Helicopter Make/Model
Transition and Differences

Training Syllabus

Helicopter Safety Enhancement No. 116

Prepared by H-SE-116 Team in partial fulfillment of USHST efforts to encourage training methods that can reduce the risk of fatal helicopter accidents

November 17, 2022

Prepared for the USHST for promotion through industry stakeholders and safety advocates
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1. Introduction

As with any instructional situation, it is important that both the student and instructor adopt a learning-centered mindset that acknowledges and utilizes previous experience, but not at the expense of being appropriately thorough. Transition training can pose additional challenges when both the instructor and student pilot come with a broad range of experience or flight hours. There exists a tendency to assume that either the previous experience applies to the current transition, or training is abbreviated (or nonexistent) because of a perceived mastery of helicopter operations.

1.1 Definitions

- **Student**: For the purposes of this document, the term “student” is used to describe a pilot who will receive ground or flight training from an instructor. Not to be confused with the holder of a student pilot certificate.

- **Instructor**: The terms “instructor” or “flight instructor” are used interchangeably and refer to any pilot providing flight or ground instruction for the purpose of an aircraft transition. The term is not limited to certificated flight instructors, though the qualifications of a CFI are valuable and recommended.

2. Training Overview

2.1 Purpose

Analysis of US helicopter accident data\(^1\) shows a trend that indicates pilots with less time in a particular make or model are more likely to have an accident, regardless of total pilot flight hours. A contributing factor to that trend has been identified as the pilot’s lack of familiarity with the new airframe or installed equipment. Lack of familiarity could be the result of inadequate training or more specifically, insufficient structure of the learning environment, training content, or completion standards.

The purpose of this document is to provide recommendations and structure for pilots and flight instructors who are seeking or conducting training in new or unfamiliar aircraft makes and models, or with new or unfamiliar equipment. Through dedicated instruction and structured course material, pilots can improve their knowledge and skill, and ultimately improve the safety of their operations.

Different aircraft makes and models can have highly variable operational characteristics, equipment, procedures, and limitations. It is important that pilots receive training from a qualified flight instructor anytime there are appreciable operational differences between aircraft they are accustomed to flying, and any new aircraft in which they don’t have previous experience. This training should be completed whenever there are increases and decreases in areas such as performance, automation, technology, or complexity.

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\(^1\) COMPARATIVE REPORT, Volume 2 U.S. JHIMDAT Data to U.S. JHSAT Data, Aug 2014
Commercial operators are required to provide mandatory training for aircraft transitions, and pilots flying for those operators must meet regulatory competency standards. Flight schools can also offer excellent learning environments and high quality of instruction. However, private owners and operators may not have the same access to instruction, comprehensive lesson plans, or qualification requirements. In such cases, the information contained in this manual may serve as a guideline for the training event, help identify areas of greater risk, and provide recommendations for additional focus when transitioning to unfamiliar aircraft or equipment.

The content of this document should be utilized as a guide to the transition or differences training event. Federal aviation regulations and the rotorcraft flight manual will be controlling in all circumstances.

2.2 Applicability

This syllabus should be referenced whenever a pilot is receiving training in the following areas:

- **Differences Training (Aircraft)** – Pilot training for variations of a particular aircraft type that has pertinent performance, operational or equipment differences from the base aircraft type. The base aircraft type and the variations must have the same type certificate.
  
  *Examples:*
  - Airbus AS350B2 and AS350B3
  - Bell 407 and 407GX
  - Robinson R44 standard and R44 with SAS/Autopilot

- **Transition Training** – A pilot who holds the appropriate category and class ratings and will receive training in a new or unfamiliar aircraft of a different type certificate.
  
  *Examples:*
  - Robinson R22 and R66
  - Airbus EC135 and EC145

2.3 Instructor Considerations

Pilots who are seeking transition or differences training should contract such training from a current and qualified instructor. The following list provides recommendations for determining the appropriate instructor qualifications.

- **Ratings or Qualifications** – an instructor providing differences or transition training should be an appropriately rated and current Certified Flight Instructor (CFI) or have similar experience and background. A qualified instructor will possess not only the skills and knowledge to demonstrate proficiency in the aircraft but should also understand critical soft skills such as crew/cockpit resource management, fundamentals of instruction and effective instructional techniques.

