SECTION II

NORMAL PROCEDURES

TABLE OF CONTENTS

PREPARATION FOR FLIGHT

Power and fuel requirements and weight and balance will be determined for each flight. Standard weight and balance computations are acceptable when filed and representative of the loading. It is recommended that a takeoff and landing data card (TOLD) shown in figure A-40, Appendix I be filled out for each flight.

CHECKLISTS

If the pilot determines that an AS REQUIRED check, i.e., Stick Trim check is necessary, the check will be done in its entirety. An abbreviated checklist may be used when the full checklist has been initially completed.

Instructions in this section are mandatory.

BRIEFINGS

Refer to section VIII for passenger and crew briefings.

PREFLIGHT CHECK

The pilot preflight inspection outlined in this section is predicated on maintenance personnel completing the appropriate Computerized Aircraft Maintenance Program (CAMP) requirements. When operating from areas where maintenance personnel are not able to perform these requirements, the pilot will ensure the accomplishment of the preflight inspection in accordance with CAMP requirements.

EXTERIOR INSPECTION

1. Aircraft General - CHECKED.

A qualified pilot will make a walkaround inspection, checking for visible fuel and oil leaks, security of inspection panels and doors, and presence of foreign matter such as ice, snow and frost. See figure 2-1 for a typical walkaround pattern.

2. Main and Tail Rotor Blades - CHECKED.

3. Main Landing Gear Pins - REMOVED (by flight mechanic), and Chocks - IN PLACE.

4. Protective Covers and Tiedown Equipment - REMOVED.

WARNING

The transmission work platform and latch handle can be placed in the stowed position without positive locking action, allowing the transmission platform to open in flight. A visual inspection should be made to ensure the work platform is completely closed.

INTERIOR INSPECTION

1. Cargo, Seats, Miscellaneous Equipment - SECURED.

2. Ramp Cables - ATTACHED PRIOR TO TAKEOFF.

3. All Visible Control Cables - CHECK

CHECKLIST RESPONSES

When a checklist item is followed by a crew position designation, i.e., (P), (CP), (FM), etc., that crewmember takes the action, and if the action is in quotes, he reports that action to the person reading the checklist. When a checklist item requires a response by more than one crewmember, the crewmember will state the response and his crew position. With the exception of, AS REQUIRED, if the action is not in quotes, he completes the action and remains silent. AS REQUIRED will not be used as a response; instead, the actual position or setting of the unit and/or item will be stated.

BEFORE STARTING ENGINES

The following before starting engines procedure is the normal procedure. The APU is started using battery power and the engines are started using the aircraft electrical system. If desired, the APU and/or engines can be started using ac or dc external power. For engine starting and rotor engagement procedures with APU inoperative, refer to **ENGINE START WITH APU INOPERATIVE** and **ROTOR ENGAGEMENT WITH APU INOPERATIVE** in this section.

1. Passenger and Crew Briefing - "COMPLETED."(P)

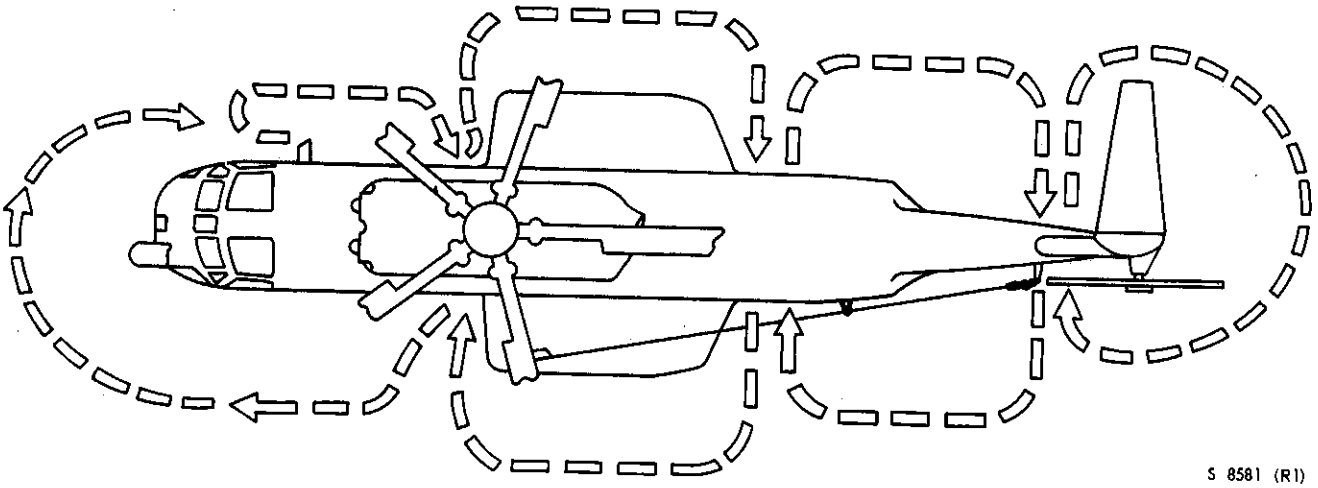
Refer to Section VIII for format of briefings.

2. Seats, Harness, and Pedals - "ADJUSTED." (P, CP)

NOTE

Adjust tail rotor pedals with feet off. With feet on or hooked behind the pedals, damage can be caused to the adjustment cables or microswitches.

3. Cockpit and Cabin Dome Lights - AS REQUIRED. (P)



S 8581 (R1)

Figure 2-1. Exterior Inspection

4. Overhead Circuit Breakers - "CHECKED." (P, CP)

a. Pilot checks center and copilot's panels.

b. Copilot checks pilot's panel.

5. Overhead Switch Panel - "CHECKED." (P)

a. Position Light Dim Switch - AS REQUIRED.

b. Position Light Switch - AS REQUIRED.

c. Aft Rotating Beacon (Anti-collision) - ON.

d. Fwd Rotating Beacon (Anti-collision) - ON.

e. Fuselage Lights - AS REQUIRED.

f. Anchor Lights - AS REQUIRED.

g. Flood Hover Lights - AS REQUIRED.

h. Searchlight - AS REQUIRED.

i. Windshield Anti-ice - AS REQUIRED.

j. Engine Anti-ice Switches - OFF.

k. Cabin Heater Vent Switch - AS REQUIRED.

l. Cab Heater Switch - OFF.

m. Pitot Heat Switch - OFF.

n. Windshield Wiper Switch - OFF.

o. Windshield Washer Switch - OFF.

p. Lower Console Red Lights Rheostat - AS REQUIRED.

q. Loading Light Switch - AS REQUIRED.

r. Emergency Exit Lights Switch - ~~ARM~~. Disarm
SEE DS-28

s. Console Light Rheostats - AS REQUIRED.

t. Nose Gear Switch - NORMAL.
KNEEL if kneeled.

u. Hoist Master Switch - AS REQUIRED.

v. Cargo Hook Switch - SAFE.

w. Stick Trim Master Switch - ON.

x. Channel Monitor Switch - OFF.

y. Converter Switches - ON.

z. External Power Switch - OFF.
ON if external power is being used.

(1) With dc external power plugged in and energized, the EXT POWER advisory light will illuminate and all dc buses will be energized.

(2) With ac external power plugged in and energized, the EXT POWER advisory light will illuminate when the battery switch is turned on. At this time all ac and dc buses will be energized.

aa. Battery Switch - ON.

ab. Generator Switches - ON.

ac. Radio Transformer Switch - 2.

ad. Start Mode Switch - NORMAL.

ae. Fire Emergency Shutoff Selector Handles - IN.

af. Engine Fire Extinguisher Switch - OFF.

ag. Hoist Cable Shear Switch - OFF AND SECURED BY BREAKAWAY WIRE.

ah. Ignition Switches - NORM.

6. Engine Controls - "CHECKED." (P)

a. Speed Selectors - Check freedom of movement, ground idle detent, full range and closed.

b. Emergency Fuel Control Levers - Check for freedom of movement, full range, and closed (behind stops).

CAUTION

Failure to have the emergency fuel control levers closed prior to start may result in a hot start.

7. Rotor Brake - "CHECKED."(P).

Check for a minimum of 320 psi on pressure gage. Ensure rotor brake locking pin in the unlocked position.

7A. See 05-21 VERT GYRO - "ON" (CP)

8. APU Fire Detection - "CHECKED." (P)

a. Hold the fire warning test switch in the No. 2 ENG and APU position. The fire warning light on the APU control panel should illuminate. On helicopters modified by TCTO lH-3(H)F-563 an APU FIRE caution light will also illuminate on the Caution-Advisory Panel along with the master caution lights.

9. Radar Mode Switch - "STANDBY." (P)

WARNING

When operating radar on the ground, ensure that area in front of antenna (within 60° of nose of helicopter), to a minimum distance of 25 feet is clear of reflecting surfaces, personnel, and inflammable materials, as injury to personnel and/or damage to equipment can result.

10. Ramp Master Switch - "OFF"(P)

11. BLADE PRESS Caution Light - "CHECKED."(P)

NOTE

If the BLADE PRESS caution light does not illuminate when the battery switch is on, the IBIS circuit electrical continuity is defective. The helicopter may be cleared for flight when the IBIS circuit is defective if the IBIS indicators are checked and indicate normal. Helicopter speed and flight duration limited to 110 knots IAS and 6 hours. Refer to AIRSPEED LIMITATIONS, Section V.

12. APU Fireguard - "POSTED." (FM), "STARTING." (P)

a. Forward EXTERNAL ICS station manned and communications established.

b. APU Fire Extinguisher Switch - OFF.

c. APU Fuel Shutoff Switch - NORM.

d. APU Function Switch - RUN AND LIGHTS CHECKED.

(1) High Exhaust Temperature Caution Light - ON.

(2) Overspeed Caution Light - ON.

(3) Low Oil pressure and Prime Pump Pressure Caution Lights - PRESS TO TEST.

e. Hold the function switch in the START position. As the APU start switch is moved to the START position, all caution lights should extinguish. At approximately 30% speed the APU advisory light should illuminate. At 45% speed, release the function switch. Clutch engagement should occur at 76% to 85% speed. (If engagement occurs above 85%, note on CG-4377 at completion of flight.) At this time, the acceleration will slow down for about 3 seconds, then rapidly increase to 98% to 100% with a maximum momentary overshoot to 110% allowed. Total time for starts should be 5 to 15 seconds. Start time will increase with colder temperatures but should never exceed 18 seconds.

CAUTION

APU start should be aborted by moving the function switch to OFF if any of the following occur: (1) No tachometer indication. This may signify a lack of overspeed protection or 90% speed sensing which could result in ignition remaining energized and burning out. (2) APU tachometer hangs up during clutch engagement for more than 4 seconds (6 seconds when below -29°C (-21°F)). This condition may result in overheating of clutch, or (3) Low oil pressure caution light ON, high exhaust temperature caution light ON or overspeed caution light ON. These indications should be accompanied by automatic shutdown.

NOTE

For APU emergency shutdown procedures, refer to **APU COMPARTMENT FIRE** in Section III.

13. Caution-advisory Panel - " CHECKED." (P)

a. Check that the caution lights listed below are out. If any of these lights are illuminated determine the cause and, if necessary, shut down the APU.

(1) 1 GEN and 2 GEN.

(2) 1 CONV and 2 CONV.

(3) PRI and AUX HYD PRESS.

(4) XMSN CHIP MAIN, XMSN CHIP INTMED, XMSN CHIP TAIL and XMSN OIL PRESS.

(5) BLADE PRESS

NOTE

If external power was used for APU start, the EXT POWER light will be illuminated on the advisory panel. Place the external power switch OFF and the EXT POWER advisory light will then go out. Direct that the external power cart be shut down, disconnected, and removed from the immediate vicinity of the aircraft.

b. Press the caution-advisory panel test button. Check that all lights and the master caution lights have illuminated. Upon release of the button, lights which were illuminated before this test will remain illuminated. If the master caution lights are still illuminated, press either to turn both off.

c. Adjust brightness of lights as desired.

14. Hydraulic and Transmission Instruments - "CHECKED." (P)

15. Hoist - "CHECKED, SECURE HOIST POWER." (FM)

a. Check operation of hoist. Check pilot's switch as desired.

16. Radio transformer switch - "CHECKED." (P) Move the switch to number 1 position and ensure that the RADIO XFMR caution light does not go on. Reposition the switch to the number 2 position.

16a. SEE 05-28 Emerg Exit Lite Swtch-Armed

17. Side Consoles - "CHECKED." (P, CP)

a. AFCS channel monitor panel.

(1) METER Selector - ASE.

(2) Vertical Gyro Switch - PORT.

(3) Hardover Switches - CENTERED. COVERS DOWN.

(4) Channel Disengage Switches - FORWARD AND ON.

b. HF Radio Control Panel - AS DESIRED.

c. Interphone and Radio Control Panels (INTER) - AS DESIRED.

d. Navigation Radio Control Panels (RAD) - AS DESIRED.

e. Compass Control Panel - AS REQUIRED.

