

SECTION II

NORMAL PROCEDURES

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PREPARATION FOR FLIGHT

Fuel requirements, weight and center of gravity location will be determined for each flight. Standard weight and balance computations are acceptable when filed and representative of aircraft loading.

BRIEFINGS

Refer to Section VIII for passenger and crew briefings.

PILOT'S PREFLIGHT INSPECTION

A pilot's preflight inspection will be accomplished prior to each flight or ground runup and it will be the final inspection prior to flight. This is performed by the pilot or a qualified copilot assigned to the flight. The purpose of this inspection is to insure removal of any protective covers/devices, and to detect damage or discrepancies which have developed since completion of the maintenance preflight inspection. The inspection will include, but is not limited to, the following items:

Exterior Inspection**1. GENERAL**

a. Be alert for damage to any part of the aircraft that may have resulted from ground handling, careless operation of flight line vehicles, other aircraft, etc.—CHECKED.

b. Be alert for any sign of fluid leakage—CHECKED.

2. BIM or IBIS indicators for normal indication—CHECKED.

3. Bottom side and tip of main rotor blades for dents or scratches—CHECKED.

4. Tail rotor blades for dents or scratches—CHECKED.

5. Tailwheel assembly for proper oleo extension, tire inflation, and lockpin seated—CHECKED.

6. Engine exhaust cover removed—CHECKED.

7. Fire extinguisher thermal discharge indicator—CHECKED.

8. Overboard drains for excessive discharge—CHECKED.

9. Left main landing gear for proper oleo extension and tire inflation—CHECKED.

10. Left-hand engine cowling fasteners, work platforms, and transmission cowling for security—CHECKED.

11. Engine intake covers removed—CHECKED.

12. Pitot cover removed—CHECKED.

13. Right-hand engine cowling fasteners, work platforms, and transmission cowling for security—CHECKED.

14. Right main landing gear for proper oleo extension and tire inflation—CHECKED.

Interior Inspection

1. Circuit breakers (aft panel)—CHECKED.

2. Cargo and equipment for proper loading and security—CHECKED.

3. Circuit breakers (forward panel)—CHECKED.

4. Transmission overtorque clock and flag—CHECKED.

5. Circuit breakers (radio panel)—CHECKED.

Air Crew Inspection

1. Minimum equipment and condition.

a. Flight mechanic's safety harness—ADJUSTED.

b. Cargo door safety strap—CHECKED.

c. Cargo door jettison handle—PROPER POSITION AND BREAKAWAY WIRE INTACT.

d. Cabin emergency escape hatch jettison handle—PROPER POSITION AND BREAKAWAY WIRE INTACT.

e. Cabin—SECURED.

f. Standard SAR Board items—CHECKED.

g. Rescue platform—CHECKED.

- h. Rescue basket—CHECKED.
- i. Rescue sling—CHECKED.
- j. Hoist for proper operation and condition of cable next to hook—CHECKED. (After rotor engagement.)

BEFORE STARTING

1. Seats, lap belt, shoulder harness, inertia reel lock, pedals fastened/adjusted—CHECKED.
2. Gyro selector switch—PORT.
3. ASE hardover switches—CENTERED.
4. ASE channel disengage switches—ON.
5. Cockpit emergency window release handles—PROPER POSITION AND BREAKAWAY WIRE INTACT.
6. Flight controls—CHECK FOR COMPLETE FREEDOM OF MOVEMENT.
7. Collective friction—ADJUST FOR SLIGHT AMOUNT.
8. Emergency throttle—OPERATE THROUGH FULL TRAVEL TO INSURE SMOOTH AND COMPLETE MOVEMENT, THEN-CLOSED.
9. Speed selector—OPERATE THROUGH FULL TRAVEL TO INSURE SMOOTH AND COMPLETE MOVEMENTS, THEN-STOPCOCKED.
10. Flight control servo shutoff switch—CENTERED.
11. Hover and flood light switch—OFF.
12. Tailwheel—LOCKED.
13. Parking brake—RESET.
14. TRANSPONDER.
 - a. STBY.
 - b. Code—AS REQUIRED.
15. ASE CG Trim index at one o'clock—SET.

16. Lower console ICS/COMM/NAV equipment—ON.
17. Landing gear switch—DOWN.
18. Fuel quantity selector—TOTAL.
19. Rotor brake lever—RESET.
20. Outside air temperature—CHECKED.
21. T-handle—FUEL ON.
22. P3 valve—AS REQUIRED.
 - a. Batt start—OPEN.
 - b. External power start—CLOSED.

NOTE

External power is normally used for the first start of the day.

23. Pitot heater switch—OFF.
24. Windshield defroster switch—OFF.
25. Engine anti-ice switch—OFF.
26. Hoist master switch—OFF.
27. Hoist shear switch—GUARD COVER CLOSED AND BREAKAWAY WIRE INTACT.
28. DC non-essential bus override switch—CENTERED.
29. Heater master switch—OFF.
30. Heater start switch—OFF.
31. Heater HI-LO cycling switch—HI.
32. Vent blower switch—NORMAL.
33. Navigation lights master switch—ON.
34. Position lights master switch—AS DESIRED.
35. Rotating anti-collision light switch—ON.
36. Windshield wiper switch—OFF.

37. All lighting rheostats—AS DESIRED.

38. Overhead console COMM/NAV equipment—ON.

NOTE

Homing Selector should be OFF unless system is to be used.

39. Pilot's compartment and cabin dome light switches—AS DESIRED.

40. Cockpit spotlight—AS DESIRED.

41. Cargo sling master switch—SAFE.

42. Release mode switch—TUGBIRD.

43. Radio master switch—ON.

44. Beeper trim switch—ON.

45. Fuel boost pump switches—ON.

46. Overspeed test switch—TEST NO. 1. (system test performed on first flight of the day)

47. Ignition switch—NORMAL.

48. Generator switches—ON.

49. Battery switch—OFF.

50. External power switch—OFF.

STARTING ENGINE

BATTERY START

Refer to ENGINE FUEL CONTROL SYSTEM OPERATION in Section VII for description of abnormal starts and to ENGINE STARTING AND GROUND FIRE emergency procedures in Section III.

1. Before starting check—COMPLETED.
2. Fire guard—POSTED.
3. Speed selector STOPCOCKED—RECHECKED.
4. Battery switch—BATT START.
5. Starter button and clock—DEPRESSED.

6. T₅ less than 100°C—CHECKED.

7. N_g accelerating through 14%—CHECKED.

8. Speed Selector—ADVANCE TO GROUND IDLE.

9. Elapsed time—NOTED.

10. Engine light-off should occur within 15 seconds after opening speed selector—CHECKED. (Refer to Section III, engine fails to light off.)

11. When light-off occurs—MONITOR T₅ AND N_g ACCELERATION. (Refer to Section III for hot start abort procedures.)

12. When T₅ peaks and is less than 650°C—CLOSE P₃ VALVE. (Refer to Section III for cold hangup procedures.)

13. Observe 45% N_g—RELEASE STARTER BUTTON.

14. N_g 56% ± 3%, —CHECKED.

15. Battery switch—ON.

16. Engine instruments—CHECKED.

STARTING WITH DC EXTERNAL POWER

NOTE

Availability of DC external power is determined by momentarily placing the external power switch on prior to initiating the start. It must be turned off prior to starter engagement.

1. Before starting check—COMPLETED.
2. Fire guard—POSTED.
3. Speed selector stopcocked—RECHECKED.
4. External power switch—ON. External power advisory light—CHECKED ON. External power switch—OFF.
5. Battery switch—ON.
6. Starter button and clock—DEPRESSED.

7. External power switch—ON. External power advisory light - CHECKED ON.

NOTE

Allow sufficient time for starter engagement with battery power only (approximately 1-2 seconds).

8. T₅ less than 100°C—CHECKED.
9. N_g accelerating through 14%—CHECKED.
10. Speed selector—ADVANCE TO GROUND IDLE.
11. Elapsed time—NOTED.
12. Engine light-off should occur within 15 seconds after opening speed selector—CHECKED. (Refer to Section III for engine failure to light-off malfunction.)
13. When light-off occurs—MONITOR T₅ AND N_g ACCELERATION. (Refer to Section III for hot start abort procedures.)
14. Observe 45% N_g—RELEASE STARTER BUTTON.
15. Ground idle N_g 56% ± 3%—CHECKED.
16. Engine instruments—CHECKED.
17. External power switch—OFF.
18. External power source—DISCONNECTED.

Starting With AC External Power

1. Before starting check—COMPLETED.
2. Fire guard—POSTED.
3. Speed selector stopcocked—RECHECKED.
4. External power switch—ON (External power advisory light should not go on.)
5. Battery switch—ON.
6. External power advisory light—ON.
7. Starter button and clock—DEPRESSED.
8. T₅ less than 100°C—CHECKED.

9. N_g accelerating through 14%—CHECKED.
10. Speed selector—ADVANCE TO GROUND IDLE.
11. Elapsed time—NOTED.
12. Engine light-off should occur within 15 seconds after opening speed selector—CHECKED. (Refer to Section III for engine failure to light-off malfunction.)
13. When light-off occurs—MONITOR T₅ AND N_g ACCELERATION. (Refer to Section III for hot start abort procedures.)
14. Observe 45% N_g—RELEASE STARTER BUTTON.
15. Ground idle N_g 56% ± 3%—CHECKED.
16. Engine instruments—CHECKED.
17. External power switch—OFF.
18. External power source—DISCONNECTED.

CAUTION

During all engine starts, regardless of the procedure used, N_g acceleration from starter engagement until reaching ground idle should be monitored closely. Any N_g hangup or lag during start could indicate engine bearing or accessory drive problems and should be investigated.

ROTOR ENGAGEMENT

1. Aircraft clear of personnel and equipment—CHECKED.
2. Collective pitch—MINIMUM.
3. Rotor brake—OFF.
 - a. Rotor brake caution light out—CHECKED.
4. Auxiliary servo pressure—CHECKED.
5. Primary servo pressure—CHECKED.
6. Transmission oil pressure rise—CHECKED.
 - a. LOW PRESS caution light on below approximately 25 psi—CHECKED.

7. Nr 33% or higher—CHECKED.

8. Flight controls—CHECKED.

CAUTION

If any binding of the flight controls is felt or if rotor response is abnormal—SECURE THE AIRCRAFT.

a. Note that no unusual cyclic stick position is required to maintain a level tip path plane.

b. Trim release—DEPRESSED FOR CYCLIC ACTUATION.

c. Actuate flight controls a slight amount in all directions.

d. Freedom of movement—CHECKED.

e. Normal rotor response—OBSERVED.

9. Servo systems—CHECKED.

CAUTION

When performing servo system check, keep thumb on flight control servo shut-off switch and be prepared to return switch to ON (centered) position in event of erratic behavior or malfunction of flight control system when switch is placed in either PRI OFF or AUX OFF. Inability to secure either servo is a grounding discrepancy.

a. Primary and auxiliary servo hydraulic pressure gages—CHECKED.

b. Servo shut-off switch—PRI OFF.

(1) Observe reaction of tip path plane. Normal indication is a slight movement of tip path plane as stationary star is allowed to move within sloppy links—CHECKED.

(2) Primary servo pressure indicates zero—CHECKED.

(3) PRI HYD caution light—ON.

c. Trim release—DEPRESS FOR CYCLIC MOVEMENT.

d. Actuate cyclic and collective.

(1) Freedom of movement—CHECKED.

(2) Observe tip path plane. Abnormal response of tip plane might indicate an auxiliary servo malfunction—CHECKED.

NOTE

If an excessive movement of the tip path plane is noted, do not continue servo check. Place flight control servo shutoff switch in the ON (centered) position, shut down engine and rotor.

e. Servo shut-off switch—CENTERED.

(1) Primary servo pressure indication normal—CHECKED.