- **Flight Hours** – it is preferred that any instructor providing differences or transition training have at least 25 hours of flight experience in the make/model of aircraft and be familiar with any
installed equipment. Prospective instructors should also meet the recency of flight experience requirements outlined in the regulations, in the training aircraft.

- **Instructor Training** – Prior to delivering transition or differences training, the instructor should have received the same training from another instructor qualified under this section.

## 2.4 Pilot Qualification and Risk Assessment

The categories listed in Table 1 below represent some areas of potential risk related to both aircraft specifics and pilot experience. Instructors and pilots should have a clear understanding of those risks prior to commencing a training event.

Instructors should complete the assessment with their student so that both have a better understanding of skills or knowledge gaps that may exist between the student pilot’s previous experience, and the proposed training aircraft make and model.

Similar to a Preflight Risk Assessment, the intent of the exercise is to raise awareness to potential challenges, prepare the pilots for the event, and begin considering possible mitigations.

### 2.4.1 Instructions for Completion

1. Instructors will survey their student on each section and check the boxes as appropriate.

2. The instructor and student will then assess the proposed training aircraft and check the boxes that best represent the make and model.

3. Each subject of disparity between pilot experience and aircraft characteristics represents a high-risk area that will require additional attention during the training event.

4. Pilots with previous experience in comparable aircraft still assume risk, and appropriate sections of this syllabus should still be covered to ensure proficiency in the training aircraft variant.

*Note: The categories listed in the table below reflect risk associated with increased and decreased aircraft capability/complexity.*
Table 1: Pilot Experience Comparable to Training Aircraft Assessment

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<thead>
<tr>
<th>Engine</th>
<th>Pilot Experience</th>
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<td>Legacy Instrumentation (Steam Gauges)</td>
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<td>Modernized or Glass Cockpit</td>
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<td>Rigid or Fully Articulated Main Rotor Head</td>
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<td>Wheeled or Retractable Landing Gear</td>
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<td>Gross Weight &gt;12,500 lbs</td>
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2.4.2 Risk Mitigation

Prior to the operation the pilot and flight instructor should discuss the qualification assessment, and consider any additional operational risk as identified in an appropriate PFRA (Preflight Risk Assessment) or FRAT (Flight Risk Assessment Tool) program. More information on developing a Flight Risk Assessment Tool can be found here (https://ushst.org/risk-management/) or https://www.faasafety.gov/gsla/ALC/lib_categoryview.aspx?categoryId=31). Mitigations should be identified, and appropriate emphasis placed on the areas defined in the table above during ground and flight instruction.

2.4.3 Other Risk Categories

Below are other areas of focus that may increase the risk of a training event and should be considered during the planning stage.

- **VFR vs. IFR** – The complexity of differences or transition training may increase due to the introduction of instrument flight rules operations. Both pilot and instructor should determine if best to acclimate the student to the aircraft and systems under visual flight rules initially, and then provide instruction on IFR operations once the pilot has had time to operate the new aircraft and gain competency. Additionally, a pilot who is experienced in an aircraft make/model under VFR may not require differences or transition training by definition but may require additional instruction in the advanced use of an autopilot, for example, prior to IFR operations.

- **Type of Flying** – Aircraft operations, performance, and characteristics can vary greatly based on the intended use. Differences and transition training should be tailored to the pilot’s needs and anticipated challenges that will be encountered in their specific flight regime.

- **Single Pilot or Crewed Aircraft** – Pilot workload, task prioritization, emergency procedures and systems interface will vary between the single pilot and crewed aircraft environments. Aircraft certification may preclude any variation, but many aircraft can be optionally crewed. Differences and transition training should address crew assignments as applicable.

- **Flight Manual Supplements** – Optionally installed equipment, whether by the OEM or by aftermarket manufacturers, can drastically change aircraft operations. Any installed equipment and applicable rotorcraft flight manual supplements should be referenced and included in the training plan.

2.5 Use of Simulators or FTD

Training aids, sometimes generically referred to as “simulators”, can provide several advantages and can range from full-motion flight simulators to avionics trainers available on a desktop computer. Simulators can offer pilots a safe environment to practice and experience real-world scenarios such as emergencies or equipment malfunctions, without the concern of injury or damage to the machine. In addition, simulators can assist with the development of soft skills such as CRM, task prioritization and aeronautical decision making in both normal and emergency operations. Not all pilots will have access to
these devices, and prior to training the instructor and student should discuss available resources and plan to include any learning aids in the lesson.

