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CNATRA P-457 CH-1
N714
6 Feb 13

CNATRA P-457 (REV 04-11) CHANGE TRANSMITTAL 1

Subj: FLIGHT TRAINING INSTRUCTION, CONTACT, TH-57

Encl: (1) Reprinted pages iv, v, vii, viii, and 6-1 through 6-26

1. Purpose. To publish Change 1 to the basic publication.

2. Action. Remove pages iv, v, vii, viii, 6-1 through 6-26 and replace with enclosure (1).

3. Record Change 1 on the Summary of Changes page.

4. Future printing of this Flight Training Instruction will incorporate the change. CNATRA POC is Major Kyle O'Connor, N714, DSN 861-3894.

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Distribution:
CNATRA SharePoint

LIST OF EFFECTIVE PAGES

Dates of issue for original and changed pages are:
Original...0...15 Aug 02 (this will be the date issued)
Revision1…0…12 Feb 04
Revision2…0…15 Dec 06
Change Transmittal…1…08 Sep 08
Revision3…0…01 Aug 11
Change Transmittal…1…06 Feb 13

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 146 CONSISTING OF THE FOLLOWING:

Page No.	Change No.	Page No.	Change No.
COVER	0	6-1 – 6-26	1
LETTER	0	7-1 – 7-7	0
vii -- viii	1	7-8 (blank)	0
x (blank)	0	8-1 – 8-14	0
1-1 – 1-8	0	A-1	0
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4-42 (blank)	0		
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INTERIM CHANGE SUMMARY

The following Changes have been previously incorporated in this manual:

CHANGE NUMBER	REMARKS/PURPOSE
1	Changes made per transmittal letter (02-06-13)

The following interim Changes have been incorporated in this Change/Revision:

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CHAPTER SIX
DEMONSTRATION AND IUT MANEUVERS

600. INTRODUCTION

This section discusses and describes maneuvers the Instructor Under Training shall be required to perform and maneuvers the instructor will demonstrate to the SMA.

Although you, as the SMA, will not execute these maneuvers, a thorough understanding of the procedures will enhance your learning and help make you a more competent helicopter pilot. If, during the course of your studies you do not understand these maneuvers, simply ask your instructor to further explain what the learning objective is for the demonstrated maneuver.

601. LOW RPM RECOVERY (IUT ONLY)

Maneuver Description. A low RPM recovery demonstrates a proper method of recovering from a low RPM situation.

Procedures

1. Enter an autorotation.

2. At 75 to 100 feet, flare and simulate forgetting to rotate the twist grip open.

3. At 15 to 20 feet, crack open the throttle slightly, lower the nose toward a level attitude and simultaneously increase the collective, bleeding rotor rpm no lower than 90%; smoothly rotate the twist grip to the full open position.

4. Complete the recovery in a 5 to 10 KTS, five-foot hover taxi before transitioning to forward flight.

Amplification and Technique

1. Coordinate twist grip application as necessary to maintain N_r above 90% while adjusting cyclic to recover no faster than 10 KTS groundspeed. The twist grip need not be full open when a five-foot, 5 to 10 KTS air taxi is established. However 100% N_r must be restored prior to the transition to forward flight.

2. If N_r falls below approximately 80%, loss of tail rotor effectiveness may occur. If possible, rotate the twist grip to FLT IDLE and complete the cut gun in an air taxi.

3. When in a stable hover taxi, if the N_r is not yet restored to 100%, coordinate twist grip and collective application to prevent a possible over torque.

Common Errors and Safety Note

1. Opening the twist grip before arriving at 15 to 20 feet AGL.

2. Opening the twist grip full open too fast.

602. SIMULATED ENGINE FAILURE ON TAKEOFF (DEMO ONLY)

Maneuver Description. The "cut gun" on takeoff is an instructor-demonstrated maneuver simulating a loss of power at low altitude.

Procedures

1. Start a transition to forward flight and climb to an altitude at or above 50 feet and no slower than 65 KTS. This is to ensure the maneuver entry is in the safe region of Height Velocity Diagram per Figure 4-6 of NATOPS manual, and follows a normal takeoff profile per Par. 407, Transition to Forward Flight.

2. While maintaining the collective setting for climb power, rotate the twist grip to flight idle.

3. Commensurate with airspeed and altitude, lower the collective and adjust the nose attitude to control groundspeed and rate of descent. Monitor N_r and control with the collective.

4. Complete (as briefed) as either a power-recovery or a full autorotation.

Amplification and Technique

The initial response required to successfully recover from an engine failure on takeoff will depend upon your nose attitude. If the aircraft is at or below the flare altitude, apply aft cyclic as necessary and lower the collective to maintain N_r; however, if the aircraft is above the flare altitude, adjust the cyclic forward to maintain airspeed while lowering the collective to maintain N_r. Upon reaching the flare altitude, complete the autorotation using normal procedures.

603. MAXIMUM GLIDE AUTOROTATION

Maneuver Description. The maximum glide autorotation demonstrates increased rate of descent and increased glide distance with increased airspeed. This maneuver shall be conducted as a straight-in autorotation entry.

Procedures

1. Execute an autorotation at 50 to 55 KTS. Note the glide distance.

2. Enter another autorotation at an increased airspeed of 72 KTS.

3. Maintain the entry airspeed and rotor rpm as in the 50 to 55 KTS autorotation.

4. At 100 feet slowly raise the nose, trading airspeed for distance over the ground.

5. At 50 to 55 KTS and 75 feet flare and complete the autorotation. Note the increased glide distance.

Amplification and Technique

1. The point of the demonstration is to show increased glide distance. Optimum airspeed is set forth in the appropriate NATOPS manual.

2. Make airspeed the only variable between the autorotations from entry to 100 feet.

3. This demonstration can terminate in a power recovery or full autorotation. However, they should both be terminated in the same manner.

604. HIGH SPEED LOW-LEVEL AUTOROTATION (DEMO ONLY)

Maneuver Description. A high speed low-level autorotation is an instructor-demonstrated maneuver simulating a loss of power at high airspeed and low altitude.

Procedures

1. Maintain 500 feet and accelerate to 100 KTS on the downwind.

2. At the field boundary, begin a descending turn to arrive on course with the intended landing area at 100 feet and 100 KTS.

3. While maintaining the collective setting, smoothly rotate the twist grip to flight idle. Adjust the collective to maintain N_r limits.

