



# UPPER LIMIT AVIATION

619 N 2360 W                      Office: (801) 596 7722  
Salt Lake City, UT 84106      Fax: (801) 596 7722  
[www.ulaheli.com](http://www.ulaheli.com)

## MANEUVER GUIDE

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# INTRODUCTION

## Purpose of This Guide

The purpose of this guide is to be a study aid for the student and to standardize flight maneuvers. This standardization increases safety during flight training and continuity between instructors and students.

Maneuvers are broken down into their purpose, a verbal step-by-step breakdown and performance standards. The performance standards are from the Private / Commercial Pilot Practical Test Standards published by the FAA.

This maneuver guide is adapted specifically for the Robinson R22 helicopter.

## Critical Safety Information

Positive Exchange of Controls: When one pilot wishes to give the other pilot control of the aircraft, he or she will say, "You have the flight controls." The other pilot acknowledges immediately by saying, "I have the flight controls." The first pilot again says "You have the flight controls." When control is returned to the first pilot, follow the same procedure. A visual check is recommended to verify that the exchange has occurred. **There should never be any doubt as to who is flying the aircraft.**

All maneuvers are to be done into the wind and when applicable outside the shaded areas of the height/velocity diagram. Autorotations to a power recovery will be done to a paved runway or taxiway. Off airport operations are only allowed in approved locations when the elevation is at least 200' below what the performance charts indicate that an out of ground effect hover can be maintained. Flights shall only take place over terrain where performance charts indicate that an in ground effect hover can be maintained.

Checklists are to be used during preflight, startup, and shutdown.

## **Common Student Errors**

One of the instructor's roles is to identify student errors and create solutions. Being aware of the following common errors will improve student progress.

1. Overcontrolling – making inputs that are too large, jerking, unnecessary, etc...
2. Coordination of Controls – understanding how the input of one control affects another.
3. Tension – gripping the controls too tight.
4. Visual Reference – looking at an improper reference point or instrument.
5. Procedure - Not knowing or understanding the procedure for a maneuver.

## **Phraseology**

The following phrases should be communicated out loud, so that both student and instructor know that the proper checks are being done.

“Clear area” – Check around aircraft for other traffic and hazards both in the air and on the ground.

“Clearing turn” – Identify all traffic on the ground and in the air by doing a 90° to 360° turn.

“Gauge check” – Warning lights out, r.p.m. in the green, engine in the green, fuel, carb heat - out of yellow, full up, or down and locked.

“Look at horizon” – Looking at the horizon or objects well in front of the helicopter allows the pilot to notice and correct for small changes in attitude, altitude, and heading.

“Pre-landing check” – Gauge check (see above) plus trim down and landing spot clear.

“Sight picture” – Reference landing spot or other outside reference and its location on the windscreen. Sight picture will vary depending upon type of approach being used.

“Skids clear” – The skids are clear of obstacles and firmly on the ground.

“Tail clear” or “tail right, nose left” / “tail left, nose right” – Tail is clear from hazards for a pedal turn or aircraft movement.

# MANEUVERS

## Basic Cockpit and Crew Resource Management

Purpose: To teach the student safe and efficient use and preparation of all resources in the cockpit.

Passenger briefing on the use of safety belts, shoulder harnesses, doors, rotor blade avoidance, and emergency procedures.

Stow objects under the seat that are not needed during flight.

Use kneeboard with proper charts, frequencies, and airport information.

Tune next radio frequency into standby.

Practice changing frequencies, adjusting trim, carb heat, and the GPS while flying.

When moving switch – Identify (place hand on it), Confirm (look to see hand is on correct switch), Move (adjust switch).

Only spend 5 – 6 seconds with your eyes inside the cockpit.

Fly aircraft first and always.

Use passenger to help with simple non-flying tasks in the cockpit.

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Airspeed while managing cockpit	+/- 10 KTS	+/- 5KTS
Altitude while managing cockpit	+/- 200'	+/- 100'
Necessary information is readily available in cockpit		

## **Straight and Level Flight**

Purpose: To teach the student how to fly the aircraft from point A to point B while learning basic control inputs.