(2) PRI HYD caution light off—CHECKED.

f. Raise collective slightly.

g. Servo shutoff switch—AUX OFF.

(1) Observe reaction of tip path plane for no movement.

(2) Stick jump—CHECKED.

(a) Maximum allowable jump in the flight controls when the AUX SERVO is turned off is: Tail rotor pedals and collective 1/16 inch, Cyclic 1/8 inch.

WARNING

If limits are exceeded, do not fly the aircraft until the cause of excess jump is corrected.

(3) Auxiliary servo pressure indicates zero—CHECKED.

(4) AUX HYD PRESS caution light on—CHECKED.

h. Trim release—DEPRESS FOR CYCLIC MOVEMENT.

i. Actuate flight controls.

(1) Freedom of movement—CHECKED.

NOTE

With auxiliary servo off, increased friction will be felt in the cyclic and collective. Pedal forces are less than normal due to pedal damper being off.

(2) Normal rotor response—CHECKED.

CAUTION

There should be no tendency of the cyclic to move when checking collective response. If a collective to cyclic coupling is noticed, return the servo shutoff switch to ON and secure the helicopter. A slight cyclic to collective coupling may be felt due to installation of solid primary servo input rods. The pilot should be able to override the coupling and it should not be felt with the engine above ground idle.

j. Servo shutoff switch—CENTERED.

(1) Auxiliary servo pressure indication normal—CHECKED.

(2) AUX HYD PRESS caution light off—CHECKED.

10. Speed selector—FLIGHT IDLE.

11. Rotor overspeed system check—AS REQUIRED.

a. Speed selector—ADVANCE TO AUTO DETENT OR UNTIL N_g STARTS TO OSCILLATE.

b. N_g trips at $72\% \pm 3\%$ and oscillates—CHECKED.

NOTE

See figure 5-4 if this limit is exceeded.

c. Overspeed test switch—NORMAL.

12. Speed selector—MAXIMUM.

a. Maximum N_f 103%-106%—CHECKED.

13. Free wheeling unit—CHECKED.

a. With positive motion turn speed selector to FLIGHT IDLE.

b. N_f/N_r tach needles split—CHECKED.

c. Rotate speed selector to auto detent and allow power surge to peak—CHECKED.

NOTE

N_f in the auto detent should be between 86%-91%.

14. 100% N_f/N_r —SET.

INSTRUMENT EQUIPMENT CHECK

If single-piloted, the pilot's instruments will be checked for normal readings during the instrument check. If dual-piloted, the instruments which are duplicated on the copilot's instrument panel will be compared as an additional check for proper instrument operation.

1. Fuel quantity indicator—CHECKED.

a. Selector to TOT position—CHECK QUANTITY.

b. Rotate selector to aft—CHECK QUANTITY.

c. Depress test switch, needle deflects to minimum—CHECKED.

d. Release test switch, needle return to same reading—CHECKED.

e. Rotate selector to FWD—CHECK QUANTITY.

f. Quantity in TOT position equals quantity in FWD & AFT positions—CHECKED.

2. Caution/advisory panel check:

a. Master switch to TEST position; all modules and master caution light should go on with equal intensity—CHECKED.

b. Master switch—RESET.

3. Engine and transmission instruments for normal indications—CHECKED.

4. Emergency exit lights—CHECKED.

a. Emergency exit lights switch—ARMED.

b. Emergency exit lights switch—OFF.

- c. Emergency exit lights—ON.
 - d. Emergency exit lights switch—ARMED.
5. Fire warning lights check:
- a. Test switch—DEPRESSED.
 - b. T-handle and instrument panel warning lights go on—CHECKED.
6. Dual tachometer—CHECKED.
7. Airspeed indicator—CHECKED.
8. VGI indices aligned, actual and indicated attitude the same—CHECKED.
- a. If actual and indicated attitudes are not the same with indices aligned, adjust VGI to actual attitude—SET.
9. Radar altimeter, bug light control—SET TO 140 FEET.
10. Torquemeter—CHECKED.
11. Flight director ASE mode—SET.
12. MA-1 compass—SET.
- a. MA-1 compass and STBY compass—COMPARED.
 - b. Slave indicator centered—CHECKED. Slave manually IF NECESSARY.
 - c. Compass acknowledge button—DEPRESSED.

NOTE

During shipboard operations, the MA-1 compass may not be accurate due to magnetic disturbances created by the ship. After takeoff, manual slaving will provide accurate headings sooner than if the system is allowed to slave by itself.

13. Barometric altimeter—SET.

CAUTION

With AIMS altimeters AAU-21/A, AAU-24/A, or AAU-32/A, during normal use of the barometric setting knob,

the counter drums may momentarily lock. If this occurs, do not force the setting knob. Use of force may cause internal gear disengagement and result in excessive altitude error. If locking occurs, the required setting may sometimes be obtained by turning the knob a full turn in the opposite direction and approaching the setting again with caution.

14. Clock—CHECKED.
15. Turn and slip indicator—CHECKED.
16. VOR/TACAN #2 needle selector switch—AS DESIRED.
17. Marker beacon:
- a. Volume—AS DESIRED.
 - b. Sensitivity—HIGH.
 - c. Marker beacon lights—PRESS-TO-TEST.
18. Vertical speed indicator—CHECKED.
19. Pitot heater switch—AS REQUIRED (On below 10°C OAT).
20. Windshield defroster switch—AS DESIRED.
21. Engine Inlet Duct Anti-ice System check, if required—CHECKED:
- a. Engine anti-ice switch—HOLD IN TEST POSITION.
 - b. ENG INLET ANTI ICE caution light cycles on and off—CHECKED.
 - c. Engine anti-ice switch—AS REQUIRED. (Refer to COLD WEATHER OPS, During Flight, page 9-6.)
22. Hoist check—AS REQUIRED.
23. DC Non-essential bus override switch—AS REQUIRED.
- a. Daytime—AS DESIRED.
 - b. Nighttime or in IMC—ON.

24. Heater system—AS REQUIRED.

RADALT CHECK

The RADALT check may be performed as soon as it is warmed up. The check must be complete prior to the takeoff check.

1. Low level warning light on—CHECKED.
2. RAWs switch—ON.
3. Press to test for accuracy 100 ± 15 feet—CHECKED.
4. RAWs audio—CHECKED.
5. Needle indicates zero—CHECKED.

ASE CHECK

The ASE check may be performed any time prior to the pre-takeoff check.

1. Tailwheel—LOCKED.
2. Parking brake—ON.
3. ASE ENG button—DEPRESS.
 - a. Green light—ON.
 - b. ASE OFF caution light—OFF.
 - c. Flight Director OFF flags hidden—CHECKED.
4. Move cyclic in pitch and roll to check proper movement of mode bars.
5. Pilot adjust CG control to place the pitch mode bar two units below center index while maintaining a center cyclic position.
6. Adjust yaw mode pointer one unit to right, then center by depressing left rudder pedal. Reverse this procedure to the left. Disengage, ASE ENG light off—CHECKED.

BEFORE TAXI/TAXI

1. Crew and passengers—READY.
2. Chocks—REMOVED.
3. Parking Brake—OFF.

4. Tailwheel—UNLOCKED.

NOTE

The tailwheel may be unlocked with or without forward movement of the helicopter at the pilot's discretion. In either case, side loads on the locking pin must be neutralized by use of tail rotor pedals before the locking pin will unlock.

5. During taxi, MA-1 compass and turn needles tracking properly—CHECKED.

6. If IFR flight is planned, all radio/navigation systems should be checked prior to takeoff.

BEFORE TAKEOFF CHECK

1. Crew and passengers—ALERTED.
2. Tailwheel—LOCKED.
3. Parking brake—AS REQUIRED.
 - a. Water, ship deck with grid—OFF.
 - b. Ship deck without grid—ON.
4. Transponder—SET TO ALT.
5. ASE—ENGAGED.

CAUTION

Aboard ship, ASE shall be disengaged anytime the ship is turning to avoid full throw tail rotor pedal deflection induced by the ASE heading retention feature.

6. COMM-NAV equipment—AS REQUIRED.
7. Caution panel—CHECKED.
8. Engine instruments—CHECKED.
9. Nr/Nr. 103%—SET.
10. Flight instruments—CHECKED.
11. Ship operations, cockpit sliding windows and cabin door—OPEN.

CRUISE CHECK

1. Airspeed—AS DESIRED.

2. Nr/Nr 96%—SET (ADJUST TO A HIGHER RPM AS NECESSARY FOR SMOOTH OPERATION).

3. Wheels—AS REQUIRED.

- a. Down over land.
- b. Up over water.

BEFORE LANDING CHECK

1. Crew and passengers—ALERTED.

2. Tailwheel—LOCKED.

3. Parking brake—AS REQUIRED.

- a. Water, ship deck with grid—OFF.
- b. Ship deck without grid—ON.

4. Wheels—AS REQUIRED.

5. Caution panel—CHECKED.

6. Nr/Nr 100%-103%—SET TO ARRIVE AT HOVER WITH 100% Nr/Nr.

7. Heater switch—AS REQUIRED. (Secure 5 minutes prior to shutdown).

8. Ship operations, cockpit sliding windows and cabin door—OPEN.

AFTER LANDING AND TAXIING

1. Collective pitch—MINIMUM.

2. Nr/Nr 100%—SET.

3. ASE—DISENGAGED.

4. Tailwheel—UNLOCKED.

5. Transponder—AS REQUIRED.

PARKING

1. Head helicopter into wind if possible.

2. Tailwheel—LOCKED.

3. Parking brake—SET.

4. Raws—OFF.

5. Emergency exit lights—DISARM.

ROTOR SHUTDOWN-ENGINE RUNNING

1. Speed selector to FLIGHT IDLE—SET.

2. Droop stops in—CHECKED.

3. Nr/Nr at or below 48%, rotor brake—ON.

NOTE

Apply rotor brake full ON using one steady motion. Make no attempt to ease rotor to a stop.

4. Electrical load—REDUCE AS NECESSARY.

NOTE

Battery drain can be reduced by turning off equipment individually or by using the BATT START position of the battery switch.

CAUTION

At least one fuel boost pump must be ON to supply fuel to the engine to preclude flameout. If the engine flames out due to fuel starvation, STOPCOCK the speed selector immediately and monitor T5 for internal engine fire.

ROTOR AND ENGINE SHUTDOWN

1. For engine cooling operate at least 1 minute at minimum pitch.

2. Speed selector—FLIGHT IDLE.

3. Droop stops in—CHECKED.

4. Speed selector—STOPCOCK.

5. Nr 48% or less, rotor brake—APPLY EXACT TIME AND AMOUNT OF APPLICATION DEPENDS ON THE WIND CONDITIONS OR OPERATIONAL NECESSITY. EASE ROTOR TO A STOP BY REDUCING ROTOR BRAKE PRESSURE DURING THE LAST FEW REVOLUTIONS OF THE ROTOR, STOPPING THE BLADES AT THE DESIRED LOCATION.

NOTE

In winds greater than 25 knots, apply rotor brake full ON at 48% N_r using one steady motion. Make no attempt to ease rotor to a stop.

6. T_5 less than 300°C—MONITOR.

(Refer to Section III INTERNAL ENGINE FIRE PROCEDURES.)

BEFORE LEAVING THE HELICOPTER

1. Overhead switch panel—SWITCHES OFF.

NOTE

Use same sequence as before starting check, omitting overhead NAV/COMM control heads.

2. T_5 less than 300°C—RECHECKED.

POSTFLIGHT

1. Overtorque clock and flag—CHECKED.
2. Chocks in—CHECKED.
3. Perform brief EXTERIOR INSPECTION.

BASIC MANUEVERS**AIR TAXI**

Align the helicopter with the desired track. Crosswind and downwind taxi should not be accomplished in winds greater than 25 knots or 20 knots respectively. Air taxi altitude should be no higher than 5 to 10 feet unless obstacles, FOD, or spray requires higher altitude. Air taxi speed is dictated by the surface to which a forced landing would be made.

