

**SECTION 8  
HANDLING AND MAINTENANCE**

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## **SECTION 8**

### **HANDLING AND MAINTENANCE**

#### **GENERAL**

This section outlines procedures recommended for handling, servicing, and maintaining the R44 helicopter. Every owner should stay in close contact with a Robinson Service Center to obtain the latest service and maintenance information. Owners should also be registered with the factory to receive service bulletins, changes to this handbook, and other helpful information as it becomes available. These publications are available on RHC's website: [www.robinsonheli.com](http://www.robinsonheli.com)

Federal Regulations place responsibility for maintenance of a helicopter on the owner and operator. The owner/operator must insure that all maintenance is performed by qualified mechanics and in accordance with the R44 Maintenance Manual (Instructions for Continued Airworthiness), Service Bulletins/Service Letters, and FAA Airworthiness Directives.

All limits, procedures, safety practices, time limits, servicing, and maintenance requirements contained in this handbook are considered mandatory.

Authorized Robinson Service Centers will have recommended modification, service, and operating procedures issued by the FAA and by Robinson Helicopter Company. This information will be useful in obtaining maximum utility and safety with the helicopter.

## **REQUIRED DOCUMENTS**

The Airworthiness Certificate (FAA Form 8100-2) must be displayed in the aircraft at all times. The following additional documents must be carried in the aircraft:

1. Registration Certificate (FAA Form 8050-3)
2. Pilot's Operating Handbook
3. Current Weight and Balance

The following documents should not be carried in the aircraft, but must be available for use by any mechanic or pilot servicing the aircraft:

1. Aircraft Logbook
2. Engine Logbook

### ***NOTE***

Required documents may vary in countries other than the United States.

## **REQUIRED INSPECTIONS**

Federal Regulations require most civil aircraft of U.S. registry to undergo a complete inspection every twelve months. This annual inspection must be signed off by a mechanic with Inspection Authorization (IA). In addition to the annual inspection, the R44 Maintenance Manual requires a complete inspection after every 100 hours of operation.

The R44 helicopter includes many unique features. Without special training, Airframe and Powerplant (A&P) mechanics are not qualified to perform the above inspections. Only appropriately rated personnel who have successfully completed a factory-approved maintenance course, or are under the direct supervision of such personnel, should perform maintenance, repairs, or inspections on the R44 helicopter.

The helicopter incorporates a number of fatigue life-limited components which must be retired at specified time intervals. A list of these components is contained in the Airworthiness Limitations section of the R44 Maintenance Manual and Instructions for Continued Airworthiness.

The factory occasionally publishes Service Bulletins and the Federal Aviation Administration (FAA) occasionally publishes Airworthiness Directives (ADs) that apply to specific groups of aircraft. They are mandatory changes or inspections which must be complied with within the time limit specified. Owners should periodically check with Robinson Service Centers to be sure that the latest Service Bulletins and ADs issued have been complied with.

**PREVENTIVE MAINTENANCE BY THE PILOT**

14 CFR Part 43 of the Federal Regulations allows a certificated pilot to perform preventive maintenance. Preventive maintenance is defined in the above regulations, and, as applied to the R44 helicopter, includes the following:

1. Replace defective safety wire or cotter pins.
2. Replace bulbs, reflectors, and lenses of position and landing lights.
3. Replace, clean, or gap spark plugs.
4. Clean or replace engine air filter.
5. Change engine oil and filter.
6. Inspect and clean chip detectors.
7. Change or replenish main and tail gearbox oil.
8. Replenish hydraulic fluid in reservoir.
9. Remove and replace gascolator bowl.
10. Remove or replace cowling or inspection panels.
11. Service or replace battery.
12. Replace wear shoes on landing gear skids.
13. Clean or refinish exterior of aircraft.

Although the above work is allowed by law, it should only be performed by pilots confident that they are qualified to reliably complete the work. All work must be done in accordance with the R44 Maintenance Manual.

After completing the work, when required, the pilot must enter the following in the appropriate logbook:

1. Date work accomplished.
2. Description of work.
3. Total hours on aircraft.
4. Pilot certificate number.
5. Signature of pilot.