4. Smoothly apply aft cyclic, initiating a flare to dissipate airspeed and prevent the aircraft from settling.

5. As the aircraft reaches the checkpoints of a standard autorotation, complete normal autorotation procedures.

Amplification and Technique

1. The key to a successful high speed low-level autorotation is smooth control inputs as the pilot dissipates excess airspeed while maintaining altitude and N_r and transitioning to normal autorotative parameters.

2. In the event that the pilot desires to gain altitude immediately, a more forceful flare will not only dissipate airspeed, but could result in the gain of 100 to 150 feet of additional altitude. Such a flare will also help maintain N_r initially.

3. As the airspeed approaches 65 KTS, smoothly adjust the nose to the appropriate descending attitude, and reduce the collective to control N_r (94 to 95% optimum). Take care to avoid a low "G" envelope as the aircraft crosses the peak of its climb.

4. Recover as a power recovery or full autorotation.

CAUTION

If a cyclic flare is initiated to gain altitude and dissipate excess airspeed, use extreme caution to avoid a less than one "G" pushover to prevent possible mast bumping. Allowing the aircraft to slow excessively at the apex will result in a reduction of mass airflow through the rotors causing N_r to decay.

Maneuver Training Guidance for 605 - 610

When flying these maneuvers, it is essential to remember that the pedals work. The aircrew must continually emphasize this point during training. It is incumbent on the pilots to remain vigilant and ready to use all controls—including the pedals—at any time to maintain safe parameters.

Primary objectives for the pilot:

1. Foremost, maintain a safe profile at all times, using pedals as needed.

2. Effectively analyze the severity of the malfunction.

3. For hover work, become comfortable and proficient at maintaining a safe, level rotation in a hover (left or right).

4. For altitude work, gain familiarity and comfort with the varying sight pictures on final.

5. Make a proper flare to safely achieve a no-groundspeed hover.

6. Understand the effect of reducing the twist grip to flight idle on a right rotation.

7. Become proficient in timing the twist grip reduction.

8. Control yaw at touchdown and prevent any rolling tendencies from developing.

Because this is a training maneuver, making a landing without using pedals in the hover is a ***secondary objective***. Never accept an unsafe condition for the sake of the simulation. Even if the pilot needs to manipulate pedals to keep training conditions manageable, the primary objectives above can be achieved.

6-4 DEMONSTRATION AND IUT MANEUVERS

A "building block" approach must be taken when first learning these maneuvers. The pilot can think of the Maneuvers at Altitude as three parts: 1) the approach, 2) the hover, and 3) the hover recovery. Since the maneuvers at altitude incorporate the hover recovery procedures, initial training must begin in the hover. Only after the pilot becomes proficient with the hover work should the altitude maneuvers be attempted.

Many variables directly affect the degree of difficulty of the maneuvers. These variables include the amount the pedals are displaced, wind direction and velocity, density altitude, and aircraft gross weight. It is critical for the IP to understand the effect of each of these variables. The first two—wind and pedal displacement—carry the most impact and can significantly impact the difficulty of the maneuver. The pilot must optimize the variables within his/her control. This includes selecting (if able) the runway with a left crosswind and keeping fuel loads to a minimum. However, the variable that the pilot has the most control over is pedal displacement. The procedures for each maneuver provide the pilot a large range of power settings to maintain control over the severity of the simulation. For all flights, the IP should always take a gradual approach, keeping the degree of severity mild for the initial approaches of the flight until the conditions and pilot proficiency can be evaluated first-hand. ***For initial training flights***, it is essential that the IP takes this gradual approach.

605. SIMULATED FIXED PITCH PEDAL POSITION IN A HOVER –NO YAW (DEMO ONLY)

Maneuver Description. This maneuver begins as the pilot fixes the pedals in a relatively stable hover. In this situation, very little or no yaw exists initially as pedals are set to maintain heading for the given conditions. However, as power changes are made with the collective or as the wind shifts or gusts, the aircraft will develop yaw (i.e., right yaw with a power increase and left yaw with a power decrease). By using controlled, mild to moderate collective inputs, the pilot can control the aircraft heading to make a safe landing.

Application. There are two primary purposes for this maneuver. First, the pilot will develop an understanding of how the aircraft reacts to collective inputs and wind conditions with the pedals fixed in this position. Second, the maneuver gives the pilot a safe method to practice landing the aircraft in this condition while maintaining the twist grip in the full open position.

Procedures

1. Establish a stable hover at a 5-foot skid height into the wind line over a smooth, paved surface. Announce, ***"Pedals frozen."***

2. Without manipulating the pedals, make a smooth, gradual increase in collective to initiate a mild, controlled right yaw.

3. After a right yaw is established, smoothly lower the collective to stop the right yaw and initiate a mild, controlled left yaw.

4. Alternate controlled collective increases and decreases as necessary for an effective demonstration. Maintain constant pedal position throughout the maneuver.

5. Making a controlled landing involves timing and patience. Initiate landing by smoothly lowering the collective. Depending on conditions, a mild left yaw will likely develop. If an excessive yaw rate for landing develops, increase collective to stop/slow rotation. Repeat this step until acceptable yaw conditions are established for landing.

6. As the aircraft touches down, eliminate any drift with cyclic and maintain a skids-level attitude. Continue to smoothly and slowly lower the collective once on deck to keep yaw under control and transfer the aircraft weight to the skids. Maintain positive control of yaw until collective is full down.

Crew Resource Management

The IP discusses the importance of maintaining a mild, controlled yaw rate and for keeping a level attitude during touchdown. (Mission Analysis)

Amplification and Technique

This maneuver is designed to be a controlled and comfortable maneuver. Control inputs should be kept smooth and mild. There is no need to rush any inputs, especially for landing. If the landing conditions are not comfortable, either increase collective to gain altitude and reattempt the landing or use pedals to abort the maneuver. If a significant yaw rate develops, especially if it will carry the aircraft heading beyond 90 degrees of the wind line, then the intended conditions for this maneuver have been exceeded. Use pedals to abort the maneuver and regain control of aircraft heading. Twist grip reduction shall not be utilized as a recovery technique for this maneuver.

Do not rush the landing. While in a hover, if the yaw rate remains minimal and controlled, the pilot should focus on making several alternating mild collective inputs to get a feel for the interaction of the aircraft with the given wind conditions and power changes. This will aid in timing the descent for touchdown.