Clear area

Look at an object straight ahead on the horizon

Maintain straight and level attitude by keeping horizon level and by keeping a fixed point on the windscreen a constant distance above or below the horizon

Cyclic controls attitude and airspeed

Collective controls altitude and MAP (power)

Pedals control trim

Scan for traffic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 15°	+/- 10°
Airspeed	+/- 10 KTS	+/- 5 KTS
Altitude	+/- 200'	+/- 100'

NOTE: Fly to intermediate checkpoints on the ground between the fixed point on the horizon and the helicopter. This will help ensure a straight ground track.

## Climbs

Purpose: To teach the student how to initiate a climb while in forward flight.

Clear area

Look at horizon

Raise collective to initiate a 500 fpm climb

Increase left pedal to maintain aircraft trim

Slight forward cyclic to maintain attitude and airspeed

Start level off for target altitude at 10% of rate of climb (ex: 50' if 500 fpm)

Lower collective, right pedal, aft cyclic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 15°	+/- 10°
Airspeed	+/- 10 KTS	+/- 5 KTS

NOTE: 53 KTS is best rate of climb  
60 KTS is normal climb speed

Raising the collective not only increases altitude, but causes the nose to pitch up slightly. This pitch up should be avoided by adding forward cyclic as the collective is raised.

## Descents

Purpose: To teach the student how to initiate a descent while in forward flight.

Clear area

Look at horizon

Lower collective to initiate a 500 fpm descent rate

Increase right pedal to maintain trim

Apply aft pressure on cyclic to maintain attitude and airspeed

Start level off for target altitude at 10% of rate of descent (ex: 50' if 500 fpm)

Raise collective, left pedal, forward cyclic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 15°	+/- 10°
Airspeed	+/- 10 KTS	+/- 5 KTS

NOTE: Apply full carb heat if induction-icing conditions exists and MAP is less than 18"

Lowering the collective not only decreases altitude, but causes the nose to pitch down slightly. This pitch down should be avoided by adding aft cyclic as the collective is lowered.

## Turns

Purpose: To teach the student how to change the heading of the helicopter in forward flight.

Clear area and into turn

Look at horizon

Apply lateral cyclic in the direction the turn is to be made

Raise collective to maintain altitude and apply left pedal to maintain trim

Maintain desired bank angle with lateral cyclic

Start rollout before reaching desired heading

Apply lateral cyclic opposite the direction of the turn being made

Lower collective and apply right pedal

Reestablish straight and level

Scan for traffic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 15°	+/- 10°
Altitude	+/- 200'	+/- 100'
Airspeed	+/- 10 KTS	+/- 5 KTS

NOTE: Use pedals to maintain aircraft in trim, do not use pedals to turn

## Airspeed Changes

Purpose: To teach the student how to increase or decrease airspeed while maintaining altitude.

Clear area

Look at horizon

Decelerate:

Apply aft pressure on cyclic to decrease airspeed

Lower collective to maintain altitude

Right pedal to maintain trim

Readjust controls to maintain new airspeed

Accelerate:

Apply forward pressure on cyclic to increase airspeed

Raise collective to maintain altitude

Left pedal to maintain trim

Readjust controls to maintain new airspeed

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 15°	+/- 10°
Altitude	+/- 200'	+/- 100'
Airspeed	+/- 10 KTS	+/- 5 KTS

## Vertical Takeoff to a Hover

Purpose: To teach the student to pick the helicopter up off the ground into a stable 3' hover.

Clear area  
Gauge check  
Center cyclic, neutralize pedals  
Look at horizon  
Raise collective until light on the skids  
Maintain ground position using cyclic  
Maintain heading using pedals  
Continue raising collective to establish 3' skid height  
Gauge check  
Note power required to hover

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 10°
Altitude	+/- 2'	+/- 2'
Touchdown Point	+/- 4'	+/- 2'

NOTE: Adjusting carb heat in a hover can be hazardous, because of the need to remove your left hand from the collective.

