## SECTION 4

### NORMAL PROCEDURES

### CONTENTS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Airspeeds</td>
<td>4-1</td>
</tr>
<tr>
<td>Daily or Preflight Checks</td>
<td>4-1</td>
</tr>
<tr>
<td>Before Starting Engine</td>
<td>4-6</td>
</tr>
<tr>
<td>Engine Starting Tips</td>
<td>4-7</td>
</tr>
<tr>
<td>Starting Engine and Run-Up</td>
<td>4-7</td>
</tr>
<tr>
<td>Takeoff Procedure</td>
<td>4-9</td>
</tr>
<tr>
<td>Doors-Off Operation</td>
<td>4-9</td>
</tr>
<tr>
<td>Cruise</td>
<td>4-10</td>
</tr>
<tr>
<td>Practice Autorotation – Power Recovery</td>
<td>4-11</td>
</tr>
<tr>
<td>Practice Autorotation – With Ground Contact</td>
<td>4-12</td>
</tr>
<tr>
<td>Hydraulics-Off Training</td>
<td>4-12</td>
</tr>
<tr>
<td>Descent, Approach, and Landing</td>
<td>4-13</td>
</tr>
<tr>
<td>Shutdown Procedure</td>
<td>4-14</td>
</tr>
<tr>
<td>Noise Abatement</td>
<td>4-15</td>
</tr>
</tbody>
</table>
SECTION 4

NORMAL PROCEDURES

RECOMMENDED AIRSPEEDS

Takeoff and Climb 60 KIAS
Maximum Rate of Climb \(V_y\) 55 KIAS
Maximum Range 100 KIAS*
Maximum Cruise 110 KIAS*
(Do not exceed except in smooth air, and then only with caution)
Significant Turbulence 60 to 70 KIAS
Landing Approach 60 KIAS
Autorotation 60 to 70 KIAS*

* Certain conditions may require lower airspeed. See \(V_{ne}\) placard in Section 2.

DAILY OR PREFLIGHT CHECKS

Remove ground handling wheels and all covers and tiedowns. Remove even small accumulations of frost, ice, or snow, especially from rotor blades. Check maintenance records to verify aircraft is airworthy. An 8-foot step ladder is recommended for preflight inspection of the main rotor; however, main rotor hub may be reached by first opening right rear seat and stepping on seat support and then stepping on deck below the aux fuel tank.

Check general condition of aircraft and verify no visible damage, fluid leakage, or abnormal wear. Verify no fretting at rivets and seams where parts are joined together. Fretting of aluminum parts produces a fine black powder while fretting of steel parts produces a reddish-brown or black residue. Verify Telatemps show no temperature increase that cannot be attributed to a change in operating conditions (mechanics draw a reference line to the right of the highest temperature square which has darkened in operation). Verify torque stripes on critical fasteners are not broken or missing.
DAILY OR PREFLIGHT CHECKS (cont’d)

1. Upper Forward Cowl Doors – Right Side

- Battery switch .............................................. ON
- Oil pressure, alt, aux fuel pump lights ............... ON
- Warning light test switches ......................... Push to test
- Fuel quantity ............................................. Check gauges
- Battery switch ............................................ OFF
- Aux fuel tank quantity ................................. Check
- Fuel filler cap ............................................ Tight
- Aux fuel tank ............................................. No leaks
- Fuel lines ..................................................... No leaks
- Fuel tank sump, gascolator drains .................... Sample
- Gearbox oil ................................................. Full, no leaks
- Hydraulic system ......................................... Fluid full, no leaks
- Rotor brake ................................................ Actuation normal
- Flex coupling ............................................. No cracks, nuts secure
- Yoke flanges .............................................. No cracks
- Gearbox, hydraulic pump Telatemps ................. Normal
- Control rod ends ......................................... Free without looseness
- Steel tube frame ......................................... No cracks
- All fasteners .............................................. Secure
- Tail rotor control ......................................... No interference

2. Main Rotor

**CAUTION**

Do not pull down on blades to teeter rotor. To lower a blade, push up on opposite blade.