SEE 05-21

18. Windows, Emergency Release Levers - "CHECKED." (P, CP)

a. Check cockpit windows for proper installation and operation. Check for locking in some open position and the closed position.

b. Check cockpit window emergency release levers for proper position in the detents and secured by break-away wire.

19. Parking Brake - "RESET." (P)

20. Landing Gear Pins - "REMOVED." (FM)

21. Nosewheel Lock - AS REQUIRED. (P)

22. Alternate Gear Handle - "CHECKED." (P)

a. Handle should be down and secured by breakaway wire.

23. Center Console - "CHECKED." (P)

a. Anchor Light Circuit Breaker - SET.

b. TACAN, VHF NAV, UHF, ADF RCVR - AS DESIRED.

c. Doppler - STANDBY.

While in flight, the doppler should be in either STANDBY or ON, thereby keeping the antenna erect and preventing damage.

d. Computer - AS DESIRED.

e. Map Display - AS DESIRED.

f. VHF Transceiver - AS DESIRED.

g. AFCS Panel - POTS AS DESIRED, TOGGLE SWITCHES OFF.

h. VHF-FM - AS DESIRED.

i. IFF - STANDBY.

j. UHF DF RANGE Control Panel - AS DESIRED.

k. Ramp - AS DESIRED, CAUTION LIGHTS CHECKED.

24. Landing Gear Panel - "CHECKED." (CP)

May be performed while pilot is checking center console.

a. Landing Gear Control Handle - DOWN.

b. Landing Gear Warning Light - TEST.

c. Landing Gear Position Lights - CHECKED.

~~25. VERT GYRO Switch - "ON." (CP)~~

~~May be performed while pilot is checking center console.~~ SAC-06-21

26. Fuel Management Panel - "CHECKED." (CP)

May be performed while pilot is checking center console.

a. Fuel Quantity Gages - CHECK QUANTITY AND TEST.

Depress test switch and hold until pointers drop to below zero, then release and note that pointers return to their original readings.

WARNING

When the test switch is depressed and held, and a pointer does not drop below zero but stops at a higher fuel indication, or the movement of a pointer is not smooth, a malfunction is indicated.

b. Place the forward tank No. 1 boost pump switch in the ON position. The No. 1 boost pump FAIL caution light should flicker and then go out. Turn off the pump and repeat the procedure for the remaining pumps, leaving No. 2 boost pump switch aft tank ON.

c. Low Pressure Caution Lights - PRESS TO TEST.

d. Place No. 1 engine fuel shutoff valve switch open and open crossfeed valve. No. 1 engine fuel flow indicator should fluctuate. Close the crossfeed valve. Open No. 2 engine fuel shutoff valve.

e. No. 2 Boost Pump Switch Aft Tank - OFF.

f. Transfer Switches - AS DESIRED.

27. Engine Fire Detection - "CHECKED." (P)

a. Hold the fire warning test switch in the No. 1 ENG position. The two master fire warning lights and the No. 1 engine T-handle lights should illuminate.

b. Hold the fire warning test switch in the No. 2 ENG & APU position. The two master fire warning lights, the No. 2 engine T-handle lights, and the APU fire warning light should illuminate. Ensure APU warning light goes out when switch is released. On helicopters modified by TCTO 1H-3(H)F-563 an APU FIRE caution light will also illuminate on the Caution-Advisory Panel along with the master caution lights.

28. Flight Controls - "CHECKED." (P)

a. Check for proper rotor blade response and freedom of motion by placing the collective full down and moving the cyclic in a circular motion, both clockwise and counterclockwise, through the full limit of the controls. Collective friction should be completely off and the stick trim release button depressed and no stick trim pressure should be felt.

b. Repeat step a. with collective full up.

c. With collective full down, fully displace tail rotor pedals in both directions to check for proper pedal damper response and freedom of movement.

29. Primary Servo - "CHECKED." (P)

a. Servo Switch - PRI OFF. Primary servo hydraulic pressure should indicate zero and PRI HYD PRESS and MASTER caution lights should illuminate. There should be no jump in controls when servo is turned off or on.

b. Servo Interlock - CHECKED.

Check that with one servo switch in the PRI OFF position, the other switch cannot turn off the auxiliary servo system.

c. Servo Switch - CENTERED (BOTH ON).

Primary servo hydraulic pressure gage should indicate normal pressure and the caution light should go out.

30. Auxiliary Servo - "CHECKED." (P)

a. Raise collective to mid-range and position the right tail rotor pedal slightly forward of the left pedal.

b. Servo-Switch - AUX OFF.

Auxiliary servo hydraulic pressure should indicate zero and AUX HYD PRESS and MASTER caution lights should illuminate.

c. Servo Interlock - CHECKED. Check that with one servo switch in the AUX OFF position, the other switch cannot turn off the primary servo system.

d. Check all flight controls for proper operation on Primary Servo by placing the collective full down and moving the cyclic in a circular motion, both clockwise and counterclockwise, through the full limit of the controls. The stick trim release button should be depressed and no stick trim pressure should be felt.

e. Repeat step d. with collective full up.

WARNING

If the following control movement (jump) limits are exceeded when auxiliary servo is turned OFF or ON, the aircraft shall not be accepted for flight. (1) Collective and tail rotor pedals 1/16 inch (2) Cyclic 1/8 inch. Tail rotor pedal movement caused by the NFG spring may mask rudder jump. If this is suspected, recycle servo switch without moving controls.

NOTE

Due to the yaw to collective coupling, the following may be noted: With full left pedal, as collective nears full up position the left pedal will move aft approximately 2 inches; beginning with full right pedal and lowering collective to full down position, the right pedal will move aft approximately 2 inches. During this check, a banging sound may be heard behind the pilot's seat. This sound is created by the tail rotor control system hitting mechanical stops.

f. With collective full down, fully displace tail rotor pedals in both directions to check for the same amount of displacement as noted in step 28.c.

g. Servo Switches - CENTERED (BOTH ON). Auxiliary hydraulic pressure gage should indicate normal pressure and the caution lights should go out.

31. Collective Friction - AS REQUIRED. (P)

a. Friction shall be checked after maintenance has been performed or at the pilot's discretion. Check that with full increase friction it is still possible to move the collective with normal arm force. Readjust collective friction to preclude collective bounce.

32. Stick Trim Check - AS REQUIRED. (P)

NOTE

This check shall be accomplished after maintenance has been performed or as desired.

a. Beeper Trim Switch - CHECKED.

Cyclic stick should follow movement of switch in each direction.

b. Cyclic Stick Trim Master Switch - CHECKED.

Copilot place master switch off. Stick trim should be free. Copilot place switch ON.

33. AFCS Check - "CHECKED." (P)

WARNING

Flight at night or in an instrument environment without an operable AFCS shall not be attempted.

a. Warmup Time With Cold Equipment - APPROXIMATELY 120 SECONDS.

b. AFCS Indicators - A MODE.

c. AFCS ENG and BAR ALT ENG buttons - DEPRESS.

Both button lights should illuminate.

d. Pitch and Roll Channels - CHECKED.

Move the cyclic forward, aft, left and right. Note that the pitch and roll bars on both AFCS indicators follow the motion of the cyclic. The roll bar displacement will lag the lateral cyclic movement.

e. CG Trim - CHECKED.

Rotate the CG trim knob in both directions. Note that the pitch bars move full travel in each direction and follow the motion of the knob. Reposition the pitch bar to center.

f. Pedal switches - CHECKED.

Rotate the yaw trim knob in either direction. When the pedals start to move, press one pedal and observe that the yaw pointer on the AFCS indicators returns to center. Repeat for remaining pedal.

g. Collective Channel - CHECKED.

(1) Collective - MAXIMUM.

The vertical arrow (collective indicator) on AFCS indicator should move to full down position.

(2) Pilot's BAR REL Button - DEPRESS MOMENTARILY.

The vertical arrow on AFCS indicator should return to center.

(3) Collective - MINIMUM.

The vertical arrow on AFCS indicator should move to full up position.

(4) Pilot's BAR REL Button - DEPRESS MOMENTARILY.

The vertical arrow on AFCS indicator should return to center.

(5) BAR OFF Button - DEPRESS.

BAR ALT button light should go out.

(6) Pilot's AFCS Release Button - DEPRESS.

AFCS ENG button light should go out.

34. Accelerometer Check - AS REQUIRED. (P)

NOTE

This check should be accomplished if utilization of the coupler is anticipated. Pilot should refer to appropriate sections of this manual when performing this check.

a. Meter Selector Switch - CPLR POSITION.

b. AFCS Indicator - A MODE.

c. Doppler - STANDBY.

d. Altitude Set Pot - ZERO.

e. AFCS Button - ENGAGED.

(1) Locate the deadband/null area on the drift pot by setting the knob to the full counterclockwise position. Slowly rotate the drift pot clockwise, noting that the roll bar on the AFCS indicator will follow the movement of the drift pot until the deadband/null area is reached. The roll bar and the drift pot should both be centered. If the drift pot is not centered, mark its position for the flight and note this on the CG-4377. If the roll bar is not centered within the donut, have the crewman adjust the associated accelerometer null set screws to obtain proper alignment within the donut. Repeat the same procedure for the speed pot.

(2) A check of the vertical accelerometer is made by noting the position of the vertical pointer. Alignment should be within ±.25 of a division from the center. If it is not, have the crewman adjust the appropriate accelerometer null set screw to obtain proper alignment.

f. If the altitude or cyclic coupler checks are not going to be accomplished, place the meter selector switch to ASE and disengage the AFCS.

NOTE

If the accelerometer check is not satisfactory, do not proceed with the altitude or cyclic coupler checks.

35. Altitude Coupler Check - AS REQUIRED. (P)

Pilot should refer to this manual when performing this check. This check should be accomplished if use of the altitude coupler is anticipated.

a. Complete Accelerometer Check.

b. Meter Selector Switch - CPLR Position

c. Collective Friction - OFF

d. ALT CPLR Switch - OFF

e. CPLR Button - ENGAGE

f. Depress press to test on RADALT and hold. Rotate CPLR altitude set pot to center vertical pointer. The altitude of the set pot should agree with altitude shown on the RADALT. If the altitudes do not agree the error noted will be present in a coupled hover and should be written up as a discrepancy, if it exceeds 5 feet.

g. Release press to test on RADALT, leave altitude set pot at altitude set.

h. Meter Selector Switch - ASE Position.

i. ALT CPLR Switch - ON. Collective should begin moving up within one division or less indicated on the vertical pointer.

j. ALT CPLR Switch - OFF. Return altitude set pot to zero. Disengage BARALT and CPLR.

k. If the Cyclic Coupler Check is not going to be accomplished, disengage the AFCS.

36. Cyclic Coupler Check - AS REQUIRED. (P)

Pilot should refer to this manual when performing this check. This check should be accomplished if use of the cyclic coupler is anticipated.

a. Complete Accelerometer check.

b. Meter Selector Switch - ASE POSITION

c. Center the roll and pitch bars by placing the cyclic in the neutral position.

d. Set the speed and drift pots to the deadband/null position as determined by the accelerometer check.

e. Meter Selector Switch - CPLR POSITION

f. Cyclic CPLR Switch - ON

g. Engage CPLR and HOVER TRIM simultaneously. No movement of crossbars should have been noticed. Any such movement indicates a possible misalignment of the crew roll and pitch bias. Have the crewman reposition the crossbars to the original position using his pitch and roll knobs.

h. Meter Selector Switch - ASE POSITION

i. Slowly turn the pilot's speed pot clockwise. Wait 5 seconds at each 1/2 division on the pitch bar. Cyclic should beep at 2 ± 1/2 divisions up on the pitch bar.

j. Reset speed pot to the deadband/null position. Recenter pitch bar with cyclic.

k. Repeat procedure in opposite direction.

l. Repeat steps i through k using the drift pot.

m. CYCLIC CPLR Switch - OFF

n. AFCS - DISENGAGED.

ENGINE STARTING PROCEDURES.

Refer to figures 2-2 and 2-3.

CAUTION

For engine starting and rotor engagement with the APU inoperative, refer to **ENGINE START WITH APU INOPERATIVE** and **ROTOR ENGAGEMENT WITH APU INOPERATIVE** procedures in this section. This procedure is limited to temperatures above -6.7°C (20°F).

1. Boost Pumps - "ON" (CP)

NOTE

The recommended procedure for operation of boost pumps is to operate the outside switches (No. 1 FWD and No. 2 AFT) on odd dates, and the inside switches (No. 1 AFT and No. 2 FWD) on even dates. This will equalize pump operation and life and insure one boost pump operation if one generator should fail.

2. No. 1 Engine - "FIREGUARD POSTED." (FM); "STARTING." (P)

a. Starter Button - DEPRESS.