HOVERING

Hover is conducted at 100% N_r/N_r at a suitable altitude selected by the pilot. Hover altitude is based on existing conditions and should be sufficient to avoid inadvertent ground contact. Factors which should be considered are the consequences of engine failure, gross weight, obstructions to visibility (blowing snow, dust, sand, water spray) wind velocity, and wind direction

with respect to the helicopter. High gross weights dictate a lower hover altitude.

VERTICAL TAKEOFF

ASE is normally engaged prior to takeoff. Set 103% N_r/N_r at minimum collective pitch. Establish a hover at an altitude appropriate for existing conditions.

RUNNING TAKEOFF

A running takeoff reduces the power required to become airborne. Increase the collective and coordinate the cyclic as necessary to begin rolling across the surface. Continue accelerating until translational lift is attained, then smoothly increase collective until takeoff occurs. Lift-off should be made in a level attitude. Adjust nose attitude to insure continued acceleration after lift-off and continue transition to forward flight.

NO HOVER TAKEOFF

This maneuver is useful for departing congested or rough areas and to minimize the exposure of the helicopter to blowing material. (FOD).

Procedure

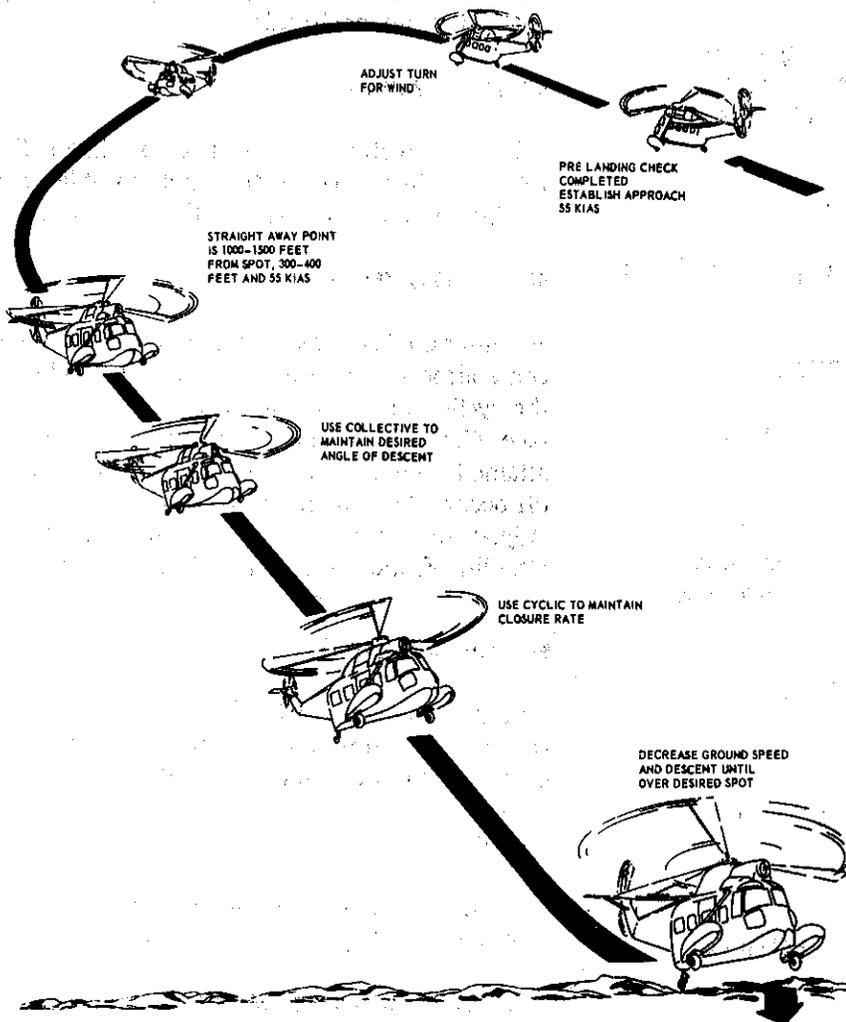
1. Increase collective and coordinate cyclic and tail rotor pedals to begin a vertical takeoff.
2. As the helicopter leaves the surface, apply forward cyclic to transition to forward flight.

TRANSITION TO FORWARD FLIGHT AND CLIMB

1. From a takeoff or a hover, apply forward cyclic to accelerate, adding collective if necessary to prevent settling.
2. Do not exceed 6° nose down during transition.
3. When translational lift has been attained, below 20 feet, add collective and continue acceleration. Adjust nose attitude to maintain 55 knots during climb. Climb at 70 knots above 1000 feet (AGL).

TRAFFIC PATTERN

Normal traffic patterns will be flown at 100% N_r/N_r , 55 knots, 1000 feet (AGL). Pattern altitude may be varied to meet local requirements.



21459

Figure 2-1. Normal Approach

NORMAL APPROACH (figures 2-1, 2-2)

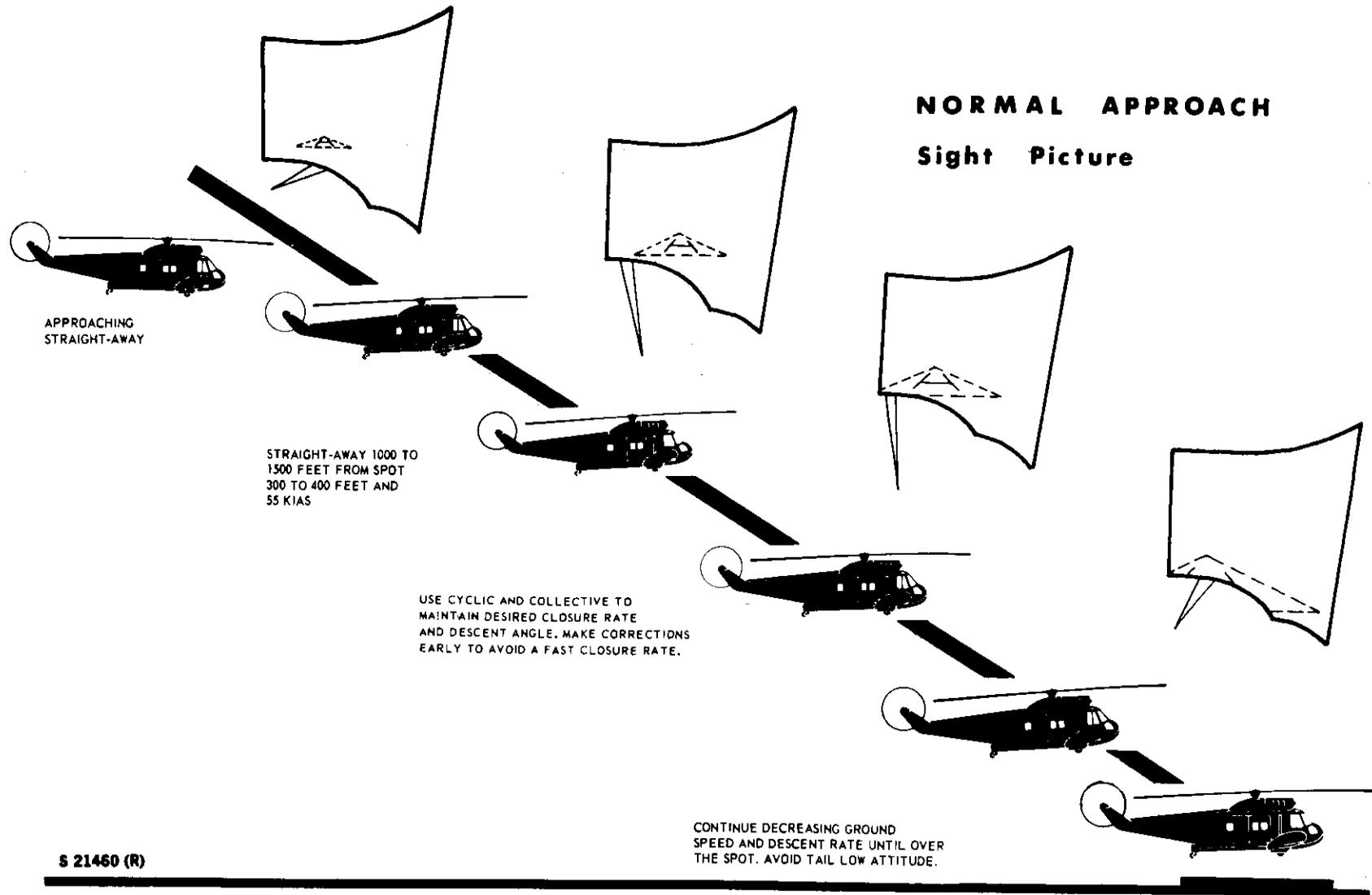
This maneuver is used to transition to a hover or to a landing, at a specific spot, over land, water, mountainous terrain, elevated structures or confined areas. With the wide variety of approach angles available, the pilot is able to adapt to various operational situations. An approach requiring a low rate of descent such as cargo sling operations, would utilize a shallow angle. A steep angle might be used when approaching a spot bounded by obstacles. High rates of descent and/or fast closure rates should be avoided. Maintaining a constant apparent ground speed during the last 200-400 feet of descent is one method of determining closure rate. Although the normal approach is best initiated from a downwind position, it may successfully be accomplished from any position. Ability to establish a visual picture of the desired approach angle, from any altitude and position, through the use of a windshield sight picture, is a requirement for properly completing an approach. This is essentially a HEAD OUT OF THE

COCKPIT type of approach. Occasionally, the pilot may desire to change the spot to which he is making an approach. To approach this new spot, power should be applied to establish level flight (or decrease rate of descent) until the new angle is then made. If the newly selected spot is closer than the original, power should be further reduced to increase the rate of descent until the new angle is intercepted. Power is then applied to descend along the new angle to the desired spot.

Procedure

1. The helicopter is normally established on downwind at 1000 feet, 55 knots. However, this approach can be commenced from any point from 180° position to a straight position.
2. After aligning the helicopter on straight away, regardless of initial altitude, fly a constant angle (STRAIGHT-LINE) descent, to the desired spot by maintaining a proper windshield sight picture.

NORMAL APPROACH Sight Picture



S 21460 (R)

Figure 2-2. Normal Approach Sight

3. On straight away, the constant angle (STRAIGHT-LINE) descent will place the helicopter 300-400 feet above the ground 1000-1500 feet downwind from the desired spot.

4. Use the crab method for drift correction through 200 feet, then shift to the wing down method.

5. Maintain the desired approach angle using collective while coordinating cyclic to give a comfortable closure rate to terminate in a hover or landing at the selected spot.

VERTICAL LANDING

Upon firm contact with the surface decrease collective while adjusting cyclic to neutral. Stop any forward movement with brakes.

RUNNING LANDING

A running landing is one method of terminating a normal approach utilizing less power than is required for a hover or a no hover landing, or when a touchdown with only small changes in power is desirable. It utilizes the effect of forward airspeed (translational lift) to reduce the power required for landing.

Procedure

1. When airspeed decreases in the normal approach to the desired touchdown speed, adjust the nose attitude to maintain that speed.

2. Control descent with collective to touch down on the spot with translational lift. Nose attitude at touchdown should be 0°-5° nose up.

3. When on the ground coordinate the cyclic, collective, and brakes as required to control ground speed.

NO-HOVER LANDING

The no-hover landing is a method of terminating a normal approach. It utilizes less power than is required for a hover and can be used to minimize FOD ingestion when landing.

Procedure

1. During the last portion of the normal approach, coordinate cyclic and collective to give a well controlled landing with 0-5 knots of ground speed (depending on the surface conditions).

