INTRODUCTION

This guide is to be used by Certified Flight Instructors and students for training in the Robinson R22. Altitude, location, and weather must be taken into consideration and therefore, minor modifications may be necessary.

The following airspeeds should be used for normal procedures:

Normal Climb	60 KIAS @ 104%
Normal Cruise	75 KIAS @ 104%
Hovering	3-5 ft @ 104%
Autorotative Descents	60-70 KIAS @ 104%
Max hover speed-Forward	10 Kts Groundspeed
Max hover speed-Rearward/Lateral	5 Kts Groundspeed

SAFETY CONSIDERATIONS

The instructor and student will use a positive exchange of controls at all times. For example, when the instructor is giving up controls to the student:
Instructor: "You have controls"
Student: "I have controls"
Instructor "You have controls" (The instructor will maintain controls until he/she repeats this back to the student)

When instructor takes the controls from the student, the instructor will say "I have controls" and the student shall place their hands on their lap and feet on the floor. Normally, the instructor will say, "I have controls, follow along" and the student will give up controls, but feel along with the instructor. After hearing either of these statements, the student shall say, "You have controls" to the instructor.

The student shall verbally recite maneuvers and checks to instructor at all times in flight.

The instructor will be ready at all times to take control in the event the student applies an abrupt or wrong control input.

Maintain awareness of your environment at all times (i.e. airspace and airport environment, other aircraft, and terrain).

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STRAIGHT & LEVEL

Purpose:
To maintain a constant altitude, heading, and airspeed.

Description:

- Eyes OUTSIDE.
- Focus on attitude and pitch control w/ cyclic.
- Reference the horizon w/ a fixed point in the cockpit (compass).
- Note changes in attitude by noting the changes between the fixed point and horizon.
- Airspeed is determined by attitude and controlled by cyclic, which is very sensitive and requires very slight pressure for change.
- Altitude is controlled by the collective and corresponding pedal and cyclic input is required for every collective input to maintain trim and attitude.
- Lowering the collective requires right pedal and aft cyclic.
- Raising the collective requires left pedal and forward cyclic.
- High manifold pressure settings or a high density altitude may require throttle adjustment (increase collective, increase throttle). To avoid having to adjust throttle make slow collective inputs in these conditions.

Performance Standards:

	Private	Commercial
Airspeed	±10 Kts	±5 Kts
Altitude	±100 ft	±50 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common errors:

- Flying out of trim w/ pedals.
- Cross controlling by applying too much pedal and opposite cyclic control.
- Not maintaining assigned airspeed.
- Failure to maintain desired ground track

NORMAL CLIMBS & DESCENTS

Purpose:
To change altitude at a controlled rate while maintaining attitude.

Description:
1. Climbs
   - 60 Kts, 500 fpm.
   - At 75 Kts, clear above, increase collective (left pedal for trim) and aft cyclic to 60 Kts climb attitude.
   - 50 ft before desired altitude, forward cyclic to 75 Kts, while adjusting collective for level flight (trim).
   - Throughout the climb, cross-check horizon w/ inside references (compass) to maintain heading and attitude.

2. Descents
   - 500 fpm
   - At 75 Kts, clear below, decrease collective to establish a 500 fpm descent rate, aft cyclic for attitude (trim).
   - 50 ft before desired altitude, increase collective and forward cyclic to maintain level flight at 75 Kts
   - Throughout, cross-check horizon w/ inside references (compass)

Performance Standards:

	Private	Commercial
Airspeed	±10 Kts	±5 Kts
Level-Off Altitude	±100 ft	±50 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common Errors:
- Not maintaining proper airspeed and power settings, especially prior to reaching the desired altitude.
- Failing to adjust pedals for trim

TURNS

Purpose:
Turn using constant bank angle, airspeed, and altitude.

Description:
- 75 Kts, clear area, apply cyclic until desired bank angle is reached.
- Unlike an airplane, pedals should not be used to assist the turn.
- Maintain a level attitude and additional collective may be needed to maintain altitude (trim).
- Prior to reaching roll out heading, apply cyclic (lower collective if needed) (trim).

Performance Standards:

	Private	Commercial
Airspeed	±10 Kts	±5 Kts
Altitude	±100 ft	±50 ft
Roll-Out Heading	±10°	±5°

Common Errors:
- Failure to clear turn.
- Not maintaining trim and a level attitude.
- Failing to cross-check and interpret outside and instrument references.