- Blades ........................................ Clean and no damage/cracks

**CAUTION**

Verify erosion on lower surface of blades has not exposed skin-to-spar bond line. Reference Rotor Systems description in Section 7.
DAILY OR PREFLIGHT CHECKS (cont’d)

2. Main Rotor (cont’d)
   Pitch change boots ......................... No leaks
   Main hinge bolts ......................... Cotter pins installed
   All rod ends ......................... Free without looseness
   All fasteners ......................... Secure
   Swashplate scissors ............. No excessive looseness
   Upper forward cowl doors ................. Latched

3. Lower Cowl Door – Right Side
   Air box and duct ......................... Secure
   Engine sheet metal ................... No cracks
   Fuel lines ............................. No leaks
   Oil lines ............................. No leaks or chafing
   Exhaust system ......................... No cracks
   Throttle linkage ......................... Operable
   Cowl door ............................. Latched

4. Aft Cowl Door – Right Side
   Oil cooler door ......................... Check
   V-belt condition ......................... Check
   V-belt slack ............................. Check
   Sprag clutch ............................. No leaks
   Upper bearing ............................. No leaks
   Telatemp – upper bearing ................. Normal
   Sheave condition ......................... Check
   Flex coupling ......................... No cracks, nuts secure
   Yoke flanges ............................. No cracks
   Steel tube frame ......................... No cracks
   Tail rotor control ......................... No interference
   Tailcone attachment bolts ................. Check
   Cowl door ............................. Latched

5. Engine Rear
   Cooling fan nut ......................... Pin in line with marks
   Cooling fan ............................. No cracks
   Fan scroll .............................. No cracks
   Tailpipe hanger ........................ No cracks
DAILY OR PREFLIGHT CHECKS (cont’d)

6. Empennage
   Tail surfaces ............................... No cracks
   Fasteners ............................... Secure
   Position light ............................ Check
   Tail rotor guard .......................... No cracks

7. Tail Rotor
   Gearbox Telatemp ........................ Normal
   Gearbox ................................. Oil visible, no leaks
   Blades ................................. Clean and no damage/cracks
   Pitch links .............................. No looseness
   Teeter bearings ......................... Check condition
   Teeter bearing bolt ..................... Does not rotate
   Control bellcrank ....................... Free without looseness

8. Tailcone
   Skins .................................. No cracks or dents
   Strobe light condition .................. Check
   Antenna ................................. Check

9. Cowl Door – Left Side
   Engine oil ............................... 7-9 qts
   Oil filter ............................... Secure, no leaks
   Battery and relay (if located here) .... Secure
   Steel tube frame ........................ No cracks
   Engine sheet metal ..................... No cracks
   Exhaust system ........................ No cracks
   Cowl door ............................... Latched

10. Main Fuel Tank
    Quantity ............................... Check
     Filler cap ............................... Tight
     Leakage ................................. None
11. Fuselage Left Side
   Baggage compartments .................. Check
   Removable controls .................. Secure if installed
   Collective controls .................. Clear
   Seat belts .................. Check condition and fastened
   Doors .................. Unlocked and latched
   Door hinge safety pins .................. Installed
   Landing gear .................. Check
   Position light .................. Check
   Static port .................. Clear

12. Nose Section
   Pitot tube .................. Clear
   Windshield condition and cleanliness .................. Check
   Landing lights .................. Check
   Yaw string .................. Check

13. Fuselage Right Side
   Baggage compartments .................. Check
   Seat belts .................. Check condition and fastened
   Aft door .................. Unlocked and latched
   Door hinge safety pins .................. Installed
   Landing gear .................. Check
   Position light .................. Check
   Static port .................. Clear

14. Cabin Interior
   Loose articles .................. Removed or stowed
   Instruments, switches, and controls .................. Check condition
   Clock .................. Functioning
   Adjustable pedals .................. Pins secure

   CAUTION

   Remove left seat controls if person in that seat is not a rated helicopter pilot.
CAUTION

Fill baggage compartments under unoccupied seats to capacity before using baggage compartments under occupied seats. Avoid placing objects in compartment which could injure occupant if seat collapses during a hard landing.

CAUTION

Ensure all doors are unlocked before flight to allow rescue or exit in an emergency.

CAUTION

Shorter pilots may require cushion to obtain full travel of all controls. Verify aft cyclic travel is not restricted.