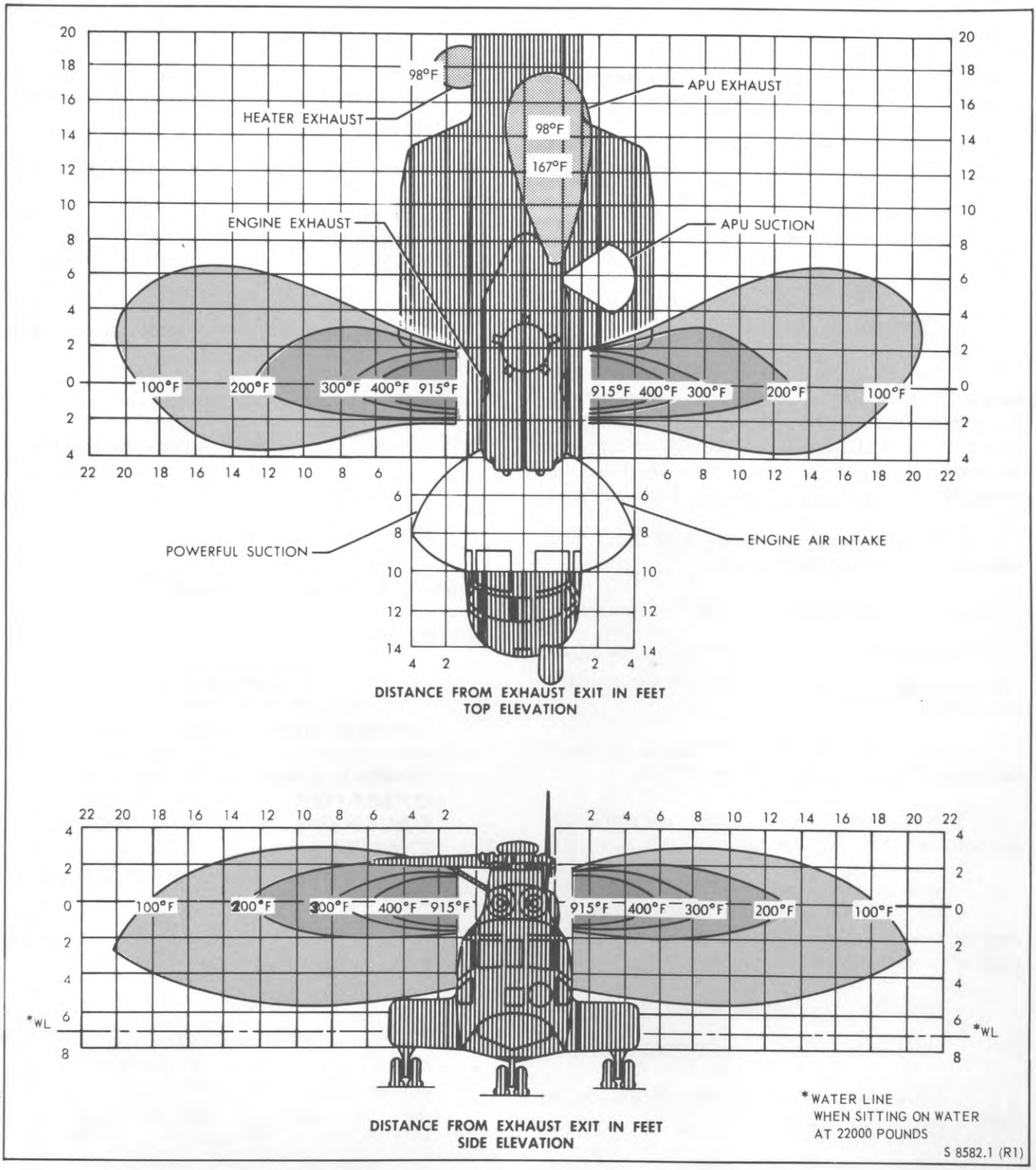


Figure 2-2. Danger Area (Sheet 1 of 2)

Hold the speed selector in the SHUT-OFF position and momentarily depress the starter button. Check for an indication of engine oil pressure and T_5 below 100°C while engine is accelerating to 19% N_g.

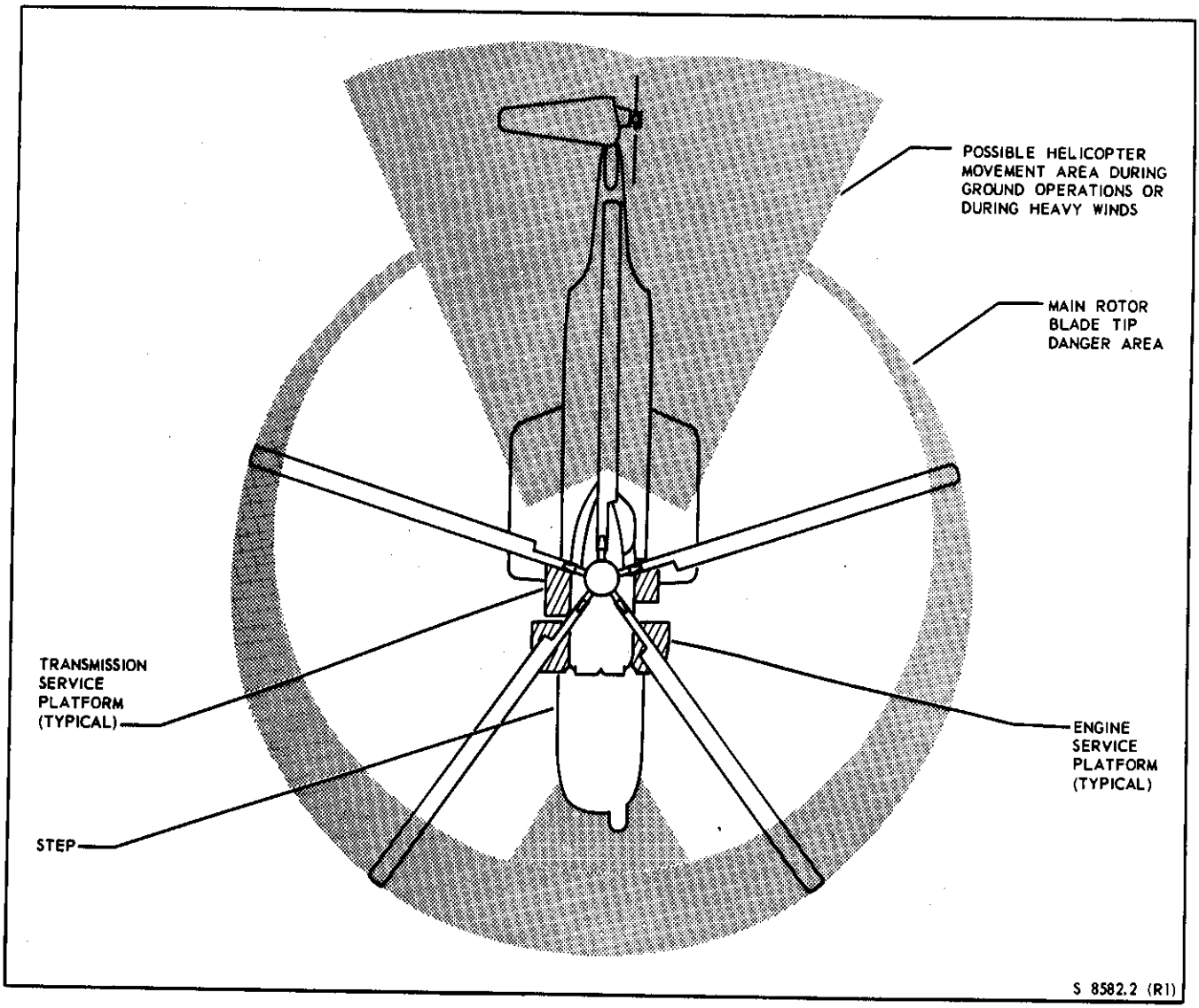


Figure 2-2. Danger Area (Sheet 2 of 2)

CAUTION

To prevent damage to the starter, do not operate starter continuously for more than 30 seconds on any one start attempt except in an emergency. Allow a 3 minute cooling period between start attempts. Do not attempt more than three starts in any 30 minute period.

NOTE

A failure in the starter circuit may result in starter dropout the moment the starter button is released. If the urgency of the mission dictates, this condition may be corrected by placing the START MODE switch in the MANUAL position for start.

b. Speed Selector - GRD IDLE.

Do not pull down on the speed selector as this will cut out the starter and ignition. If starter is aborted inadvertently, return speed selector to SHUT-OFF. It is not abnormal for T_5 to go as high as 750°C in 3 seconds. T_5 can be controlled by use of the ENG ST button. If T_5 rises abnormally (hot start imminent), abort the start when T_5 reaches 840°C; engine overtemperature may result if operation is continued. If the engine does not light-off within 10 seconds, or fails to accelerate to idle and T_5 continues to rise, abort the start. In event of a cold hangup, abort the start or use emergency starting procedures described in COLD HANG-UP in Section III. Abort the start by pulling

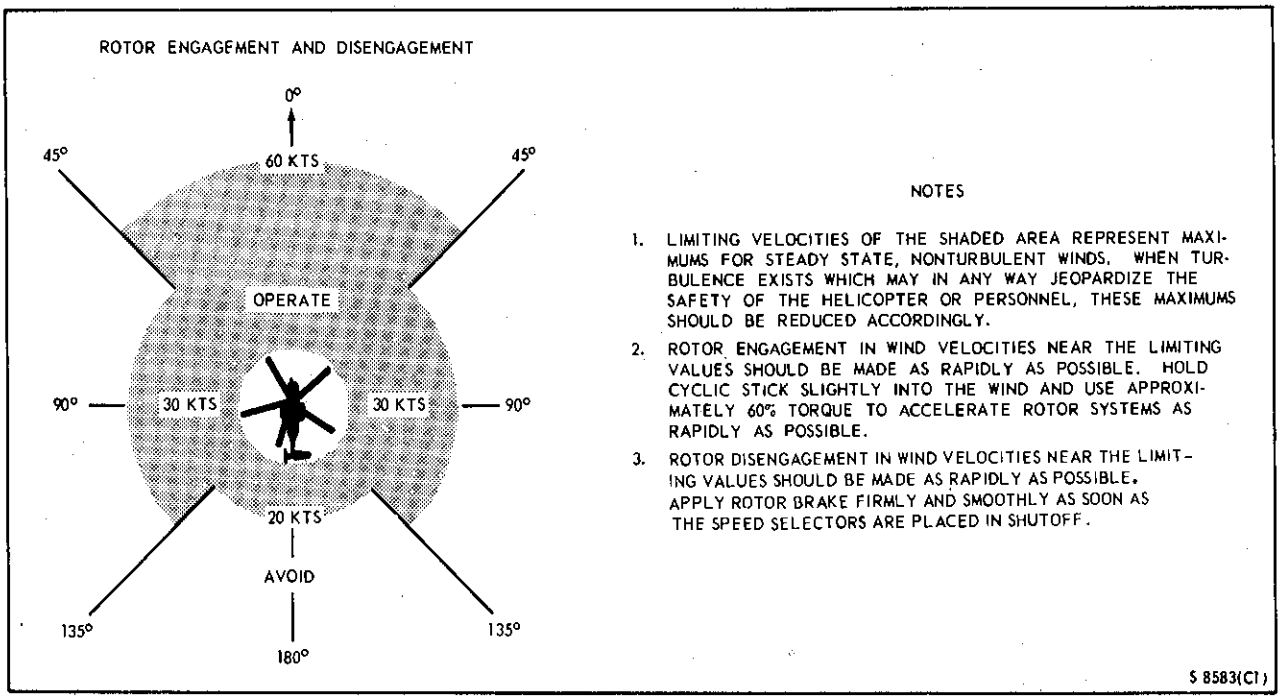


Figure 2-3. Rotor Engagement Chart

the speed selector down and returning it to the SHUT-OFF position. Move the boost pump switch to the OFF position. Before attempting another start, allow the engine to stop rotating and wait 3 minutes for fuel to drain from the manifolds, combustion chambers, and exhaust hood before repeating starting procedures.

CAUTION

If T5 rises above 735°C, a notation of the maximum temperature and time should be entered on CG-4377. If T5 rises abnormally or reaches 840°C, immediately shut down the engine. Transient operation between 840°C and 950°C is permissible during an aborted start. If T5 exceeds 950°C, an overtemperature inspection is required and additional engine starts should not be attempted. If engine fire follows, as may be indicated by a continuous temperature of 300°C, engage the starter with ignition switch OFF and motor until the temperature drops to 200°C.

NOTE

If it is necessary to utilize the ENG ST button to maintain T5 within limits on the first start of the day, it shall be noted on form CG-4377. Fuel control malfunctions during the start cycle may be masked by use of the ENG ST button.

c. Starter and Ignition Drop Out - CHECKED.

When the engine lights-off and accelerates to approximately 49% N_g the starter and ignition will automatically drop out. If automatic dropout does not occur, pull down on the speed selector. Verify starter dropout by observing the swing of the standby compass back to the heading of the helicopter.

d. After engine temperatures and pressures have stabilized check for the following.