During the landing, as the aircraft nears the deck for touchdown, the pilot must evaluate the rate of yaw and anticipate any changes that may occur (as a result of wind effects or power changes) as the aircraft touches down. The pilot must remember to include a scan out toward the horizon to ensure the aircraft (and therefore the skids) are remaining level for touchdown and that no lateral drift is developing.

Safety Notes

1. Always remember that ***the pedals work and shall be used if conditions warrant.*** The flying pilot shall make pedal inputs as needed to maintain safe flight parameters at all times. In addition, the instructor pilot at any time can call for control of pedals to make necessary inputs. This control change shall be initiated positively without delay. Do not forego needed pedal

inputs for the sake of the simulation. Moreover, if the flying pilot feels uncomfortable with the maneuver at any time, regardless of the severity of the maneuver, he or she is encouraged to use the pedals and abort the maneuver.

2. While airborne, the aircraft needs to be kept in a level attitude as it rotates, especially near the deck. Failure to do so will make recovery more difficult and can unnecessarily decrease stinger ground clearance.

3. The aircraft may slide and/or yaw as the aircraft touches down. In this case, it is critical to use all controls—***including pedals if necessary***—to prevent an unsafe roll condition from developing.

4. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. It should also be noted that the corresponding decrease in torque created by lowering the collective for touchdown may decrease a right yaw and may increase a left yaw.

5. Heading changes during this maneuver should not exceed 90 degrees from the wind line. A headwind component should be maintained. If these conditions cannot be maintained, use pedals to stop the rotation and abort the maneuver. Attempt the maneuver again using smaller power changes.

6. This maneuver shall be performed by IPs and IUTs only. This maneuver shall not be performed by SMAs.

7. The wind line may be used to aid in controlling yaw rate, however, there is no requirement to land the aircraft directly into the wind line as long as NATOPS limitations are not exceeded.

606. SIMULATED COMPLETE LOSS OF T/R THRUST IN A HOVER – (DEMO ONLY)

Maneuver Description.

1. To develop the proper procedures required to enable the pilot to recover from a tail rotor failure in a hover.

2. Refer to the NATOPS Manual Emergency Procedures chapter.

Procedures

1. Discuss the necessity for a skids-level attitude.

2. Stabilize the helicopter in a stable 5 foot hover heading 90º left of the windline.

3. Instructor will neutralize the pedals, PAC- ***"Initiating 3-2-1."*** Then PAC (IP) neutralizes pedals (simulating loss of tail rotor thrust) to commence a right rotation about a vertical axis.

4. As the aircraft comes into the windline, rotate the twist grip to flight idle, hold the pedals and collective position constant. The rotation should slow to a stop shortly after reducing the twist grip to flight idle. Additional aerodynamic stability is gained as the tailboom and vertical stabilizer approach the windline at the nine o'clock position.

CAUTION

1. If rotation is excessive, use left pedal to slow or stop rate of rotation and abort the maneuver. Attempt maneuver again with less addition of right pedal to neutralize.

2. Rapid application of left pedal to arrest excessive rotation could cause over torque. Ensure moderate neutralization of pedals with winds above 15 KTS.

3. Advancing twist grip after reduction for the maneuver could cause over torque and excessive acceleration of yaw.

5. Cushion with collective, follow rotation on the ground with right forward cyclic as necessary or hold cyclic constant.

Crew Resource Management

Instructor Pilot discusses necessity for a level attitude at touchdown. (Mission Analysis)

Safety Notes and Common Student Errors

1. A skids-level attitude must be maintained to eliminate drift.

2. The maneuver will be completed on a hard surface.

3. The maneuver will only be demonstrated to SMAs.

4. IUTs will be required to do the maneuver when undergoing training with a standardization instructor.

5. If IP/PAC feels uncomfortable with the maneuver, they are encouraged to use the pedals and abort the maneuver.

607. SIMULATED FIXED PITCH PEDAL POSITION IN A HOVER – LEFT YAW - (DEMO ONLY)

Maneuver Description. This maneuver begins as the pilot fixes the pedals with a ***mild,*** left rotation established. Since the rotation is not excessive, the pilot should not rush a recovery. Instead, the pilot should evaluate the wind and note how the wind effects the aircraft's rotation. If the rotation is mild enough, it may be possible to recover by simply lowering the collective to make a controlled landing while keeping the twist grip full open (as in the "SIMULATED

FIXED PITCH PEDAL POSITION IN A HOVER –NO YAW" maneuver). Otherwise, the pilot will recover by smartly increasing and decreasing collective as needed to gain control of aircraft heading and effect a landing. This technique takes advantage of the delay in the change in yaw that occurs following a change in power. Refer to the NATOPS Manual Emergency Procedures chapter.

Application. There are two primary purposes for this maneuver. The first is to increase the pilot's proficiency to recover from a fixed-pedal, left-yaw condition in a hover. The second is to give the pilot the ability to analyze the severity of the malfunction and apply the proper recovery procedures at the appropriate time given a unique set of conditions (winds, DA, gross weight, severity of yaw rate, etc.).

Procedures

1. Establish a stable hover at a 5-foot skid height into the wind line over a smooth, paved surface. Initiate a controlled rotation to the left and then freeze pedal position once desired yaw rate is obtained. Announce, ***"Pedals frozen."***

2. Determine if the rate of rotation is mild enough to allow for a safe landing using a collective reduction only.

If rotation is excessive for landing:

3. Initiate recovery by smoothly and smartly increasing collective to counter the left yaw. Expect the yaw to slow as the aircraft climbs.

4. With the left yaw stopped, smoothly and smartly decrease collective to set up for landing.

5. Do not rush the landing. If an excessive left yaw develops prior to landing, increase collective to reduce the rotation and regain altitude. Repeat this step until acceptable yaw conditions are established for landing. Be patient and expect to repeat this action multiple times. The goal should be to arrive in a momentary 2-3 foot hover with little to no rotation before initiating landing.

6. Eliminate any lateral drift with cyclic as the aircraft settles. Once both skids have touched down, use cyclic to maintain level skids. Continue to smoothly lower the collective once on deck to keep yaw under control and transfer the aircraft weight to the skids. Maintain positive control of yaw until collective is full down.

If rotation is not excessive for landing:

7. Lower collective to effect a landing.

Crew Resource Management

The IP discusses the importance of maintaining a mild, controlled yaw rate and for keeping a level attitude during touchdown. (Mission Analysis)

Amplification and Technique

This recovery takes advantage of the fact that the change in lift created by collective movement occurs before a change in yaw, allowing the aircraft to descend to a position for landing before an excessive left yaw develops.