BEFORE STARTING ENGINE

<table>
<thead>
<tr>
<th>Action</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat belts</td>
<td>Fastened</td>
</tr>
<tr>
<td>Fuel shut-off valve</td>
<td>ON</td>
</tr>
<tr>
<td>Cyclic/collective friction</td>
<td>OFF</td>
</tr>
<tr>
<td>Cyclic, collective, pedals</td>
<td>Full travel free</td>
</tr>
<tr>
<td>Throttle</td>
<td>Full travel free</td>
</tr>
<tr>
<td>Collective</td>
<td>Full down, friction ON</td>
</tr>
<tr>
<td>Cyclic</td>
<td>Neutral, friction ON</td>
</tr>
<tr>
<td>Pedals</td>
<td>Neutral</td>
</tr>
<tr>
<td>Rotor brake</td>
<td>Disengaged</td>
</tr>
<tr>
<td>Circuit breakers</td>
<td>In</td>
</tr>
<tr>
<td>Landing lights</td>
<td>OFF</td>
</tr>
<tr>
<td>Avionics switch (if installed)</td>
<td>OFF</td>
</tr>
<tr>
<td>Clutch</td>
<td>Disengaged</td>
</tr>
<tr>
<td>Altimeter</td>
<td>Set</td>
</tr>
<tr>
<td>HYD and governor switches</td>
<td>ON</td>
</tr>
</tbody>
</table>
ENGINE STARTING TIPS

Prime 3 to 5 seconds after fuel pump caution light extinguishes. If engine does not fire after 5 to 7 seconds of cranking, repeat priming sequence and reattempt start. If engine fires momentarily but dies before or while moving mixture to rich, pull mixture off, engage starter, and push mixture slowly rich while cranking. If engine fails to start after three attempts, allow starter to cool ten minutes before next attempt.

With a hot engine, it may be helpful to cool fuel in lines by running fuel pump for 30 seconds with mixture OFF prior to beginning start procedure (hold key in prime position).

STARTING ENGINE AND RUN-UP

<table>
<thead>
<tr>
<th>Control</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle</td>
<td>Closed</td>
</tr>
<tr>
<td>Battery, strobe switches</td>
<td>ON</td>
</tr>
<tr>
<td>Area</td>
<td>Clear</td>
</tr>
<tr>
<td>Mixture</td>
<td>Rich</td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Prime, then Both</td>
</tr>
<tr>
<td>Mixture</td>
<td>Pull OFF</td>
</tr>
<tr>
<td>Starter</td>
<td>Engage until engine fires</td>
</tr>
<tr>
<td>Mixture</td>
<td>Move full rich</td>
</tr>
<tr>
<td>Mixture guard</td>
<td>Installed</td>
</tr>
<tr>
<td>Starter-On light</td>
<td>Out</td>
</tr>
<tr>
<td>Set engine RPM</td>
<td>50 to 60%</td>
</tr>
<tr>
<td>Clutch switch</td>
<td>Engaged</td>
</tr>
<tr>
<td>Blades turning</td>
<td>Less than 5 seconds</td>
</tr>
<tr>
<td>Alternator switch</td>
<td>ON</td>
</tr>
<tr>
<td>Oil pressure within 30s</td>
<td>25 psi minimum</td>
</tr>
<tr>
<td>Avionics, headsets</td>
<td>ON</td>
</tr>
<tr>
<td>Annunciator panel test</td>
<td>All lights on</td>
</tr>
<tr>
<td>Audio alert</td>
<td>Test</td>
</tr>
<tr>
<td>Wait for clutch light</td>
<td>Circuit breakers in</td>
</tr>
<tr>
<td>Warm-up RPM</td>
<td>60 to 70%</td>
</tr>
<tr>
<td>Engine gages</td>
<td>Green</td>
</tr>
<tr>
<td>Mag drop at 75% RPM</td>
<td>7% max in 2 seconds</td>
</tr>
<tr>
<td>Sprag clutch check</td>
<td>Needles split</td>
</tr>
<tr>
<td>Doors (if installed)</td>
<td>Closed and latched</td>
</tr>
<tr>
<td>Limit MAP chart</td>
<td>Check</td>
</tr>
<tr>
<td>Cyclic/collective friction</td>
<td>OFF</td>
</tr>
<tr>
<td>Hydraulic system</td>
<td>Check</td>
</tr>
<tr>
<td>Governor On, increase throttle</td>
<td>RPM 101-102%</td>
</tr>
<tr>
<td>Warning lights</td>
<td>Out</td>
</tr>
<tr>
<td>Lift collective slightly, reduce RPM</td>
<td>Horn/Light at 97%</td>
</tr>
</tbody>
</table>
FOR aircraft which provide low RPM horn through the audio system, a headset for each pilot is required to hear the horn.