(1) N_g between 53% and 59% (may be more or less at extreme temperatures or altitudes).

(2) T5 between 300° and 600°C (may be more or less at extreme temperatures or altitudes).

(3) Fuel flow approximately 130 pounds per hour.

(4) Engine oil pressure of at least 10 psi.

CAUTION

If a minimum of 10 psi engine oil pressure is not indicated, shut down engine.

3. No. 2 Engine - "FIREGUARD POSTED." (FM); "STARTING." (P)

a. Repeat procedure used for No. 1 engine.

4. Area Clear - "AREA CLEAR." (FM)

5. Rotor - "ENGAGING, YOU HAVE THE COLLECTIVE." (P)

CAUTION

Do not engage rotors if transmission oil temperature is below -6.7°C (20°F). **ROTOR ENGAGEMENT WITH APU INOPERATIVE** (below -6.7°C (20°F)) for pre-heat procedures in section IX.

NOTE

High velocity or gusty winds can cause excessive blade flapping. The rotor should not be engaged in winds above 60 knots (figure 2-3). When engaging or disengaging the rotor in high or gusty winds, the rotor should be accelerated or decelerated as rapidly as possible, limiting torque used to 60%.

a. Copilot hold the collective at minimum.

b. Advance the No. 2 speed selector until approximately a 5% N_g increase is noted. This will eliminate the deadband travel in the speed selector linkage and allow for more positive control during engagement.

c. Release the rotor brake, ensuring that the handle is in the detent and note that the ROTOR BRAKE caution light goes out.

NOTE

Pilot should monitor tip path plane to ensure adequate blade clearance. At night, use of the searchlight is recommended.

6. N_f Indications - "CHECKED." (P)

a. Advance the No. 2 speed selector to 102% N_r maintaining approximately 40% torque. As N_r increases, ensure that there is an N_f indication on both engines. If no indication is evident, return the speed selector to ground idle and secure the engine. Anti-flapping restrainers should release at approximately 25% N_r. Droop stops should release at approximately 75% N_r.

7. Cyclic Response - "CHECKED." (P)

As N_r accelerates, move the cyclic a small amount in all directions and check for proper tip-path displacement.

CAUTION

If flight controls do not respond correctly, shut down by retarding both speed selectors to SHUTOFF and applying the rotor brake.

8. APU - "OFF." (P)

a. Place the APU function switch in the OFF position. As the APU speed decreases, the APU advisory light will go out.

9. Caution-advisory Panel - "CHECKED." (P)

WARNING

Illumination of the generator and converter caution lights at this time indicates a possible malfunction of the tail rotor drive takeoff freewheeling unit. Shut down the No. 2 engine and secure the rotor. Do not secure the No. 1 engine until the rotor has stopped in order to maintain hydraulic pressure for control servos.

10. Speed Selectors "103%" (P)

11. Engine, Transmission Instruments - "CHECKED." (P)

12. See 05-25 Navigator - as required

BEFORE TAXI

Refer to figure 2-4.

1. Chocks - "REMOVED." (FM)

a. The chocks shall not be removed before rotor engagement.

2. Ramp - "CHECKED." (P)

a. Ramp Position - AS DESIRED.

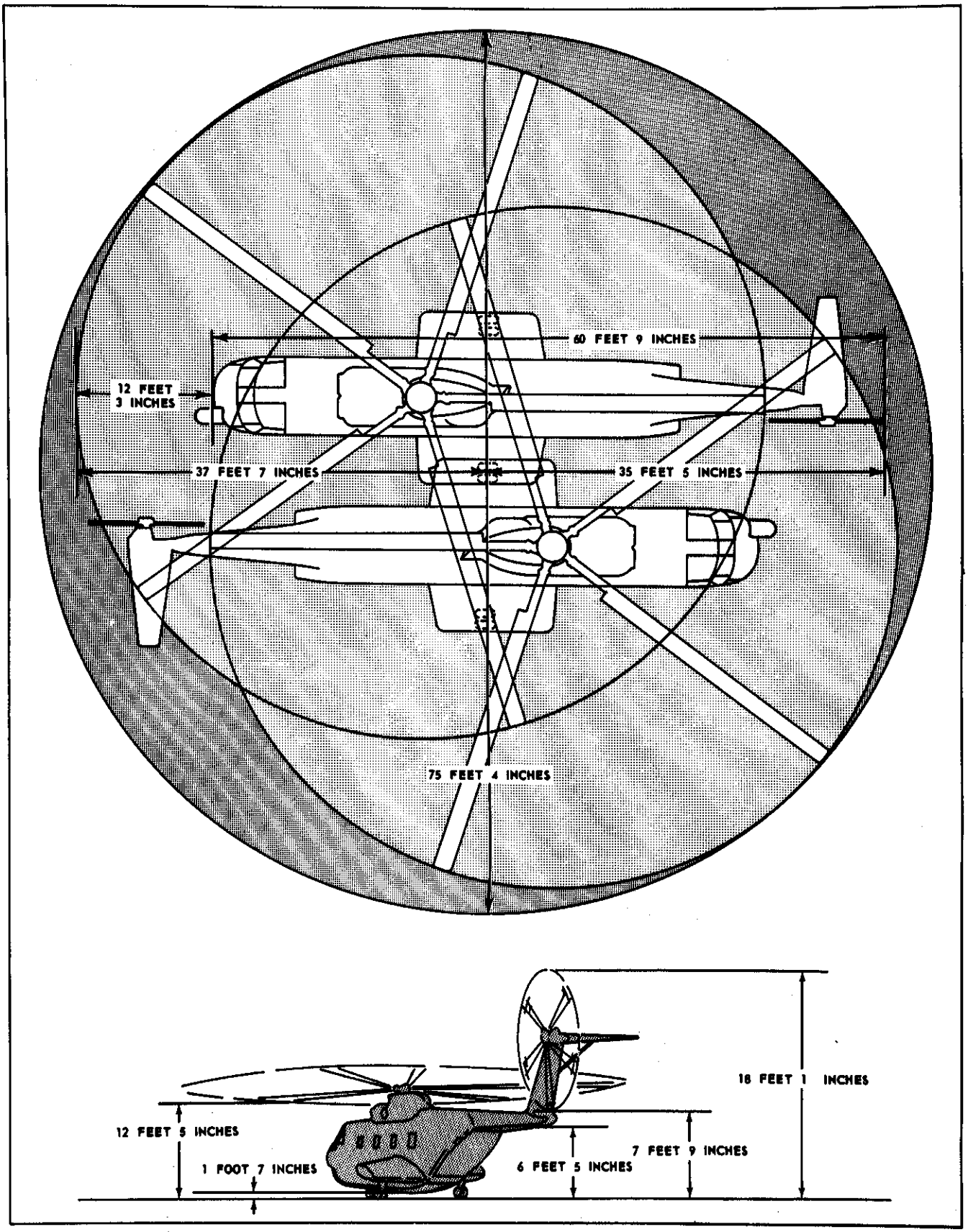


Figure 2-4. Turning Radius and Ground Clearance

b. Aft Ramp Cables - ATTACHED.

WARNING

Visually check ramp area for personnel and equipment before closing.

3. AFCS - "ENGAGED." (P)

4. Heat and Anti-ice - AS REQUIRED. (CP)

a. Engine Anti-ice - CHECKED.
If flight in icing conditions is anticipated.

NOTE

Engine anti-ice should be on anytime FAT is below 10°C.

(1) Proper operation of the engine anti-ice system will be indicated by a slight T5 rise. The green advisory lights, marked #1 ENG IGV ANTI-ICE and #2 ENG IGV ANTI-ICE and the amber caution lights, marked #1 INLET ANTI-ICE and #2 INLET ANTI-ICE, should illuminate.

(2) When the temperature in the bellmouth reaches 38°C, the caution lights should go out while the advisory lights will remain on as long as the system is left on. At temperatures above -18°C, the caution lights should not remain illuminated during ground operations.

CAUTION

The INLET ANTI-ICE caution lights will not function as a warning of system failure or icing conditions unless the anti-ice switches are in the ON position.

b. Windshield Anti-ice - AS REQUIRED.

CAUTION

The windshield anti-ice switches should be placed in the LOW position before going to the HIGH position to avoid the possiblility of the glass cracking due to sudden changes in temperatures.

c. Cabin Heat - AS REQUIRED.

d. Pitot Heat - AS REQUIRED.

5. Lights - AS REQUIRED. (CP)

a. Hover Lights, Searchlight - CHECKED.
If required.

6. Accel/Decel Check - AS REQUIRED. (P) Co-pilot perform.

NOTE

The acceleration-deceleration check shall be performed in any of the following circumstances: After any engine maintenance, where an engine problem is suspected, after salt water operations (after engine wash), and on first flight of the day. This check should not be done while taxiing.

NOTE

When making accel/decel check, the pilot moving the speed selectors shall observe operation of both engines simultaneously for signs of acceleration or deceleration stall. The engine set to drive the rotor at 102% may experience a deceleration stall when the engine being checked is accelerated.

a. With collective at minimum, set one speed selector full forward and retard the other to ground idle. Note maximum Nf on the advanced speed selector, then trim that speed selector full forward. Nf should not increase, but the speed selector lever will move. Nf should be 105% to 109%. Retard that speed selector to 102% Nf and accel/decel check the other engine as follows:

(1) Advance the speed selector to the full forward position within 1 second. As soon as Ng peak is noted, rapidly retard the speed selector of the engine being checked to GRD IDLE.

NOTE

Due to rapid acceleration during the check, a clunking noise in the gear box may be heard as the freewheeling units engage. If this occurs, monitor Nf and determine if it overshoots Nr. A maximum of 8% Nf overshoot is allowed.

(2) For proper stator vane response, Ng should accelerate from 68% to 90% in not more than 8 seconds.

NOTE

A reduction in opposite speed selector from 102% Nf may be necessary to reach 90% N_g which is a function of engine load requirements.

(3) Abnormal indications which might be anticipated are loud bangs with no unusual instrument indications; loud bangs accompanied by decreasing N_g and increasing T_5; hissing sounds accompanied by decreasing N_g and increasing T_5. If any of these malfunctions occur, they must be investigated prior to flight.

(4) To prevent unnecessary wear on the freewheeling units, return the speed selector forward slowly.

b. Repeat above checks for opposite engine.

c. The maximum Nf's should agree within 2%.

7. Flight Instruments - "CHECKED". (P)

a. Pilot will read off what they indicate, and copilot will crosscheck his.

b. Check compass sync needle.

CAUTION

During normal use of the barometic altimeter setting knob, 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 rotating the knob a full turn in the opposite direction and approaching the setting again with caution.

8. Crew Report Ready for Taxi - "READY FOR TAXI."(FM)

9. Parking Brake - "OFF."(P)

TAXIING

Ground taxiing should be performed at 103% Nr When starting to taxi, check the brakes for proper operation. While taxiing, check all compass cards and turn slip indicators for proper tracking. When taxiing at high gross weights, maintain a small amount of up collective and move cyclic stick slightly in the direction of any turns to avoid excessive wear on the tires. To preclude collective bounce, some collective friction should be used. Refer to **PILOT INDUCED COLLECTIVE BOUNCE** in section IV.

WARNING

Avoid using a combination of excessive cyclic and low collective setting. Tests indicate that the rotor blades will contact the pitot tubes and foreign object deflector if the cyclic control is moved to within approximately 2 inches from full forward with the collective control full down. If a large cyclic control movement or rapid reduction of collective is applied, excessive rotor blade flapping may occur. If the cyclic control is near the fore or aft position and the collective is lowered rapidly, the rotor blades may flex or dip sufficiently for the blades to contact the aircraft.

BEFORE TAKEOFF CHECK

1. Crew Report Ready for Takeoff - "READY FOR TAKEOFF." (FM)

a. The term "Ready for Takeoff" shall include but is not limited to the following items:

(1) Shoulder harnesses fastened.

(2) Movable seats facing forward.

(3) All cargo and rescue equipment stowed and secured.

(4) All passengers seated with seat belts fastened.

(5) Safety strap across cabin door when cabin door is open.

2. Caution-Advisory Panel - "CHECKED." (P)

a. RAWS - ON.

b. Parking Brake - OFF.

3. Pitot Heat - AS REQUIRED. (CP)

NOTE

When operating in visible moisture, turn on the pitot heat to prevent water buildup in the pitot tubes.

4. IFF - "CHECKED." (CP)

a. Set as directed or in accordance with expected flight conditions.

5. Speed Selectors - "FULL FORWARD". (P) Copilot perform.

a. The Nf should be between 105% and 109%.