NOTE

Because of this delay, the pilot must lead collective inputs to avoid over-controlling the heading.

The recovery will typically require several smooth, delayed "pumps" of the collective, alternating power increases and decreases, to work the aircraft into a position for landing. An ideal position to initiate a landing is a 2-3 foot hover with the nose aligned slightly left of the wind line. However, wind line should not be a primary consideration. The primary goal is to achieve a low, stable hover that will allow a positive—***but controlled***—collective reduction to get the skids on the deck before a significant left yaw develops.

Some mild yaw can be tolerated as the aircraft touches down. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. If the rate of yaw is mild enough, a power-on landing (twist grip full open) may be accomplished without having to make the initial aggressive collective pull. Instead, simply lower the collective in a controlled manner to effect a safe landing.

Safety Notes

1. Always remember that the pedals work and shall be used if conditions warrant. The flying pilot shall make pedal inputs as needed to maintain safe flight parameters at all times. In addition, the instructor pilot at any time can call for control of pedals to make necessary inputs. This control change shall be initiated positively without delay. Do not forgo needed pedal inputs for the sake of the simulation. Moreover, if the flying pilot feels uncomfortable with the maneuver at any time, regardless of the severity of the maneuver, he or she is encouraged to use the pedals and abort the maneuver.

2. In an actual emergency condition, the recovery may be initiated as soon as the condition is positively identified and conditions permit. However, during this simulation, the crew should consider making multiple full rotations to enhance the pilot's ability to analyze the stuck pedal condition and the effects of wind on the condition.

3. Do not rush the landing. It is likely, depending on gross weight, DA, and wind conditions, that more than one iteration may be needed to accomplish the landing. For initial training,

several iterations are recommended to allow the pilot to get a feel for the lag in the change in torque compared to the change in lift as power is increased/decreased. This will aid in timing the descent for touchdown.

4. The aircraft may slide and/or yaw as the aircraft touches down. In this case, it is critical to use all controls—***including pedals if necessary***—to prevent an unsafe roll condition from developing.

5. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. It should also be noted that the corresponding decrease in torque created by lowering the collective for touchdown may decrease a right yaw and may increase a left yaw.

6. During initial recovery, collective application must be rapid ***but controlled.*** Too rapid or too large of an application can result in an overtorque or the creation of excessive yaw in the opposite direction.

7. During portions of the recovery, the aircraft may be in a high hover. Minimize the time spent in this region.

8. Do not exceed NATOPS turn rate limitations. If rotation is nearing NATOPS limits, then the yaw rate is excessive. The desired rate should be controlled and relatively comfortable. If rotation becomes excessive or aircraft control becomes questionable, use pedals to stop the rotation and abort the maneuver. Attempt the maneuver again with less addition of left pedal.

9. In moderate and/or gusty wind conditions, the pedals may require some minor manipulation (even after the "pedals frozen" call) to keep a reasonable yaw rate and to avoid exceeding NATOPS limits.

10. While still airborne, the aircraft needs to be kept in a level attitude as it rotates, especially near the deck. Failure to do so will make recovery more difficult and can unnecessarily decrease tail skid ground clearance.

11. The wind line may be used to aid in controlling yaw rate; however, there is no requirement to land the aircraft into the wind line as long as NATOPS limitations are not exceeded.

608. SIMULATED FIXED PITCH PEDAL POSITION IN A HOVER – RIGHT YAW - (DEMO ONLY)

Maneuver Description. This maneuver begins as the pilot fixes the pedals with a ***mild***, right rotation established. Since the rotation is not excessive, the pilot should not rush a recovery. Instead, the pilot should evaluate the wind and note how the wind affects the aircraft's rotation. If the rotation is mild enough, it may be possible to recover by simply lowering the collective to make a controlled landing while keeping the twist grip full open (as in the "SIMULATED FIXED PITCH PEDAL POSITION IN A HOVER –NO YAW" maneuver.) Otherwise, at the appropriate time, the pilot will recover by smoothly reducing the twist grip to flight idle to counter the right yaw and use cyclic and collective to maintain a controlled landing profile.

Refer to the NATOPS Manual Emergency Procedures chapter.

Application. There are two primary purposes for this maneuver. The first is to increase the pilot's proficiency to recover from a fixed-pedal, right-yaw condition in a hover. The second is to give the pilot the ability to analyze the severity of the malfunction and apply the proper recovery procedures at the appropriate time given a unique set of conditions (winds, DA, gross weight, severity of yaw rate, etc.).

Procedures

1. Establish a stable hover at a 3-foot skid height into the wind line over a smooth, paved surface. Initiate a controlled rotation to the right and then freeze pedal position once desired yaw rate is obtained. Announce, ***"Pedals frozen."***

2. Determine if the rate of rotation is mild enough to allow for a safe landing using a collective reduction only.

If rotation is excessive for landing:

3. As the nose approaches the wind line, initiate recovery by smoothly rotating twist grip to flight idle.

CAUTION

The twist grip motion must be smooth and without interruption from full open to flight idle to prevent damaging aircraft vibrations and operations in the restricted N_f ranges.

4. Use cyclic to eliminate drift. As the skids touch down, maintain a skid-level attitude until maneuver is complete.

5. Use collective to cushion the landing.

If rotation is not excessive for landing:

6. Lower collective to effect a landing.

Crew Resource Management

The IP discusses the importance of maintaining a mild, controlled yaw rate, for rotating the twist grip at the appropriate altitude (3 feet), and for maintaining a level attitude during touchdown. (Mission Analysis)

Amplification and Technique

If the rate of yaw is mild enough, a power-on landing (twist grip full open) may be accomplished by simply lowering the collective in a controlled manner to effect a safe landing. Experience with other maneuvers (especially the SIMULATED FIXED PITCH PEDAL POSITION IN A HOVER –NO YAW maneuver) will aid in determining if the rate of rotation will permit a landing while keeping the twist grip full open. If yaw builds to an unacceptable level while a power-on landing is attempted (with twist grip full open), the pilot can increase collective to gain altitude and initiate the procedures again, beginning with step 2. As always, either pilot can always use pedals at any point to abort the maneuver, reestablish a hover with pedals, and reattempt the maneuver as needed.

