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Federal Aviation Administration
Los Angeles, CA

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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

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.

SECTION 5

PERFORMANCE

GENERAL

IGE hover controllability has been substantiated in 17 knot wind from any direction up to 9600 feet (2930 meters) density altitude. Refer to hover performance charts for allowable gross weight.

CAUTION

Performance data presented in this section was obtained under ideal conditions. Performance under other conditions may be substantially less.

NOTE

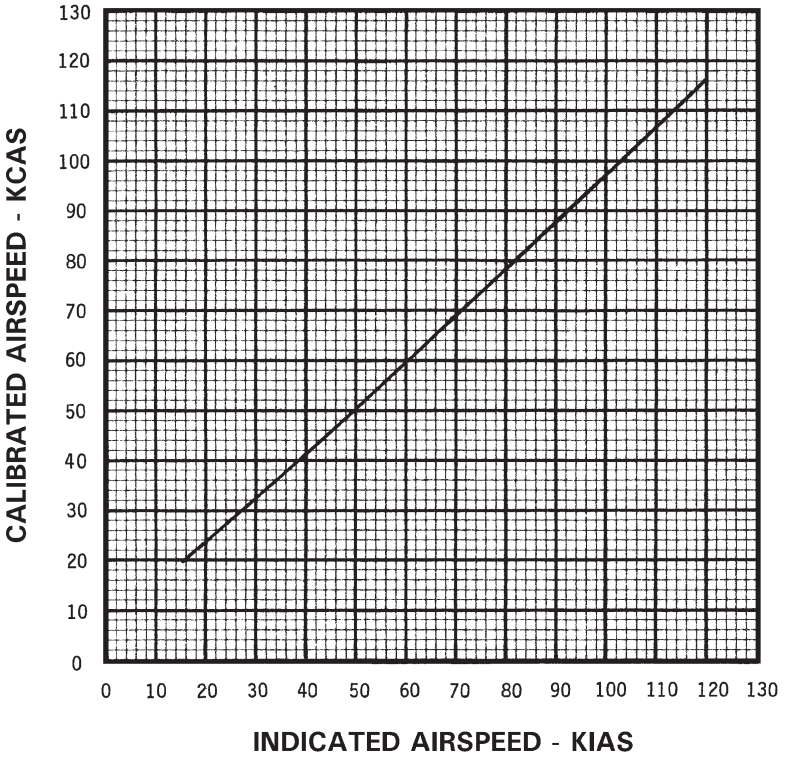
Hover performance data given is with carburetor heat off. Full carburetor heat reduces hover ceilings by up to 2400 feet (730 meters).

Indicated airspeed (KIAS) shown on charts assumes zero instrument error.

DEMONSTRATED OPERATING TEMPERATURE

Satisfactory engine cooling has been demonstrated to an outside air temperature of 38°C (100°F) at sea level or 23°C (41°F) above ISA at altitude.

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR



AIRSPEED CALIBRATION CURVE

SECTION 7

SYSTEMS DESCRIPTION

CONTENTS

INTENTIONALLY BLANK

DRIVE SYSTEM (cont'd)

The long tail rotor drive shaft has no support bearings but has a lightly-loaded damper bearing. The tail gearbox contains a single 90° splash-lubricated spiral-bevel gear set.

POWERPLANT

One Lycoming O-540 six-cylinder, horizontally-opposed, overhead-valve, air-cooled, carbureted engine with a wet sump oil system powers the helicopter. The engine is equipped with a starter, alternator, shielded ignition, two magnetos, muffler, oil cooler, oil filter, and induction air filter. See Sections 1 and 2 for powerplant specifications and limitations.

A direct-drive, squirrel-cage fan wheel mounted to the engine output shaft supplies cooling air to the cylinders and oil cooler via a fiberglass and aluminum shroud.

Induction air enters through an opening on the right side of the fuselage and passes through a flexible duct to the carburetor air box. A second flexible duct passes heated air from an exhaust-mounted scoop to the air box. A sliding valve controlled by the carburetor heat control adjusts the mix of cool and heated air, which then flows through the air filter and up into the carburetor.

The pilot should adhere to recommended procedures in the Lycoming Operator's Manual to obtain maximum engine life and efficiency.

FLIGHT CONTROLS

Dual controls are standard equipment and all primary controls are actuated through push-pull tubes and bellcranks. Bearings used throughout the control system are either sealed ball bearings which do not require lubrication or have self-lubricated liners.