GENERAL

1. Airspeeds in this manual refer to indicated airspeeds (KIAS) except where specified otherwise.

2. Torques should be matched within 10% of each other during all normal flight operations.

3. Rotor rpm (N_r) should be maintained at 103% during all normal flight operations.

TAKEOFF

Regardless of the type takeoff used, a safe single-engine airspeed and altitude should be attained as soon as possible. This is best accomplished by coordinating controls to arrive at 150 feet with approximately 70 knots of airspeed. A climb speed of approximately 80 KTS should be attained as soon as practical thereafter. The single-engine failure height velocity chart and dual engine failure - height velocity chart (figures A-12 and A-13 Appendix I) should be used as guides in determining minimum takeoff climb speeds. The takeoff distance charts (figures A-14, A-15, A-16, A-17, A-18, and A-19 Appendix I) show the best airspeed to be used for obstacle clearance. The first objective during takeoff is to clear obstacles at a safe airspeed and then establish a best rate-of-climb airspeed (climb charts in figures A-20, A-21, A-22, A-23, A-24, and A-25 Appendix I), which is also the airspeed that will produce best single-engine performance. On initial takeoff while hovering, note power required, check engine instruments, flight controls, and CG trim.

During normal takeoffs and landings with the helicopter light on the wheels, bank angle, sidedrift, or crosswind may cause the helicopter to begin pivoting or rolling laterally. Under these conditions, lateral cyclic stick inputs are less effective in generating a rate of roll than for a free-hovering helicopter. If bank angle and roll rate is allowed to increase, a critical combination of rate and angle will be reached where lateral cyclic inputs do not stop the rolling tendency. Full lateral cyclic will be insufficient to keep the helicopter from rolling over. Without proper corrective action, bank angles as little as 5°, coupled with roll rates and crosswinds, can cause the helicopter to roll over in about 2 seconds.

WARNING

When doing normal takeoffs and landings, the pilot must maintain precise control of roll attitudes so as not to allow the helicopter to reach a critical bank angle and roll rate that cannot be controlled with lateral cyclic. If a rolling tendency commences, take immediate corrective action. Depending on the situation, either raise collective and lift off or reduce collective to stop the rolling tendency. Reduction of collective is most effective in controlling rolling motions and is the recommended procedure if conditions permit. Raising collective and lifting off is acceptable, but be prepared for an abrupt roll in the opposite direction.

A power available check may be made while hovering into the wind at an appropriate height or while in forward flight. This check shall be done on each flight. Refer to Engine Power Available Check in Section VII.

CAUTION

Under certain snow and temperature combinations, prolonged hovering may cause snow to impact and build up inside the foreign object deflector. When the rotor downwash is circulating snow, the power available check should be done in forward flight to avoid this buildup and subsequent possible ingestion.

NOTE

If the torque reading obtained during the power available check with the engine anti-ice ON is 7% or more below the calculated torque available (TOLD), repeat the check with the anti-ice OFF. If the torque reading is still 7% or more below the calculated torque available, abort the flight.

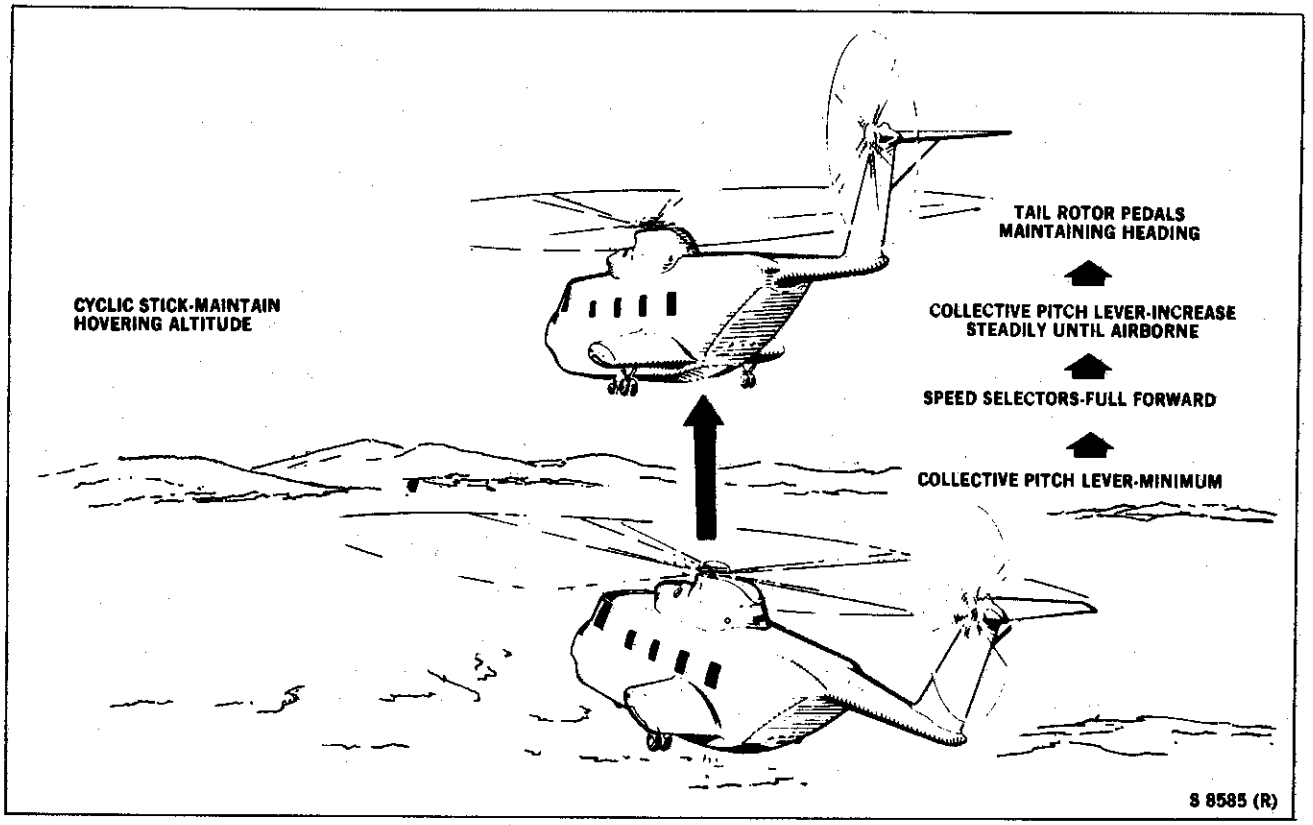


Figure 2-5. Vertical Takeoff to A Hover

VERTICAL TAKEOFF

Refer to figure 2-5. Normally, AFCS is engaged prior to takeoff, and TRIM RELEASE BUTTON can be depressed or stick trim spring force overridden.

CAUTION

Although it is permissible to use the cyclic trim release button during day VFR, continued and indiscriminate use of the button will develop habit patterns which will be difficult to overcome when flying on instruments or at night.

NO HOVER TAKEOFF

Refer to figure 2-6. This is a practical maneuver to be used when departing a FOD environment, i.e., water, snow, sand, leaves. The purpose of this maneuver is to depart the FOD environment expeditiously thereby keeping as much of the FOD as possible out of the engines. Although it is not a jump takeoff, once the power pull is started there should be a steady positive power increase to at least maximum continuous power. Anticipate the wheels breaking ground and ease the cyclic stick forward. Once airborne and clear of the FOD, transition to a normal climbout.

MAXIMUM PERFORMANCE TAKEOFF (RESTRICTED AREA)

Refer to figure 2-7. Position the helicopter to the most clear area downwind from the obstacle. Hover and note the maximum torque required, then land and compare with TOLD data. Increase collective smoothly and positively to maximum available, not to exceed 103% torque, and as the helicopter leaves the ground, apply forward cyclic to gain translational lift, obstacles permitting (refer to Section V for transient overtorque limits). The attainable airspeed will vary depending on the size of the area. Establish a safe climb angle to clear the obstacle, then accelerate to an 80 knot climb. Climb performance is greatly reduced without translational lift. In the areas of thick trees do not depend on the wind until above the trees.

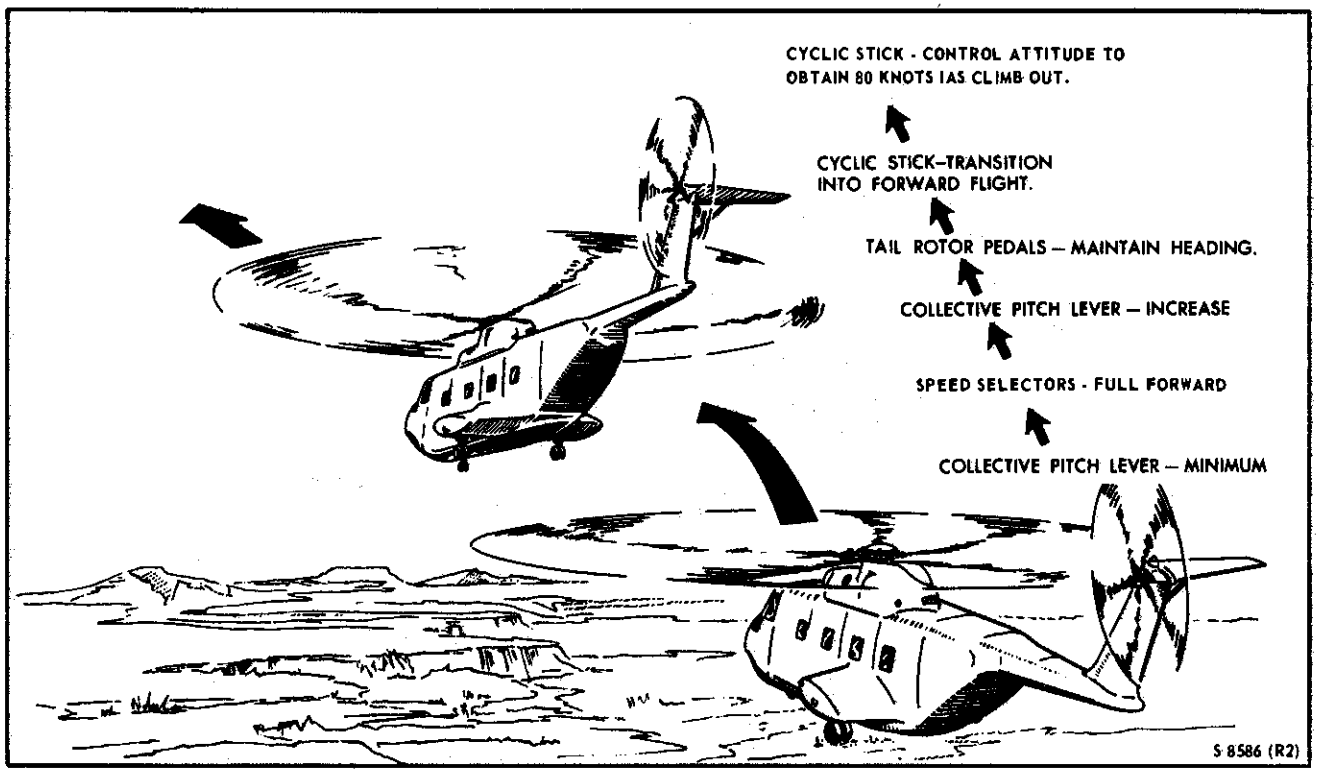


Figure 2-6. No Hover Takeoff

CAUTION

At high gross weights, it may not be possible to make a safe landing in the event of engine failure. Consequently, this maneuver should only be practiced at low gross weights.

RUNNING TAKEOFF

Refer to figure 2-8. Running takeoffs are used under certain conditions of high gross weight and high density altitude where there may not be sufficient power developed by the engines and lift developed by the main rotor blades to accomplish a normal takeoff. Under these conditions, it is necessary to obtain translational lift through forward motion on the ground prior to becoming airborne. Running takeoffs should only be attempted on smooth surfaces and should be made into the wind when practical. Line the helicopter up on the desired takeoff heading. Increase collective to approximately 40% torque and simultaneously apply forward cyclic. It may be necessary to use left tail rotor pedal pressure until climb torque is established. Use the wing down technique with a crosswind. When the helicopter has solidly attained translational lift, move the cyclic slightly aft towards the neutral position (observe the tip path plane) and smoothly increase collective to at least maximum continuous power. When airborne, transition to a normal climb.

CAUTION

Avoid abrupt collective and/or cyclic movements to prevent lift off in a nose low attitude and possible inadvertent nosewheel contact with the surface.

CROSSWIND TAKEOFFS

Crosswind takeoff procedures are the same as into the wind vertical, no hover, maximum performance and running takeoff procedures, with the exception of the required cyclic displacement into the wind. These takeoffs are prohibited in winds exceeding 35 knots.