2.6 Instructor Responsibility

Upon the completion of training, the pilot receiving instruction should demonstrate an appropriate level of competency in all proposed areas of operation. The instructor delivering the training should evaluate the student pilot's performance, and based on reasonable judgement, determine if the pilot is capable of operating the aircraft independently if single pilot, and with a crew if dual pilot.

2.7 Logbook Endorsement or Remarks

Although an instructor’s endorsement is not required for differences or transition training by regulation, it should still be considered as an important final step in the training curriculum. Formal documentation of the instructor’s effort, and the student’s proficiency will serve as record of the event.

At the completion of training and following the successful demonstration of competency, the instructor can provide the following logbook endorsement as illustrated an example below:

(Transition/Differences) training for (Aircraft Make/Model) in accordance with the recommendations of USHST H-SE 116 and utilizing the manufacturers systems descriptions and limitations has been satisfactorily completed on (Date).
Appendix A: GROUND TRAINING SYLLABUS

Areas of Additional Emphasis* During the development of this course material, pilots who had recently received transition or differences training were surveyed to understand specific areas that were challenging to learn. Those areas of emphasis are identified in the Ground and Flight Training Syllabi below with an asterisk (*). That is not to say that other topics are less important, but rather that trend data has indicated common areas where a student pilot may have benefited from some additional learning opportunities.

1. Airframe
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Fuselage and Main Cabin Structure
   d. Panels, Doors, Windows

2. Crew Compartment
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Flight Control Display Systems
   d. Analog or Digital Instrumentation
   e. Caution, Warning or Advisory Display
   f. Cyclic and Collective Control Heads
      i. Switching
      ii. Functions
   g. User Interface Devices, Switches, Circuit Breakers

3. Flight Controls
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Hydraulic System Description (as applicable) *
      i. Components
      ii. Hydraulic Pump(s)
      iii. Reservoir
      iv. Actuators
   d. Normal and Emergency Procedures

4. Autopilot
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Components
   d. Flight Control Computers
   e. Actuators
   f. SAS
   g. Trim Motors
   h. Cyclic or Collective Controls
   i. Normal and Emergency Procedures

5. Flight Instruments
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Power Supply
   d. Normal and Emergency Procedures
   e. Day and Night operations

6. Powerplant
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Components
   d. Cockpit Indications
   e. Engine Fuel Controls
   f. Lubrication Systems
   g. Fire Suppression
   h. Normal and Emergency Procedures
8. **Main Rotor**
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Drive Links
   d. Main Rotor Head
   e. Main Rotor Blades

9. **Anti-Torque System**
   a. Systems Description and Limitations
   b. Inspection, Servicing and Maintenance
   c. Components
      i. Tail rotor blades
      ii. Fenestron
      iii. NOTAR

10. **Electrical System***
    a. Systems Description and Limitations
    b. Inspection, Servicing and Maintenance
    c. Components
       i. Battery
       ii. Starter-Generator(s)
       iii. Inverter(s)
       iv. User Interface Devices, Switches, Circuit Breakers
       v. External Power
    d. Cockpit Indications
    e. Normal and Emergency Procedures

11. **Fuel System***
    a. Systems Description and Limitations
    b. Inspection, Servicing and Maintenance
    c. Fuel Cells or Tanks
    d. Fuel Filters
    e. Transfer and Prime Pumps
    f. Cockpit Indications
    g. Normal and Emergency Procedures

12. **Landing Gear**
    a. Systems Description and Limitations
    b. Inspection, Servicing and Maintenance
    c. Components
       i. Skid
       ii. Wheels
       iii. Fixed and Emergency Floats

13. **Environmental**
    a. Systems Description and Limitations
    b. Inspection, Servicing and Maintenance
    c. Cabin Heating, Cooling and Ventilation

14. **Avionics and Navigation***
    a. Systems Description and Limitations
    b. Inspection, Servicing and Maintenance
    c. Radios, ICS, and Communication
    d. Navigation Units and Flight Directors

15. **Performance**
    a. Limitations
    b. Power Checks
    c. Height-Velocity Diagram
    d. Performance Charts
       i. IGE Hover
       ii. OGE Hover
       iii. Rate of Climb

16. **Weight and Balance**
    a. Limitations
    b. Aircraft Weight Record
    c. Loading
       i. Cabin
       ii. Fuel
    d. Calculations
Appendix B: FLIGHT TRAINING SYLLABUS

Areas of Additional Emphasis* During the development of this course material, pilots who had recently received transition or differences training were surveyed in an effort to understand specific areas that were challenging to learn. Those areas of emphasis are identified in the Ground and Flight Training Syllabi below with an asterisk (*). That is not to say that other topics are less important, but rather that trend data has indicated common areas where a student pilot may have benefited from some additional learning opportunities.