## Vertical Landing from a Hover

Purpose: To teach the student to land the helicopter from a stable 3' hover.

Look at horizon

Position directly over landing spot using cyclic

Gently lower collective to initiate descent

Maintain ground position using cyclic

Maintain heading using pedals

Continue slowly lowering collective until ground contact

Slowly lower collective to the bottom

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 10°
Altitude	+/- 2'	+/- 2'
Touchdown Point	+/- 4'	+/- 2'

## Hover Taxi

Purpose: To teach the student to hover the aircraft in a forward direction

Clear area

Look at horizon

Initiate forward movement with slight forward pressure on the cyclic

Control heading using pedals

Control ground position using cyclic

Control skid height using collective

3' skid height

No more than a brisk walking pace over ground

Maintain skids parallel to the direction of movement using the pedals

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 10°
Altitude	+/- 2'	+/- 2'
Ground Track	+/- 4'	+/- 2'

## Normal and Crosswind Takeoff

Purpose: To transition from a stationary 3' hover to forward flight without entering the shaded areas of the height/velocity diagram.

Clearing turn

Gauge check

Radio call

Look at horizon

Hover power is takeoff power (maintain MAP until established in climb)

Slowly move helicopter forward

At ETL:

Maintain 3' altitude with cyclic

Accelerate using forward cyclic

Use pedals to maintain skids parallel to ground track

At 45 KTS:

Gentle aft cyclic to initiate climb

Continue accelerating to 60 KTS using cyclic

At 50' AGL:

Trim helicopter using pedals

At 300' AGL:

Gauge check

Adjust carb heat if needed

Start turn if needed

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Climb A/S	+/- 10 KTS	+/- 5 KTS

Avoids shaded areas of height/velocity diagram

Does not exceed manifold pressure limits

NOTE: 60 KTS is normal climb speed

## Normal and Crosswind Approach

Purpose: To transition from forward flight at altitude to a 3' hover.

Pre-landing check

Set up 300' AGL 60 KTS

At normal approach angle, 10°:

Lower collective to initiate a 500 fpm descent rate

Slow to a brisk walking pace along the ground using aft cyclic

Note and hold the normal approach sight picture on the windscreen

Collective controls rate of descent and approach angle

Cyclic controls rate of closure

At 30 KTS

Descent rate < 300 fpm

At 50' AGL:

Initiate a slip if needed to align the skids parallel to ground track

Slow to a walking pace on the ground

At ETL:

Look at horizon

Increase power with gradual up collective

Check MAP is within limits

Add left pedal, and forward cyclic as needed to maintain heading and level attitude

Arrive above spot in a stationary 3' hover

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Termination Point	+/- 4'	+/- 2'
Avoids settling with power conditions		
Maintains normal glide slope		
Maintains constant rate of closure		

## Traffic Patterns

Purpose: To teach the student standard traffic pattern procedures.

Determine traffic direction based on winds and other aircraft in pattern

Visually identify all traffic in pattern

Radio calls before all turns in traffic pattern and prior to takeoffs

After takeoff fly upwind to 300' AGL before starting crosswind turn or removing hand from collective

Gauge check – adjust carb heat if needed

Continue climb on crosswind

Turn downwind and level off at traffic pattern altitude (TPA), 500' AGL and 70 KTS

Abeam landing spot perform pre-landing checks

With landing spot 45° behind aircraft start base turn, initiate 500 fpm descent, and slowly decrease airspeed to 60 KTS

Turn final at 300' AGL and 60 KTS

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Airspeed	+/- 10 KTS	+/- 10 KTS
Altitude	+/- 100'	+/- 100'
Avoids wake turbulence and interfering with fixed wing traffic		

## Radio Calls

Purpose: To teach the student proper verbiage and clarity during radio communications.