HOVERING

1. Into wind.

a. Over land up to 19,500 lbs, the recommended altitude is 5 feet.

b. Over land 19,500 to 22,050 lbs, the recommended altitude is 5 feet or less, with 1 to 3 feet desirable. Limited maneuvering should be performed

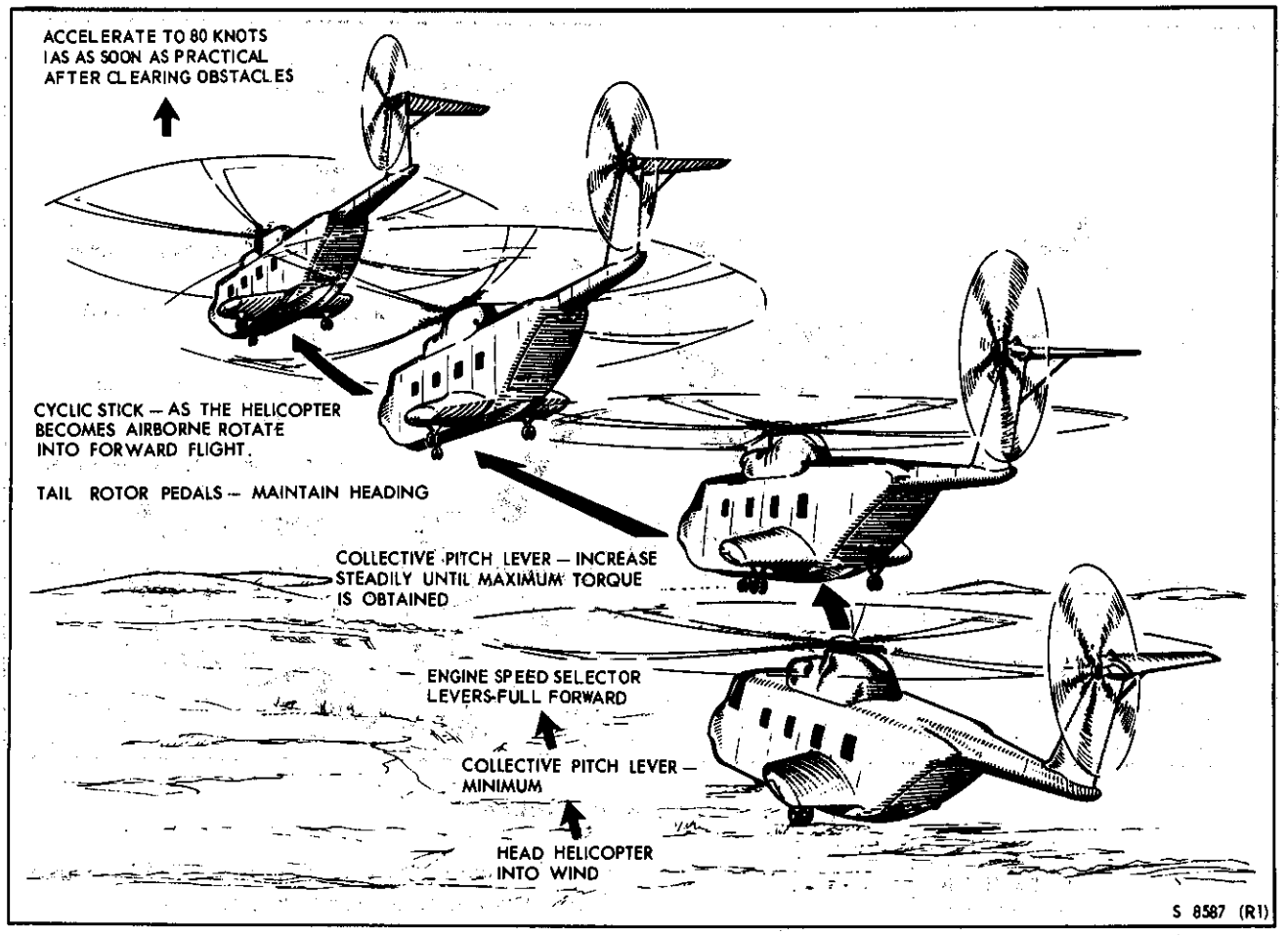


Figure 2-7. Maximum Performance Takeoff

at this altitude and high weight due to the torque requirements.

CAUTION

During night and/or low visibility operations (blowing sand, dirt, snow or rain), hovering duration should be limited and the altitude should be high enough to prevent inadvertent ground contact. The possibility of flying into the surface during conditions of reduced visibility is much greater than the possibility of an engine malfunction.

2. Crosswind. Do not hover crosswind in winds exceeding 35 knots.

3. Downwind. Do not hover downwind in winds exceeding 30 knots. During extended downwind hovering, close the cargo door and cockpit windows and turn on the ventilating fan to prevent excessive exhaust fume concentration in the cockpit and cargo compartment.

NOTE

The engine fire warning light(s) may illuminate due to the recirculating engine exhaust gases when hovering downwind or crosswind.

4. Turns on a spot. Turns on a spot should be accomplished at a minimum of 5 feet. Maintain a constant rate of turn, not to exceed 360° in 15 seconds.

CAUTION

Under certain conditions, application of left rudder may result in power requirements exceeding power available.

5. Air taxiing. Air taxiing should be performed by heading the helicopter in the direction of motion whenever practical. Air taxi altitude should be consistent with power requirements and obstacle clearance.

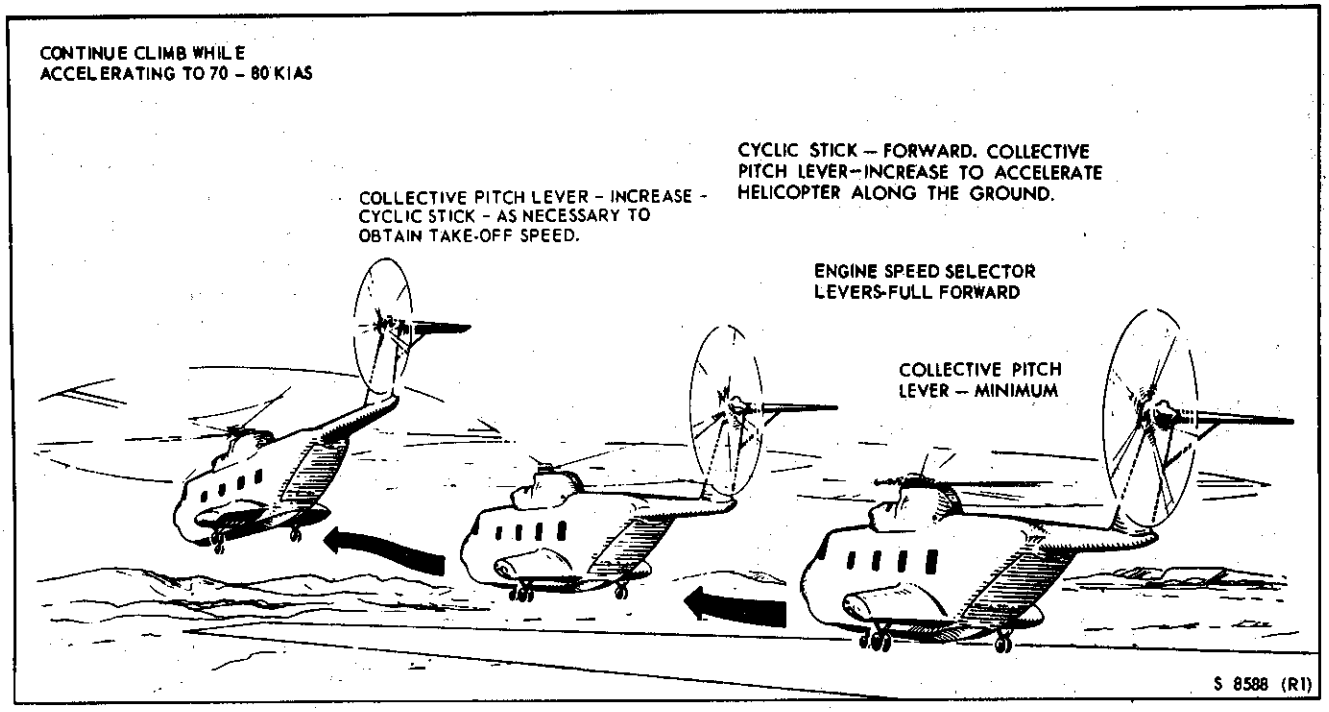


Figure 2-8. Running Takeoff

Avoid air taxiing downwind if possible as translational lift is easily lost and the helicopter could settle onto the surface.

6. Sideward and rearward flight. A constant rate of movement over the ground should be maintained at a constant altitude and a constant heading.

TRANSITION TO FORWARD FLIGHT

Transition to forward flight by applying forward cyclic to accelerate and collective as necessary to prevent settling. When translational lift is attained, continue to increase collective (max. 103%Q), simultaneously climbing and accelerating so as to arrive at approximately 150 feet with 70-75 KIAS. Transition to an 80 KIAS climb. Maximum continuous power should be utilized for climb where practicable.

AFTER TAKEOFF CHECKLIST

1. Engine and Transmission Instruments-CHECKED. (CP)

2. Wheels - "UP"/"DOWN" (P) Copilot perform.

3. Crew perform safety check - "SAFETY CHECK COMPLETE, CHECK COMPASSES AND FUEL." (FM)

NOTE

The safety check shall be performed by the flight mechanic every 30 minutes during flight. Refer to Section VIII for specific items to be checked.

4. Speed Selectors - "103%" (P) Copilot perform.

CRUISE

Refer to Appendix I, as necessary, to obtain best cruise airspeeds. After cruise airspeed has been established, readjust collective as necessary to maintain the desired airspeed. Set speed selectors to 103% Nf/Nr. For proper management of fuel, refer to **FUEL SYSTEM MANAGEMENT,** section VII.

WARNING

Abrupt movements of all flight controls should be avoided. Combinations of cyclic movements with low collective settings may cause rotor blade to fuselage contact. Rapid lowering of the collective with or without a cyclic input may also cause main rotor blade to fuselage contact.

NEW NEW NEW

NOTE

To enhance the "see-and-be-seen" concept of averting collisions, it is recommended that the controllable searchlight be turned on when operating in the vicinity of any airport, in conditions of reduced visibility, and in areas where flocks of birds may be expected.

TRAFFIC PATTERN

Traffic pattern altitude or entry may be varied as necessary to meet local requirements. Maintain 80 knots and 103% Nr. This checklist should be used for initial entry into the traffic pattern and on termination landings. Once established in the touch and go pattern, refer to abbreviated checklist.

BEFORE LANDING

The copilot will silently complete items 2 thru 6, 8, and 9.

1. Crew Report Ready for Landing - "READY FOR LANDING." (FM)

a. The term "Ready for Landing" should include, but is not limited to, the following:

(1) Shoulder harnesses fastened.

(2) Movable seats facing forward.

(3) All cargo and rescue equipment stowed and secured.

(4) All passengers seated with seat belts fastened.

(5) Safety strap across cabin door when cabin door is open.

(6) Smoking lamp out.

2. Heater Switches - AS REQUIRED. (CP) Allow a minimum of 5 minutes for heater cooling prior to shutdown.

3. Radar - AS REQUIRED. (CP)

4. Doppler - AS REQUIRED. (CP)
STBY for water landings.

5. Brakes - AS REQUIRED. (CP)

6. Nosewheel Lock - AS REQUIRED. (CP)

CAUTION

The nosewheel lock handle must be unlocked for normal landing to prevent shearing the nose gear lockpin. During slope operations, the nosewheel lock handle may be locked to prevent the nose gear turning; however, caution must be used to avoid sideward motion as the helicopter settles to the ground.

7. Wheels - "DOWN(UP OVER WATER)" (P) Copilot perform.

8. Caution-Advisory Panel - CHECKED. (CP)

9. Engine and Transmission Instruments - CHECKED. (CP)

10. Approaching 300 feet AGL or minimums whichever is higher - "SPEED SELECTORS FULL FORWARD, RECHECK WHEELS DOWN(UP OVER WATER)" (P) Copilot perform.