ACCELERATION / DECELERATION

Purpose:
Maintain a constant altitude while changing airspeed. Increases pilot coordination.

Description:

- 75 Kts, slowly increase collective about 2” above cruise power while adding forward cyclic and left pedal, stabilize at 85 Kts level flight.
- To decelerate, slowly reduce collective, aft cyclic, right pedal, stabilize at 60 Kts.
- Accelerate back to 75 Kts
- Cross-check airspeed, altitude, attitude, RPM, and trim throughout

Performance Standards:

	Private	Commercial
Airspeed	±10 Kts	±5 Kts
Altitude	±100 ft	±50 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common Errors:

- Not maintaining trim and a level attitude
- Not cross-checking and interpreting outside and instrument references

VERTICAL TAKEOFF TO A HOVER

Purpose:
Transition from surface to 3-5 ft hover

Description:

- Collective full down, cyclic centered, and pedals neutral, Pre-Take Off Check List:
  - Warning Lights are Out.
  - RPMs in the green.
  - Engine gages green
  - Fuel is good
  - Carb heat out of yellow.
  - Trim down
- Clear right, left, & skids.
- Select reference point outside (50-75 ft).
- Slowly increase collective with a small amount of left pedal.
- Light on skids, neutralize all movement. Caution: NO backward or lateral movement (dynamic rollover). If there is any lateral or rearward movement, lower collective and begin again. Do not raise collective until all movement is neutralized.
- Continue smoothly and slowly increasing collective while maintaining pedals.
- With two occupants, the R22 normally hovers with a nose low attitude and therefore the heels of the skids will break ground first. Compensate with aft cyclic
- Maintain heading w/ pedals, position over ground w/ cyclic, and altitude w/ collective
- Perform hover check upon reaching 3-5 ft:
  - Warning Lights are Out.
  - RPMs in the green.
  - Engine gages green
  - Fuel is good
  - Carb heat out of yellow.
  - Trim down
  - Notice your hover power

Performance Standards:

	Private	Commercial
Position	10’ circle	5’ circle
Altitude	±2 ft	±1 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common Errors:

- Failing to pick up at an acceptable rate and maintaining desired altitude

- Not correcting drift and continuing to raise collective while there is movement

VERTICAL LANDING FROM A HOVER

Purpose:
Transition from 3-5 ft hover to surface.

Description:

- From hover (headed into wind) select a reference point (50-75 ft ahead).
- DO NOT look down. Keeping eyes outside prevents over-controlling.
- Smoothly and slowly lower collective to a slow rate of sink (right pedal).
- Caution: NO backward or lateral movement while landing
- If sink rate stops, smooth downward collective is required to overcome an increase in ground effect.
- As skids contact surface, all movement should be neutralized, smoothly and slowly lower collective full down.
- The toes of the skids may touch first due to forward CG with 2 occupants. A slight amount of forward cyclic is required when contacting ground. During solo flight the R22 is level and will not require forward cyclic upon ground contact.

Performance Standards:

	Private	Commercial
Drift	±4 ft	±2 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common Errors:

- Descending too rapidly
- Not correcting for drift
- Failing to lower collective to compensate for ground effect
- Not lowering collective smoothly to the full down position upon ground contact

HOVERING FLIGHT

Purpose:
To maneuver forward, sideward, backward, and turn in a hover.

Description:

1) Forward, Sideward, Backward

-From hover headed into wind, input smooth cyclic while maintaining heading with pedals

-Small corrections to collective are required to maintain altitude

-As movement begins, adjust cyclic to keep groundspeed to walking pace while looking in the direction of flight to maintain ground track

-To stop movement, input smooth cyclic in opposite direction

Note: Small, slow smooth inputs to avoid pendular action

Note: During crosswinds, additional cyclic will be needed to compensate for drift

2) Hovering pedal turns

-Clear tail (verbally)

-From hover headed into wind, apply pedal pressure in desired direction

-Apply opposite pedal if needed to maintain a slow constant turn (about 15 seconds for a 360° turn)

-Cyclic controls attitude and position

-Collective controls constant altitude

-Left turns require an increase in engine performance due to the increased pitch of the tail rotor and therefore, a slight reduction in RPM and altitude may be noticed. This can be corrected with a small increase of the collective. Right turns produce the opposite effect

-Gently apply opposite pedal when desired heading is reached

Performance Standards:

	Private	Commercial
Altitude	±2 ft	±1 ft
Heading	±10°	±5°
RPM	±2%	±2%
Ground Track	±5 ft	±3 ft

Common Errors:

-Not maintaining a constant rate of turn

-Failure to maintain position over reference point and ground track

-Not looking in the direction of flight

NORMAL TAKEOFF FROM A HOVER

Purpose:
Transition from a hover to a normal climb

Description:
-From hover, 360° clearing turn
-Pick a reference point along takeoff path to ensure ground track
-Pre-takeoff check (same as hover check)
-Begin takeoff with a small, single input of forward cyclic, if aircraft settles reduce amount of forward cyclic, or if excessive amount of settling increase collective
-Maintain heading w/ pedals and altitude (less than 5') w/ collective
-Reaching 10-12 Kts, ETL and transverse flow effect occur, and can be felt by a lateral vibration, additional right pedal will be needed
-Continue accelerating while maintaining ground track w/ cyclic
-Upon reaching 40-45 Kts, gently reduce the amount of forward cyclic, begin climb
-Increase collective to climb power, and establish 60 Kts (trim)
Note: H / V Diagram

Crosswind considerations:
-Maintain heading until 50 ft flying the helicopter in a slip
-Place cyclic into wind to maintain ground track
-Above 50 ft, crab the helicopter into the wind by putting the aircraft in trim using pedals

Performance Standards:

	Private		Commercial
Altitude below 10 ft	±25 ft	±10 ft	
Altitude above 10 ft	±50 ft	±25 ft	
Heading	±10°	±5°	
RPM	±2%	±2%	
Ground Track	±5 ft		±3 ft

Common Errors:
-Settling prior to reaching ETL by not using enough power
-Not maintaining attitude, airspeed, drift and power during climb

NORMAL APPROACH TO A HOVER

Purpose:
Transition from flight at altitude to 3-5 ft hover

Description:
-On final into wind, aligned to point of touchdown, 60 Kts 300' AGL
-10° normal approach angle (compass is a good reference point)
-Lower collective, right pedal, aft cyclic while maintaining point of landing on windscreen or compass
-Collective controls angle of approach
-Cyclic controls rate of closure (speed moving toward touchdown point [TDP])
-If TDP moves up from reference point (compass), approach is becoming shallow, raise collective, If TDP moves lower from reference point lower collective
-As ground approaches, apparent groundspeed and rate of closure appear to be increasing. At this point, "bleed off" airspeed with slight aft cyclic to "brisk walk" and maintain approach angle by smoothly lowering the collective
-At about 25-40 ft, aircraft loses ETL depending on the wind, be prepared to add raise collective, left pedal, with gentle forward cyclic to maintain rate of closure
-While settling to a 3-5' hover, stabilize all movement

Crosswind considerations:
-Maintain crab into wind and trim above 50 feet
-Use a slip to align skids with the ground track (centerline) below 50 feet. Apply cyclic into wind and opposite pedal

Performance Standards:

	Private		Commercial
Altitude below 10 ft	±25 ft	±10 ft	
Altitude above 10 ft	±50 ft	±25 ft	
Heading	±10°	±5°	
RPM	±2%	±2%	
Ground Track	±5 ft		±3 ft

Common Errors:
-Not maintaining rate of closure w/ cyclic and angle of descent w/ collective
-Failure to make pedal adjustments w/ collective movements
-Holding airspeed too long and overshooting TDP

TRAFFIC PATTERN OPS

Purpose:
Provide training in the fundamental areas of a traffic pattern
Note: Traffic patterns vary depending on the airport environment

Description:

1) Upwind Leg – 60 kt climb, turn 90° at about 300' AGL
2) Crosswind Leg – Maintain ground track by crabbing into wind. 60 Kts until reaching 450' AGL, then slowly increase airspeed to 75 Kts, 90° turn. This leg should be rather short; just level the ship, then turn to the downwind leg
3) Downwind Leg – 500' and 75 Kts, use reference points to ensure ground track. Abeam TDP perform pre-landing check (carb heat full if carb ice conditions present), At about 45° off shoulder from TDP, decrease collective to 300-500 fpm descent rate, 90° turn while descending, gentle aft cyclic to begin reducing airspeed
4) Base Leg – Continue descending to 300' AGL and reducing airspeed to 60 Kts, 90° turn to roll out aligned w/ runway or TDP, if needed level at 300'
5) Final – 60 Kts, 300' until reaching the appropriate approach angle