FLIGHT CONTROLS (cont'd)

Flight control operation is conventional. The cyclic is center mounted with the left and right control grips mounted to a cross tube which pivots on the center cyclic post. The pilot's cyclic grip angle can be adjusted fore and aft relative to the cross tube by a mechanic to achieve the most comfortable hand position. The most forward position provides the most control clearance at aft cyclic for larger pilots. Pilots should always verify the ability to apply full control travel prior to flight.

Collective operation is conventional. The engine throttle is correlated to collective inputs through a mechanical linkage. When the collective is raised, the throttle is opened and when the collective is lowered, the throttle is closed. The collective stick also incorporates a twist grip throttle control which is described in the Engine Controls section.

CAUTION

Above 4000 feet (1200 meters), throttle-collective correlation and governor are less effective. Therefore, power changes should be slow and smooth.

CAUTION

At high power settings above 6000 feet (1800 meters), the throttle is frequently wide open and RPM must be controlled with collective.

Right-side tail rotor pedals are adjustable. To adjust, remove quick-release pin on each pedal by depressing button and pulling. Slide pedal fore or aft to most comfortable of three adjustment positions and reinstall quick-release pin. Verify pins are secure before flight.

Left-side pedals are not adjustable. However, optional pedals designed for shorter pilots (Robinson part nos. F755-9 and -10) may be installed in place of standard pedals.

ELECTRICAL SYSTEM

A 28-volt DC electrical system which includes an alternator and a sealed lead-acid battery is standard. The battery is located either in the engine compartment or under the left seat.

The circuit breaker panel is on the ledge just forward of the left seat. Breakers are marked to indicate function and amperage. Inflight reset of circuit breakers is not recommended.

The battery switch controls the battery relay which disconnects the battery from the electrical system. A wire protected by a fuse near the battery bypasses the battery relay to allow both tachometers and the clock to continue to receive battery power with the battery switch off.

The alternator control unit protects the electrical system from overvoltage conditions. The ammeter indicates current to the battery ("—" indicates discharge). An ALT caution light or ammeter discharge indication in flight indicates low voltage and possible alternator failure. Turn off nonessential electrical equipment and switch alternator off then back on after one second to reset alternator control unit. If ALT light stays on or ammeter still indicates discharge, land as soon as practical.

CAUTION

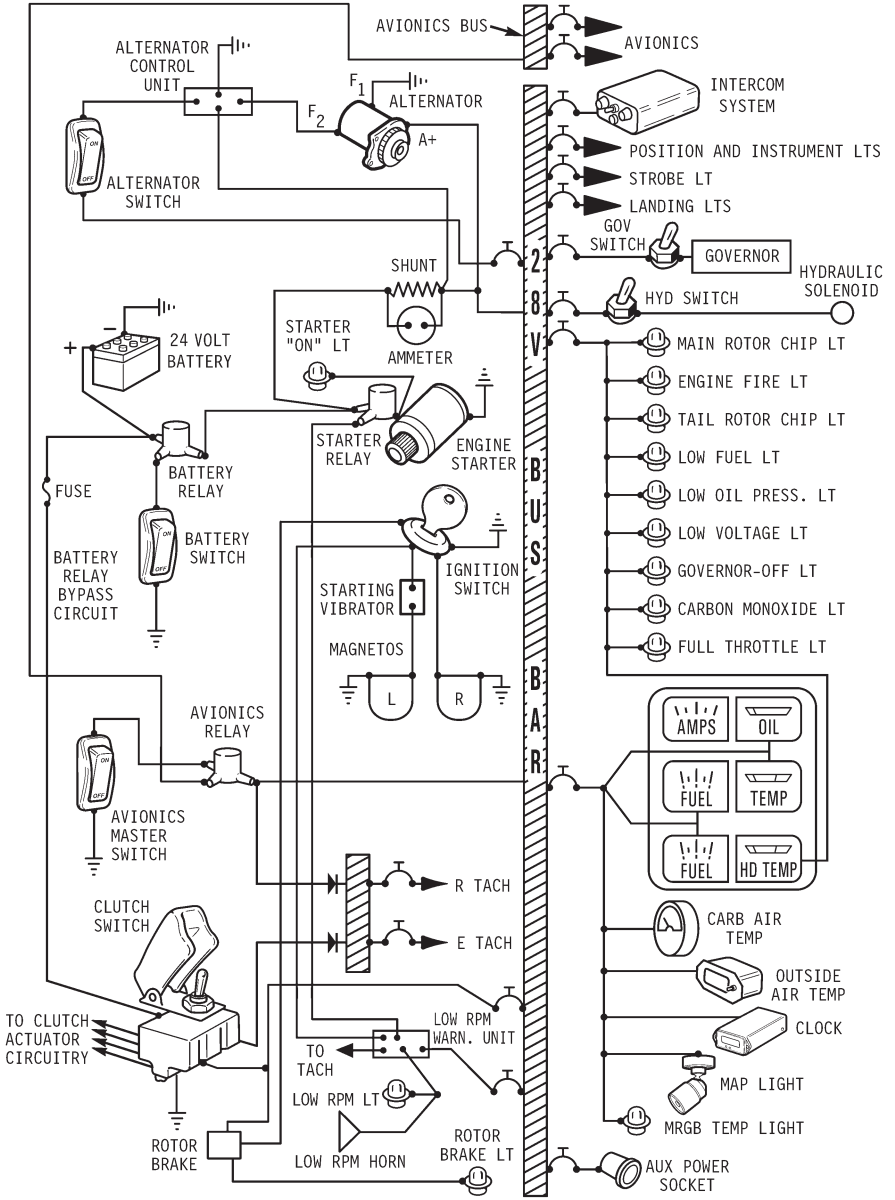
Continued flight without functioning alternator can result in loss of power to tachometers, producing a hazardous flight condition.