ABBREVIATED CHECKLIST

TAKEOFF CHECK

1. ENG/XMSN INSTS. (CP)
2. CAUTION/ADVISORY PANEL. (CP)
3. SPEED SELECTORS. (CP)

LANDING CHECK

1. BRAKES. (CP)
2. WHEELS. (CP)
3. CAUTION PANEL. (CP)
4. ENG/XMSN INSTS. (CP)
5. SPEED SELECTORS. (CP)

NORMAL APPROACH

Refer to figure 2-9. The desired normal approach begins abeam the straightaway, heading downwind at a recommended 1000 feet AGL and 80 knots airspeed. Complete the landing checkoff list prior to reaching the 180° position. Commence the approach by reducing collective and establish a descending turn (strong - wind turn early - no wind turn abeam straightaway position). Arrive at the 90° position at 600 to 700 feet

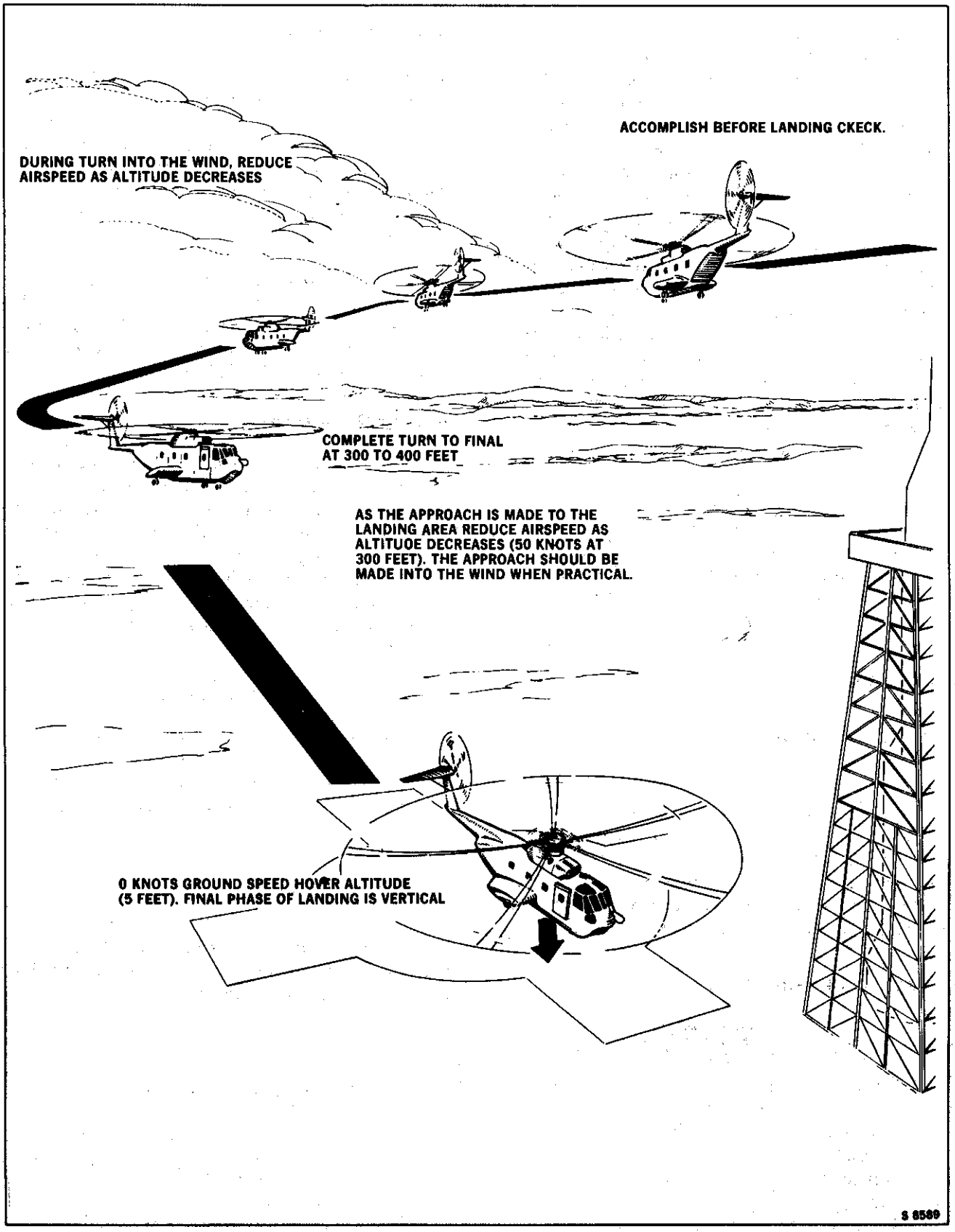


Figure 2-9. Normal Landing

AGL, 65 knots, and straightaway position at 300 to 400 feet AGL, 50 knots, 1500-2000 feet from intended point of touchdown. Approaching 300 feet AGL the pilot will call for the speed selectors to be placed FULL FORWARD and will direct the copilot to recheck the wheels DOWN (UP OVER WATER). At 300 feet AGL slowly transition the nose to approximately 6° to 8° nose up and adjust the collective to prevent ballooning. Adjust cyclic and collective as necessary on final to maintain an apparent constant angle approach to the intended point of hover. Collective application should begin relatively early as a light loading of the rotor system and continues slowly so that the aircraft will arrive at the desired hover altitude with zero ROD, zero ground speed, and hover power. An apparent constant angle approach does not necessarily mean a constant nose attitude so emphasis must be placed on proper power management in coordination with cyclic control.

CAUTION

Do not exceed 12°, nose-up attitude at the point of ground contact. At 15° nose-up attitude, the tail pylon will contact the ground on landing.

LANDING

VERTICAL LANDING

Upon main wheel contact with the surface, the nose will tend to fall through and should be countered with slight aft cyclic. A smoother landing may be accomplished by maintaining a 1 to 2 knot forward ground speed at touchdown. If any unusual vibration or unbalanced condition during touchdown is experienced, execute an immediate takeoff.

CROSSWIND LANDING

CAUTION

Crosswind landings are prohibited in winds exceeding 35 knots. During crosswind landings, with the wind from the right, it may be noted that tail rotor control may run out. This happens at high gross weights when entering a hover. This condition usually occurs with a 90° crosswind from the right of about 35 knots.

NO HOVER LANDING

This is the most practical technique of landing on most surfaces, particularly with high density altitudes and/or heavy gross weights. A safe landing, using 5% to 10% less torque than that required to hover, can be accomplished. Minimum snow, sand, and other debris will be circulated with a no hover landing. The transition to a hover procedures are used with the following exception:

1. At approximately 60 feet, increase collective smoothly and continue coordinating flight controls to settle softly onto the surface in the landing attitude (approximately 5° nose up) with 0 to 5 knots ground speed, depending on the surface.

RUNNING LANDING

Running landings are usually accomplished when the helicopter cannot be hovered due to a high gross weight or density altitude. Running landings should be accomplished with the nosewheel unlocked and parking brake off. Adjust collective, as necessary, to maintain the desired approach angle and rate of descent and dissipate speed gradually throughout the approach so the landing can be accomplished while maintaining translational lift.

CAUTION

Running landings should only be attempted on a smooth hard surface. Maximum ground speed on touchdown is 40 knots. Eliminate all drift before touchdown.

GO-AROUND

Refer to figure 2-10. The pilot should announce -Go-around- on ICS, at which time the copilot advances the speed selectors full forward. Smoothly and positively increase collective to maximum power and transition to an 80-knot climb.

AFTER LANDING CHECKLIST

The after landing check is to be used when the flight is to be terminated and the engines and the rotors will be shut down.

1. Speed Selectors - "103%" (P) Copilot perform.
2. Radar - STANDBY. (CP)

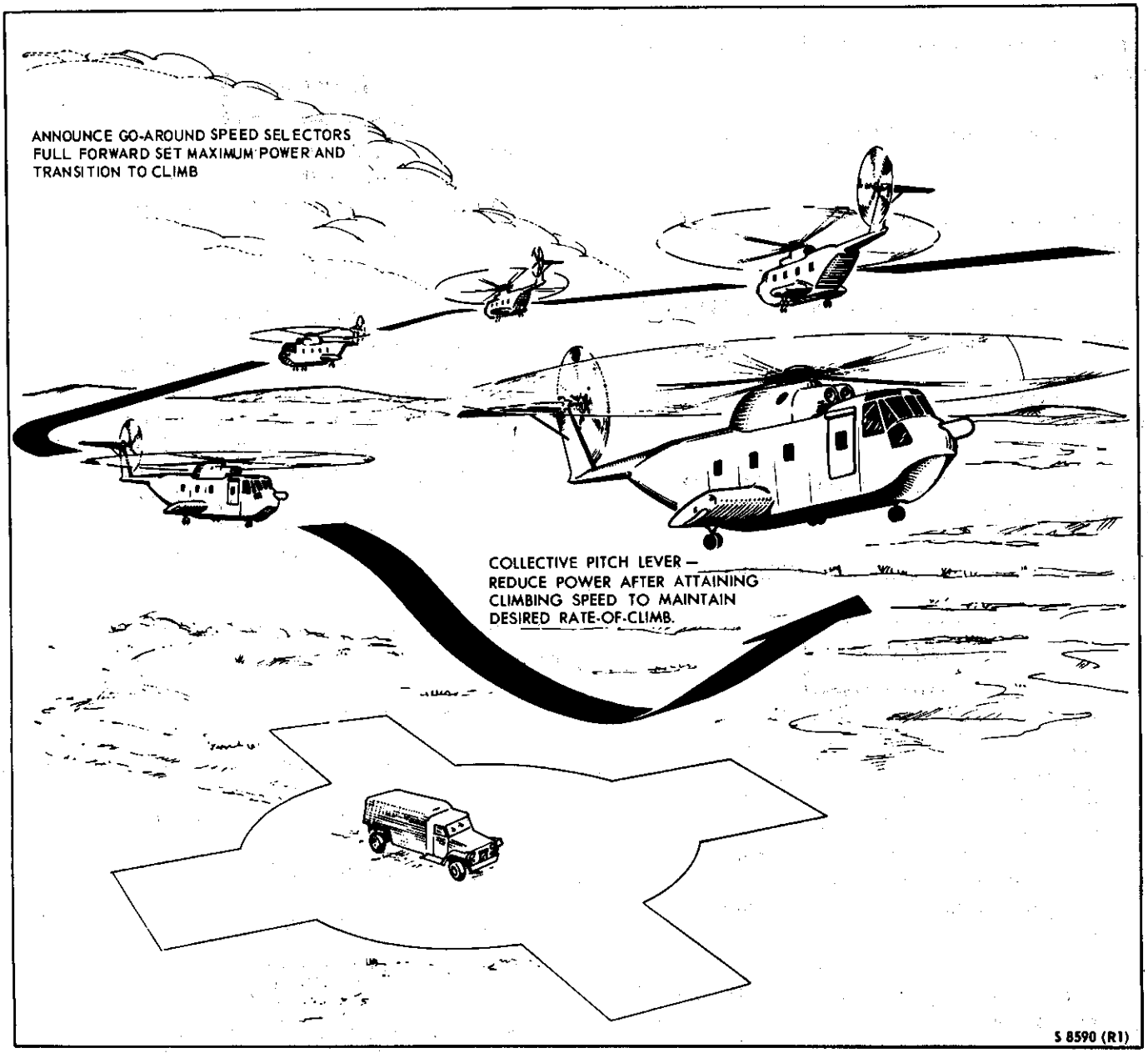


Figure 2-10. Go-Around Diagram

3. IFF - STANDBY.(CP)

SECURE CHECKLIST

1. Parking Brake - "SET." (P)
2. AFCS - "DISENGAGED." (P)
3. Center Console - "CHECKED." (CP)
   a. IFF - OFF.
   b. VHF-FM - AS DESIRED.
   c. VHF Transceiver - AS DESIRED.
   d. Map Display - OFF.
   e. Radar - OFF.
   f. Computer - OFF.
   g. Doppler - OFF.
   h. ADF RCVR, UHF, VHF NAV, TACAN - OFF.
4. RAWS - "OFF." (P) Copilot perform.
5. Boost Pumps - "OFF." (P) Copilot perform.

6. VERT GYRO Switch - "OFF." (P) Copilot perform.

7. Ignition Switches - "OFF." (P) Copilot perform.

8. Pitot Heat/Engine Anti-ice - "OFF." (P) Copilot perform.

9. Emergency Exit Light Switch - "DISARM." (P) Copilot perform.

10. Cockpit and Cabin Dome Lights - AS REQUIRED.(CP)

11. No. 1 Engine Speed Selector - "GRD IDLE." (P) Copilot perform.

12. Caution-Advisory Panel - "CHECKED." (P)

WARNING

Illumination of the generator and converter caution lights at this time indicates a possible malfunction of the tail rotor drive takeoff freewheeling unit. Shut down the No. 2 engine and secure the rotor. Do not secure the No. 1 engine until the rotor is stopped in order to maintain hydraulic pressure for control servos.

13. No. 2 Engine Speed Selector - "GRD IDLE." (P) Copilot perform.

To provide engine cooling prior to engine shutdown, one of the following conditions must transpire before securing the engines. In an emergency, the engines may be shut down immediately.

a. One minute of taxiing.

b. One minute of operation at, or above, the minimum governing range and with minimum collective pitch.

c. One minute at ground idle.

14. Droop Stops - "DROOPS IN." (FM)

WARNING

Refer to figure 2-2. Danger areas depicted are increased with a droop stop out. Ensure ground crew personnel are well clear of danger areas.

NOTE

If one or more droop stops fail to go in, re-engage the rotor using the No. 2 engine. Repeat items 13 and 14 of the secure checklist. During rotor coastdown, slightly displace the cyclic in an attempt to dislodge the jammed droop stop. If the droop stop still fails to go in, neutralize the controls, secure the engines, and smoothly apply the rotor brake as soon as the speed selectors are placed in shutoff.

15. Speed Selectors - "SHUT OFF." (P) Copilot perform.

16. Fuel Management Panel - "OFF " (CP)

a. Fuel Shutoff Valve Switches - OFF.

b. Fuel Crossfeed Valve Switch - CLOSE.

c. Transfer Switches - OFF.