## **ALTERATIONS TO AIRCRAFT**

The compactness and many unique design features of the R44 helicopter make any modification inadvisable. Dynamic characteristics and susceptibility to fatigue of the rotor, drive, and control systems make any modification to these systems extremely hazardous.

Also hazardous is installation of any electronic equipment or avionics not factory-approved and supplied. The compactness of the console and tunnel containing the controls and wire bundles makes installation of any additional wires likely to interfere with free control movement. The electronic tachometers and governor may be affected by other electronic devices and their reliability and accuracy is essential for safe operation of the helicopter. Installation of unauthorized electrical devices can result in a hazardous condition.

Because of these potential hazards, Robinson Helicopter Company does not authorize any modification or alteration other than those which are factory-supplied and installed by factory-trained personnel.

## **GROUND HANDLING**

For leveling, hoisting, or jacking, see appropriate sections of the maintenance manual.

The helicopter may be maneuvered on the ground using ground handling wheels. Recommended tire pressure is 60 psi (4 bar). Wheels must be removed for flight.

To attach wheels:

1. Hold handle and wheel with protruding spindle in its lowest position.
2. Insert spindle into support mounted on skid. Make sure spindle is all the way in.
3. Pull handle over center to raise helicopter and lock wheel in position.

### ***CAUTION***

When lowering helicopter, handle has a tendency to snap over.

Ground handling generally requires two people: one to hold the tail down and steer by holding the tail gearbox and a second to push on the fuselage. The steel tube frame inside the aft cowl door may be used as a hand hold for pushing. Keep feet clear of skid tubes. Alternately, a Robinson electric tow cart may be used per the instructions provided.

### ***CAUTION***

Do not move helicopter by gripping tail rotor guard, outboard part of horizontal stabilizer, tail rotor, or tail rotor controls.



## **PARKING**

1. Place cyclic control in neutral position and apply friction. |
2. Put collective full down and apply friction.
3. Align rotor blades approximately fore and aft. Apply rotor brake. Use blade tie-downs in windy conditions.

### ***CAUTION***

If using rotor blade tie-downs, do not overtighten tie-down straps (5 lb max tension). Do not pull down on blades to teeter rotor. To lower a blade, push up on opposite blade.

4. During storm conditions, helicopter should be hangared or moved to a safe area.
5. If helicopter is hangared, turn fuel shutoff valve off.

## **CABIN DOORS**

All four cabin doors may be removed and installed by maintenance personnel or pilots. To remove a door, disconnect door strut by lifting inboard end of strut while holding door in full open position, remove cotter rings in upper and lower hinge pins, and then lift door off. To install doors, use reverse procedure. Adjust weight and balance as required when removing or installing doors.

## **ENGINE OIL**

Recommended maximum oil quantity is nine quarts and minimum quantity for takeoff is seven quarts as indicated on the oil dipstick.

The oil and filter should be changed at least every 50 hours or four months, whichever occurs first. If no oil filter is installed, change oil every 25 hours. Check alternator drive belt condition and tension and fan shaft bearing condition at each oil change.

To change oil:

1. Ground run or fly helicopter to obtain normal operating temperature.
2. Remove engine side cowls and open quick drain on bottom of sump to drain oil into suitable container.
3. Cut safety wire from oil suction-screen cap located on centerline at accessory (magneto) end of sump.
4. Remove, inspect, clean, and reinstall oil suction screen. Re-safety cap.
5. Cut safety wire (if installed) from oil filter and break loose using wrench or loosen pressure-screen housing bolts.
6. Place suitable container below and inboard of magneto to catch oil retained in filter or screen housing and remove filter or screen housing slowly to allow oil to drain into container. Do not allow oil to drain on magneto housing.
7. Cut filter open to inspect, or inspect and clean pressure screen.
8. Install new filter per instructions printed on filter. Use only Champion CH48108, CH48108-1, Tempest AA48108-2, or Robinson B123-1 or -2 filter with Robinson filter adapter or use Champion CH48103 or CH48103-1 filter with early-style filter installation. Safety wire is not required on filter. If no filter is installed, re-install pressure screen and housing. Torque pressure-screen housing bolts to 96 in.-lb.

**ENGINE OIL (cont'd)**

9. Close quick drain and fill sump with 9 quarts of appropriate grade oil as recommended below.
10. Start helicopter. Verify oil pressure within 30 seconds. Ground run for a few minutes, shut down, and verify no leaks.
11. Check oil level on dipstick.
12. Install cowlings.
13. Make appropriate maintenance record entries.