Performance Standards:

	Private		Commercial
Altitude	±100 ft		±50 ft
Altitude above 10 ft	10 Kts	5 Kts	
Heading	±10°	±5°	
RPM	±2%	±2%	

Common Errors:
-Failure to correct for wind drift
-Inadequate spacing from other traffic
-Not maintaining altitude and airspeed to performance standards

MAX PERFORMANCE TAKEOFF AND CLIMB

Purpose:
Transition from the surface to a max performance climb (obstruction clearance)

Description:
-Pre-takeoff check
-From surface or 3-5' hover, clear area left, right, and overhead (clearing turn)
-Choose reference point for ground track
-Light on skids if on surface, neutralize all movement, then increase collective to 5 min. takeoff power while maintaining heading with left pedal and begin climbing
-When obstacle is cleared (practice clearing a 50 ft obstacle), **gentle** forward cyclic to a 40 kt pitch attitude, then slowly apply additional forward cyclic to 60 Kts
-Passing through 55 Kts, reduce collective to normal climb power
-Closely monitor RPM, if RPM droops, terminate maneuver and initiate low RPM recovery, if throttle is full, reduction of collective is only option

Performance Standards:

	Private	Commercial
RPM	±2%	±2%
Heading	±10°	±5°

Common Errors:
-Not checking available max power or not setting the pre-determined power setting
-Improper RPM control
-Too much forward movement before obstacle is cleared
-Not reducing collective to normal climb power at 55 Kts
-Drift during climb

STEEP APPROACH

Purpose:
Transition from flight to a hover using a steeper than normal approach angle to simulate obstacle clearance or a pinnacle landing.
Note: See safety notice SN-22

Description:
-On final, maintain 60 Kts, 300 ft AGL 'till the normal approach angle is achieved
-Upon intercepting normal approach angle, initial aft cyclic w/ slight reduction of collective to prevent ballooning
-Maintain 300 ft AGL until a steep approach angle is intercepted (about 15°). You should be at about 45 Kts
-Reduce collective more than you would for a normal approach (right pedal) in order to maintain that angle referencing a spot on the windscreen
-Maintain approach angle and rate of descent with the collective, rate of closure w/ cyclic, and trim or heading w/ pedals
-Crab above 50 ft and slip below 50 AGL and keep a level attitude
-Loss of ETL will occur at a higher altitude during a steep approach requiring an increase in collective sooner than normal, this increase in collective will require forward cyclic and left pedal
-Stabilize a 3-5 ft hover

Note:
Special consideration must be made to ensure the descent rate is less than 300 fpm when airspeed is less than ETL (30 Kts is a good reference to use)

Performance Standards:

	Private	Commercial
Termination point	±10 ft	±5 ft
Heading	±10°	±5°
RPM	±2%	±2%

Common Errors:
-Failure to start reducing forward airspeed when intercepting the normal approach angle
-Overshooting spot by arriving at the termination point with too much airspeed
-Not controlling rate of closure w/ cyclic and angle of descent w/ collective
-Failing to make pedal and cyclic inputs w/ collective changes
-Losing ETL with a high rate of descent

RAPID DECELERATION – QUICK STOP

Purpose:
Coordinated movement to simulate a condition when a rapid decrease in forward airspeed is required (aborted takeoff)

Description:
-Normal takeoff profile until reaching 25 ft, then apply **gentle** forward cyclic to achieve 45-60 Kts
-Begin stop by smoothly lowering collective, right pedal, and simultaneous aft cyclic
-Apply aft cyclic and additional decreased collective as needed to maintain altitude
-To prevent ballooning, decrease collective and/or less aft cyclic
-As airspeed is lost, aircraft settles
-Slowly increase collective (left pedal) to control rate of descent
-Add forward cyclic to level aircraft, settle to 3-5 ft hover

Note:
Use caution to avoid settling w/ a tail low attitude and make sure termination is not at an excessively high hover height

Performance Standards:

	Private	Commercial
Termination point	±50 ft	±25 ft
Heading	±10°	±5°
RPM	±2%	±2%
Altitude	±15 ft	±10 ft

Common Errors:
-Not applying aft cyclic **simultaneously** w/ lowering collective **and** right pedal
-Too aggressive aft cyclic input
-Descending and stopping forward motion w/ a tail low attitude