NOTE

Except for emergency procedures, do not operate alternator with battery switched off. The battery helps protect electrical equipment from voltage spikes.

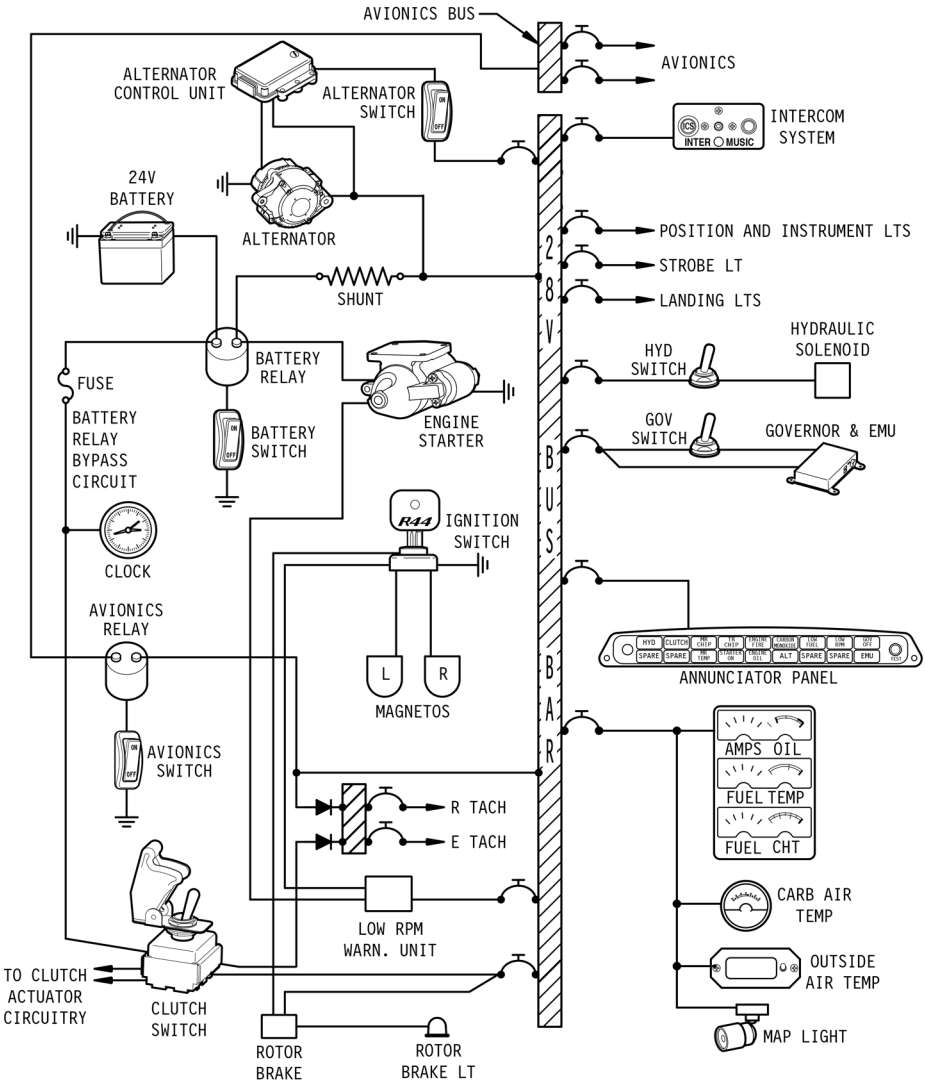
An avionics master switch controls power to the avionics bus. This allows all avionics to be switched on and off by a single switch.