The recovery using twist grip reduction takes advantage of the fact that right yaw can be reduced or stopped by the loss of torque that occurs as the twist grip is reduced to flight idle. It is important to keep the aircraft no higher than a 3-foot skid height as the recovery is initiated to minimize the time the aircraft remains airborne after twist grip is rotated to idle. The sudden loss of torque with twist grip reduction can be significant enough to stop the right rotation and actually induce a left yaw (depending on pedal position, gross weight, wind conditions, rate of twist grip reduction, etc.). The longer the aircraft is kept airborne unnecessarily after the twist grip is reduced to idle, the more likely the left yaw will develop.

Some mild yaw can be tolerated as the aircraft touches down. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. The corresponding decrease in torque created by lowering the collective for touchdown may increase or decrease the yaw rate depending on direction of rotation.

Safety Notes

1. Always remember that ***the pedals work and shall be used if conditions warrant***. The flying pilot shall make pedal inputs as needed to maintain safe flight parameters at all times. In addition, the instructor pilot at any time can call for control of pedals to make necessary inputs. This control change shall be initiated positively without delay. Do not forgo needed pedal inputs for the sake of the simulation. Moreover, if the flying pilot feels uncomfortable with the maneuver at any time, regardless of the severity of the maneuver, he or she is encouraged to use the pedals and abort the maneuver.

2. In an actual emergency condition, the recovery may be initiated as soon as the condition is positively identified and conditions permit. However, during this simulation, the crew should consider making multiple rotations to enhance the pilot's ability to analyze the stuck pedal condition and the effects of wind on the condition. Multiple rotations will also increase the pilot's ability to maintain a stable, level right rotation.

3. While airborne, the aircraft needs to be kept in a level attitude as it rotates, especially near the deck. Failure to do so will make recovery more difficult and can unnecessarily decrease stinger ground clearance. A common tendency is to pull aft cyclic and allow the nose to rise during the rotation. During initial training, it is recommended to simply practice making level

hovering rotations at 3 feet to become proficient in keeping a level aircraft during recovery.

4. The aircraft may slide and/or yaw as the aircraft touches down. In this case, it is critical to use all controls—***including pedals if necessary***—to prevent an unsafe roll condition from developing.

5. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. It should also be noted that the corresponding decrease in torque created by lowering the collective for touchdown may decrease a right yaw and may increase a left yaw.

6. To minimize the left yaw at touchdown, avoid rolling the twist grip to flight idle above 3 feet.

7. Do not exceed NATOPS turn rate limitations. If rotation is nearing NATOPS limits, then the yaw rate is excessive. The desired rate should be controlled and relatively comfortable. If rotation becomes excessive or aircraft control becomes questionable, use pedals to stop the rotation and abort the maneuver. Attempt the maneuver again with less addition of right pedal.

8. In moderate and/or gusty wind conditions, the pedals may require some minor manipulation (even after the "pedals frozen" call) to keep a reasonable yaw rate and to avoid exceeding NATOPS limits.

9. The wind line may be used to aid in controlling yaw rate; however, there is no requirement to land the aircraft into the wind line as long as NATOPS limitations are not exceeded.

10. Advancing the twist grip after reducing to flight idle can cause an overtorque.

11. It is common for the LOW NR horn and warning light to activate during recovery after twist grip is reduced to idle.

12. The twist grip motion must be smooth and without interruption from full open to flight idle to prevent the onset of damaging aircraft vibrations and operations in the restricted N_f ranges.

609. SIMULATED FIXED PITCH PEDAL POSITION AT ALTITUDE– LOW POWER (DEMO ONLY)

Maneuver Description. The pilot sets up the maneuver to simulate fixed pedals in a low-powered, forward flight condition. The approach and flare should create a left yaw on final as power is reduced. On short final, the nose will rotate to the right due to the increase in torque created by increasing the collective to arrest the rate of descent and groundspeed. Once in a hover, the pilot will recover using the appropriate ***simulated fixed pitch pedal position in a hover*** recovery procedures. Refer to the NATOPS Manual Emergency Procedures chapter.

Application. There are two primary purposes for this maneuver. The first is to increase the pilot's proficiency to recover from a fixed-pedal, low-power condition in forward flight. The second is to give the pilot the ability to analyze the severity of the malfunction and apply the

proper recovery procedures at the appropriate time given a unique set of conditions (winds, DA, gross weight, severity of yaw rate, etc.).

Procedures

1. This maneuver shall be flown to a runway. Prior to takeoff, establish a hover at 5-foot skid height into the wind near intended point of landing and note torque.

2. Fly the pattern at 500 feet AGL. On downwind, slow to 50 KIAS, set torque at 10 to 40% below hover torque (at IP's discretion), and center the ball. Freeze pedals in this position and announce **"*Pedals frozen*."**

3. Set up for a straight-in steep approach (at 500 feet AGL) to the intended point of landing. Maintain 500 feet AGL and 60 KIAS on final. Maintain no less than 60 KIAS until landing area is assured.

4. When runway is made, lower collective to the full down position. Despite the low power stuck pedal condition, the nose should yaw to the left as nearly all torque is removed.

NOTE

If the nose is not yawed left to some degree during the steady-state descent, terminate the maneuver, and conduct a waveoff. Verify correct setup procedures, ensure conditions (winds, gross weight, etc.) are optimized as much as practical, and reattempt as desired, adjusting torque settings at IP's discretion. If still unable to achieve a left yaw in the descent, do not attempt to complete the maneuver.

Excluding the left yaw, the sight picture will resemble an autorotative profile, except the twist grip will remain full open during the descent. Expect a descent rate and glideslope similar to an autorotation. Because of the unbalanced condition the descent rate will be higher than a balanced autorotation.

5. During the descent, use the cyclic to achieve the desired glideslope and to maintain groundspeed. Groundspeed should remain near constant (typically between 50-60 KIAS) from the top of the glideslope until the flare. Do ***NOT*** decelerate below 50 KIAS until the flare.

6. Initiate a smooth flare to arrive at approximately 3 feet above the runway with little to no groundspeed and minimum descent rate.

NOTE

The altitude at which the flare is initiated can vary depending on conditions (wind, groundspeed, rate of descent, DA, etc.), but typically should be no higher than 50 feet AGL.

CAUTION

To avoid excessive rate of descent and/or nose high attitude on short final, avoid over-flaring or ballooning in the flare.

NOTE

Expect a nose high and nose left attitude toward the end of the approach. Depending on conditions, the nose may yaw significantly to the left as the aircraft decelerates. If yaw approaches approximately 70 degrees left, use right pedal to prevent further left yaw.