Listen first, do not cut into a conversation, wait 3 – 5 seconds after switching to a frequency to start transmitting

Think before talking

4 W's

Who you're talking to

Who you are

Where you are (cardinal direction from, distance and altitude)

What you're doing or requesting

Transmit using recommended phraseology from the Pilot/Controller Glossary in the AIM

Read back all clearances and altitudes

Avoid too many radio calls when in uncontrolled airspace

A good rule of thumb is to make a radio call whenever taking off, turns in the traffic pattern, entering the traffic pattern, position reports, and when you suspect other unidentified traffic is in your vicinity

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
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Listens for several seconds before transmitting		
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Uses recommended phraseology		
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Makes recommended calls in uncontrolled airspace		
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## Go Around

Purpose: To teach the student how to discontinue an intended landing and stay airborne.

Proceed with an approach

Decision point is anytime before losing ETL

Say "Going around"

Look at horizon

Raise collective to climb power

Maintain trim using pedals

Pitch for 60 KTS using the cyclic

Radio call

No turns until 300' AGL unless obstacles dictate otherwise

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
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Climb A/S 60 KTS	+/- 10 KTS	+/- 5 KTS
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Does not exceed max continuous MAP limit

Makes go around decision before losing ETL

## **Air Taxi**

Purpose: To move the helicopter with minimal fuel consumption, minimal disturbance to the surface, minimal time and obstacle avoidance. Aircraft must remain below 100' AGL.

Clear area

Look at horizon

From a hover start to accelerate

At 45 KTS:

Start a climb using the cyclic

At any altitude below 100' AGL:

Stop climb by lowering collective to maintain altitude

Adjust airspeed to 45 to 60 KTS and maintain airspeed using cyclic

Before reaching destination initiate normal approach to a 3' hover and protect tail rotor

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Altitude	+/- 10'	+/- 5'
Airspeed	+/- 10 KTS	+/- 5 KTS

## Quick Stop / Rapid Deceleration

Purpose: To teach the student how to rapidly stop the helicopter.

Clearing turn

Gauge check

Radio call

Initiate air taxi (45 to 60 KTS, Less than 100' AGL)

Look at horizon

“Quick stop”

At the same time lower collective to maintain altitude, aft cyclic to slow helicopter, right pedal to maintain heading

Protect tail rotor

At ETL:

Raise collective to maintain altitude

Level skids with forward cyclic

Left pedal to maintain heading

With skids level descend to a 3' hover

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
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Heading	+/- 10°	+/- 5°
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Maintains altitude until skids level

Maintains safe tail rotor clearance from the ground

Avoids descending with a tail low attitude

## **Straight in Autorotation to a Power Recovery**

Purpose: To teach the student an autorotative descent, flare, and power recovery.

Pre-landing checks

Set up 700' AGL minimum and 65 KTS

“Airspeed and altitude good, no climb”

Look at horizon to maintain attitude during entry

Entry: (Entry point varies based on gross weight, density altitude, and winds)

“Straight-in auto to a power recovery”

Lower collective, aft cyclic, right pedal

Lower collective to the bottom

Roll off throttle and maintain throttle closed

Look at rotor r.p.m., adjust collective to maintain r.p.m. in the green arc

Glide:

Start scan “outside, airspeed, r.p.m.” repeat as needed

Glide configuration 65 KTS, r.p.m. in green arc, aircraft in trim

Up collective decreases r.p.m. and reduces airspeed

Down collective increases r.p.m. and increases airspeed

Forward cyclic increases airspeed and decreases r.p.m.

Aft cyclic decreases airspeed and increases r.p.m.

At 40' AGL:

Scan: “horizon, r.p.m.”

Start flare by using slight aft cyclic

Maintain collective setting during flare

Continue cyclic flare to:

Reduce descent rate

Reduce groundspeed

Increase r.p.m. into the yellow arc

Power recovery:

When r.p.m. begins to decay, roll on throttle and allow governor to takeover

Raise collective to maintain altitude

Use pedals to maintain heading

Forward cyclic to level skids

Establish 3 – 5' hover

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Airspeed 65 KTS	+/- 5 KTS	+/- 5 KTS
Touchdown area	+/- 200'	+/- 100'

Rotor r.p.m. within limits during glide and avoids rotor overspeed during flare

Recovers to skids level attitude

NOTE: During days with high density altitudes reduce airspeed to 60kts and rotor rpm to the bottom of the green arc before the flare. The reason for this is the higher true airspeed and to reduce the chance of exceeding rotor rpm limits.