ELECTRICAL SYSTEM (cont'd)



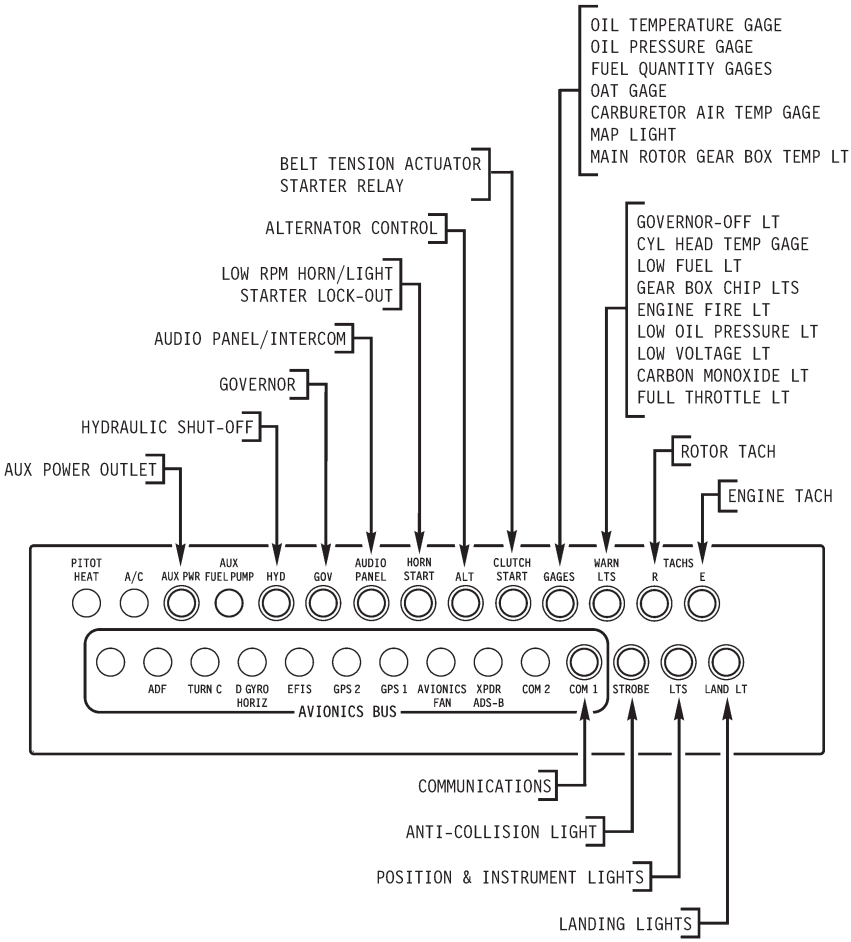
ELECTRICAL SYSTEM (EARLIER AIRCRAFT)

ELECTRICAL SYSTEM (cont'd)



ELECTRICAL SYSTEM (LATER AIRCRAFT)

ELECTRICAL SYSTEM (cont'd)



CIRCUIT BREAKER PANEL – TYPICAL

LIGHTING SYSTEM

A red anti-collision light is installed on the tailcone and is controlled by the strobe switch. An optional flashing light may be mounted forward on the tailcone in addition to the standard anti-collision light. Position lights are installed on each side of the cabin and in the tail and are controlled by the nav lights switch. A light at the top of the windshield illuminates the instrument panel. Panel lighting is active when the nav lights switch is on and lighting is dimmed via the knob above the nav lights switch. An overhead map light mounted on a swivel is controlled by an adjacent switch with high and low settings. The map light may be used for emergency lighting of the instrument panel. An additional cabin light with an adjacent switch is located just aft of the map light.