SETTLING WITH POWER

Purpose:
To demonstrate the dangerous result of operating at low airspeed, and moderate to high power setting w/ a high rate of descent

Demonstrate at a minimum altitude of 1500 ft AGL
Recover at the first indications of shutter or a 500-700 fpm descent rate, whichever occurs first

Description:
-Most commonly happens during a steep approach w/ a tail wind
-Clear area vertically and horizontally w/ a 360° turn
-Adjust power to approximately 5" below climb power
-Smooth aft cyclic 'till airspeed approaches 20 Kts
-Allow aircraft to sink and develop a 300 fpm descent rate
-More aft cyclic 'till the aircraft descends to less than 10 Kts
-Shutter will begin and control movements feel "sluggish"
-An increase in collective increases vibration and sink rate
-To recover, apply forward cyclic and reduce collective
-At the first indication of airspeed (ETL), increase collective to climb power
-Continue forward cyclic to a 60 kt attitude
-**Recovery must be made prior to passing through 800-1000 ft AGL**

Performance Standards:
The pilot must have a thorough understanding and recognize the eminent onset of settling w/ power, and perform recovery

Common Errors:
-Failure to recognize the onset and conditions contributing to settling w/ power
-Improper recovery (raising collective)

LOW ROTOR RPM RECOGNITION AND RECOVERY

Purpose:
To become familiar w/ the recognition of low rotor rpm and the proper recovery
Note: Review SN 10 and SN 12

Description:

1) Forward Flight
    a. Entry and Recognition
        i. Announce maneuver during cruise flight
        ii. Slowly decrease throttle to 95% RPM
        iii. Recognized by decrease in engine noise, slight vibration and cyclic shake at higher airspeeds, and the low rotor RPM warning light & horn
    b. Recovery
        i. Simultaneously roll on throttle, lower collective & gentle aft cyclic (no forward cyclic movement)
        ii. When rpm is in the green, increase collective and apply forward cyclic to resume cruise flight
        iii. Monitor RPM
2) Hover
    a. From 5 ft hover into wind
    b. Slowly decrease throttle to 95%
    c. Recognized by obvious decrease in engine noise and tendency to settle towards the ground
    d. Natural reaction for some pilots will be to raise collective to stop the descent. This increases RPM decay and increases descent
    e. Recovery is the same as forward flight, lower collective and simultaneously roll on throttle
    f. If RPM is not regained prior to ground contact, keep a level attitude

Performance Standards:
Pilot should be able to recognize and recover from low rotor rpm prior to 95%

Common Errors:
-Failure to recognize low rotor RPM conditions
-Raising the collective to stop descent instead of lowering to regain RPM

STRAIGHT IN AUTOROTATION

Purpose:
To simulate safely landing the aircraft in the event of power loss or other catastrophic emergency

Note: Prior to performing this maneuver in flight, read SN-25 and SN-38. Also read page 4-9 in the POH

Description:

1) Entry
    a. From level flight at 70 to 75 Kts (500-700 ft AGL) into wind, smoothly lower collective full down (about 1 second) while applying right pedal (in trim) and aft cyclic to maintain a level, 75 kt attitude
    b. Reduce throttle slightly to split needles, **not past the detent spring**, and begin scan: attitude, trim, rpm, airspeed, outside (landing zone)
2) Glide
    a. After establishing descent, slowly and smoothly reduce airspeed to 60-70 Kts and maintain this attitude throughout glide
    b. Aft cyclic causes increased rpm, which is controlled by small increase in collective (Avoid large collective increases because it can lead to "chasing the needle"). When raising collective to control RPM, hold back the throttle slightly to prevent the correlator from joining the needles
    c. RPM in the green, in trim during glide; below 100 ft AGL maintain alignment with slip if necessary (avoid looking straight down, maintain scan)

Note: 100 ft check, make an immediate power recovery if the following conditions do not exist:

-Rotor rpm in green
-60-70 Kts
-Stabilized rate of descent about 1500 FPM or less

3) Flare
    a. From 60 to 70 kt attitude, at 40 ft AGL, begin flare w/ aft cyclic to reduce forward airspeed and decrease rate of descent.
    b. The amount of flare depends on wind and gross weight. Start lightly and the flare should be gradually increased, Too much flare will cause a balloon up
4) Power recovery
    a. At 8-10 ft (skids) crack throttle and begin to level w/ forward cyclic. **Use caution w/ a tail low / nose high attitude below 10 ft**
    b. Just prior to leveling, increase collective (left pedal)
    c. As the needles join, it may be necessary to add throttle to hover

d. DO NOT allow the skids to descend below 5 ft during recovery
e. Complete when rpm is 104%, level at 5 ft, and heading is stabilized