2. After landing, coordinate the cyclic, collective, and brakes to control ground roll.

WAVEOFF

A waveoff provides the pilot a means of aborting an unfavorable approach. This maneuver may be executed during any portion of an approach by increasing collective to 95% torque and establishing a 55 knot climb.

CONFINED AREA PROCEDURES

These procedures provide the pilot with guidelines for landing in and taking off from an area that is restricted by terrain features or other obstacles. Additionally, portions of these procedures apply when operating below safe obstacle clearance altitudes when no landing is intended. Adequate crew briefing and coordination cannot be overemphasized. Each member of the crew must understand what is intended and be alert for any hazard which may be encountered during the course of the operation, which may require an immediate WAVEOFF. Normally a confined area operation consists of several parts: high recon, low recon, approach and termination, maneuvering, and takeoff.

HIGH RECON

The high recon affords the pilot the opportunity to evaluate and plan the operation from a safe altitude. The high recon is usually flown at about 1000 feet AGL and in a circular orbit to the side of the area. This gives the pilot the best possible view. The approach, termination, and takeoff should be tentatively planned based on the observation and estimate of:

1. Size of the area and long axis of the area.

2. The presence and height of obstacles.

3. The condition and slope of the terrain.

4. Wind direction and velocity.

5. Forced landing areas.

6. Anticipated helicopter performance (Appendix I).

7. Waveoff route.

LOW RECON

The low recon is used to confirm observations and finalize plans made during the high recon. The low

recon may be conducted separately or as part of the final approach to the area. If conducted separately, the low recon is usually commenced by using the approach planned during the high recon. As the descent is made to the area, the approach is broken off so as to fly to the side of the area. The low recon is flown at 55 knots and at an altitude sufficient to provide adequate observation of the area. As the low recon is completed, a climb to pattern altitude is made to set up for the actual approach.

APPROACH AND TERMINATION

Prior to initiating the approach the pilot will brief the copilot and crewman. The crewman is utilized to advise the pilot of obstacle clearance on the approach. The approach should be a normal approach if possible. The angle selected should be one which will clear the obstacle and continue to the planned termination point, which is normally as far forward in the landing area as conditions permit. If a steeper than normal approach is required, only that portion from just above the obstacle to the spot should be steeper. As the approach progresses, the pilot should continue to evaluate the factors considered on the high and low recons. The approach is terminated in either a hover or no hover landing depending on the power available and the terrain. Determine the stability of the helicopter after touchdown prior to reducing power. Use of the foot-actuated wheel brakes should be considered to prevent forward motion on touchdown in confined areas.

MANEUVERING

Air or ground taxi may be utilized depending on existing conditions. All crewmembers should keep a constant lookout for obstacles during maneuvering.

TAKEOFF

The takeoff should be made over the lowest obstacle consistent with other factors such as wind and utilization of the long axis of the area. Based on new information, the takeoff position may be different from that determined during the high and low recons. The takeoff may be initiated from the surface or a hover. Power should be applied to establish a straight line climb angle that will clear the obstacle. Attain 55 knots as soon as practicable. In some areas, the wind cannot be depended on for added lift until the helicopter is above the obstacles.

LOW ALTITUDE OPERATIONS

Prior to descending below a safe obstacle clearance

altitude the pilot should evaluate and plan the operation using the High and Low Recon procedures listed above. This is particularly important when operating in unfamiliar areas. Certain obstacles, particularly wires, may not appear on available aeronautical charts and may be very difficult to detect visually when operating at low altitudes. All crew members must be briefed to keep a constant lookout for obstacles during maneuvering at low altitudes. If weather conditions require continuous operation below safe obstacle clearance altitude, ground speed must be reduced so that obstacles may be seen and avoided.

SLOPE OPERATIONS

Slope operations are conducted either upslope or sideslope. Never land downslope nor turn the tail into a slope during hovering, as the tail rotor may contact the ground.

UPSLOPE

Landing with the nose of the helicopter pointed upslope is the most desirable procedure. The wheels are normally down but may be raised at pilot's discretion for landing on steeper slopes. The parking brakes are set on the PRELANDING check. When over the desired landing spot, commence a slow, vertical descent, until the main wheels touch down. Continue lowering collective, while coordinating upslope cyclic, until the tailwheel, and the weight of the helicopter is resting firmly on the ground. If the rotor blades contact the droop stops before reaching minimum collective pitch, raise the collective until the blades are just off the droop stops. Maintain this position to complete the mission.

WARNING

The helicopter may not be shut down after a wheels-up landing on an upslope. The wheels will extend when electrical power is secured which may preclude a subsequent rotor engagement due to the increased nose-up attitude.

SIDESLOPE

Execute the landing by heading the aircraft parallel to the slope with the parking brake and wheels as desired. Descend slowly, placing the upslope wheel on the ground. Coordinate reduction of collective pitch with lateral cyclic (into the slope). Reduce collective pitch until the tailwheel and the downslope main wheel touch the ground. Continue coordinating reduction of

collective pitch and application of cyclic into the slope until all the weight of the aircraft is resting firmly on the ground. If the rotor blades contact the droop stops, cease lowering the collective and hold this position to complete the mission. To take off, coordinate cyclic control and collective pitch to bring the aircraft to a level attitude with the upslope main wheel still on the ground. After attaining a level attitude, continue increasing collective pitch to bring the aircraft to a hover.

WARNING

The helicopter may not be shut down after a wheels-up landing on a sideslope. The wheels will extend unevenly when electrical power is secured, and may roll the helicopter over.

ELEVATED HELIPAD APPROACH PROCEDURES

Elevated helipads are found on roof tops, on oil rigs, on aids to navigation platforms, etc. Approaches to elevated helipads are executed in the same manner as the confined area approach.

HIGH RECON AND LOW RECON

Perform reconnaissance in the same manner as in confined area operations.

APPROACH AND TERMINATION

A normal approach should be made to the helipad with termination at the forward edge of the pad to take best advantage of the wind and to insure that the tailwheel will be placed on the landing surface. The approach may be terminated in a hover or with a no hover landing as necessary. Use of the foot-actuated wheel brakes will prevent the helicopter from rolling after touchdown. The pilot will brief the crewman to open up and provide clearance information, especially tailwheel clearance.

TAKEOFF

The takeoff may utilize the no hover technique or be made from a hover. Following takeoff from an elevated structure, a rapid gain in air speed is more important than a gain in altitude. This provides the pilot better autorotative characteristics should an engine failure occur.

CARGO SLING PROCEDURES

The mechanical and electrical operation of the cargo sling is explained in detail in Section IV. The cargo sling provides the pilot with a method of transporting external loads weighing up to 3000 pounds. Before commencing cargo sling operations, the pilot should obtain information on load weights, operating areas and weather as necessary to compute the aircraft performance from Appendix I. For aircraft weight and balance, the pilot need only insure that the center of gravity is within limits prior to lifting the external load and that the load will not exceed gross weight limitations. External loads shift the center of gravity toward the main rotor centroid. The minimum crew for cargo sling operations is one pilot and one crewman in the cabin. The crewman is mandatory since the pilot does not have manual release capability in the cockpit. Cargo sling operations may be subdivided into hookup, transition to forward flight, cruise, and approach phases.

PREFLIGHT

Prior to flight the pilot shall ensure that the following items are inspected:

1. The cargo sling for proper installation and security.
2. Manual release for proper rigging.
3. Cargo hook for security and condition. Insure that at least 3/8-inch clearance is visible between the swaged ball and the latch inside the hook.
4. Prior to the first hookup of the day, check both manual and electrical operation of the hook. A manual release capability is mandatory.

HOOKUP

1. Insure the sling is fully extended so that all cables and lines are clear.
2. Cargo sling master switch—ON.
3. Release mode switch—SLING.
4. Hot mike—CHECK.
5. Crewman direct pilot into position over cargo using hoist voice procedures.

6. Ground personnel discharge static electricity.
7. Crewman monitor hookup and check ground personnel clear of cargo.

NOTE

Ground personnel should enter and depart the hookup area from the starboard side of the helicopter.

8. Crewman report hookup and ready for lift-off.
9. Pilot increase power until the cable is under tension and lift the load vertically.
10. Crewman report cargo clear of deck.

NOTE

Training loads will not exceed 1000 pounds.

TRANSITION TO FORWARD FLIGHT

Transition to forward flight and establish a positive rate of climb as soon as translational lift has been attained. Do not descend during transition. Acceleration and maximum airspeed will be dependant upon the type of load carried. Some loads will require airspeeds as low as 10 knots to maintain stability. Turns should be coordinated and shallow (5°-10° bank). Do not exceed a 30° bank.

NOTE

The crewman should monitor the load for oscillation and other unsatisfactory indications. Be ready to manually release the load as directed.

CRUISE

Cargo sling master switch—SAFE (after 1000 feet terrain clearance).

NOTE

Control of oscillating loads is a major factor in external load operations. Light, bulky, and odd shaped objects swing and spin easier than heavy, compact loads. Oscillations are usually initiated by too much airspeed and abrupt control move-

ments. Control swing by reducing air-speed and applying slight lateral cyclic as necessary.

CAUTION

Release uncontrollable loads.

WARNING

Do not fly over populated areas, buildings, or other surface conditions that would be endangered or damaged by inadvertent cargo release. Gusty wind conditions, action of the load, or aircraft equipment malfunction can cause or require unplanned load release.

APPROACH

1. Use a NORMAL APPROACH not exceeding a rate of descent of 300 feet-per-minute on final.
2. Hot mike—ON.
3. Cargo sling master switch—AS REQUIRED.
4. Crewman direct helicopter into position.
5. Crewman report—"CARGO ON DECK."
6. Crewman report—"CARGO RELEASED."
7. Crewman report prior to landing—"SLING STOWED."

CAUTION

AUTO position is not to be used with loads less than 500 pounds. Do not switch to AUTO position until over a safe drop area.

CAUTION

The Radar Altimeter may be unreliable with a load attached.

WATER OPERATIONS**TAXI**

Taxiing is accomplished by adding forward cyclic and raising collective. Taxi speed is regulated by cyclic con-

trol. High speed taxiing will result in a nose low attitude and build-up of bow wave which will tend to cause the nose of the helicopter to tuck. Sideward taxiing speed will be limited to 2 to 3 knots water speed as the helicopter will assume a high degree of roll. Rearward taxiing should only be performed when absolutely necessary as rearward vision is limited and the possibility of taxiing into a floating or sunken object is greater. Rough water taxiing should be accomplished by utilizing enough collective to keep the aircraft in light contact with the water and using cyclic to resist pitching and rolling tendencies. Rough water taxiing should be kept to a minimum.

CAUTION

Extreme care should be used when taxiing crosswind or downwind in high winds. Downwind taxiing in high winds can result in an excessively high taxi speed.

CAUTION

Do not allow the sea to break on helicopter and/or come up the windshield and go into the engine. Very little water with the collective full down will cause the engine to flame out.

CAUTION

When taxiing in unfamiliar areas or shallow water, be alert to preclude striking floating surface or subsurface objects that could damage the hull or sponsons. If hull or sponson damage is suspected, an immediate takeoff should be made. Wheels should be lowered prior to landing in water of questionable depth. Actuation of the system while on the water may contaminate the struts and cause system malfunction.

HOVERING

Refer to Basic Maneuvers in this section. Maintaining position over water is difficult and aids must be used, such as debris, seaweed, foam, rotor downwash, and smoke float signals.

VERTICAL TAKEOFF

Refer to Basic Maneuvers in this section.

NO HOVER TAKEOFF

Refer to Basic Maneuvers in this section.

TRANSITION TO FORWARD FLIGHT AND CLIMB

Refer to Basic Maneuvers in this section.

TRAFFIC PATTERN

Refer to Basic Maneuvers in this section.

NORMAL APPROACH

Refer to Basic Maneuvers in this section.

VERTICAL LANDING

Refer to Basic Maneuvers in this section.