7. As the aircraft begins to settle near the end of the flare (usually 10-15' AGL), increase collective to eliminate the remaining descent rate and ground speed.

8. As the aircraft approaches zero groundspeed, use forward cyclic to level the aircraft and terminate the approach in a hover.

CAUTION

Due to the nose high, nose left attitude on short final, tail skid clearance will be lower than normal. If the pilot is late to level the aircraft, a tail skid strike becomes increasingly possible.

NOTE

The tendency is to level too quickly (carried over from the autorotation sight picture) resulting in undesirable groundspeed at the bottom. Be patient. The key to a successful recovery is timing the flare to avoid an excessive tail low attitude near the deck prior to leveling the aircraft and any groundspeed after reaching a level attitude.

9. As right yaw develops as collective is increased, initiate landing by rotating twist grip to flight idle.

CAUTION

If groundspeed exists after completing the approach, the crew should consider terminating the maneuver at five feet using pedals as needed. A landing using twist grip reduction shall not be attempted unless a zero or near-zero groundspeed is achieved.

To avoid a hard landing, twist grip reduction to flight idle—***if required—must be initiated between 3 and 5 feet. Twist grip reduction shall not be initiated above 5 feet.*** The instructor must be vigilant to prevent early twist grip rotation.

Advancing the twist grip after reducing to flight idle may cause an overtorque.

If groundspeed develops after rotating the twist grip to flight idle and the nose is not aligned with the direction of travel, the crew shall utilize pedals as necessary to make a safe landing.

NOTE

For training purposes, the instructor may elect to terminate in a hover or slow taxi—***using pedals to recover***—vice applying the hover recovery procedures. This will give the aircrew the opportunity to focus on the approach portion of the maneuver.

This intent should be briefed on downwind or before using the phrase ***"Recovery with Pedals."*** (For example, on downwind the pilot or IP will state: "This approach will use a Recovery with Pedals.") With this call, twist grip reduction shall not be considered and the pilot shall use pedals as needed to terminate in a controlled hover.

A moderate and increasing right yaw is likely with this maneuver. However, a mild right yaw is possible with favorable conditions (strong left crosswind, mild fixed pedal condition, etc.). In this case, a power on landing (without using twist grip) should be considered.

10. Use cyclic to eliminate drift. If yaw exists, ensure skids are level prior to touchdown and maintain the skid-level attitude until maneuver is complete.

11. Use collective to cushion the landing.

Crew Resource Management

1. The Instructor Pilot discusses the importance of sufficiently leveling the aircraft to prevent a tail low attitude near the deck, achieving a zero-groundspeed hover, avoiding an early/high rotation of twist grip to flight idle, and maintaining a level attitude during touchdown (Mission Analysis).

2. During the descent, it is recommended that the non-flying pilot call out altitudes in AGL, if desired by the flying pilot. (Situational Analysis)

Application and Technique

With this condition, the crew must expect and be prepared for a moderate to strong right yaw to develop as the approach is completed. By finishing in a zero or near-zero groundspeed hover, these procedures allow the crew to apply the "fixed pedal in a hover-right yaw" recovery procedures, as needed, to safely recover from the fixed-pedal condition. For this reason, it is important to terminate the approach no higher than 3 feet skid height to allow the safe reduction of twist grip to flight idle as the nose begins to rotate to the right.

Some mild yaw can be tolerated as the aircraft touches down. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. The corresponding decrease in torque created by lowering the collective for touchdown will aid in decreasing any remaining right yaw, and can potentially generate a left yaw, depending on conditions. In the less likely case that the rate of right yaw is minimal after completing the approach, a power-on landing (with twist grip full open) may be accomplished by simply lowering the collective in a controlled manner to effect a safe landing.

Safety Notes and Common Student Errors

1. Always remember that ***the pedals work and shall be used if conditions warrant*.** The flying pilot shall make pedal inputs as needed to maintain safe flight parameters at all times. In addition, the instructor pilot at any time can call for control of pedals to make necessary inputs. This control change shall be initiated positively without delay. Do not forgo needed pedal inputs for the sake of the simulation. Moreover, if the flying pilot feels uncomfortable with the maneuver at any time, regardless of the severity of the maneuver, he or she is encouraged to use the pedals and abort the maneuver.

2. Set up for landing to a runway with a headwind (ideally ***left*** of centerline). If the nose is not yawed left to some degree during the steady-state descent, terminate the maneuver and execute a waveoff. Verify correct setup procedures, ensure conditions (winds, gross weight, etc.) are optimized, and reattempt as desired, adjusting torque settings as needed. If still unable to achieve a left yaw in the descent, do not attempt to complete the maneuver.

3. The range of torque provided in the maneuver setup (10-40% below hover torque) provides the crew control over the severity of right yaw in the hover and to also practice different fixed pedal positions. During initial training, a higher power setting should be utilized to minimize the right rotation.

4. Expect a moderate to strong right rotation to begin to develop as power is added to attain a hover. The crew shall always be prepared to arrest any right yaw with twist grip reduction at the appropriate altitude and groundspeed.

5. Advancing the twist grip after reducing to flight idle may cause an overtorque.

6. The goal is to terminate the approach and enter the hover at a 3-foot skid height, over the runway, with no groundspeed. There is no requirement to land the aircraft into the wind line or

aligned with runway heading, nor should it be a goal for the pilot. The aircraft may be landed out of the wind line as long as NATOPS wind limitations are not exceeded.

7. The aircraft may slide and/or yaw as the aircraft touches down. In this case, it is critical to use all controls—***including pedals if necessary***—to prevent an unsafe roll condition from developing.

8. It is common for the LOW NR horn and warning light to activate during recovery after twist grip is reduced to idle.

9. The twist grip motion must be smooth and without interruption from full open to flight idle to prevent the onset of damaging aircraft vibrations and operations in the restricted N_f ranges.

10. A simulated fixed-pedal waveoff may be executed for training at the discretion of the IP. Conduct a simulated waveoff early by lowering the nose towards the deck, enter ground effect as necessary, and allowing airspeed to build to counter any right yaw. Initiate the climb with collective. If right yaw becomes excessive during the waveoff, terminate the maneuver and execute normal waveoff procedures.

11. When practicing multiple approaches simulating the same fixed pedal positions, the pedals may be repositioned by visually resetting them to the same position on downwind and announcing ***"Pedals frozen."***

12. The intent of the HIGE torque check in step 1 is to get a "real time" indication of HIGE power while exposed to the current conditions (i.e., with current winds across the deck at the OLF). It does not have to occur over the intended landing runway—just at a point on the field that is exposed to the same winds as the landing runway.

