aircraft may spin

Full Pedal Deflection on Landing – if the pedals are not in the neutral position once the aircraft has landed the aircraft may spin.

Low Friction Surfaces – Landing or Taking Off on icy, wet or smooth surfaces can cause the aircraft to spin, if not corrected using pedal

Low RPM Horn Check – If performed incorrectly the aircraft may become light on the skids and start to spin, especially if the Collective lever is raised too high.

Recovery:
Pedal to prevent Yaw
Throttle down to Idle

Do Not:
Attempt to lift into the hover, this could cause Dynamic roll over or uncontrolled spinning in the hover.

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Safety Notice SN-9

Issued: Jul 82 Rev: Jun 94

MANY ACCIDENTS INVOLVE DYNAMIC ROLLOVER

A dynamic rollover can occur whenever the landing gear contacts a fixed object, forcing the aircraft to pivot about the object instead of about its own center of gravity. The fixed object can be any obstacle or surface which prevents the skid from moving sideways. Once started, dynamic rollover cannot be stopped by application of opposite cyclic alone. For example, assume the right skid contacts an object and becomes the pivot point while the helicopter starts rolling to the right. Even with full left cyclic applied, the main rotor thrust vector will still pass on the left side of the pivot point and produce a rolling moment to the right instead of to the left. The thrust vector and its moment will follow the aircraft as it continues rolling to the right. Quickly applying down collective is the most effective way to stop a dynamic rollover.

To avoid a dynamic rollover:

1) Always practice hovering autorotations into the wind and never when the wind is gusty or over 10 knots.

2) Never hover close to fences, sprinklers, bushes, runway lights or other obstacles a skid could catch on.

3) Always use a two-step liftoff. Pull in just enough collective to be light on the skids and feel for equilibrium, then gently lift the helicopter into the air.

4) Do not practice hovering maneuvers close to the ground. Keep the skids at least five feet above the ground when practicing sideward or rearward flight.

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Safety Notice SN-36

Issued: Nov 00

OVERSPEEDS DURING LIFTOFF

Helicopters have been severely damaged by RPM overspeeds during liftoff. The overspeeds caused a tail rotor drive shaft vibration which led to immediate failure of shaft and tailcone. Throughout the normal RPM range, tail rotor shaft vibration is controlled by damper bearing. However, damper is not effective above 120% RPM.

Mechanical correlation can cause overspeed during liftoff if RPM is increased to normal flight settings and collective raised before governor is switched on. Overspeeds can also occur if throttle is gripped too firmly during liftoff causing governor to be overridden. Inexperienced pilots, who are most likely to be nervous or distracted, are particularly susceptible to this type of overspeed.

To avoid overspeeds during liftoff:

1. Always confirm governor on before increasing RPM above 80%.
2. Verify governor stabilizes engine RPM near top of green arc.
3. Maintain relaxed grip on throttle allowing governor to control RPM.

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T.E.M.: LOOKOUT, Checks, T's & P's, Surface, Wind Direction/Velocity

PPL (H) Test Tolerances & Standards – Document 19H

PPL (H) TEST TOLERANCES

TO HOVER IGE	+/- 3 ft
LANDING:	NO SIDEWAYS OR BACKWARDS MOVEMENT

SECTION 2:

(a) Take-off and landing (lift off and touch down)

- *Lift to and establish a stable hover maintaining ground position and heading*
- *Descend to land maintaining ground position and heading*
- *Complete all necessary checks and drills throughout*
- *Maintain lookout throughout*

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Takeoff & Landing – Common Errors

- TAKEOFF
  - Yaw – Slow Feet
  - Snatching Collective
  - Uncommanded Yaw with Increase Power or RPM

- LANDING
  - Unstable Hover
  - Dumping Collective
  - Do Not Drift Sideways or Backwards
  - Uncommanded Yaw – lack of Pedal input

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