On slippery surfaces, be prepared to counter nose-right rotation with left pedal as governor increases RPM.

For hydraulic system check, use small cyclic inputs. With hydraulics OFF, there should be approximately one half inch of freeplay before encountering control stiffness and feedback. With hydraulics ON, controls should be free with no feedback or uncommanded motion.

Idle mixture and speed may require adjustment as conditions vary from sea level standard. Refer to R44 Maintenance Manual for idle adjustment procedure.

Before takeoff, pilot should uncover one ear and listen for any unusual noise which may indicate impending failure of a bearing or other component.
TAKEOFF PROCEDURE

1. Verify doors latched, governor and hydraulics ON, and RPM stabilized at 101 to 102%.

2. Clear area. Slowly raise collective until aircraft is light on skids. Reposition cyclic as required for equilibrium, then gently lift aircraft into hover.

3. Check gages in green and note hover MAP.

4. Lower nose, and accelerate to climb speed following profile shown by height-velocity diagram in Section 5. Avoid exceeding two inches MAP above IGE hover power to prevent excessive nose-down attitude. If RPM drops below 101%, lower collective.

DOORS-OFF OPERATION

Maximum airspeed with any door(s) off is 100 KIAS. Warn passengers to secure loose objects and to keep head and arms inside cabin to avoid high velocity airstream.

**CAUTION**

Ensure all seat belts are buckled during door-off flight. Rear seat bottoms may lift if not restrained and items in baggage compartments could be blown out.

**CAUTION**

Flight with left door(s) removed is not recommended. Loose objects exiting left doors may damage tail rotor.
CRUISE

1. Verify RPM in green arc.

2. Set manifold pressure as desired with collective. Observe MAP and airspeed limits. Maximum recommended cruise speed is 110 KIAS.

3. Verify gages in green, warning lights out.

**CAUTION**

Do not exceed 110 KIAS except in smooth air, and then only with caution. In turbulence, use lower airspeed. If turbulence is significant or becomes uncomfortable for the pilot, use 60 to 70 KIAS.

**CAUTION**

In-flight leaning with engine mixture control is not allowed. Mixture must be full rich during flight.

**NOTE**

When loaded near aft CG limit, slight yaw oscillation during cruise can be stopped by applying a small amount of left pedal.
PRACTICE AUTOROTATION – POWER RECOVERY

1. Lower collective to down stop and reduce throttle as desired for tachometer needle separation.

**CAUTION**

To avoid inadvertent engine stoppage, do not chop throttle to simulate a power failure. Always roll throttle off smoothly. Recover immediately if engine is rough or engine RPM continues to drop.

**NOTE**

Governor is inactive below 80% engine RPM regardless of governor switch position.

**NOTE**

When entering autorotation from above 6000 feet, reduce throttle slightly before lowering collective to prevent engine overspeed.

2. Adjust collective to keep rotor RPM within limits and adjust throttle for tachometer needle separation.

3. Keep airspeed 60 to 70 KIAS.

4. At about 40 feet AGL, begin cyclic flare to reduce rate of descent and forward speed.

5. At about 8 feet AGL, apply forward cyclic to level aircraft and raise collective to control descent. Add throttle if required to keep RPM in green arc.

**CAUTION**

Simulated engine failures require prompt lowering of collective to avoid dangerously low rotor RPM. Catastrophic rotor stall could occur if the rotor RPM ever drops below 80% plus 1% per 1000 feet of altitude.
PRACTICE AUTOROTATION – WITH GROUND CONTACT

If practice autorotations with ground contact are required for demonstration purposes, perform in same manner as power recovery autorotations except:

Prior to cyclic flare, roll throttle off into overtravel spring and hold against hard stop until autorotation is complete. (This prevents throttle correlator from adding power when collective is raised.)