Performance Standards:

	Private	Commercial
Predetermined Spot	±50 ft	±25 ft
RPM	Normal limits for both	
Airspeed	±5 Kts	±5 Kts

Common Errors:

-Not applying the correct amount of right pedal during entry
-Too much aft cyclic during entry causing a nose-high attitude
-Not manipulating the throttle to achieve a needle split
-Overcorrecting of RPM with collective during glide
-Not scanning properly
-Under/Overshooting spot
-Too much aft cyclic at beginning of flare
-Not joining RPM needles in the green during recovery

HOVERING AUTOROTATION

Purpose:
To simulate safely landing from a hover w/ a complete power loss or catastrophic failure.

Description:
-From a 2 to 3 ft hover @ 104%, grip throttle so it will be rolled off into the detent
-“Hand underneath, eyes outside”
-Into the wind, roll throttle smoothly into the detent while adding right pedal
-Slight right cyclic may be needed to correct a left drift due to loss of tail rotor thrust
-DO NOT raise or lower collective while rolling off throttle
-At about 1 ft, smoothly increase collective, holding throttle firmly into the detent, to cushion landing
-As the skids touch, apply slight forward cyclic
-Lower collective full down when firmly on the ground

Note:
Use extreme caution to avoid sideward or backward movement on touchdown to prevent a possible roll-over.

Performance Standards:

	Private	Commercial
Heading	±10°	±5°
Touchdown	Level	Level

Minimal sideward movement and no backward movement allowed

Common Errors:
-Not rolling all the way into the detent
-Incorrect amount of right pedal when rolling off throttle
-Raising or lowering the collective when rolling off throttle
-Improper timing of collective pull to cushion or not using all available collective
-Not correcting for drift and failing to touch down with a level attitude
-Failure to maintain heading

PRACTICE FORCED LANDINGS

Purpose:
To simulate an emergency situation designed to develop the pilot's reaction time, planning, and judgment in the event of an engine failure during flight

Note: See SN-10, SN-27, and SN-38

Description:
-Inform student that a "simulated engine failure" will be performed during the flight
-Announce "engine failure", roll the throttle smoothly into flight idle
-Student should lower collective and establish a level attitude glide, maintaining 90% or more RPM. The RPM should build back to green to become a normal auto
-Locate and maneuver to a suitable landing spot, preferably into wind
-When determined by the CFI, a power recovery will be accomplished by first cracking the throttle to establish engine RPM, then raise collective to join needles establishing a climb at 60 Kts

Note:
-Recover before 100 ft AGL as the student should have the aircraft aligned with the touchdown area, 60 to 70 Kts, rotor RPM in the green, in trim, and a steady descent rate.

Performance Standards:

	Private	Commercial
Predetermined Spot	Suitable	Suitable
RPM	Normal limits	
Airspeed	±5 Kts	±5 Kts

Common Errors:
-Failing to recognize the emergency and not lowering collective soon enough to maintain rotor RPM
-Selecting an unsuitable landing spot or not maneuvering into wind
-Under/Overshooting desired spot
-Failing to properly recover

RUNNING TAKEOFF

Purpose:
To simulate a takeoff when a hover cannot be sustained due to high DA or high gross weight

Description:
-From a 3 to 5 ft hover, note hover power in the direction of takeoff
-Set down on surface, pre-takeoff checks, and clear the area
-Takeoff power will be 1”-2” Hg less than hover power
-Increase collective ‘till light on the skids, neutralize movement
-Slowly increase collective and apply forward cyclic to slide forward
-Maintain heading w/ pedals and ground track w/ cyclic
-Continue slowly increasing collective to modified takeoff power
-Approaching ETL, apply slight aft cyclic and lift to 3-5 ft AGL
-Continue to accelerate remaining below 10 ft ‘till 40-45 Kts, then climb
-At 50 ft AGL, set manifold pressure to normal takeoff power

Crosswind considerations:
Use slip below 50 ft, and crab above 50 ft AGL

Note:
DO NOT attempt this maneuver if you do not have sufficient power to hover. If the helicopter cannot hover, its performance is unpredictable and the maneuver should be aborted.