Two landing lights are installed in the nose. One wide-angle and one narrow-beam light are used to increase the lighted area. One landing light switch controls both lights and is located on the cyclic center post.

NOTE

Landing lights operate only when clutch actuator switch is in the engage position.

NOTE

Continuous operation of landing and position lights in flight is recommended to promote collision avoidance.

EXTERNAL POWER RECEPTACLE (OPTIONAL)

An optional 28-volt SAE AS35061-style external power receptacle is located inside the right engine cowl door. When the battery is switched on, the external power relay and the battery relay both close, connecting external power to the aircraft electrical system and battery. The external power relay will not close if reverse polarity is sensed by the receptacle.

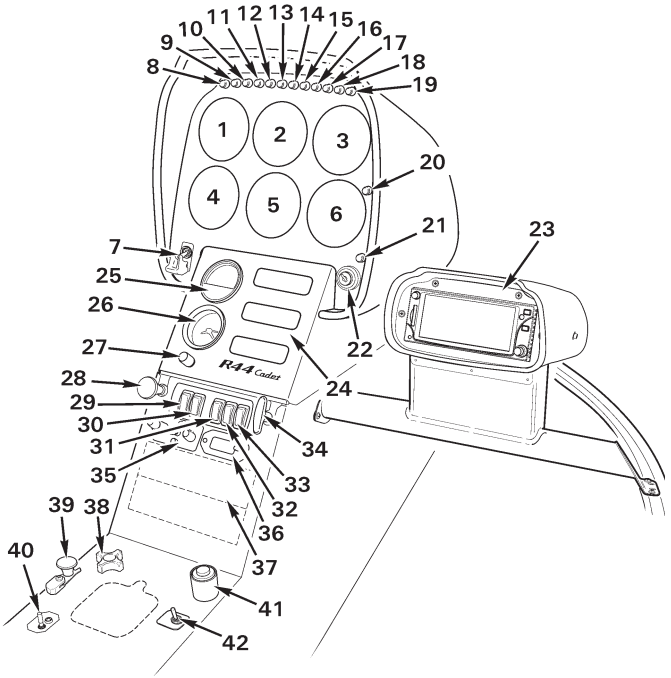
A separate wire from the external power receptacle to the battery bypasses the external power and battery relays. This wire allows battery charging via the external receptacle with the battery switch off. A 20-amp (10 amp on earlier aircraft) circuit breaker at the receptacle opens if current exceeds normal charging levels, and a diode provides polarity protection.

To use ground power for engine starting, have ground personnel connect ground power to the external receptacle prior to engaging starter, disconnect after engine start, and latch cowl door. Starts using ground power assist follow the same procedure as normal starts.

INSTRUMENT PANEL

Standard primary instruments include an airspeed indicator, engine and rotor dual tachometer, altimeter, manifold pressure gage, and magnetic compass. Engine gages include an ammeter, oil pressure, oil temperature, cylinder head temperature, and fuel quantity for main and aux tanks. Also standard are a clock, a carburetor air temperature gage, and a digital outside air temperature gage. A collective-activated hourmeter is located right of the pilot's seat and may be used for recording time in service.

A view of a typical instrument panel is given on the following page. Additional views of panels with electronic flight displays are found in the Optional Avionics Supplement in Section 9. Pilots should familiarize themselves with panel layout and equipment installations for each specific aircraft that they fly.



1. VERTICAL SPEED INDICATOR
2. AIRSPEED INDICATOR
3. ENGINE AND ROTOR TACHS
4. OPTIONAL INSTRUMENT
5. ALTIMETER
6. MANIFOLD PRESSURE GAGE
7. CLUTCH ACTUATOR SWITCH
8. CLUTCH ACTUATOR LIGHT
9. M.R. GEARBOX TEMP LIGHT
10. M.R. GEARBOX CHIP LIGHT
11. CARBON MONOXIDE LIGHT
12. STARTER-ON LIGHT
13. T.R. GEARBOX CHIP LIGHT
14. LOW FUEL LIGHT
15. LOW RPM LIGHT
16. ALT LOW VOLTAGE LIGHT
17. ENGINE FIRE LIGHT
18. OIL PRESSURE LIGHT
19. GOVERNOR-OFF LIGHT
20. FULL THROTTLE LIGHT
21. ROTOR BRAKE LIGHT
22. IGNITION SWITCH
23. PILOT'S SIDE CONSOLE (OPT'L)
24. ENGINE INSTRUMENTS
25. CARBURETOR AIR TEMP
26. CLOCK
27. PANEL LIGHTS DIMMER
28. CABIN HEAT
29. NAVIGATION LIGHTS SWITCH
30. ANTI-COLLISION LIGHT SWITCH
31. AVIONICS MASTER SWITCH
32. ALTERNATOR SWITCH
33. BATTERY SWITCH
34. CABIN AIR
35. INTERCOM
36. OUTSIDE AIR TEMP/VOLTMETER
37. AVIONICS STACK
38. CYCLIC FRICTION
39. CARBURETOR HEAT
40. ELT SWITCH (OPTIONAL)
41. MIXTURE CONTROL
42. PITOT HEAT SWITCH (OPT'L)