## 180° Autorotation to a Power Recovery

Purpose: To teach the student an autorotative descent with a 180° turn, flare, and power recovery.

Set up 900' AGL minimum and 65 KTS

Enter when abeam landing spot on the downwind leg

“180° auto to a power recovery”

Enter autorotation

Stabilize airspeed and r.p.m.

Look at horizon

Start turn toward landing spot

Scan: “outside, airspeed, r.p.m.”

Anticipate build in r.p.m. when turning

Adjust turn to hit landing spot using lateral cyclic

Maintain 65 KTS and r.p.m. in the green arc

Complete turn no lower than 100' AGL to reestablish straight-in autorotation

During roll out anticipate a loss of r.p.m. and airspeed by lowering collective and pushing forward cyclic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Airspeed 65 KTS	+/- 5 KTS	+/- 5 KTS
Touchdown area	+/- 200'	+/- 100'
Rotor r.p.m. within limits during glide and avoids rotor overspeed during flare		
Recovers to skids level attitude		

NOTE: Avoid diving or slowing during turn by referencing the horizon.

During days with high density altitudes reduce airspeed to 60kts and rpm to the bottom of the green before the flare. The reason for this is the higher true airspeed and to reduce the chance of exceeding rotor rpm limits.

## Hover Autorotation

Purpose: To teach the student how to land the helicopter without power from a hover.

Clearing turn

Nose into wind

2 – 3' skid height

Reposition hand on throttle "hand all the way under the throttle"

"Throttle, pedal, settle, pull"

Look at horizon

"Hover auto in 1, 2, 3"

Close throttle to DETENT

Add right pedal at the same time to maintain heading

Maintain ground position using cyclic

Wait for helicopter to start settling

Raise collective to cushion landing using full up collective

Once on the ground lower the collective to the bottom to avoid excessive blade flapping

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 5°
No rearward movement and minimal sideward movement		

## Engine Failure at Altitude

Purpose: To teach the student proper entry and rapid decision-making for finding a landing area after an engine failure.

Instructor says, “Simulated engine failure” and slowly rolls off throttle

Student enters autorotation and stabilizes

Looks for a landing spot into the wind

Heads for landing spot

> 500’ AGL “Go around”

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
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Airspeed 65 KTS	+/- 5 KTS	+/- 5 KTS
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Selects and navigates toward a suitable landing area

Enters autorotation before significant r.p.m. drop

Ensures nose does not drop during entry

## **Low Rotor R.P.M. Recovery in Forward Flight**

Purpose: To teach the student how to recognize low rotor r.p.m. and how to recover.

Clearing turn

Three warning signs of low rotor r.p.m.

1. Decrease in noise
2. Increase in vibration
3. Low rotor r.p.m. warning system at 97%

Recovery

“Roll on throttle, lower collective, aft cyclic” (all small, controlled inputs)

Look at horizon

“Governor off”

“Simulated low rotor r.p.m.”

Instructor slowly rolls throttle down

Student maintains altitude with collective

At recognition

“Low rotor r.p.m.”

Roll on throttle

Lower collective

Aft cyclic - if needed

Recovery complete when:

R.p.m. is at the top of the green

Previous airspeed and altitude resumed

“Governor on”

Standards                      Private                      Commercial

Recovers r.p.m. to green arc

Proper recovery

Recognizes low rotor r.p.m.

## **Low Rotor R.P.M. Recovery in a Hover**

Purpose: To teach the student to recognize and recover from low rotor r.p.m. in a hover.

Clearing turn

3' hover over suitable landing area

Look at horizon

Review symptoms and recovery (omit aft cyclic during recovery)

“Governor off”

“Simulated low rotor r.p.m.”

Instructor rolls down throttle

Student maintains altitude by raising the collective

Recovery

At first sign of low rotor r.p.m. recover

“Low rotor r.p.m.”