Performance Standards:

	Private		Commercial
Heading	±10°	±5°	
Airspeed	±10 Kts		±10 Kts
RPM	±2%	±2%	

Must maintain ground track w/ crosswind correction if necessary

Common Errors:
-Failure to maintain heading or ground track
-Not attaining ETL prior to attempting to lift
-Excessive forward cyclic during ground run
-Not maintaining a normal takeoff profile after lifting
-Failure to establish climb power and airspeed

RUNNING LANDING

Purpose:
To simulate an approach and landing when sufficient power for hovering is not available due to high DA and/or gross weight

Description:
-Note hover power, subtract 2", this is max power that can be used
-On final into wind at 60 Kts, 300 ft, begin shallow approach (5° or VASI)
-Plan to arrive at the touchdown point at or slightly above ETL
-Prior to ground contact, level attitude is required
-Use modified max power to cushion touchdown, maintaining heading w/ pedals, cyclic for track, and slowly lower collective for brakes until coming to a complete stop

Crosswind considerations:
Crab above 50 ft, slip below 50 ft

Performance Standards:

	Private	Commercial
Heading	±10°	±5°
Airspeed	Maintain ETL for both	

Must maintain ground track w/ crosswind correction if necessary

Common Errors:
-Using improper approach angle
-Failing to arrive at surface at the same time as arriving at ETL
-Touching down without a level attitude
-Failing to maintain heading, ground track, and directional control after touchdown

SLOPED OPERATIONS

Purpose:
To land from a hover and takeoff to a hover from a sloped surface.

Note:
Prior to conducting slope operations, review SN-9 and become familiar w/ dynamic rollover. For training, use a max slope angle of 3 to 5°

Description:

1) Slope Landings
    a. Position helicopter perpendicular to slope at a 3 ft hover into wind
    b. Clear area and tail, then slide directly above spot laterally, stabilizing into a hover
    c. Lower collective for slow rate of sink
    d. When upslope skid touches, begin applying lateral cyclic to hold skid into the slope
    e. Stabilize a one skid hover
    f. Slowly lower collective holding the upslope skid into the hill w/ lateral cyclic 'till the down slope skid is firmly on the ground
    g. With skids firmly on the ground, center the cyclic to ensure "head clearance" on the upslope side
    h. Slowly lower collective to about 15"
2) Slope Takeoffs
    a. Almost exact reverse of landing
    b. Pre-takeoff checks and clear skids
    c. Apply cyclic into slope and slowly increase collective
    d. When light on skids, neutralize all movement
    e. Continue increasing collective maintaining heading w/ pedals
    f. When down slope skid breaks ground, slowly center cyclic
    g. As level attitude is reached, the cyclic should be neutral
    h. Continue increasing collective, maintaining position w/ cyclic and heading w/ pedals 'till reaching a stabilized 3 to 5 ft hover
    i. Slowly move laterally away from the spot, ensuring tail rotor clearance

Performance Standards:

	Private	Commercial
Heading	±5°	±5°

Common Errors:
-Not clearing tail and turning the tail upslope
-Lowering down slope skid too rapidly
-Not enough lateral cyclic, which causes the helicopter to slide down slope
-Failure to maintain heading with pedals

180 DEGREE AUTOROTATION (W/ POWER RECOVERY)

Purpose:
To simulate safely landing by turning 180° in the event of a power loss or other catastrophic emergency.

Note: See SN-38

Description:

1) Entry
    a. Abeam spot (or past spot depending on wind) on downwind at 75 Kts and at least 700 ft AGL, smoothly lower collective (right pedal for trim) full down, aft cyclic to maintain attitude and immediately begin turn
    b. Roll off throttle slightly to split needles
    c. Scan: attitude, trim, airspeed, rpm, outside (landing zone)
2) The Turn/Glide
    a. After turn and descent are established, reduce airspeed to 60 to 70 Kts maintaining attitude and trim
    b. Angle of bank is determined by wind and distance from spot (avoid an excessively steep turn)
    c. Changes in attitude and angle of bank will cause increases and decreases in rotor rpm, adjust collective to keep rpm in the green
    d. During rollout, collective will need to be lowered to keep rpm in the green
    e. Turn will be completed and helicopter aligned w/ spot prior to 100 ft AGL (200' in high DA)

Note:
Passing through 100 ft AGL, make an immediate power recovery if the following conditions do not exist:

-Aligned with touchdown point
-RPM in the green
-Airspeed 60-70 Kts
-Rate of descent stabilized

When aligned w/ spot, turns into a straight-in auto

3) The Flare (Same as straight-in auto)
    f. About 40 ft, begin flare w/ aft cyclic to reduce forward airspeed and decrease rate of descent.
    g. The amount of flare depends on wind and gross weight. Start lightly and the flare should be gradually increased
5) Power recovery

a. At 8-10 ft (skids) crack throttle and begin to level w/ forward cyclic. **Use caution w/ a tail low / nose high attitude below 10 ft**
b. Just prior to leveling, increase collective (left pedal)
c. As the needles join, it may be necessary to add throttle to hover
d. DO NOT allow the skids to descend below 5 ft during recovery
e. Complete when rpm is 104%, level at 5 ft, and heading is stabilized

Performance Standards:

	Private	Commercial
Predetermined Spot	±50 ft	±25 ft
RPM	In the green for both	
Airspeed	±5 Kts	±5 Kts

Common Errors:
-Starting the turn too late
-Failing to maintain a level attitude throughout the maneuver
-Under/Overshooting spot
-Not using a proper scanning technique

OFF AIRPORT LANDINGS (PINNACLES & CONFINED AREAS)

Purpose:
To land in a safe and efficient manner away from the airport environment

Note:
See SN-16, SN-17, and SN-37. IGE and OGE hover ceilings will be determined before the flight. Just because you landed there before does not mean you can do it today.

Description:
-High recon at 500 ft AGL, 60 Kts to best determine wind direction and velocity
-Pick 4 reference points for forced landings; points also are used to hold a constant orbit
-Can also keep touchdown spot out window to determine wind
-The acronym "WOTFEEL" will be used
-Wind, Obstacles, Turbulence, Forced landings, Entry, Exit, Landing zone (rocks, grass height, slopes, etc.)

Note:
Special emphasis should be placed on loose dirt or snow conditions on the landing zone (due to a white or brown out condition). If at any time a loss of visibility situation arises, immediately initiate a go around. No landings will be made to snow covered areas (to a hover only).

Description (cont.):
-Low recon on final, looking for obstacles, winds/turbulence, and landing zone.
-On final scanning instruments, perform a 100 ft check: manifold pressure and more importantly rpm **(If rpm droops at any time, immediately abort the maneuver and initiate low rpm procedures, regardless of mp).** Also, keep in mind sloping terrain, rocks, grass, and confined areas, all decrease IGE hover abilities.

1) Pinnacles:
    a. After high recon, pre-landing checks abeam spot
    b. 45° past the spot start visual descent, turn base onto final
    c. 60 Kts, 300 ft, and approach depends on the winds
    d. On the leeward side, downdrafts may be present, so use a steeper than normal approach. If wind is calm, use normal approach
    e. Exit should be down-sloping terrain if possible; airspeed over altitude takeoff is recommended because it covers unfavorable terrain rapidly, gives the pilot more favorable glide angle, and it gives you a better chance of reaching a safe area in case a forced landing occurs
2) Confined Areas:
    a. After high recon, pre-landing checks abeam spot

b. 45° past the spot start visual descent, turn base to final
c. 60 Kts, 300 ft, use as steep of an approach as necessary to clear obstacles (including tail rotor clearance)
d. Avoid a vertical descent from altitude to the landing zone
e. Landing zone should be very specific (aim small, miss small) and should be kept in sight the entire final approach
f. Establish hover right at your spot, and know your surroundings to avoid turning tail into obstructions
g. On the high/low recons you should've located takeoff path (if necessary reposition for takeoff into wind)
h. Takeoff profile should be altitude over airspeed, but no steeper than needed
i. **Clearing a barrier by a few feet and maintaining normal power and rpm is better than clearing it by a wide margin w/ no power reserve and low rpm**
j. Always have alternate routes in case you're not able to complete the maneuver

Performance Standards:
Student must exhibit knowledge of the element related to confined area ops, high/low recon, suitable approach path, termination point, departure path, suitability of landing surface, etc.
RPM normal limits for both Private and Commercial

Common Errors:
-Failure to do a high/ low recon
-Not tracking the selected approach path
-Failure to assure obstacle clearance during approach or departure
-Not picking emergency landing spots
-Judging the wind direction or speed incorrectly