INSTRUMENT PANEL – TYPICAL

(Exact panel configuration may vary with optional equipment and date of helicopter manufacture.)

AUDIO SYSTEM

A voice-activated intercom/audio system is standard and is controlled by a small control panel above the avionics stack. The ICS volume knob controls intercom volume but does not affect radio volume. The VOX squelch knob is used to set the threshold volume at which the intercom is activated. When the VOX knob is turned fully clockwise, keying is required to activate the intercom.

A music input jack is located on a panel between the seat back rests. This input is muted when the intercom is active, when transmitting, and during reception of radio signals.

Headset jacks are located in the ceiling. Intercom and transmit are controlled by trigger switches on the cylic grips. The trigger has two detents: the first detent activates the intercom and the second detent transmits. An additional intercom button is located on the outboard side of the left seat.

Audio control panels from several manufacturers are offered as options in place of the standard intercom system. Pilots should consult the manufacturer's operating instructions if an audio panel is installed.

OPTIONAL AVIONICS

A wide range of optional avionics are available for the R44 Cadet. It is not practical to provide a description of all equipment in this manual. All aircraft are delivered with the manufacturers' operating manuals for each piece of installed equipment. Pilots are referred to the manufacturers' manuals for detailed operating instructions. Additional information for more complex options such as primary or multi-function displays (PFDs/MFDs) may be found in the Optional Avionics Supplement in Section 9. Good practice dictates becoming familiar with installed equipment before operating an aircraft.

CABIN HEATING AND VENTILATION

Fresh air vents are located in each forward door and in the nose. Door vents are opened and closed using the knob near the vent door hinge. A rotating knob is provided to lock vents closed. For maximum ventilation, open door vents wide during hover but only one inch or less during cruise. The rotating knob can be used to hold vents partially open.

The fresh air inlet in the nose is opened by pulling the vent handle on the console face. Rotating the vent handle clockwise will lock its position. Air from the nose inlet is directed along the inside surface of the windshield for defogging as well as for ventilation.

The cabin heater consists of a muffler heat shroud, a control valve at the firewall, outlets forward of the tail rotor pedals and in the rear floor area, and interconnecting ducting. A heater control knob located on the console face actuates the valve which directs heat either into the cabin or out an overboard discharge on the cabin underside.

CAUTION

In case of an in-flight engine fire, cabin heat should be turned off to seal cabin area from engine compartment.

SEATS, BELTS, AND BAGGAGE

The seats are not adjustable but the pilot-side pedals are adjustable. Each helicopter is supplied with a cushion which can be placed behind the pilot to position him farther forward. This allows shorter pilots to reach the pedals, the cyclic grip in its most forward position, and controls on the center console.

Heated seat bottoms and backrests are an option. Switches to control low and high heat settings are located at the bottom of the avionics console. The seat heaters operate only when the alternator switch is in the ON position to reduce the likelihood of inadvertently draining the battery before the engine is started.

SEATS, BELTS, AND BAGGAGE (cont'd)

Both seats are equipped with a combined lap belt and inertia reel shoulder strap. The inertia reel is normally free but will lock if there is sudden movement as would occur in an accident.

Five-point harnesses are optional. The lap belts on these harnesses should be adjusted to eliminate slack. On five-point harnesses, the lower strap should be adjusted as necessary to ensure that the buckle does not interfere with the cyclic grip in the full aft position. A webbing stop located above the inertia reel limits shoulder strap retraction and should be adjusted so the straps are comfortable without excessive slack.