Note: Flight training should include maneuvers and procedures during normal operations, as well as during emergency operations as appropriate.

1. Preflight Inspection
2. Ground Operations
   a. Start Procedures
   b. Taxiing and Hovering
   c. Pre-takeoff Checks
3. Normal Operations
   a. Takeoff and Departure
      i. Normal Takeoff
      ii. Maximum Performance Takeoff
      iii. Instrument Takeoff
      iv. Rejected Takeoff or Rapid Deceleration
   b. Inflight Maneuvers
      i. Steep Turns
      ii. Settling with Power / Power Settling / Vortex Ring State
      iii. Unusual attitude Recovery
   c. Instrument Procedures
      i. Holding
      ii. Precision Approach
         1) Coupled
         2) Uncoupled
      i. Non-Precision Approach
         1) Coupled
         2) Uncoupled
      i. Missed Approach
      ii. Circling Approach
   d. Landing and Approach to Landing
      i. Normal Approach
      ii. Steep Approach
      iii. Shallow Approach
      iv. Confined Area or Pinnacle Landing
      v. Slope Operations
4. Emergency Procedures
   a. System Malfunctions or Failure*
   b. Recovery from U/IIMC*
      i. Additional resources can be found at the USHST website (https://ushst.org/56secs/)
   c. Power Failure and Autorotation (Single Engine)
   d. One Engine Inoperative Approach and Landing (Multi Engine)
   e. Hovering Autorotation (Single Engine)
   f. Anti-Torque Failure
5. Post Flight Procedures
Appendix C: MANEUVER DESCRIPTIONS AND COMPLETION STANDARDS

Advanced Takeoff Profile and Climb

- Exhibits knowledge of the elements related to maximum performance takeoff and climb.
- Considers situations where the maneuver is recommended, and factors related to takeoff and climb performance, to include height/velocity information.
- Determine available power.
- Utilizes proper control technique to initiate takeoff and forward climb airspeed attitude.
- Utilizes the maximum available takeoff power to clear obstacles.
- After clearing all obstacles, transitions to normal climb attitude, accelerating to recommended airspeed ± 5 Kts, and power setting.

Anti-Torque Failure

- Demonstrates appropriate recognition, diagnosis, and recovery in accordance with manufacturers published emergency procedures or flight manual supplements.

Autorotation: See “Power Failure and Autorotation (Single Engine)”

Circling Approach

- Exhibits adequate knowledge of the elements related to a circling approach procedure.
- Selects and complies with circling approach procedure considering turbulence and wind shear and considering the maneuvering capabilities of the aircraft.
- Confirms the direction of traffic and adheres to all restrictions and instructions issued by ATC and the examiner.
- Does not exceed the visibility criteria or descend below the appropriate circling altitude until in a position from which a descent to a normal landing can be made.
- Maneuvers the aircraft, after reaching the authorized MDA and maintains that altitude within + 100 feet, - 0 feet and a flight path that permits a normal landing to the intended runway or point of intended. The runway selected must be such that it requires at least a 90° change of direction, from the final approach course, to align the aircraft for landing.
- Demonstrates an appropriate level of single-pilot resource management skills.

Confined Area or Pinnacle Landing

- Exhibits knowledge of the elements related to confined area operations.
- Accomplishes a proper high and low reconnaissance.
- Selects a suitable approach path, termination point, and departure path.
- Tracks the selected approach path at an acceptable approach angle and rate of closure to the termination point.
- Avoids situations that can result in settling-with-power.
- Terminates at a hover or on the surface, as conditions allow.
- Accomplishes a proper ground reconnaissance.