610. SIMULATED FIXED PITCH PEDAL POSITION AT ALTITUDE –HIGH POWER (DEMO ONLY)

Maneuver Description. The pilot sets up the maneuver to simulate fixed pedals in a high-powered, forward flight condition. The approach and flare will create a left yaw on final as power is reduced. On short final, the nose will typically rotate to the right due to the increase in torque created by increasing the collective to arrest the rate of descent and groundspeed. However, depending on the conditions (wind, pedal position, gross weight, etc.), a left rotation is possible. Once in a hover, the pilot will recover using the appropriate ***simulated fixed pedal in a hover*** recovery procedures. Refer to the NATOPS Manual Emergency Procedures chapter.

Application. There are two primary purposes for this maneuver. The first is to increase the pilot's proficiency to recover from a fixed-pedal, high-power condition in forward flight. The second is to give the pilot the ability to analyze the severity of the malfunction and apply the proper recovery procedures at the appropriate time given a unique set of conditions (winds, DA, gross weight, severity of yaw rate, etc.).

Procedures

1. This maneuver shall be flown to a runway. Prior to takeoff, establish a hover at 5-foot skid height into the wind near intended point of landing and note torque.

2. On initial climb out, stabilize at 50 KIAS, set torque at 5 to 15% above hover torque (at IP's discretion) not to exceed 80%, and center the ball. Freeze pedals in this position and announce ***"Pedals frozen."*** Fly the pattern at 500 feet AGL.

NOTE

The setup can be accomplished on downwind, but due to the increased workload, the climb out method is recommended.

3. Fly a normal approach to the 90 position. Set up to the intended point of landing using a 20-30 degree glideslope on final. The nose should be yawed left. Do not decelerate below 50 KIAS until initiating the flare.

4. With the landing area made, initiate a gradual flare to arrive at approximately 3 feet above the runway with little to no groundspeed and minimum descent rate.

NOTE

The altitude that the flare is initiated can vary depending on conditions (wind, groundspeed, rate of descent, DA, etc.), but typically should be no higher than 50 feet AGL.

5. As the flare is initiated, lower the collective as necessary to maintain glideslope. Typically, this will force the nose further left, aiding in recovery.

CAUTION

To avoid excessive rate of descent on short final, coordinate cyclic and collective to avoid over-flaring or ballooning in the flare.

NOTE

Expect a nose high and nose left attitude toward the end of the approach. Depending on conditions, the nose may yaw significantly to the left as the aircraft decelerates. If yaw approaches approximately 70 degrees left, use right pedal to prevent further left yaw.

6. As the aircraft begins to settle near the end of the flare (usually 10-15 feet AGL), increase collective to eliminate the remaining descent rate and ground speed.

7. As the aircraft approaches zero groundspeed, use forward cyclic to level the aircraft and terminate the approach in a 3-foot hover.

CAUTION

Due to the nose high, nose left attitude on short final, tail skid clearance will be lower than normal. If the pilot is late to level the aircraft, a tail skid strike becomes increasingly possible.

NOTE

The tendency is to level too quickly (carried over from the autorotation sight picture) resulting in undesirable groundspeed at the bottom. Be patient. The key to a successful recovery is timing the flare to avoid an excessive tail low attitude near the deck prior to leveling the aircraft and any groundspeed after reaching a level attitude.

8. Entering the hover, yaw will likely develop, but depending on conditions, could be left or right. In this case, initiate the appropriate simulated hover fixed pedal recovery techniques.

CAUTION

If groundspeed exists after completing the approach, the crew should consider terminating the maneuver at five feet using pedals as needed. A landing using twist grip reduction shall not be attempted unless a zero or near-zero groundspeed is achieved.

Remember that twist grip reduction to flight idle is not required for a left yaw or potentially even a mild right yaw. Do not be conditioned to rotate the twist grip automatically.

To avoid a hard landing, twist grip reduction to flight idle—***if required***—must be initiated between 3 and 5 feet. ***Twist grip reduction shall not be initiated above 5 feet.*** The instructor must be vigilant to prevent early twist grip rotation.

Advancing the twist grip after reducing it to flight idle may cause an overtorque.

If groundspeed develops after rotating the twist grip to flight idle and the nose is not aligned with the direction of travel, ***the crew shall utilize pedals as necessary*** to make a safe landing.

NOTE

For training purposes, the instructor may elect to terminate in a hover or slow taxi—***using pedals to recover***—vice applying the hover recovery procedures. This will give the aircrew the opportunity to focus on the approach portion of the maneuver.

This intent should be briefed on downwind or before using the phrase ***"Recovery with Pedals."*** (For example, on downwind the pilot or IP will state: "This approach will use a Recovery with Pedals.") With this call, twist grip reduction shall not be considered and the pilot shall use pedals as needed to terminate in a controlled hover.

Crew Resource Management

The Instructor Pilot discusses the importance of sufficiently leveling the aircraft to prevent a tail low attitude near the deck, for achieving a zero groundspeed hover, for avoiding an early/high rotation of twist grip to flight idle, and for maintaining a level attitude during touchdown. (Mission Analysis)

Application and Technique

Depending on gross weight, groundspeed, wind conditions, and torque application, at the end of the approach the aircraft may stabilize in a hover or, more likely, begin a rotation in one direction or the other. By finishing in a zero or near-zero groundspeed hover, these procedures allow the crew to apply the appropriate ***"fixed pedal in a hover"*** recovery, as needed, to safely recover from the fixed-pedal condition. For this reason, it is important to terminate the approach no higher than 3 feet skid height to allow the safe reduction of twist grip to flight idle if the nose begins to rotate to the right. Differing rates of collective and cyclic inputs can be applied in the flare to achieve this end state, as long as the pilot avoids an excessive tail low attitude, an excessive rate of descent (i.e., "getting vertical") and any groundspeed as the approach is terminated.

Some mild yaw can be tolerated as the aircraft touches down, ***as long as the skids are kept level***. The friction of the skids on the pavement will assist in controlling the yaw as the aircraft settles. It should also be noted that the corresponding decrease in torque created by lowering the collective for touchdown may decrease a left yaw and may increase a right yaw.
The pilot needs to keep in mind that if the rate of yaw (left or right) is mild enough as the approach is terminated, a power-on landing (keeping the twist grip full open) may be accomplished by simply lowering the collective ***in a controlled manner*** to effect a safe landing.