Optional anchor loops located in the cabin ceiling above the door posts provide attachment points for a safety tether for equipment or occupants during doors-off operation.

A baggage compartment is located under each seat. Seat cushions hinge forward for access. Two additional compartments are located under the rear deck. The rear deck covers hinge forward and have lockable latches.

LANDING GEAR

A skid-type landing gear is used. Most hard landings will be absorbed elastically. However, in an extremely hard landing, the struts will hinge up and outward as the crosstube yields (becomes permanently bent) to absorb the impact. Slight crosstube yielding is acceptable. However, yielding which allows the tail skid to be within 30 inches of the ground when the helicopter is sitting empty on level pavement requires crosstube replacement.

The four landing gear struts are fitted with aerodynamic fairings to reduce air drag. The helicopter is approved to fly with or without the fairings installed.

Abrasion-resistant wear shoes are mounted on the bottom of the skids. These shoes should be inspected periodically, particularly if autorotation landings have been performed. Have skid shoes replaced whenever the thinnest point in the wear area is less than 0.05 inches (1.3 mm).

LANDING GEAR (cont'd)

Optional mirrors may be installed near the forward end of one or both landing gear skid tubes. Each mirror is mounted on a friction ball joint and may be adjusted to the desired angle.

ROTOR BRAKE

The rotor brake is mounted on the aft end of the main gearbox and is actuated by a cable connected to a pull handle located on the cabin ceiling. To stop the rotor, use the following procedure:

1. After pulling mixture off, wait at least 30 seconds.
2. Pull brake handle forward and down using moderate force (approximately 10 lb).
3. After rotor stops, it is recommended to use the rotor brake as a parking brake by hooking bead chain in slot in bracket.

The brake must be released before starting the engine. When the brake is engaged, the starter is disabled.

CAUTION

Applying rotor brake without waiting at least 30 seconds after engine stops or using a force which stops rotor in less than 20 seconds may damage brake shoes.

ENGINE PRIMER SYSTEM (OPTIONAL)

The primer is used to improve engine cold starting. The primer pump is mounted to the steel tube frame and is accessible through the lower right cowl door. Engine priming is performed as follows:

1. Unlock pump handle and pump as required for priming (normally two to three strokes). Pull handle up slowly to allow time for fuel to fill pump.
2. After priming, push handle full down and lock.

CARBON MONOXIDE DETECTOR

The carbon monoxide (CO) detector indicates elevated cabin CO levels. CO is an odorless, toxic gas present in engine exhaust which causes headaches, drowsiness, and possible loss of consciousness. CO levels may become elevated due to an exhaust leak or exhaust recirculation during prolonged hovering.

The CO detector system consists of a sensor above the pilot's heater outlet and a caution light. A system check (light flashes twice) is performed each time power is switched on. A sensor malfunction is indicated by a continuing flash every four seconds.

If the caution light illuminates, shut off heater and open nose and door vents as required to ventilate the cabin. If hovering, land or transition to forward flight. If symptoms of CO poisoning (headache, drowsiness, dizziness) accompany caution light, land immediately. Have exhaust system inspected before next flight.

Many chemicals can damage the CO sensor. Avoid use of solvents, detergents, or aerosol sprays near the sensor. Temporarily tape off openings in top and bottom of sensor housing when cleaning cabin interior.

ADS-B EQUIPMENT

An Automatic Dependent Surveillance Broadcast (ADS-B) capable transponder is installed on later aircraft. The transponder transmits GPS position information to air traffic control to supplement radar/transponder information.

ADS-B "Out" capability is required for operation in certain airspace. ADS-B equipment installed at the factory meets the requirements of 14 CFR § 91.227. ADS-B Out operation is mostly automatic and requires little pilot action. Malfunctions will be annunciated on the transponder and/or GPS. Refer to transponder and GPS manufacturer's documentation for further details on ADS-B Out equipment operation.

NOTE

ADS-B Out equipment installed at the factory operates on frequency 1090 MHz. This frequency is also accepted for ADS-B Out equipment in most countries outside the United States.

NOTE

The ability to turn off ADS-B Out broadcasts is provided via transponder controls. However, ADS-B Out is required in certain airspace. ADS-B Out should not be selected off unless directed by air traffic control.

ADS-B equipment may also receive traffic information from other ADS-B equipped aircraft and (depending on specific equipment and country of operation) additional traffic and weather information from ground stations. ADS-B equipment that receives information is known as ADS-B "In", is not required by regulations, and is optional.