Holding

- Exhibits adequate knowledge of the elements related to holding procedures.
- Changes to the holding airspeed appropriate for the altitude or aircraft when 3 minutes or less from, but prior to arriving at, the holding fix.
- Explains and uses an entry procedure that ensures the aircraft remains within the holding pattern airspace for a standard, nonstandard, published, or non-published holding pattern.
• Recognizes arrival at the holding fix and initiates prompt entry into the holding pattern.
• Complies with ATC reporting requirements.
• Uses the proper timing criteria, where applicable, as required by altitude or ATC instruction.
• Complies with pattern leg lengths when a DME distance is specified.
• Uses proper wind correction procedures to maintain the desired pattern and to arrive over the fix as close as possible to a specified time.
• Maintains the airspeed with ± 10 KIAS; altitude within ± 100 feet; headings within ± 10º and tracks a selected course, radial or bearing with ¾-scale deflection of the CDI.
• Uses MFD and other graphical navigation displays, if installed to monitor position in relation to the desired flight path during holding.
• Demonstrates an appropriate level of single-pilot resource management skills.

Hovering: See “Taxiing and Hover Maneuvers”

Hovering Autorotation (Single Engine): See “Power Failure in the Hover”

IIMC Recovery: See “Recovery from U/IIMC”

Instrument Takeoff
• Airspeed: ± 10 KTS
• Altitude: ± 100 ft. (once leveled off)
• Heading ±10º or track as assigned by ATC

Maximum Performance Takeoff: See “Advanced Takeoff Profile and Climb”

Missed Approach
• Exhibits adequate knowledge of the elements related to missed approach procedures associated with standard instrument approaches.

• Initiates the missed approach promptly by applying power, establishing a climb attitude.
• Reports to ATC beginning the missed approach procedure.
• Complies with the published or alternate missed approach procedure.
• Advises ATC or examiner anytime that the aircraft is unable to comply with a clearance, restriction, or climb gradient.
• Follows the recommended checklist items appropriate to the go-around procedure.
• Requests, if appropriate, ATC clearance to the alternate airport, clearance limit, or as directed by the examiner.
• Maintains the recommended airspeed within ± 10 Kts, heading, course, or bearing within ± 10º, and altitudes within ± 100 feet during the missed approach procedure.

Multi Engine Emergencies: See “One Engine Inoperative Approach and Landing (Multi Engine)”

Non-Precision Approach
• Exhibits adequate knowledge of the elements related to an instrument approach procedure.
• Selects and complies with the appropriate instrument approach procedure to be performed.
• Establishes two-way communications with ATC, as appropriate to the phase of flight or approach segment and uses proper communication phraseology and technique.
• Selects, tunes, identifies, and confirms the operational status of navigation equipment to be used for the approach procedure.
• Complies with all clearances issued by ATC or the examiner.
• Recognizes if any flight instrumentation is inaccurate or inoperative, and takes appropriate action.
• Advises ATC or examiner anytime that the aircraft is unable to comply with a clearance.

• Prior to beginning the final approach segment: Altitude ± 100 feet, heading within ± 10°, and allows less than ¾ scale deflection of the CDI or within ± 10° in case of an RMI, and maintains airspeed ± 10 Kts, and accurately tracks radials, courses, and bearings.

• Applies the necessary adjustments to the published MDA and visibility criteria for the aircraft approach category when required.

• Establishes a rate of descent and track that will ensure arrival at the MDA prior to reaching the MAP with aircraft in position for a normal landing.

• On final approach segment: No more than ¾ scale deflection of the CDI or HSI or 10° in case of a bearing pointer and maintains airspeed ± 10 Kts of that desired.

• Maintains MDA within + 100 feet, - 0 feet to the MAP.

Normal Approach

• Exhibits knowledge of the elements related to a normal approach.

• Considers the wind conditions and performance data including HV diagram.

• Considers wind conditions, landing surface, and obstacles.

• Selects a suitable termination point.

• Establish and maintain recommended approach angle of 8° to 12° and rate of closure.

• Avoid situations that may result in settling-with-power.

• Maintain proper ground track with crosswind correction, as necessary.

• Arrive at the designated termination point at a stabilized hover at recommended hover altitude ± ½ hover height.

Normal Takeoff

• Exhibits knowledge of the elements related to normal and crosswind takeoff and climb, including factors affecting performance, to include height/velocity information.

• Establish a stationary position on the surface, prior to takeoff in a headwind and/or crosswind conditions.

• Takeoff Attitude: Slow/smooth transition from the surface to forward flight.

• Maintains proper ground track with crosswind correction, as necessary.

• Remain aware of the possibility of wind shear and/or wake turbulence.