The following grades of oil are recommended:

Average Ambient Air Temperature	Mineral Grades MIL-L-6082 or SAEJ1966 (Use first 50 hours)	Ashless Dispersant Grades MIL-L-22851 or SAEJ1899 (Use after first 50 hours)
All Temperatures	—	SAE15W50 or SAE20W50
Above 60°F	SAE50	SAE40 or SAE50
30°F to 90°F	SAE40	SAE40
0°F to 70°F	SAE30	SAE30, SAE40, or SAE20W40
0°F to 90°F	SAE20W50	SAE20W50 or SAE15W50
Below 10°F	SAE20	SAE30 or SAE20W30

**HYDRAULIC FLUID**

Hydraulic fluid level is indicated by a sight gage in the reservoir. The sight gage can be viewed by opening the cowl door aft of the aux fuel tank. A filler/vent cap is located on top of the reservoir. If hydraulic fluid is not visible in reservoir sight gage with helicopter sitting level, remove filler/vent cap and add Robinson part number A257-15 fluid (MIL-PRF-5606) to center of sight gage. Torque filler/vent cap to 100 in.-lb.

**NOTE**

Sight gage reading will be higher with system hot.

## **GEARBOX OIL**

Main and tail gearbox oil quantities are indicated by sight gages. The main gearbox sight gage is on the right side of the gearbox and can be viewed by opening the cowl door below the aux fuel tank. The tail gearbox sight gage is located at the aft end of the tail gearbox.

If oil is not visible in the sight gage with helicopter sitting level, oil must be added. The gearboxes use either Robinson P/N A257-2 or A257-22 oil. Refer to placard to ensure correct oil is being added.

To add oil to the tail gearbox:

1. Cut safety wire (if installed) and remove filler/vent cap located on top of gearbox.
2. Fill very slowly to center of sight gage. **DO NOT** overfill. (Less than a tablespoon of oil is usually required.)
3. Reinstall filler/vent cap. Be sure metal gasket or rubber o-ring is in place. Torque to 100 in.-lb.
4. Safety wire as before. (Safety wire not required if cap is sealed with an o-ring.) Be sure safety wire applies tension in direction which would tighten cap.

To add oil to the main gearbox, see maintenance manual.

## **FUEL**

Approved fuel grades and capacity are given in Section 2.

A small quantity of fuel should be drained from the gascolator and from each tank using the quick drains prior to the first flight each day and after refueling. On later helicopters, a glass tube stowed inside the upper, aft cowl door is provided which may be used to catch the fuel samples. Drain enough fuel to remove any water or dirt and check for approved fuel color. If fuel contamination is suspected, continue to drain fuel from gascolator and tank drains until all contamination is eliminated.

### **FUEL BLADDERS**

Fuel tanks are equipped with crash-resistant flexible bladders. The bladders are subject to deterioration, which may cause them to leak or seep fuel as they age. To prolong bladder life, fuel tanks should be topped off when the helicopter is stowed to keep the bladder material from drying out. Extreme heat and water adversely affect the material. Therefore, ensure the sumps are drained of water and use a hangar for stowage when possible.

### **FIRE EXTINGUISHER (OPTIONAL)**

The optional fire extinguisher (model RT-A400) should be weighed monthly to verify it contains a sufficient charge of extinguishing agent. Results should be recorded on the decal affixed to the extinguisher or in other maintenance records. If weight falls below 500 grams, remove extinguisher from service.

The extinguisher is rated for a storage and operating temperature of 120°F (49°C). If operating conditions would expose extinguisher to higher temperatures (e.g. parking in the sun in a hot climate), remove extinguisher and store it in a cooler area between flights.

## **BATTERY**

The battery is located in the engine compartment, under the left front seat, or beneath the instrument console. The battery is sealed and does not require fluid level checks.

A discharged battery is **NOT AIRWORTHY** because it will not have the reserve capacity to operate the electrical system should the charging system fail in flight.