17. Rotor Brake - ON at 30% N_r (P)

CAUTION

Rotor disengagment in wind velocities near the limiting values shown in figure 2-3 should be made as rapidly as possible. When wind conditions dictate, apply rotor brake firmly and smoothly as soon as speed selectors are placed in SHUTOFF.

NOTE

If one or both engines are at idle, a minimum of 320 psi is recommended. If rotor brake pressure is low, it is necessary to replace the handle fully into the detent and then reapply the rotor brake.

18. Landing Gear Pins and Chocks - INSTALL. (FM)

a. The flight mechanic will not install either the pins or the chocks until the rotor system stops turning.

19. T_5 - "CHECKED" (P).

CAUTION

If high T_5 persists, have engine exhaust checked for fire. If T_5 reaches 300°C engage the starter and motor the engine until T_5 is below 200°C. A slow buildup of T_5 to a temperature above 200°C is not abnormal after engine coast down.

20. Overhead Switch Panel - CHECKED. (P)

a. Position Light - OFF.

b. Rotating Beacon Lights - OFF.

c. Fuselage Light - OFF.

d. Anchor Light - OFF.

e. Flood Hover Lights - OFF.

f. Searchlight - OFF.

g. Windshield Anti-ice - OFF.

h. Engine Anti-ice - OFF.

i. Cabin Heater Vent - NORM.

j. Cabin Heater - OFF.

k. Pitot Heat - OFF.

l. Windshield Wiper - OFF.

m. Windshield Washer - OFF.

n. Lower Console Red Light Rheostat - OFF.

o. Loading Light - OFF.

p. Console Light Rheostats - OFF.

q. Nose Gear Switch - NORMAL.

r. Hoist Master Switch - OFF.

s. Cargo Hook - SAFE.

t. Stick Trim Master - OFF.

u. Channel Monitor Test - OFF.

v. Converters - OFF.

w. External Power - OFF.

x. Battery - OFF.

y. Generators - OFF.

z. Radio XFMR Switch - 2

aa. Start Mode Switch - NORMAL

NOTE

At the completion of night operations, ensure that the scroll checklist, standby compass, utility, and cockpit and cabin dome lights are turned off.

WATER OPERATIONS

SALT WATER POWER DETERIORATION

Operational experience has shown that salt spray ingestion in the engine may result in a loss in performance as well as a loss in compressor stall margin. This reduction in stall margin makes the engine susceptible to stall during accelerations, and more particularly, under deceleration conditions. As the spray is ingested and strikes the compressor blades and stator vanes, salt is deposited. The resulting buildup gradually changes the airfoil sections which in turn reduces compressor efficiency. This deterioration will be noticed as a decrease in torque (Q) and an increase in T_5 for a given N_g. Should the deterioration reach the point where the compressor actually stalls, T_5 will increase while N_g and torque decrease. The circumstances under which power deterioration may occur during salt water operation vary with a number of factors. The flight regime, gross weight, wind direction and velocity, pilot technique, duration of maneuver, salinity of the water, and the relative density of the salt spray all have a bearing on performance deterioration (figure 2-11). Intermittent operation in moderate salt spray conditions (such as a series of landings and takeoffs) could expose the engines to enough salt spray to cause noticeable performance deterioration. During prolonged operations (such as low hovering or taxiing) in heavier spray conditions, power deterioration will be readily apparent. Maneuvers such as hovering close to the water in light winds (about 8 knots), taxiing with high power, or low flights at low speeds, will generate maximum rotor downwash spray conditions. The amount of spray observed on the windshield is the best indication of spray ingestion into the engine. The FOD shield provides engine protection because the air

NOTE: OS-22 replaced by OS-24

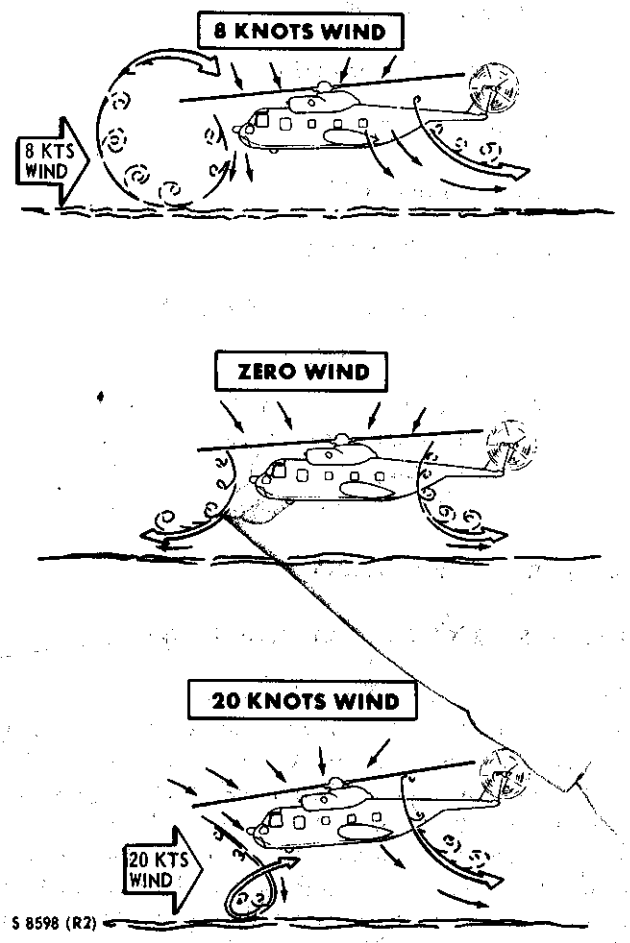


Figure 2-11. Low Hover Spray Patterns

entering the engine must make two turns of about 90 degrees. These turns cause the heavier water particles to precipitate out from the air stream. Careful operation, following the procedures and limitations contained herein when operating in these conditions, should result in the preservation of rated engine power. Establish a hover and note operating T5 and torque (Q) for each engine. To maintain a constant torque output, T5 increases as engine performance deteriorates and this rise must be monitored by the pilots. When a rise of 35°C T5 (at constant torque) occurs, engine shaft horsepower has deteriorated by about 25% and the corresponding stall margin has been reduced to about 50%. See 9-2-22

When power has deteriorated to this point (35°C rise), the operation shall be terminated and a takeoff initiated. Slow and deliberate collective inputs must be utilized to ensure that the engines do not accelerate or decelerate rapidly. Appropriate entries should be made on CG-4377 following salt water operation, reflecting any T5 rises, power losses, etc.

WARNING

If the operation results in a T5 rise of 35°C, extreme care must be taken and it is recommended that for takeoff/transition, minimum power be utilized and be maintained with no reduction until such time as the aircraft is at its destination, at an altitude from which an autorotative landing can be successfully conducted, before a power reduction is initiated.

GENERAL

The procedures in this section cover normal water operations as they differ from land operations. The helicopter is designed for amphibious operations which require an understanding of its capabilities and limitations. Refer fo figure 2-12, Water Clearance, to note clearances when resting on the water. For normal operations with rotors turning, the helicopter may be operated in water up to and including Sea State 4 as noted in figure 2-13, Wind - Sea State Table. Normal rotor shutdown and engagements can be conducted on water up to and including Sea State 2 conditions. The values shown in the table are for relatively steady state conditions of long duration. With the rotor stopped the helicopter will weathercock into the wind.

CAUTION

The doppler power switch should be placed in STBY prior to landing on the water.

SEE MSG 091730 JUN 80

Engine Starting Procedures On Water

Procedures are the same as in land operations.

Rotor Engagement On Water

When engaging the rotor (engine(s) in IDLE), the helicopter will have a tendency to turn to the right and roll left 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 and slight right cyclic. Advance the No. 2 engine speed selector until 5% N_g increase is noted, then release the rotor brake. Allow the rotor to accelerate until the tail rotor control pedals become effective (approximately

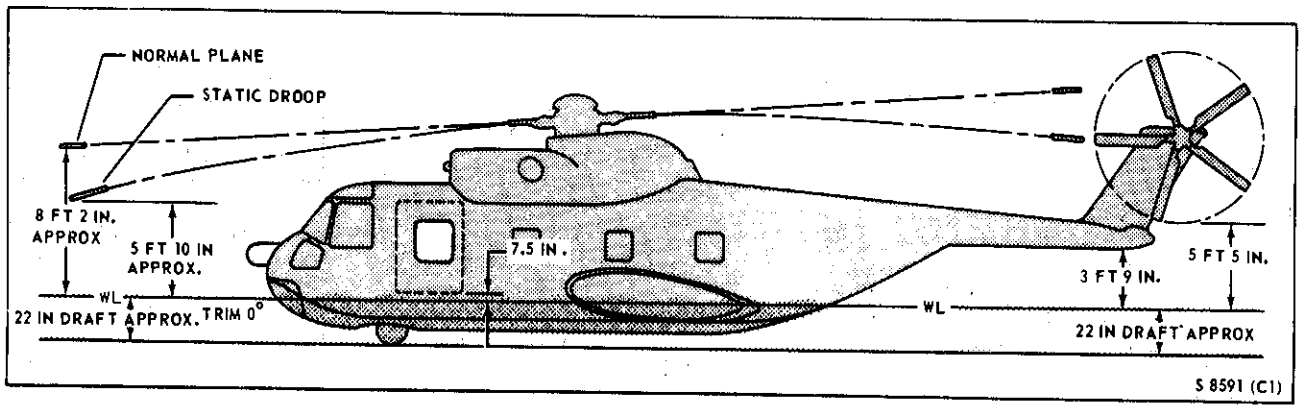


Figure 2-12. Water Clearance

30% N_r) prior to advancing the No. 2 engine speed selector.

Taxiing On The Water

Prolonged water operations should be accomplished at 103% N_r to provide optimum water controllability and maximum rotor blade tip clearance above the water. Water taxiing should be limited to approximately 10 knots. The nose of the helicopter may tend to pitch downward due to resistance of the water on the hull. If this condition is reached, the taxi run should be aborted by smoothly lowering the collective. The position of the cyclic should be kept at neutral as the high speed taxi maneuver is aborted. Smooth taxi turns can be made by applying tail rotor pedals and cyclic stick into the direction of the turn.

WARNING

Fast turns accomplished with tail rotor pedals only, and without cyclic stick held into the turn, may result in excessive roll angles and possible upset in rough water.

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 when operating in water of questionable depth.

Sideward and Rearward Water Taxiing Sideward taxiing is limited because of the large flat plate area offered by the hull and sponsons. The large water resistance encountered by the hull and sponsons and the relatively high helicopter center of roll tend to make the fuselage roll in the direction of motion. Rearward taxiing may be accomplished but should be kept to a minimum, due to tail rotor water clearance reduction.

Takeoff

A vertical or no hover takeoff from water is the same as from land. Running takeoffs from the water are impractical, not recommended, and should not be performed except in emergency.

WARNING

Extreme nose low attitudes should be avoided to preclude inadvertent water reentry.

Hovering Over Water

Maintaining position over open water is difficult and aids such as debris, seaweed, foam, rotor downwash, and smoke float signals must be used. Pilots must become familiar with and use the rotor downwash patterns. Transitioning into a hover with no wind, the rotor wash will be equal around the helicopter, and as the speed of the helicopter or wind increases, the wash pattern retreats downwind.

WARNING

Hovering operations when little or no visual reference is available may induce pilot disorientation, particularly at night, because of downwash spray. This spray may exist to an altitude of approximately 40 feet when at heavy gross weights and no wind.

SEA STATE	SEA INDICATIONS	WIND		WAVES	
				WAVE HEIGHT IN FEET	
	DESCRIPTION	DESCRIPTION	VELOCITY RANGE (KNOTS)	AVERAGE	MAXIMUM
0	Sea may look like a mirror or small ripples with appearance of scales, but without foam crest.	Calm to light airs	0-3	0	Less than 6 inches
1	Wavelets that are short but pronounced. Crests may begin to break. Perhaps very few scattered whitecaps.	Light to gentle breeze	4-9	6 inches	1
2	Large wavelets or small waves, becoming larger. Fairly frequent whitecaps.	Gentle to moderate breeze	10-13	2	3
3	Small waves becoming larger. Frequent whitecaps.	Moderate breeze	14-16	3	5
4	Moderate waves, pronounced long foam. Many whitecaps. Chance of some spray.	Fresh breeze	17-19	4.5	7
5	Moderate to large waves form. White foam crests are more extensive everywhere. Probability of some spray.	Fresh to strong breeze	20-24	8	12
6	Large waves. Sea heaps up. White foam from breaking waves begins to be blown in streaks along the direction of the wind. May begin to see spindrifts.	Strong breeze	25-28	11	18
7	Sea heaps up. Streaks along the direction of wind. Moderately high waves of greater length. Edges of crest break into spindrift. The foam is blown in well marked streaks along wind direction.	Moderate to fresh gale	29-38	25	40
8	High waves. Dense streaks of foam along the direction of wind. Sea begins to roll. Visibility limited Note: for conditions above these limits, use Whole Gale, Storm, or Hurricane definition.	Strong gale	39-44	36	58

Figure 2-13. Wind-Sea State Table