• Airspeed: In accordance with flight manual ± 5 Kts.

• Altitude: Level off altitude ± 100 ft.

One Engine Inoperative Approach and Landing (Multi Engine)

• Exhibits adequate knowledge of maneuvering to a landing with a power-plant inoperative, including the controllability factors associated with maneuvering, and the applicable emergency procedures.

• Selects a suitable touchdown point.

• Maintains, prior to beginning the final approach segment the desired altitude ± 100 feet, the desired airspeed ± 10 KIAS, the desired heading ± 5°, and maintains the desired track.

• Establishes the approach and landing configuration appropriate for the runway or landing area and adjusts the power-plant controls as required.

• Maintains a shallow approach angle and recommended airspeed to the point of transition to touchdown.

• Terminates the approach in a smooth transition to touchdown, not to exceed stated OEI limits.
• Completes the after-landing checklist items in a timely manner, after clearing the landing area, and as recommended by the manufacturer.

Pinnacle Landing: See “Confined Area or Pinnacle Landing”

Power Failure and Autorotation (Single Engine)
• Exhibits knowledge of the elements related to an autorotation terminating with a power recovery to a hover.
• Selects a suitable touchdown area.
• Properly coordinates all controls throughout the execution of the maneuver.
• Initiates the maneuver at the proper point.
• Establishes proper aircraft trim and autorotation airspeed, ± 5 Kts.
• Maintains rotor RPM within limits.
• Compensates for wind speed and direction as necessary to avoid undershooting or overshooting the selected landing area.
• Utilizes proper deceleration, collective pitch application to a hover.
• Comes to a hover within 100 feet of a designated point.

Power Failure in the Hover
• Exhibits knowledge of the elements related to power failure at a hover.
• Determines that the surface is suitable for a safe landing.
• Performs autorotation from a stationary or forward hover into the wind.
• Maintains established heading, ± 5°.
• Touches down with minimum sideward movement and no rearward movement.
• Exhibits orientation, division of attention, and proper planning.

Precision Approach
• Exhibits adequate knowledge of precision instrument approach procedures.
• Accomplishes the appropriate precision instrument approaches as selected by the examiner.
• Establishes two-way communications with ATC, as appropriate to the phase of flight or approach segment and uses proper communication phraseology and technique.
• Complies, in a timely manner, with all clearances, instructions, and procedures.
• Advises ATC anytime that clearance cannot be complied with.
• Completes aircraft checklist items appropriate to the phase of flight.
• Prior to beginning the final approach segment, maintains altitude ± 100 feet, desired airspeed ± 10 Kts, and desired heading ± 10°.
• Selects, tunes, identifies, and confirms the operational status of navigation equipment to be used for the approach procedure.
• Apply the necessary adjustments to the published DA/DH and visibility criteria for the aircraft approach category when required.
• Establish a predetermined rate of descent at the point where the glide slope begins, which approximates that required for the aircraft to follow the glide slope.
• Maintains a stabilized final approach, from the Final Approach Fix to DA/DH allowing no more than ¾ scale deflection of either glide slope or localizer indications, and maintains desired airspeed ± 10 Kts.

Quick Stop: See “Rejected Takeoff”

Rapid Deceleration: See “Rejected Takeoff”
Recovery from U/IIMC*

- **Control:** Fly the aircraft. Refocus the scan inside the cockpit to the primary flight instruments – airspeed, altitude, and attitude.
- **Climb:** As soon as the aircraft is under control by reference to the instruments, a controlled climb should be initiated. Inadvertent IMC encounters often occur at low altitudes where rising terrain poses a serious threat. The pilot should initiate a straight-ahead controlled climb to an altitude that will provide obstruction clearance in the area of operation. Always review Maximum Elevation Figures (MEF) on VFR charts prior to departure.
- **Course:** After the aircraft is in a controlled climb, the pilot can elect to turn to a new heading if known obstacles are ahead and/or divert to a different location with better known or forecast weather conditions.
- **Communicate:** After the pilot has control of the aircraft, initiated a climb, and on course, they should communicate with ATC regarding their intentions and need for assistance.
- **Source:** IHST Training Fact Sheet - Inadvertent Entry into Instrument Meteorological Conditions (IIMC), Nick Mayhew. Other resources are available at https://ushst.org/56secs

Rejected Takeoff or Rapid Deceleration

- Exhibits knowledge of the elements related to a Rejected Takeoff or Rapid Deceleration.
- Properly coordinates all control inputs throughout the execution of the maneuver.
- Maintains a safe altitude that permits safe clearance between tail rotor/tail boom and the surface.
- Decelerates and terminates in a stationary hover at recommended hover altitude ± ½ hover height.
- Maintain heading throughout the maneuver ± 5°.

