SECTION 4

NORMAL PROCEDURES

CONTENTS

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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 (Do not exceed except in smooth air, and then only with caution)	110 KIAS*
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, the main rotor hub may be reached by stepping on the aft right door sill and then stepping on the 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 and alternator lights . . . . . ON
Warning light test switches . . . . . Push to test
Fuel quantity . . . . . Check gages
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
   - Carb air ducts . . . . . Secure
   - Carb heat scoop . . . . . Secure
   - Engine sheet metal . . . . . No cracks
   - Fuel lines . . . . . No leaks
   - Oil lines . . . . . No leaks or chafing
   - Exhaust system . . . . . No cracks
   - Primer (if installed) . . . . . Prime as required/ Locked/No leaks
   - Cowl door . . . . . Latched

4. Aft Cowl Door – Right Side
   - Oil cooler door . . . . . Check
   - V-belt condition . . . . . Check
   - V-belt slack . . . . . 1.5 inches (4 cm) maximum |
   - 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
   - Throttle linkage . . . . . Operable
   - 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

DAILY OR PREFLIGHT CHECKS (cont'd)

11. Fuselage Left Side
    - Baggage compartments . . . . . Check
    - Removable controls . . . . . Secure if installed
    - Collective control . . . . . Clear
    - Seat belt . . . . . 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
    - 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
    - Seat belt . . . . . Check condition
    - 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.

DAILY OR PREFLIGHT CHECKS (cont'd)

CAUTION

Fill aft baggage compartments to capacity before using baggage compartments under occupied seats. Avoid placing objects in under-seat compartments 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

Seat belts . . . . . Fastened
Fuel shut-off valve . . . . . ON
Cyclic/collective friction . . . . . OFF
Cyclic, collective, pedals . . . . . Full travel free
Throttle . . . . . Full travel free
Collective . . . . . Full down, friction ON
Cyclic . . . . . Neutral, friction ON
Pedals . . . . . Neutral
Rotor brake . . . . . Disengaged
Circuit breakers . . . . . In
Carb heat . . . . . OFF
Mixture . . . . . Full rich
Mixture guard . . . . . Installed
Landing light switch . . . . . OFF
Avionics switch . . . . . OFF
Clutch . . . . . Disengaged
Altimeter . . . . . Set
HYD and governor switches . . . . . ON

STARTING ENGINE AND RUN-UP

Throttle twists for priming . . . . . As required
Throttle . . . . . Closed
Battery, strobe switches . . . . . ON
Area . . . . . Clear
Ignition switch . . . . . Start, then Both
Starter-On light . . . . . Out
Set engine RPM . . . . . 50 to 60%
Clutch switch . . . . . Engaged
Blades turning . . . . . Less than 5 seconds
Alternator switch . . . . . ON
Oil pressure within 30 seconds . . . . . 25 psi minimum
Avionics, headsets . . . . . ON
Annunciator panel test (if equipped) . . . . . All lights on
Audio alert (if equipped) . . . . . Test
Wait for clutch light out . . . . . Circuit breakers in
Warm-up RPM . . . . . 60 to 70%
Engine gages . . . . . Green
Mag drop at 75% RPM . . . . . 7% max in 2 seconds
Carb heat . . . . . CAT rise/drop, set as required
Sprag clutch check . . . . . Needles split
Doors (if installed) . . . . . Closed and latched
Limit MAP chart . . . . . Check
Cyclic/collective friction . . . . . OFF
Hydraulic system . . . . . Check
Governor On, increase throttle . . . . . RPM 101-102%
Warning lights . . . . . Out
Lift collective slightly, reduce RPM . . . . . Horn/light at 97%

CAUTION

For aircraft which provide low RPM horn through the audio system, a headset for each pilot is required to hear the horn.

CAUTION

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

STARTING ENGINE AND RUN-UP (cont'd)

NOTE

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.

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 adjust carb heat if required.
4. Lower nose and accelerate to climb speed following profile shown by height-velocity diagram in Section 5. If RPM drops below 101%, lower collective.

CRUISE

1. Adjust carb heat if required. (See page 4-12.)
2. Verify RPM in green arc.
3. Set manifold pressure as desired with collective. Observe MAP and airspeed limits. Maximum recommended cruise speed is 110 KIAS.
4. 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.

DOORS-OFF OPERATION

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

CAUTION

Ensure aft baggage compartment covers are latched closed prior to door-off flight. An unlatched cover may blow open and items in baggage compartment could be blown out.

CAUTION

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

PRACTICE AUTOROTATION – POWER RECOVERY

1. Adjust carb heat if required. (See page 4-12.)
2. 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 4000 feet, reduce throttle slightly before lowering collective to prevent engine overspeed.

3. Adjust collective to keep rotor RPM within limits and adjust throttle for tachometer needle separation.
4. Keep airspeed 60 to 70 KIAS.
5. At about 40 feet AGL, begin cyclic flare to reduce rate of descent and forward speed.
6. 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 overcontrolling.

USE OF CARBURETOR HEAT

Carburetor ice can form in a wide range of atmospheric conditions, but is most likely to form when OAT is between -4ºC and 30ºC (25ºF and 86ºF) and the difference between OAT and dew point is less than 15Cº (27Fº). When conditions conducive to carburetor ice are suspected, use carburetor heat as follows:

During Run-up: Use full carburetor heat (it is filtered) to preheat induction system.

During Flight: Use carb heat as required to keep CAT gage indication out of yellow arc.

CAUTION

The pilot may be unaware of carburetor ice formation as the governor will automatically increase throttle and maintain constant manifold pressure and RPM. Therefore, the pilot must apply carburetor heat as required whenever icing conditions are suspected.

USE OF CARB HEAT ASSIST

The carb heat assist correlates application of carburetor heat with changes in collective setting to reduce pilot work load. Lowering collective mechanically adds heat and raising collective reduces heat. A friction clutch allows the pilot to override the system and increase or decrease heat as required.

A latch is provided at the control knob to lock carburetor heat off. The knob should be left unlatched unless it is obvious that conditions are not conducive to carburetor ice. Apply carburetor heat as required if carburetor ice is a possibility. Monitor CAT gage and readjust as necessary following lift to hover or any power change.

DESCENT, APPROACH, AND LANDING

1. Reduce power with collective as desired. Adjust carb heat as required. 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 knots.
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
Mixture guard . . . . . Back on mixture
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.

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 start-up and shutdown to reduce possibility of unintentional hydraulics-off liftoff. Switch OFF only for pre-takeoff controls check or hydraulics-off training.

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 descent 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 judgement, they would result in an unsafe flight path.

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