NOTE

Altitude and movement, particularly at night, are difficult to see and judge properly, and it is very easy to contact the water prematurely. The radar altimeter should be used to cross check the altitude.

NO HOVER LANDING

Refer to Basic Maneuvers in this section.

WARNING

To avoid tail rotor contact, do not exceed 12 degrees nose up attitude on touchdown.

WAVEOFF

Refer to Basic Maneuvers in this section.

CONFINED AREA PROCEDURES

Refer to Basic Maneuvers in the section.

ROTOR SHUTDOWN AND ENGAGEMENT

While heading into the wind, disengage the ASE and decrease the speed selector to FLIGHT IDLE. Once the droop stops are in, turn the helicopter 180° from the windline. Commence a smooth application of rotor brake, simultaneously applying a right rudder until di-

rectional control is lost (15% to 35% Nr). When directional control is lost, apply rotor brake full on. The helicopter will then swing left to the approximate desired shutdown heading. The amount and rate of turn will be influenced by the strength of the wind. When engaging the rotor (engine in FLIGHT IDLE), the helicopter will turn to the right as torque is applied to the rotor system. To minimize turning of the helicopter and to gain control as soon as possible, apply full left tail rotor pedal prior to releasing the rotor brake. Tail rotor control will start to become effective at approximately 20% Nr. A slight amount of right tail rotor pedal is necessary to keep the tail rotor blades from striking the flapping stops, which is indicated by a medium frequency vibration. Tail rotor control will be effective for slow turns while at FLIGHT IDLE (45% to 50% Nr/Nr). Slowly increase Nr/Nr to 103% and conduct BEFORE TAKEOFF CHECK to resume water operation.

HOIST PROCEDURES

Most SAR hoists will be made from a vessel. Although the procedures below cover vessel hoists, they are adaptable to land and water hoists. The pilot will brief the crew after evaluating the situation and prior to commencing the hoist. The briefing should include items that directly affect the safety of the operation, such as:

1. Point at which hoist will be made.
2. Ship's heading and speed.
3. Helicopter heading for hoist.
4. Type of rescue device to be used (Basket, Sling, Litter) including use or non-use of trail line.
5. Horizontal and/or vertical clearance to be used.
6. Altitude during the hoist.
7. Anticipated unusual circumstances.
8. Expected helo exit direction.

The quality of the crew briefing will determine how efficient and safe the hoist will be. After the crew briefing, the pilot will direct the flight mechanic to accomplish the Rescue Checklist.

RESCUE CHECKLIST

1. Flight mechanic's safety harness—ON AND ADJUSTED.
2. Visor—DOWN
3. Hoist glove—ON
4. Hot mike—CHECKED.
5. Request hoist power and permission to open up.
6. Rig rescue device.
7. Report—RESCUE CHECKLIST COMPLETE, READY AFT.

HOIST FROM A VESSEL

Communications should be established with the vessel as early as possible to expedite the rendezvous and hoist. The ship's personnel should be briefed as follows:

1. If possible, have the vessel assume a heading 35° to 45° right of the wind line, underway or maintain steerageway.
2. Have the vessel lower or stow all antennas, booms, rigging, flag staffs, from the hoist area.
3. The rescue device to be utilized will be provided by the helicopter.

WARNING

Do not use the vessel's equipment except as a last resort. Litters which are specially stressed and rigged for hoist operations must be used for maximum safety.

4. Discharge static electricity before handling the hoist rig.
5. Have the vessel's personnel disconnect the hoist cable if the rig is to be moved away from the hoist location. Emphasize that the hook is not to be attached to any part of the vessel.
6. Pass additional information as required.

The pilot must evaluate the characteristics and rigging of the vessel, select the safest hoisting location, and establish horizontal and/or vertical clearance criteria. Hoist preparations will be completed in flight or in a hover as appropriate. When hoist preparations are completed, move into position while climbing to the desired hoist altitude. The hoist rig should be dipped or grounded before delivering it directly to a survivor.

CAUTION

If any possibility exists of fuel spillage, caution must be used when discharging static electricity.

When ready to commence the hoist, the pilot directs the flight mechanic to "GO ON HOT MIKE." At this time the flight mechanic should go on hot mike, start the hoisting rig down, and commence giving ADVISORY REPORTS. When the pilot directs the flight mechanic to "CONN ME IN" the flight mechanic commences giving COMMANDS to position the helicopter over the hoisting area as previously briefed. The running flow of ADVISORY REPORTS keep the pilot informed as to the progress of the hoist.

WARNING

If at any time during the hoist the flight mechanic loses sight of the vessel, he will immediately inform the pilot. If possible, hoisting should be discontinued and the helicopter maneuvered for another approach.

CAUTION

Simultaneous operation of the hoist and main landing gear may overload the auxiliary hydraulic system.

CAUTION

If ICS communications are lost, hoisting should be discontinued if possible until conditions permit a safe continuation of the hoist operation.

CAUTION

If the hoist does not respond properly to the electrical controls, the flight mechanic shall immediately notify the pilot. Then, before using the manual hydraulic override, the flight mechanic should

attempt to determine the cause (bent cable, fouled cable, popped circuit breaker, etc.) by inspecting the hoist. Use of the override with a fouled reel or cable may cause further damage and possible parting of the cable. If resistance is encountered when using the override, the hoist should be stopped immediately to prevent further damage.

If the sea conditions are rough, it may be desirable to have the pilot lift the helicopter while the flight mechanic simultaneously raises the rig with the hoist. This expedites clearing the rig from the vessel's deck. Once the rig is clear of the deck and obstructions, the pilot must be advised so he can move the helicopter clear of the vessel. When clear of the vessel, the pilot may lower the helicopter to a safe hovering altitude as the hoisting rig is raised. The helicopter should not be transitioned to forward flight until the hoisting rig is inside the cabin, all personnel are seated and strapped in, and all equipment is properly secured.

TRAIL LINE HOIST

The safest hoist is one using a trail (heaving) line. This may be used on any hoist but is most advantageous when the pilot cannot obtain a visual reference or the deck cannot be "plumbed" with the cable. One end of the line should be attached to the hoist hook with a 300-pound weak link. By moving as close as practical to the vessel, the end of the trail line may be passed to personnel on deck so they may guide the rig to their position. The bitter end of the line should be weighted sufficiently and lowered hand-over-hand to the vessel. Additional weights should be used in high winds or where the trail line sails excessively. When on-scene conditions require, the trail line may be tossed to or across the vessel. If possible, the weighted trail line should be tossed across the vessel to avoid personnel injury or damage to the vessel.

WARNING

The flight mechanic must use extreme care when lowering or tossing the weighted trail line to prevent fouling of the helicopter rotor system.

The trail lines are bundled in 100 ± 5-foot links. The trail line will feed out smoothly when lowered and should not be uncoiled before use. Once the weighted end is on deck, the flight mechanic should continue to pay out line while the pilot moves laterally to obtain visual contact with the vessel.

WARNING

Do not attach the trail line to the hoist hook/rig until the rig is ready to go out the door. Attaching the trail line prior to this could allow the hoist rig to be jerked out of the cabin door from behind the flight mechanic if the line should foul in the vessel's standing rigging.

SALVAGE PUMP DELIVERY

Salvage pumps may also be delivered to a vessel by one of two trail line methods. The DIRECT METHOD for pump delivery is done exactly like the trail line hoist described above. The 300 pound weak link should be used. If environmental conditions or mast and rigging obstructions do not permit direct delivery of the salvage pump, the INDIRECT METHOD should be utilized. With this method of delivery the weighted end of the trail line is lowered to the vessel. The helicopter is moved left and a low hover is established clear of the vessel. After the end of the trail line (without a weak link) is attached to the salvage pump, the pump is pushed into the water. The vessel's crew must pull the pump alongside and lift it aboard.

NOTE

A salvage pump weighs approximately 110 pounds. The indirect method of delivery should only be used when sufficient personnel are available on the vessel to pull the pump alongside and lift it aboard.

HOIST PHRASEOLOGY

The pilot and flight mechanic must perform as a team to make a safe hoist recovery. To prevent confusion and misunderstanding, the flight mechanic will use two types of standardized voice reports: COMMANDS and ADVISORY REPORTS. A COMMAND is given to direct the pilot to position the helicopter. All COMMANDS are given in reference to the longitudinal axis of the helicopter. All distances given will be in feet. ADVISORY REPORTS keep the pilot informed of everything else that is occurring during the hoist. An ADVISORY REPORT is information, not a command. Some ADVISORY REPORTS are mandatory and must be reported.

The following is a list of COMMANDS and ADVISORY REPORTS that will be utilized during a rescue hoist:

<u>COMMAND</u>	<u>MEANING</u>
GO ON HOT MIKE (given by pilot)	FM begins ADVISORY REPORTS
CONN ME IN (given by pilot)	FM begins giving COMMANDS to position helo over the hoist site.
FORWARD _____	Move helo forward _____ feet.
BACK _____	Move helo back _____ feet.
LEFT _____	Move helo left _____ feet.
RIGHT _____	Move helo right _____ feet.
UP	Increase helo altitude.
DOWN	Decrease helo altitude.
HOLD	Hold the helo in a position relative to the target.
____ (LEFT, RIGHT, ETC.) EASY	Move helo very slowly in direction indicated.
FORWARD AND RIGHT _____	Combination COMMAND.
CEASE COMMANDS (given by pilot)	Cease giving COMMANDS but continue ADVISORY REPORTS.
SHEAR! SHEAR! SHEAR!	FM and CP (if aboard) activate their respective shear switch.
<u>ADVISORY REPORT</u> (Basket hoist example)	<u>MEANING</u>
ON HOT MIKE, HAVE TARGET IN SIGHT, BASKET GOING OUT THE DOOR	FM is beginning the hoist.
BASKET BELOW AIR-CRAFT	Basket is below the hull.

BASKET HALFWAY DOWN/UP	Self-explanatory.
BASKET HOLDING ___ FEET OFF THE WATER	Basket has been lowered to a safe distance from the water and will not be lowered any further until over the hoist area.
BASKET ON DECK	Self-explanatory.
MAN GETTING IN THE BASKET	Self-explanatory.
MAN IN THE BASKET	Man in the basket and ready to be hoisted.
PREPARE TO TAKE THE LOAD	FM is taking in slack and preparing to lift the basket clear of the deck.
TAKING THE LOAD	FM is lifting the basket off the-deck with the hoist.
BASKET CLEAR OF VESSEL, CLEAR TO MOVE LEFT	Basket is well clear of the deck and not in danger of fouling in the rigging. Move left so the pilot can regain visual contact (if lost) and clear the helo away from the vessel. Continue COMMANDS.
BASKET OUTSIDE DOOR	Self-explanatory.
BASKET IN CABIN, GOING OFF HOT MIKE	Basket is in the cabin and being disconnected from the hoist. FM is going off hot mike.
CABIN SECURED, READY FOR FORWARD FLIGHT	All rescue gear has been stowed; all passengers and crewmen are strapped in and ready for forward flight.
BASKET (CABLE) FOULED	Basket (cable) has become fouled on the vessel.
BASKET (CABLE) FREE	Basket (cable) no longer fouled on the vessel.
LOST TARGET (given by pilot)	Pilot has lost sight of the hoisting reference.

TARGET (given by pilot) Pilot has regained sight of the hoisting reference.