Often, a 10 or 15 minute charge will improve battery condition enough to start the engine. If battery is located in the engine compartment, open left engine cowl access door and connect positive charger cable to positive (battery side) battery relay terminal. Then, connect negative charger cable to battery ground strap or engine. If battery is located beneath the instrument console, remove console hold down screws (one each side), lift console, remove battery box cover, and connect charger cables directly to battery posts (connect positive cable first). Use extreme caution not to short to console sheet metal. Later console installations are equipped with charging posts on the right side of the console. Charger cables may be connected directly to these posts without accessing the battery. If battery is located beneath the left front seat, open under-seat compartment, remove battery protective panel at forward end of compartment, and connect charger cables as described for engine compartment battery.

After charging, disconnect cables (disconnect negative cable first), secure access panels or console as required, and attempt a normal start. If battery still has insufficient charge to start engine, service or replace battery before further flight.

On helicopters with a 28-volt electrical system, the battery may be charged using the optional external power receptacle located inside the right engine-cowl door. Power connected to the receptacle will flow directly to the battery via the 20-amp charging circuit breaker (10 amp breaker on earlier helicopters) without the battery switch on. For larger charging currents, the battery switch must be on to allow current flow through the external power and battery relays.

## **CLEANING HELICOPTER**

### **CLEANING EXTERIOR INCLUDING ROTOR BLADES**

The helicopter should be washed with mild soap and water. Harsh abrasives, alkaline soaps, or detergents should not be used because they could scratch painted or plastic surfaces or could cause corrosion of metal. Cover areas where cleaning solution could cause damage. Use the following procedure:

1. Rinse away loose dirt and salt residue with water.
2. Apply cleaning solution with a soft cloth, sponge, or soft bristle brush.
3. To remove stubborn oil and grease, use a cloth dampened with aliphatic naphtha.
4. Rinse all surfaces thoroughly.
5. Apply carnauba wax to rotor blades and renew wax when water no longer beads on blade surface. Any good automotive wax may be used to preserve other painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing.

### ***CAUTION***

Never use high-pressure spray to clean helicopter. Never blow compressed air into main or tail rotor blade tip drain holes.

### **CLEANING WINDSHIELD AND WINDOWS**

1. Remove dirt, mud, and other loose particles from exterior surfaces with clean water.
2. Wash with mild soap and warm water or with aircraft plastic cleaner. Use a soft cloth or sponge in a straight back and forth motion. Do not rub harshly.
3. Remove oil and grease with a cloth moistened with isopropyl alcohol (rubbing alcohol) or aliphatic naphtha.

**CLEANING HELICOPTER (cont'd)**

**CLEANING WINDSHIELD AND WINDOWS (cont'd)**

***CAUTION***

Do not use gasoline, other alcohols, benzene, carbon tetrachloride, thinner, acetone, or window (glass) cleaning sprays.

4. After cleaning plastic surfaces, apply a thin coat of hard polishing wax. Rub lightly with a soft cloth. Do not use a circular motion.

***CAUTION***

Windshield surface must be hydrophobic (water repellent) for good visibility in rain. When using a new cleaning or polishing product on windshield, verify water beads on surface before flying.

5. On acrylic windows (standard windshield), scratches can be removed by rubbing with jeweler's rouge followed by hand polishing with commercial plastic polish. Use a figure eight motion when polishing.

***NOTE***

Impact-resistant windshields are made from polycarbonate with a protective hardcoat and cannot be polished.

**CLEANING UPHOLSTERY AND SEATS**

1. Vacuum and brush, then wipe with damp cloth. Dry immediately.
2. Soiled upholstery, except leather, may be cleaned with a good upholstery cleaner suitable for the material. Follow manufacturer's instructions. Avoid soaking or harsh rubbing.



**CLEANING HELICOPTER (cont'd)**

**CLEANING UPHOLSTERY AND SEATS (cont'd)**

***CAUTION***

Avoid use of solvents, detergents, or aerosol sprays near CO sensor. Tape off openings in top and bottom of sensor housing when cleaning cabin interior.

3. Leather should be cleaned with saddle soap or a mild hard soap and water.

**CLEANING CARPETS**

Remove loose dirt with a whisk broom or vacuum. For soiled spots and stains, use nonflammable dry cleaning liquid.

**STORAGE**

The helicopter requires special preparation for long-term storage (greater than 30 days). Contact your maintenance provider to determine appropriate procedures prior to storage.

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