Settling With Power: See “Vortex Ring State (also known as Settling with Power) / Settling with Insufficient Power”

Shallow Approach

- Exhibits knowledge of the elements related to a shallow approach, including the purpose of the maneuver, factors affecting performance data to include height/velocity information.
- Considers wind, landing surface, obstacles, and hazards.
- Establishes and maintains recommended approach angle of 5° to 8°, and rate of closure.
- Remains aware of the possibility of wind shear and/or wake turbulence.
- Maintains proper ground track, with crosswind correction, if necessary.
- Maintains a speed that will take advantage of effective translational lift.
- Considers performance data including Height Velocity information.
- Avoids situations that may result in settling-with-power.
- Arrives at the designated termination point at a stabilized hover at recommended hover altitude ± ½ hover height.

Slope Operations

- Exhibits knowledge of the elements related to slope operations
- Selects a suitable slope, approach, and direction considering wind effect, obstacles, dynamic rollover avoidance and discharging passengers.
- Properly moves towards the slope.
- Makes a smooth positive descent to touch the upslope skid on the surface.
- Maintains positive control while lowering the down slope skid to touchdown.
• Recognizes when the slope is too steep and abandons the operation prior to reaching cyclic control stops or airframe slope limits.
• Maintains specified heading throughout the operation, ± 5°.

Steep Approach
• Exhibits knowledge of the elements related to a steep approach.
• Considers situations where this maneuver is recommended, and factors related to a steep approach to include performance data, and height velocity information.
• Considers wind conditions, landing surface, and obstacles.
• Selects a suitable termination point.
• Establishes and maintains the recommended approach angle (15° maximum) and proper rate of closure.
• Avoids situations that can result in settling-with-power.
• Remains aware of the possibility of wind shear and/or wake turbulence.
• Maintains proper ground track with crosswind correction, if necessary.
• Arrives at the designated termination point at a stabilized hover at recommended hover altitude ± ½ hover height.

Steep Turns
• Entry altitude: + 100 ft.
• Airspeed: + 10 Kts
• Angle of bank: + 5 degrees

System Malfunction or Failure
• Demonstrates appropriate recognition, diagnosis, and recovery in accordance with manufacturers published emergency procedures or flight manual supplements.

Tail Rotor Failure: See “Anti-Torque Failure”

Taxiing and Hover Maneuvers
• Exhibits knowledge of the elements related to hover taxiing.
• Hover taxis over specified ground references, demonstrating forward, sideward, and rearward hovering, and hovering turns.
• Maintains specified ground track within ± 2 feet on straight legs.
• Maintains constant rate of turn at pivot points.
• Maintains position within ± 2 feet of each pivot point during turns.
• Makes 90°, 180°, and 360° pivoting turns, stopping within 10° of specified headings.
• Maintains recommended hovering altitude, ±½ of that altitude within 10 feet of the surface, if above 10 feet, ±5 feet.

Twin Engine Emergencies: See “One Engine Inoperative Approach and Landing (Multi Engine)”

UIMC Recovery: See “Recovery from U/IIMC”

Unusual Attitude Recovery
• Altitude: Entry altitude ± 100 ft.
• Airspeed: Entry airspeed ± 10 Kts
• Heading: Entry heading ± 10°
• Attitude: Level

Vortex Ring State (also known as Settling with Power) / Settling with Insufficient Power
• Pilot exhibits knowledge of the conditions which may lead to an undesired state.
• Selects an altitude that will allow recovery to be completed no less than 1,000 feet AGL or manufacturers recommended altitude, whichever is higher.
• Promptly recognizes and announces the onset.
• Utilizes the appropriate recovery procedure.
Appendix D: US Helicopter Safety Team

USHST

To learn more about the US Helicopter Safety Team, visit www.ushst.org. Site visitors can review and download an electronic copy of this report and others in the document repository. A summary of other USHST helicopter safety enhancements and related work is also available for review.

H-SE 116 Team

The following H-SE 116 team members and industry stakeholders were instrumental in the completion of this report.

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