If a trail line hoist is performed, the following additional ADVISORY REPORTS shall be utilized:

<u>ADVISORY REPORT</u>	<u>MEANING</u>
TRAIL LINE GOING OUT THE DOOR	FM is beginning to deliver a trail line to the vessel.
TRAIL LINE HOLDING ___ FEET OFF THE WATER	Self-explanatory.
TRAIL LINE SAILING AFT	Trail line is sailing aft in the wind, and extra effort will be required to deliver it.
TRAIL LINE ON DECK	Self-explanatory.
TRAIL LINE TENDED	Trail line is being tended by vessel personnel.
PAYING OUT TRAIL LINE	FM is paying out extra trail line still in the cabin.
WEAK LINK CONNECTED TO HOIST HOOK	Basket is ready to go out, and FM is making last-minute connection of the weak link to hoist hook.
BASKET CLEAR OF VESSEL, TRAIL LINE STILL ON DECK, CLEAR TO MOVE LEFT	Self-explanatory.
BASKET IN CABIN, RETRIEVING TRAIL LINE	Self-explanatory.
TRAIL LINE IN CABIN, GOING OFF HOT MIKE	Basket and trail line are in the cabin. FM is going off hot mike to secure passenger and equipment.

RESCUE PLATFORM RECOVERY PROCEDURES

The Rescue Platform provides the pilot with a particularly effective device to recover personnel or objects from the water or small boats when a water landing can be made. The platform is designed to permit the flight mechanic to work at the outboard side of the right

sponson to assist mobile survivors or to rescue immobile survivors with a minimum of time and maneuvering of the helicopter. A platform recovery is usually a safer method of rescue than a hoist when conditions are favorable. Platform recoveries are divided into calm water and rough water recoveries depending upon the sea conditions. Each platform recovery is commenced by making a sea evaluation to determine the direction of the primary and secondary swell systems, the wind-driven sea, and the wind. With this information and thorough observation of the recovery target, the pilot briefs the crew for the recovery. An approach is made into the wind terminating in a hover with the recovery target in the approximate 1 to 2 o'clock position outside the rotor wash pattern. This position affords the pilot and flight mechanic the best view of the target. Once in a stable hover, the pilot will direct the flight mechanic to complete the Rescue Checklist.

CALM WATER RECOVERY

The rescue platform will normally be used to effect the rescue of survivors from sheltered water or smooth, calm, open sea conditions. The flight mechanic will lower the platform and go on HOT MIKE at the direction of the pilot. Immediately after touchdown, the flight mechanic should position himself on the platform with the safety harness adjusted to permit complete freedom of movement on the platform. Normally the flight mechanic will use the boat hook to help retrieve the survivors.

WARNING

To prevent rotor blade contact, the boat hook must not be raised above the shoulders.

Water touchdown should be accomplished with the survivor in the approximate 2 o'clock position just outboard of the rotor wash. When the pilot desires to receive COMMANDS from the flight mechanic, he will direct him to "CONN ME IN." The helicopter should be maneuvered to bring the survivor alongside the rescue platform. The closure rate should be slow enough to ensure that the survivor is not endangered. The helicopter should be brought to a stop in the water when the survivor is alongside the platform. Forward flight should not be commenced until the cabin is secured.

CAUTION

Extreme care must be used in approaching parachutes in the water. When recovering an immobile survivor attached to a parachute, land with the parachute well outside of the rotor wash and have the flight mechanic use a raft or swim to the survivor and free him of the parachute.

CAUTION

Do not air taxi close to a small raft as the downwash could cause the raft to become airborne and contact the rotor blades. Land with the raft well outside the rotor wash and use minimum collective during recovery.

CAUTION

When approaching a small boat, the pilot must be ready to take corrective action if persons in the boat stand up, raise oars, or in any way jeopardize themselves or the helicopter. A rotor shutdown may be warranted.

ROUGH WATER RECOVERY

If the sea conditions are such that it is inadvisable to land the helicopter into the wind due to possible tail rotor damage, or it is necessary to keep the time on the water to a minimum, a rough water recovery should be accomplished. The flight mechanic will lower the platform and go on HOT MIKE at the direction of the pilot. Turn the helicopter to place the major swell on the port bow to the port beam, holding the survivor in the approximate 1 o'clock position well outside the rotor wash. When the pilot desires to receive COMMANDS from the flight mechanic, he will direct him to "CONN ME IN." While maintaining the desired position, evaluate the sea and wind conditions, close on the survivor, and when sea conditions permit, land with the survivor just inside of the rotor disc. During this phase, the copilot must alertly scan the sea to port.

CAUTION

Do not allow the swells to break over the bow of the helicopter, as an engine flameout could occur.

NOTE

Certain wind/sea conditions may dictate that the major swell system be placed off the starboard bow to starboard beam in order to avoid hovering downwind. Example: A north wind combined with a major swell system from the east.

When the survivor is on the platform, establish a safe hover and, as the helicopter clears the water, turn into the wind. Forward flight should not be commenced until the cabin is secured.

RESCUE PLATFORM RECOVERY PHRASEOLOGY

The pilot and flight mechanic must perform as a team to make a safe platform recovery. To prevent confusion and misunderstanding, the flight mechanic will use two types of standardized voice reports: COMMANDS and ADVISORY REPORTS. A COMMAND is given to direct the pilot to position the helicopter. All COMMANDS are given in reference to the longitudinal axis of the helicopter. All distances given with COMMANDS are in feet. ADVISORY REPORTS keep the pilot informed of everything else that is occurring during the recovery. An ADVISORY REPORT is information, not a command.

The following is a list of COMMANDS and ADVISORY REPORTS that will be utilized during a rescue platform recovery:

<u>COMMAND</u>	<u>MEANING</u>
FORWARD ____	Move helo forward- ____feet.
BACK ____	Move helo back ____feet.
RIGHT ____	Move helo right ____feet.
LEFT ____	Move helo left ____feet.
____(RIGHT, LEFT) EASY	Move helo very slowly in direction indicated.
FORWARD and RIGHT	Combination command.

HOLD Hold the helo in this exact position.

UP Immediately establish a hover. Danger to the survivor or helo exists. May be given by the copilot.

CONN ME IN FM begins giving COMMANDS to position survivor alongside the platform.

ADVISORY REPORTS MEANING

RESCUE CHECKLIST COMPLETE, READY AFT. Self-explanatory.

MAN APPROACHING PLATFORM The survivor is close to the platform and closing.

MAN AT PLATFORM Self-explanatory.

MAN ON PLATFORM, CLEAR TO HOVER. Self-explanatory. (Rough water recovery advisory.)

MAN IN CABIN, GOING OFF HOT MIKE FM is going off hot mike to assist survivor and secure the cabin.

CABIN SECURED, READY FOR FORWARD FLIGHT All rescue gear has been stowed; all passengers and crewmen are strapped in and ready for forward flight.

PICK-UP INTO HOVER, MAN DRIFTING ____ This is very important. If the survivor drifts into an area that would endanger him, such as too far aft, immediately lift into a hover. This ADVISORY REPORT informs the pilot of a potentially serious situation. "UP" is a COMMAND and differs in that it represents an immediate emergency.

TOWING

Towing with the helicopter is prohibited except with a line held by the flight mechanic. Towing in this manner

should be undertaken with great caution. Under no circumstances shall the line be attached to any part of the aircraft or the flight mechanic. The pilot must ensure that the line is firmly secured to the vessel and that the bitter end is hand-held by the flight mechanic.

FORMATION FLIGHT

The Air Operations Manual (CG-333) outlines the circumstances under which formation flying may be conducted. When flying formation it is imperative that the flight leader fly as smoothly as possible with a minimum of attitude and power changes. The flight leader must allow his wingman a minimum of 10% torque for maneuvering. Communication between units of the formation is recommended. The normal distance between helicopters is one rotor disc diameter with a 10 foot step-up.

BASIC FORMATIONS

Column

The wingman flies directly astern of the flight leader.

Parade

The wingman flies on a bearing of 45° left or right of the astern position of the flight leader. This is a show or flyover formation. The flight leader will be advised when maneuvering from this position.

Tactical

The wingman flies on a bearing of 35° left or right of the astern position of the flight leader, and is free to maneuver from side to side as he desires.

Cross Country Cruise

The wingman flies on a bearing of 35° left or right of the astern position of the flight leader at a distance of three to four rotor disc diameters.

MANEUVERING

When the formation is maneuvering, the flight leader should advise the wingman of the expected evolution.

Break-Up

Formations may need to break up for landing separation or other purposes. When breaking left the formation should be formed in parade right or tactical right.

The flight leader will bank his helicopter smartly to commence the break-up, 3 seconds later the next helicopter will break, etc.

Join-Up

Join-up may be accomplished from any angle within 45° left or right of the astern position and terminates when the desired formation position is attained. As the helicopters close in range, the wingman must avoid a fast closure rate.

SHIPBOARD-HELICOPTER OPERATIONS

Shipboard-helicopter operations require a great deal of coordination between the crew of the helicopter and the ship's personnel. Pilot's contemplating ship-helicopter operations should refer to the Shipboard-Helicopter Operational Procedures Manual (CG-419). The paragraphs below cover flight procedures peculiar to the shipboard operations.

RECOVERY PROCEDURES

Prior to commencing recovery, the pilot should satisfy himself that flight deck motion is acceptable for landing.

TRAFFIC PATTERN

The normal traffic pattern will be flown at 500 feet. Prior to reaching the abeam position, complete the PRELANDING CHECK.

APPROACH

When landing clearance has been granted, a normal approach to a hover (approximately two rotor diameters and altitude of 50 feet astern of the vessel) may be commenced. The pilot will vary the approach to align the helicopter with the extended center line of the vessel, establish a closure rate and descent path that will allow positive control of the relative motion prior to reaching the Hover position. During the straight in portion of the approach, signals will be available from the LSO to assist the pilot in the approach. LSO signals are advisory except the WAVE OFF, which is mandatory. Maintain sight of the LSO at all times. If sight of the LSO is lost, a WAVE OFF IS MANDATORY. Arrive at or near the stern of the vessel with sufficient altitude to preclude unintentional deck contact. Continue the approach to a hover within the maneuvering zone. Make a final evaluation of deck motion and other existing conditions to determine if a landing should be attempted.

WAVEOFF

A waveoff should be executed at any time doubt exists as to the safe conclusion of an approach. It may be initiated by the pilot, HCO, or LSO. There is no set pattern for a waveoff; rather the pilot is expected to maneuver the aircraft to a safe flight condition and position to resolve the difficulty before commencing another approach.

HOVER

Position the helicopter over the optimum touchdown point with the assistance provided by signals from the LSO. The pilot and LSO must be aware of the importance of optimum deck placement on landing to permit a rapid, coordinated tiedown.

LANDING

From a hover over the touchdown point, the pilot should note the vessel's movement cycle and attempt to land at the most favorable moment. Lower the collective to establish a positive rate of descent. A positive touchdown should be made to prevent multiple contacts which can result in excessive stresses on the landing gear. As deck contact is made, continue lowering the collective to the full down position. After reaching minimum collective pitch, center the cyclic. No further control inputs should be made. Cyclic movement on deck has no effect on aircraft stability. In the event of a landing distant from the optimum touchdown point, a secure tiedown may not be possible. The helicopter should be moved to a more suitable position.

NOTE

On vessels with a grid installed, landing with one or more main wheels outside the grid will normally require repositioning the aircraft in order to effect a tiedown.

LANDING WITHOUT THE GRID INSTALLED

The procedures for approach and landing without the grid installed remain the same as for operations with the grid except that the landing will be accomplished with the parking brake SET.

NIGHT RECOVERY

Night pattern and approach procedures are the same as for daylight operations. Depth perception is seriously impaired and closure rate is more difficult to determine.

Due to the difficulty in discerning deck motion at night, the helicopter should cross the stern of the vessel at a slightly higher altitude than during daylight to insure adequate tail wheel clearance. Once over the deck, the pilot should closely monitor the signals of the LSO as these will usually be his only source of information on position, attitude, and altitude.

NOTE

The pilot should consciously avoid trying to fly formation on the superstructure.