Safety Notes and Common Student Errors

1. Always remember that ***the pedals work and shall be used if conditions warrant***. The flying pilot shall make pedal inputs as needed to maintain safe flight parameters at all times. In addition, the instructor pilot at any time can call for control of pedals to make necessary inputs. This control change shall be initiated positively without delay. Do not forgo needed pedal inputs for the sake of the simulation. Moreover, if the flying pilot feels uncomfortable with the maneuver at any time, regardless of the severity of the maneuver, he or she is encouraged to use the pedals and abort the maneuver.

2. Set up for landing to a runway with a headwind (ideally ***left*** of centerline). Do not allow the nose to yaw more than 10 degrees right of centerline while on final. If it does, terminate the maneuver and execute a waveoff. Make another attempt at the instructor's discretion, adjusting torque settings as needed.

3. A left yaw in a hover is the desired outcome of the maneuver, but not required. The range of torque provided in the maneuver setup (5-15% above hover torque) provides the crew the flexibility to encourage this condition and to also practice different fixed pedal positions. During initial training, a higher power setting should be utilized to minimize any right rotation.

4. Avoid getting too steep on final. Doing so can create an excessive nose-left attitude on final as flare is initiated.

5. Because of the possibility of a right yaw developing in the hover, the crew must always be prepared to properly arrest any right yaw with twist grip reduction.

6. Advancing the twist grip after reducing to flight idle may cause an overtorque.

7. The goal is to terminate the approach and enter the hover at a 3-foot skid height, over the runway, with no groundspeed before entering the hover. There is no requirement to land the aircraft into the wind line or aligned with runway heading, nor should it be a goal for the pilot. The aircraft may be landed out of the wind line as long as NATOPS wind limitations are not exceeded.

8. The aircraft may slide and/or yaw as the aircraft touches down. In this case, it is critical to use all controls—***including pedals if necessary***—to prevent an unsafe roll condition from developing.

9. It is common for the LOW NR horn and warning light to activate during recovery after twist grip is reduced to idle.

10. The twist grip motion must be smooth and without interruption from full open to flight idle to prevent the onset of damaging aircraft vibrations and operations in the restricted N_f ranges.

11. A simulated fixed-pedal waveoff may be executed for training at the discretion of the IP. Conduct a simulated waveoff early by lowering the nose towards the deck, enter ground effect as necessary, and allowing airspeed to build to counter any right yaw. Initiate the climb with collective. If right yaw becomes excessive during the waveoff, terminate the maneuver and execute normal waveoff procedures.

12. When practicing multiple approaches simulating the same fixed pedal positions, the pedals may be repositioned by visually resetting them to the same position and announcing ***"Pedals frozen."***

13. The intent of the HIGE torque check in step 1 is to get a "real time" indication of HIGE power while exposed to the current conditions (i.e., with current winds across the deck at the OLF). It does not have to occur on the intended landing runway—just at a point on the field that is exposed to the same winds as the landing runway.

611. POWER OFF WAVEOFF (DEMO ONLY)

Maneuver Description. The power off waveoff enables the pilot to terminate a simulated emergency procedure or autorotative descent and transition to a normal climb/forward flight.

Application. The power off waveoff is a transition from any situation where the twist grip is not in the full open position to a power on climb/forward flight.

PROCEDURES

1. Time and altitude permitting:

   a. Smoothly lower the collective to the full down position.

   b. With collective full down, smoothly rotate the twist grip to the full open position and check for normal acceleration. PAC shall verbalize, **"TWIST GRIP FULL OPEN."** PNAC shall confirm and verbalize, **"ROGER, TWIST GRIP FULL OPEN."**

   c. Increase collective as necessary to arrest rate of descent.

   d. Adjust the nose to the appropriate attitude and use collective to establish a 70 KIAS, 500-700 FPM climb, and maintain balanced flight.

   e. Both pilots shall continuously clear the aircraft during climbout.

2. Time and altitude not permitting:

   a. Smoothly rotate the twist grip to the full open position while simultaneously increasing the collective and check for normal acceleration. PAC shall verbalize, **"TWIST GRIP FULL OPEN."** PNAC shall confirm and verbalize, **"ROGER, TWIST GRIP FULL OPEN."**

   b. Continue to increase collective as necessary to arrest rate of descent.

   c. Adjust the nose to the appropriate attitude and use collective to establish a 70 KIAS, 500-700 FPM climb, and maintain balanced flight.

   d. Both pilots shall continuously clear the aircraft during climbout.

WARNING

Lowering the collective to avoid an overtorque may create or exacerbate an unsafe flight profile. An overtorque is preferable to damage or destruction of the aircraft.

CAUTION

In flight, avoid a pausing or creeping movement while increasing or decreasing the twist grip between the FLIGHT IDLE and FULL OPEN positions. If the movement is not made at a firm and continuous rate, N_g underspeed and/or oscillation may occur. This may cause a momentary and false ENG OUT warning indication.

Crew Resource Management

1. PAC or PNAC initiates waveoff using appropriate procedures, if uncomfortable with the maneuver. (Decision Making)

2. PAC performs waveoff when a crewmember calls "Waveoff." (Adaptability/Flexibility)

3. PAC and PNAC ensure twist grip is positioned to full open. (Situational Awareness)

4. PAC/PNAC monitors rotor RPM, TOT, and torque. (Situational Awareness)

5. PAC makes appropriate radio call, as required, upon establishing positive rate of climb and balanced flight. (Communication)

Amplification and Techniques

1. After increasing the collective to stop the rate of descent (in most cases, initially setting 50% torque will significantly slow or stop the rate of descent), adjust the nose to the 70 KIAS climbing attitude and adjust collective to at least 70% torque in order to establish a 500 to 700 FPM climb (i.e. "70, 70, ball, call"). Maintain balanced flight.

2. Closely monitor rotor RPM, TOT and torque when executing a waveoff. For example, increasing collective with the twist grip partially open will result in dangerously low RPM and a high TOT condition not conducive to safe flight. Until normal waveoff engine power is assured, maintain the aircraft within safe autorotational parameters.

3. Execute the maneuver smoothly, yet positively.

Common Error and Safety Notes

1. Ensure twist grip is full open.

2. Failure to transition to the 70 KIAS climbing attitude.

3. Failure to maintain balanced flight.

4. Failure to maintain climb at 500 to 700 FPM.

5. Failure to keep torque within limits.