Roll on throttle

Lower collective

Repeat recovery procedure if r.p.m. is still low (milking the collective)

Recovery complete when:

r.p.m. is at the top of the green

Previous hover height is resumed

“Governor on”

Standards                      Private                      Commercial

Recovers r.p.m. to top of green arc

Proper recovery

Recognizes low rotor r.p.m.

## Settling with Power

Purpose: To teach the student to recognize the symptoms and the recovery from settling with power.

Clearing turn

Climb to > 1,000' AGL

Turn into the wind with suitable landing area available

Look at horizon

Slow to hover by using a gentle quick stop

Settling with power can occur when all of following occur simultaneously:

Airspeed is less than ETL

> 300 fpm descent rate

> 20% power used

Settling with power symptoms include:

Increasing aircraft vibration

Sluggish cyclic reactions

As power is applied descent rate increases

At the first sign of settling with power initiate recovery:

“Settling with power”

Initiate 10° nose low attitude using forward cyclic

Lower collective slightly

Maintain heading

At ETL:

Pitch for a 60 KT attitude using aft cyclic

Raise collective to max continuous power

Maintain trim with pedals

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 5°
Recognizes settling with power		
Recovers promptly and before reaching 500' AGL		

NOTE: During settling with power descent rates can escalate to well beyond the descent rates during autorotations, so recover at the first symptom. Take note of altitude lost during recovery procedure.

## Max Performance Takeoff

Purpose: To simulate a takeoff over an obstacle that prevents a normal takeoff. Use the shallowest climb angle needed to safely clear obstacle in order to reduce time spent in the shaded areas of the height/velocity diagram and to increase helicopter performance.

Land helicopter pointing in direction of takeoff  
Check MAP limits using OAT gauge and pressure altitude  
Discuss abort plan  
Clear area – above, behind, left, right, and skids  
Carb heat down conditions permitting  
Radio call  
Raise collective until light on the skids  
Neutralize movement  
Look above obstacle  
Slowly raise collective to leave ground  
After leaving the ground slight forward cyclic to obtain ETL and 45kt attitude  
Look at obstacle and its location on the windscreen to judge if obstacle will be cleared  
Continue raising collective to max continuous power, or if needed, to 5-minute takeoff  
Maintain heading using pedals  
Adjust climb angle using cyclic  
“Obstacle clear” - accelerate to 60 KTS using gentle forward cyclic  
At 60 KTS resume normal climb

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Climb A/S 60 KTS	+/- 10 KTS	+/- 5 KTS
Heading	+/- 10°	+/- 5°
Does not exceed MAP limits		

NOTE: Do not exceed MAP limits as low rotor r.p.m. can occur  
Do not forget carb heat if it was put full down for takeoff  
Some obstacles require a vertical climb before moving forward

## Steep Approach

Purpose: To simulate an approach over an obstacle, to a pinnacle, or a confined area.

Pre-landing check

Set up 300' AGL 60 KTS

At normal approach angle:

Slow to 45 KTS with aft cyclic and maintain altitude by lowering collective

At steep approach angle, 15°:

Lower collective to initiate a 500 fpm descent rate

Slow to a walking pace along the ground with aft cyclic

At 100' 30 KTS

Descent rate < 300 fpm

Carb heat down if needed

At 50' AGL:

Initiate a slip if needed to align the skids parallel to ground track

At ETL: (last go around decision point)

Descent rate < 300 fpm

Look at horizon

Increase power using gradual up collective

Check MAP is within limits

Add left pedal, and forward cyclic as needed

Terminate approach to the surface, unless instructor says otherwise

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Termination Point	+/- 4'	+/- 2'
Avoids settling with power conditions		
Maintains steep glide slope		
Maintains steady rate of closure		
Does not exceed MAP limits		

NOTE: Lowering carb heat conserves power.  
Terminating the approach to the surface takes less power than stopping in a hover.

## Shallow Approach to a Running Landing

Purpose: To simulate landing the helicopter in a power limited situation such as a loss of a magneto or at high-density altitudes.