PRIMARY TIEDOWNS

When the aircraft is firmly on deck, give the "attach tiedowns" signal, if they are to be used. After the pilot signals to accept primary tiedowns the aircraft is considered to be attached to the deck unless the LSO gives a waveoff or hover signal in reply. **FURTHER ATTEMPTS AT FLIGHT ARE PROHIBITED.** Subsequent to signaling for the tiedowns, should the helicopter become unstable to the point where a mishap is imminent, the appropriate action for the pilot is to stop-cock the engine, apply the rotor brake, and turn the battery switch off.

REMAINING ON DECK WITHOUT SHUTDOWN

Should the vessel change course while the helicopter is on deck, the pilot must disengage the ASE to avoid full throw rudder pedal deflection induced by the ASE heading retention feature.

WARNING

The use of secondary tiedowns with the rotor engaged is prohibited due to the danger of inducing ground resonance.

SHUTDOWN

The LSO will provide droop stop signals. Under conditions of extreme wind, excessive flight deck motion, or with faulty droop stops, the flight deck will be cleared of all personnel. Normal Rotor and Engine Shutdown procedures apply.

ENGINE START AND ROTOR ENGAGEMENT NORMAL PROCEDURES APPLY**SHIPBOARD TAKEOFF**

When ready for takeoff, signal the LSO to remove the primary tiedown straps. Observe all straps removed.

Execute a vertical takeoff, ensuring that the nose of the aircraft does not cross the forward peripheral line, and when sufficient altitude is attained, move laterally clear of the ship, left or right, into a position where a normal or instrument takeoff, as appropriate, can be made.

NIGHT TAKEOFF

The night takeoff will be the same as the day takeoff until the aircraft is laterally clear of the ship. From that point, an instrument takeoff is required.

EMERGENCY PROCEDURES TRAINING

The procedures set forth in Section III of the Flight Manual should be studied and used for all actual emergencies. The procedures described in this section are for training only. They ensure that correct, non-interfering habit patterns are learned by the pilot and eliminate confusion between pilots while simulating emergencies. Guidelines are established for each procedure specifying minimum pilot qualifications. A Pilot Under Instruction (PUI) in this section may be a Student Pilot, Copilot, First Pilot, or an Aircraft Commander. An Aircraft Commander acting as an instructor pilot on a syllabus training flight may perform all or part of the PUI procedures in order to demonstrate a maneuver.

In specified maneuvers the Safety Pilot (SP) induces the simulated emergency and restores aircraft systems to normal configuration. TRADIV ONLY evolutions are not contained in this manual. The following safety criteria apply when practicing simulated emergencies:

1. Do not practice dual emergencies. Do not practice ASE OFF with any simulated emergency.
2. Operating conditions should be ideal. Operations terminating in a landing or hover should be conducted on or to an area clear of obstacles with crash equipment available.
3. Simulated emergencies should be realistically accomplished.
4. The following voice report is required any time engine governing is changed from speed selector to emergency throttle or vice versa: "I have the aircraft on emergency throttle (or speed selector)." Also, when passing control of the aircraft during any operations involving the use of emergency throttle, the method of engine governing will be included in the required voice procedure.

SIMULATED COLD HANG-UP

Objectives

To develop proficiency in recognizing cold hang-up symptoms and in metering additional fuel with emergency throttle during a cold hang-up.

Discussion

Refer to Chapter VII, page 7-2, paragraph 5, entitled Cold Hang-up.

Guidelines

1. Simulated cold hang-ups may be practiced by a designated Aircraft Commander (AC) without another pilot in the cockpit. In that event he would perform both the duties of the pilot under instruction (PUI) and the Safety Pilot (SP) as listed in the procedures.
2. Simulated cold hang-ups may be induced by a Safety Pilot (SP) who is a designated Aircraft Commander. The PUI may be a Student Pilot, Copilot, First Pilot, or another Aircraft Commander.

Procedures

SP—Open P3 valve prior to engine start.

PUI—Start engine. Following the light-off, N_g acceleration will slow down between 30 and 50%, and T5 will remain low, indicating a cold hang-up.

Advance emergency throttle slowly to increase N_g to ground idle.

Release starter at 45% N_g .

SP—Close P3 valve.

PUI—Close emergency throttle. Observe ground idle N_g .

SP—Check emergency throttle closed.

Simulated emergency terminated.

SIMULATED ENGINE COMPARTMENT FIRE ON THE GROUND

Objectives

To develop rapid and correct responses towards accomplishing the engine compartment fire on the ground emergency procedures.

Discussion

To achieve maximum benefit an engine compartment fire must be simulated at a point where the PUI can actually move the speed selector and T-handle. This emergency is best simulated immediately before or after parking, but prior to engine shutdown.

Guidelines

The simulated engine compartment fire may be induced during ground operations by a Safety Pilot (SP) who is a designated Aircraft Commander. The PUI may be a Student Pilot, Copilot, First Pilot, or another Aircraft Commander.

Procedures

SP—Announce on ICS “Simulated fire warning light on.”

PUI—Stop Aircraft.

Speed selector—STOPCOCK.

Battery switch—CHECKED ON.

T-Handle—PULL TO FIRE EXTINGUISHER ARMED POSITION.

Announce—Words to the effect: “There is no indication of an engine compartment fire. If a fire was indicated I would discharge the fire extinguisher, turn the battery off, stop the rotor, set the parking brake, exit and fight the fire.”

NOTE

The engine cowling fire shutter doors must be reset prior to the next engine start.

Simulated emergency terminated.

EMERGENCY THROTTLE OPERATION

Objective

To develop proficiency in maintaining rotor RPM while governing the engine with emergency throttle.

Discussion

Flight utilizing emergency throttle requires the pilot to perform the governing function normally accomplished by the automatic fuel control. Coordination of the emergency throttle (power) and collective pitch (rotor loading) is necessary to maintain desired rotor RPM and torque. Both emergency throttle and collec-

tive pitch are variable factors: A change of one will require a corresponding change of the other with respect to both magnitude and rate of change. When changing power settings, the emergency throttle and the collective pitch must be changed simultaneously to maintain rotor RPM. When a power change is not required, rotor RPM can be maintained with small adjustments of the collective.

Guidelines

1. Practice emergency throttle operations may be conducted by a designated Aircraft Commander (AC) without another pilot in the cockpit.

2. Practice emergency throttle operation may be conducted by a Student Pilot, Copilot, or First Pilot (PUI) with a designated Aircraft Commander as the Safety Pilot (SP).

Procedures

AC or PUI—Assume control of aircraft.

Adjust speed selector to 96% Nr/Nr.

Adjust emergency throttle to 100% Nr/Nr.

Maintain 100% Nr/Nr during all maneuvers.

Close emergency throttle.

Adjust speed selector to desired Nr/Nr.

Simulated emergency terminated.

TAIL ROTOR CONTROL MALFUNCTION

Objective

To acquaint pilots with aircraft response experienced in tail rotor control malfunctions in which the tail rotor pitch becomes fixed at a constant anti-torque setting (tail rotor thrust); to develop skill in the analysis and evaluation of power, airspeed, and yaw relationships at altitude; and, to develop skill in successfully landing the aircraft regardless of the anti-torque setting available.

Discussion

Tail rotor control malfunctions are situations in which the tail rotor anti-torque thrust is fixed or limited to only minor change.

The tail rotor malfunction discussed in this procedure is one in which pilot control of the tail rotor is completely lost and the tail rotor pitch is controlled by the counterweights on the tail rotor hub assembly. This

will result in a pitch setting approximating that required for a normal hover, 70% to 80% torque. This anti-torque thrust setting will allow for an approximate normal approach to a running landing or a hover. The approach may be executed by reducing power to simultaneously descend and decelerate to the back side of the power curve. This method will result in a left yaw whenever torque is set below the fixed anti-torque. As airspeed is reduced on the backside of the power curve, an increase in torque will reduce the amount of left yaw. The rate of descent in this condition will be at a rate determined by the difference between power required and power applied. Minor heading changes prior to touchdown can be affected by minor changes in torque. Increases in power will cause right yaw while decreases in power will cause left yaw. The termination—running landing or hover—is dependent upon the tail rotor counterweight setting and the aircraft performance, which is a function of the ambient conditions and gross weight.

Guidelines

1. A simulated tail rotor control malfunction may be induced by a Safety Pilot (SP) who is a designated Aircraft Commander. The Pilot Under Instruction (PUI) may be a Student Pilot, Copilot, First Pilot, or another Aircraft Commander.
2. Entry into the simulated tail rotor control malfunction should be made from 1000 feet AGL.
3. This maneuver will be terminated at an altitude of not less than 10 feet AGL in a hover or air taxi.

Procedures

- SP—Assume control of aircraft.
 Establish level flight at 55 knots.
 Remove feet from contact with tail rotor pedals.

NOTE

Feet are off the pedals throughout the entire evolution. Positive control may be regained any time if necessary.

- PUI—Disengage yaw channel.
 Assume control of aircraft, with feet on deck.

- SP—Turn off AUX Servo. Aircraft will probably yaw left, but may remain steady or yaw slightly right, dependent upon power applied and tail rotor counterweight setting.

Keep feet off pedals unless required to restore a safe yaw angle.

Turn AUX Servo on.

- PUI—Conduct a flight check at altitude, observing effect of various power settings and airspeeds on yaw angle.

Attempt to determine most favorable combination for touchdown.

Establish a long straight in approach.

CAUTION

During this evaluation, the following yaw angle limitations should be observed to prevent structural damage.

15° at 85 knots

30° at 55 knots

90° at 25 knots

NOTE

On short final, as the aircraft decelerates, some unusual left yaw conditions may be encountered due to low power applied and loss of streamline effect. The amount of yaw is an indication of the power—airspeed combination for touchdown. The greater the yaw angle, the higher the power (lower the airspeed).

Approaching the touchdown point, apply only that power required to arrive at a zero yaw angle. Maintain a proper attitude for termination—running landing or hover. If the nose goes to a right yaw condition prior to termination, increase airspeed with cyclic to allow a reduction of power which will bring the nose back to the left. Readjust airspeed/power combination for zero yaw angle.

Plan for a running landing, but it is not uncommon for the aircraft to terminate in a hover.

- SP—Prior to simulated running landing, or after establishing a hover, take control of aircraft, feet on pedals.

- PUI—Re-engage yaw channel.

Simulated emergency terminated.

AUXILIARY SERVO OFF OPERATION

Objectives

To expose pilots to the aircraft responses experienced in auxiliary servo off operations. To demonstrate the interface between electrical/electronic ASE components and the auxiliary servo and to develop proficiency in aircraft control.

Discussion

While flying with the auxiliary servo system secured, increased friction will be felt in the cyclic and the collective. Pedal forces are less than normal due to the pedal damper being off. Airspeed must be limited to a maximum of 60 knots in order to ensure adequate control response. The pilot should observe that the ASE continues to operate normally electrically but is ineffective because it cannot make the required mechanical inputs at the auxiliary servo.

Guidelines

1. Practice auxiliary servo off operations may be conducted by a Student Pilot, Copilot, or First Pilot (PUI) with a designated Aircraft Commander acting as a Safety Pilot (SP).

2. Practice auxiliary servo off operations may be conducted by a designated Aircraft Commander without another pilot in the cockpit.

Procedure

PUI—Take control of aircraft.

SP—Turn auxiliary servo off.

PUI—Perform normal maneuvers auxiliary off.

SP—Turn auxiliary servo on.

Simulated emergency terminated.

AUTOROTATIONS, POWER RECOVERY, VISUAL

Objectives

To develop the correct habit patterns for dealing with an engine failure during flight or an engine power decrease condition.

To develop proficiency in recognizing and applying the proper aircraft maneuvering required to successfully execute precision autorotations.

Discussion

The autorotation is an emergency procedure rather than a normal flight maneuver. The practice of power recovery visual autorotations should be conducted in such a manner as to reinforce the emergency procedures for an engine failure during flight or an engine power decrease condition. Entry into the autorotation should be followed by a rapid analysis of the engine instruments so that maximum time would be available to recover with emergency throttle if the engine is capable of producing power. During the analysis of engine instruments, decide and announce if emergency throttle can be used.