Always contact ground with skids level and nose straight ahead.

NOTE

Have landing gear skid shoes inspected frequently when practicing autorotations with ground contact. Rapid wear of skid shoes may occur.

HYDRAULICS-OFF TRAINING

Hydraulic system failure may be simulated using the cyclic-mounted hydraulic switch.

CAUTION

With hydraulics switched OFF, controlling helicopter in a hover may be difficult due to control system feedback forces.

CAUTION

Before switching hydraulics from OFF to ON, relax force on cyclic and collective to avoid over-controlling.
DESCENT, APPROACH, AND LANDING

1. Reduce power with collective as desired. Observe airspeed limits. Maximum recommended airspeed is 110 KIAS except in smooth air.

   **CAUTION**

   Do not initiate a descent with forward cyclic. This can produce a low-G condition. Always initiate a descent by lowering collective.

2. Make final approach into wind at lowest practical rate of descent with initial airspeed of 60 KIAS.

3. Reduce airspeed and altitude smoothly to hover. (Be sure rate of descent is less than 300 FPM before airspeed is reduced below 30 KIAS.)

4. From hover, lower collective gradually until ground contact.

5. After initial ground contact, lower collective to full down position.

   **CAUTION**

   When landing on a slope, return cyclic control to neutral before reducing rotor RPM.

   **CAUTION**

   Never leave helicopter flight controls unattended while engine is running.

   **CAUTION**

   Hold throttle closed if passenger is entering or exiting with engine running and left seat collective installed.
SHUTDOWN PROCEDURE

Collective down, RPM 60–70% . . . . . . . . . . . . . . . . . . . . . . . . . . . Friction ON
Cyclic and pedals neutral . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Friction ON
CHT drop . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Throttle closed
Clutch switch . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Disengage
Wait 30 seconds . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Mixture OFF
Wait 30 seconds . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Apply rotor brake
Clutch light . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Extinguishes
Avionics, alt, battery, and ignition switches . . . . . . . . . . . . . . . . . . . . . OFF

NOTE
If ambient temperature is above 100°F (38°C), cool down at 60-70% RPM for at least one minute before reducing to idle. In hot ambient conditions, it may also be helpful to open engine cowl doors while parked if parking period will be less than one hour.

NOTE
During idle and after engine shutdown, pilot should uncover one ear and listen for unusual noise which may indicate impending failure of a bearing or other component.

CAUTION
Do not slow rotor by raising collective during shutdown. Blades may flap and strike tailcone.

NOTE
HYD switch should be left ON for startup and shutdown to reduce possibility of unintentional hydraulics-off liftoff. Switch OFF only for pre-takeoff controls check or hydraulics-off training.

NOTE
Rotor brake should be left engaged after shutdown to disable starter buttons and reduce possibility of unintentional starter engagement.
NOISE ABATEMENT

To improve the quality of our environment and to dissuade overly restrictive ordinances against helicopters, it is imperative that every pilot minimize noise irritation to the public. Following are several techniques which should be employed when possible.

1. Avoid flying over outdoor assemblies of people.
   When this cannot be avoided, fly as high as practical, preferably over 2000 feet AGL.

2. Avoid blade slap. Blade slap generally occurs at airspeeds below 100 KIAS. It can usually be avoided by maintaining 100 KIAS until rate of decent is over 1000 feet per minute, then using a fairly steep approach until airspeed is below 65 KIAS. With the right door vent open, the pilot can easily determine those flight conditions which produce blade slap and develop piloting techniques to eliminate or reduce it.

3. When departing from or approaching a landing site, avoid prolonged flight over noise sensitive areas. Always fly above 500 feet AGL and preferably above 1000 feet AGL.

4. Repetitive noise is far more irritating than a single occurrence. If you must fly over the same area more than once, vary your flight path to not overfly the same buildings each time.

5. When overflying populated areas, look ahead and select the least noise-sensitive route.

**NOTE**

Above procedures do not apply where they would conflict with Air Traffic Control clearances or when, in the pilot’s judgment, they would result in an unsafe flight path.