Pre-landing check

Set up 300' AGL 60 KTS on final

Shallow approach angle is 5°:

Lower collective to initiate a 300 fpm descent rate

Slow to 45 KTS using aft cyclic

At 50' AGL:

Initiate a slip if needed to align the skids parallel to ground track

Slow to 30 KTS using aft cyclic

At 3' skid height:

Slow to ETL using aft cyclic

Keep skids parallel with ground track to avoid dynamic rollover

At ETL:

Level skids and descend final 3' by adding gentle forward cyclic

Maintain ETL until ground contact

At ground contact:

Lower collectively slowly to the bottom to slow helicopter

Maintain ground track using cyclic

Maintain skids parallel to ground track using pedals

During ground run:

Collective controls speed

Cyclic controls ground track

Pedals control heading

Standards                      Private                      Commercial

Touches down skids level at ETL

Avoids dynamic rollover situations by maintaining skids parallel to ground track

## Slope Landings

Purpose: To teach the student to land the helicopter on a slope.

Clearing turn

Determine which skid to land that will point the helicopter into the wind

Be aware of dynamic rollover

Approach slope with tail away from the slope

Parallel skid with the slope at a 3' skid height

Maintain slope in sight picture

Land uphill skid and pause to stabilize

Lower collective and add cyclic into slope simultaneously, maintain skids level initially

Maintain heading using pedals

Land downhill skid

Check stability using small fore and aft cyclic inputs

Skids clear

Maintain cyclic into the slope

Lower collective to the bottom

Center cyclic

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
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Heading	+/- 10°	+/- 5°
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Smooth transition while landing the uphill and downhill skids

Recognition of too steep a slope

Maintaining tail clear of slope

NOTE: If cyclic reaches lateral stop before landing downhill skid abort landing

## Slope Pick-Ups

Purpose: To teach the student how to pick up the helicopter into a hover from sloped surface.

Clear area and skids

Look at horizon

Move the cyclic into slope to its approximate position during the bottom of the landing

Raise collective while centering cyclic until the helicopter is skids level

Pause on uphill skid to stabilize

Raise collective to achieve 3' hover

“Tail clear”

Move tail away from slope using the pedals

Move away from slope

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Heading	+/- 10°	+/- 5°
Smooth transition while lifting the skids off the ground		
Maintaining tail clear of slope		

## Off Airport Landings

Purpose: To teach the student a technique for evaluating a landing site and choosing a desirable approach and departure path.

Clear area

Performance check (OGE chart, power margin, OGE hover 300' to 500' above spot)

AWOTFEEL during orbit or high recon

Altitude – 300 - 500' AGL 40 - 60 KTS orbit with landing spot 45° off to the side

Winds – direction and speed

Obstacles – wires, poles, terrain, vegetation, etc...

Turbulence – location and avoidance

Forced landing areas – always have one, even if it is the landing spot

Entry – into wind unless obstacles and location of forced landing areas dictate otherwise (absolutely no approaches shall be made without a go around plan/path)

Exit – into wind unless obstacles and location of forced landing areas dictate otherwise

Landing Spot – surface condition, pick specific spot

Extend orbit downwind to set up for final and do not lose sight of landing spot

“Pre-landing checks”

Verify AWOTFEEL on final approach

Make a normal approach, unless avoiding obstacles or turbulence, to farthest point in landing zone

At 50' AGL visualize where skids and tail will go at the landing spot

Apply power early (before losing ETL) and ensure sufficient power exists to land

Terminate approach to the surface unless sufficient power exists to hover

All off airport landings are treated like slope landings

“Tail rotor clear”

Ground recon – confirm AWOTFEEL, make changes to departure path if necessary

If normal takeoff cannot be made, perform max performance takeoff checks

<u>Standards</u>	<u>Private</u>	<u>Commercial</u>
Orbit airspeed	+/- 10 KTS	+/- 5KTS
Orbit altitude	+/- 100'	+/- 50'

Avoids situations where a go around cannot be made. Always leave an out.

NOTE: Be aware of dry grass and engine exhaust

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