A further objective of practice power recovery autorotations is recognizing what is required, and applying the proper techniques, to terminate in some preselected landing area. To meet this objective, power recovery visual autorotations should be practiced where it is necessary to use the variables of airspeed, sideslip angle, and ground track to terminate at the preselected landing area. Continuous practice of power recovery autorotations to a spot will result in a working knowledge of how to apply these variables, and will assure that an engine failure during flight will be followed by a successful autorotation.

For discussion and practical application purposes, visual autorotations have been grouped into three speed ranges: 25 to 45 knots or steep angle autorotations, 45 to 65 knots or minimum rate of descent autorotations, and 65 to 82 knots or maximum glide autorotations. Throughout the procedural discussion of these autorotations, notes and cautions have been provided which warrant particular attention, as they refer to hazards and flight regimes to be avoided.

Guidelines

1. Power recovery visual autorotations may be practiced by a designated Aircraft Commander without another pilot in the cockpit, or by a Student Pilot, Copilot, or First Pilot with a Safety Pilot who is a designated Aircraft Commander.

2. Unannounced entries may be induced by a Safety Pilot at any altitude above 1000 feet AGL within range of a recovery area.

3. Preplanned entries may be made at any altitude above 500 feet AGL within range of a recovery area.

4. Night practice power recovery visual autorotations may be conducted only to a lighted airport with crash equipment immediately available.

5. Day practice power recovery visual autorotations shall be terminated at 1000 feet AGL with a no-flare recovery, if crash equipment is not immediately available.

6. Practice power recovery visual autorotations will not be conducted at gross weights above 7600 pounds.

7. Power off autorotations will be practiced only under the direct supervision of TRADIV Instructor Pilots.

Procedure

AC or PUI—Preplanned autorotations may be entered from any position in accordance with the guidelines listed above. The normal method of entry is to lower the collective with a positive steady movement to minimum and then split the needles (N_r/N_r) by decreasing the speed selector to the AUTO DETENT. After establishing the autorotative descent toward the intended landing area, scan the dual tachometer to verify a needle split, and N_g/T_5 to determine if the engine is still running. Make a voice report of the engine status to the safety pilot.

SP—Unannounced entries may be made in accordance with the above guidelines. The method will be to retard the speed selector to the AUTO DETENT.

AC or PUI—Fly aircraft to the selected landing area using variables of airspeed, ground track, and side slip angle.

NOTE

During any practice autorotation, if not satisfied with the progress of the maneuver, the surface conditions, or any adverse conditions, execute a WAVE off.

Steep Angle Autorotation (25 to 45 knots)

Use the slow airspeed range, side slip, and "S" turns

whenever the glide must be shortened to reach an area that would be overshoot using higher airspeeds.

1. Enter the autorotation and evaluate the requirements for terminating in a selected area.

2. Adjust pitch attitude for an airspeed that results in the required glide angle. S-turns and side slips may also be used to lose altitude to avoid very low airspeeds where a steeper descent angle is required.

CAUTION

Airspeeds in the lower end of this range will be accompanied by increasing rates of descent and should be avoided. The low airspeed will not require much flare to establish a suitable ground speed for termination, and the rate of descent will not be significantly reduced by this mild flare. Airspeeds below 25 knots, or below translational lift, will cause excessive rates of descent, which may be beyond the capability of the rotor system to adequately cushion the landing with collective application.

3. Between 200 feet and 70 feet, flare as required to slow the aircraft to the desired ground speed for terminating the autorotation.

4. Start advancing the speed selector at 200 feet AGL, to be at full increase not later than 150 feet AGL.

WARNING

Late application of the speed selector to full increase may not allow sufficient time for the engine to spool up. If the collective is being raised during the spool up of the engine, N_r/N_r will decay under the increasing rotor blade pitch, making power recovery in a hover unlikely. The inadvertent ground contact and subsequent unloading of the rotor blades will be followed by a strong yaw right as the engine drives N_r from its low point to the setting called for by the speed selector.

5. Lower the nose to the proper attitude for the actual or simulated terrain (0° - 3° nose up for prepared surfaces, 5° nose up for unprepared surfaces and water).

6. Apply collective to stop the descent no lower than 10 feet AGL, at a ground speed suitable for the actual or simulated terrain.

7. Readjust speed selector to 100% N_f/N_r .

Simulated emergency terminated.

Minimum Rate of Descent Autorotation (45 to 65 knots)

The minimum rate of descent autorotation should be used whenever arriving at a particular area is not of prime importance, as when over large bodies of water.

1. Enter the autorotation and evaluate the requirements for terminating in a selected area.

2. Adjust the pitch attitude for an airspeed that results in the required glide angle.

3. At approximately 150 to 100 feet AGL, initiate a flare to slow to the desired ground speed.

NOTE

The altitude for beginning the flare, the amount and rate of flare, vary with airspeed, weight, and density altitude. The effect of the flare is determined visually and the rate and amount of flare may be adjusted so that ground speed, attitude, and rate of sink are all under control when descending through approximately 50 feet.

4. Advance the speed selector to full increase not later than reaching the top of the flare, regardless of the amount of flare used and the altitude at which the flare was commenced.

5. Lower the nose to the proper attitude for the actual or simulated terrain (0° - 3° nose up for prepared surfaces, 5° nose up for unprepared surfaces or water).

6. Apply collective to stop the descent no lower than 10 feet AGL at a ground speed suitable for the actual or simulated terrain.

7. Readjust the speed selector to 100% N_f/N_r .

Simulated emergency terminated.

Maximum Glide Autorotation (65 to 82 knots)

The maximum glide autorotation should be used

whenever the glide must be extended to reach a selected area.

1. Enter the autorotation and evaluate the requirements for terminating in the selected area.

2. Adjust the pitch attitude for an airspeed that results in the required glide angle.

NOTE

If airspeed was low when entering the autorotation, pushing the nose over to gain airspeed will give the appearance initially of steepening rather than extending it. Not until airspeed is stabilized will the result of the increased airspeed and the need for any further adjustments be apparent.

NOTE

Increasing airspeed above 82 knots will begin to diminish the distance covered over the ground. If additional glide extension is necessary, the only remaining variable is rotor RPM. Reducing rotor RPM will be effective in extending the glide only down to approximately 95% N_r .

3. At approximately 120 to 90 feet AGL, flare as required to reduce ground speed to a rate acceptable for touchdown.

CAUTION

Rotor RPM will build in the flare and collective loading will be necessary to prevent overspeeding of the rotor system.

NOTE

Flaring too rapidly may cause a climb in the flare which could result in a higher than desirable exit altitude.

4. Advance the speed selector to full increase not later than reaching the top of the flare regardless of the amount of flare and the altitude at which the flare was commenced.

5. Lower the nose to the proper attitude for the actual or simulated terrain (0° - 3° nose up for prepared

surfaces, 5° nose up for unprepared surfaces or water).

6. Apply collective to stop the descent no lower than 10 feet AGL at a ground speed suitable for the actual or simulated terrain.

7. Readjust the speed selector to 100% Nr/Nr.

Simulated emergency terminated.

AUTOROTATIONS, POWER-RECOVERY, HOODED

Objectives

To develop the correct habit patterns for dealing with an engine failure during flight in instrument conditions.

Discussion

The autorotation is an emergency procedure rather than a normal flight maneuver. The practice of power-recovery hooded autorotations should be conducted in such a manner as to reinforce the emergency procedures for an engine failure in flight in instrument conditions. Entry into the autorotation should be followed by a rapid analysis of the engine instruments so that maximum time will be available to recover with emergency throttle if the engine is capable of producing power. During the analysis of engine instruments, decide and announce if emergency throttle can be used.

Guidelines

1. Power-recovery hooded autorotations may be practiced by a PUI who is a Student Pilot, Copilot, First Pilot, or an Aircraft Commander, under the supervision of a Safety Pilot (SP) who is a designated Aircraft Commander.

2. Unannounced entries to power-recovery hooded autorotations may be induced by the SP at any altitude above 1000 feet AGL within the range of a recovery area.

3. Preplanned power-recovery hooded autorotations may be entered at any altitude above 500 feet AGL within range of the planned recovery area.

4. Day practice power-recovery hooded autorotations shall be terminated at 1000 feet with a no-flare recovery if crash equipment is not immediately available.

5. Night practice power-recovery hooded autorotations are prohibited.

6. Practice power-recovery hooded autorotations will not be conducted at gross weights above 7600 pounds.

7. Power-off hooded autorotations will be practiced only under the direct supervision of TRADIV Instructor Pilots.

Procedure

SP—Fly aircraft to vicinity of recovery area.

PUI—Assume control of the aircraft.

Preplanned autorotations may be entered from any position in accordance with the guidelines. The normal method of entry is to lower the collective with a positive steady movement to minimum and then split the needles (Nr/Nr) by decreasing the speed selector to the AUTO DETENT. After establishing an autorotative descent at 55 knots and a turn toward the wind line, scan the dual tachometer to verify the needle split, and Ng/Ts to determine if the engine is still running. Make a voice report of the engine status to the Safety Pilot.

Place feet on the deck.

SP—Unannounced entries may be made in accordance with the guidelines. The method will be to retard the speed selector to the AUTO DETENT.

Ensure that the autorotation will terminate in the recovery area. Adjust the heading if necessary.

PUI—At 140 feet on the RADALT, flare the nose at a rate so as to arrive at 20° nose up at 70 to 90 feet.

Advance the speed selector to full increase not later than reaching the top of the flare.

Maintain 20° nose up until the airspeed has decreased to the desired exit speed (20 knots for calm winds, add one knot for each two knots of surface winds).

Once the desired exit speed is reached, exit the flare to a 5° nose up touchdown attitude.

SP—Take control of the helicopter with sufficient altitude to stop the descent no lower than 10 feet AGL.

Readjust the speed selector to 100% N_r/N_r.

Simulated emergency terminated.

SHIFT TO EMERGENCY THROTTLE IN AN AUTOROTATION

Objectives

To develop proficiency in maintaining rotor RPM while shifting engine governing to emergency throttle in an autorotation.

Discussion

This evolution is not intended to teach a complete emergency procedure. Rather, it focuses on a small, but vital segment of the engine power decrease emergency procedure. Applying emergency throttle when the rotor is unloaded can easily result in rotor overspeeds if collective is not used promptly to contain RPM. When marrying the needles at 100% N_r/N_r, be especially alert to maintain RPM with collective as emergency throttle is applied. Proficiency in establishing a climb from an autorotative descent is essential to cope with an actual power decrease condition.

Guidelines

1. Shifting to emergency throttle in an autorotation may be conducted by a designated Aircraft Commander without another pilot in the cockpit.
2. Shifting to emergency throttle in an autorotation may be conducted by a Student Pilot, Copilot, or First Pilot (PUI) with a designated Aircraft Commander as the Safety Pilot (SP).

Procedure

SP— Monitor pilot procedures.

PUI— Take control of aircraft at 55 knots in level flight at 1500 feet AGL, within autorotative distance of a runway.

Lower collective to enter autorotation.

SP— Retard speed selector to 96% N_r.

PUI— Observe needle split.

Advance emergency throttle to marry needles and apply sufficient power to establish a climb.

CAUTION

Be alert to apply collective any time N_r/N_r exceeds 100%.

PUI— Maintain 100% N_r/N_r using emergency throttle.

Execute a landing, or wave off.

CAUTION

There is no 110% overspeed protection against pilot induced overspeed when governing with emergency throttle. However, the 122% N_r automatic fuel shutoff will still function if the N_r flex shaft is intact.

SP— Close emergency throttle.

Adjust speed selector to desired N_r/N_r.

Simulated emergency terminated.