ADS-B In functionality requires a suitable display such as a moving map GPS or Multi-Function Display (MFD). ADS-B In equipment installed at the factory receives both approved US frequencies (978 MHz and 1090 MHz). Refer to avionics manufacturer's documentation for details on ADS-B In equipment operation.

EMERGENCY LOCATOR TRANSMITTER (OPTIONAL)

The Emergency Locator Transmitter (ELT) installation consists of a transmitter with internal battery pack, an external antenna, and a remote switch/annunciator. The transmitter is mounted to the upper steel tube frame and is accessible through the aft, upper cowl door. The remote switch/annunciator is located left of the cyclic stick.

The ELT is operated by a switch on the transmitter and a remote switch in the cockpit. The transmitter switch has been secured in the AUTO or ARM position at installation and should always be in this position for flight. The remote switch/annunciator is a three position switch with indicator light. This switch should also be in the AUTO or ARMED (middle) position for flight. With both switches set to AUTO/ARM, the ELT will begin transmitting when subjected to a high "G" load. When the unit is transmitting, the red indicator light illuminates.

Moving the remote switch to ON activates the transmitter. Use the ON position if an emergency landing is imminent and time permits.

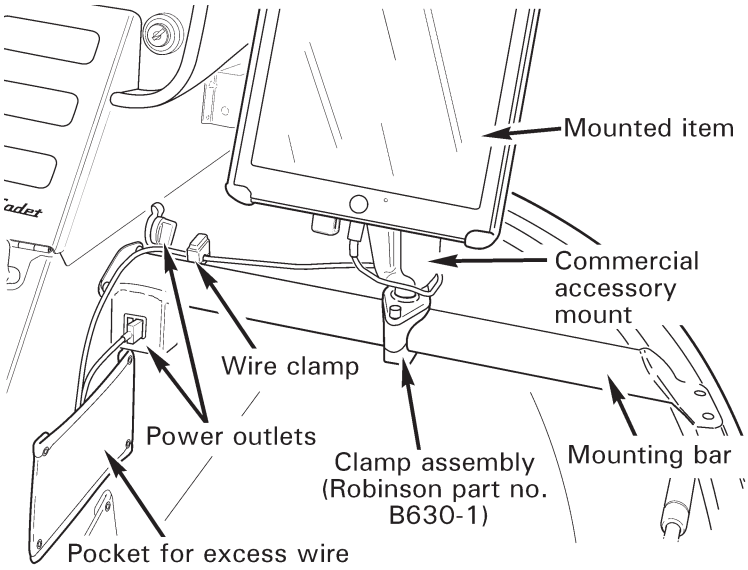
If the ELT is inadvertently activated, use the RESET position of the remote switch to stop transmission and reset the unit. The red indicator will extinguish when unit is reset.

For more detailed instructions on ELT operation, maintenance, and required tests, refer to manufacturer's instructions supplied with the unit.

ACCESSORY MOUNTS (OPTIONAL)

Provisions for mounting small, portable items are an option. The provisions use mounting bars located forward of the pilot's seat, the copilot's seat, or both. The bars are fitted with one or more clamp assemblies which are compatible with a variety of commercially available accessory mounts. There is a 10 lb total weight limit for items attached to each bar. USB and cigarette-lighter-style power outlets are installed near the inboard end of the mounting bars. The power outlets are protected by the Aux Power circuit breaker and in-line fuses and are placarded with voltage/current ratings. Wire clamps and a pocket for securing excess wire are also provided.

The accessory mounts are intended to provide a safe means of mounting small items such as portable electronic devices. The mounting bar, clamp assembly, and power outlets are approved as part of the aircraft type design, but any items attached are the responsibility of the pilot in command under appropriate operating rules. Ensure that any items attached are secure and do not interfere with flight controls or primary field of view. Route any wires through the wire clamps or secure them to the bar with cable ties or tape.



COCKPIT CAMERA (OPTIONAL)

An optional video camera may be installed in the cabin ceiling. The camera records 4K video, intercom/comm audio, and GPS position both internally and to a removable flash drive inserted in the front of the camera housing. The internal memory retains only recent video and is not user accessible. Recording starts automatically when the helicopter battery is switched on and stops when it is started off.

Recording to the flash drive can be stopped or audio muted using the record and audio switches on the front of the camera housing. Do not remove the flash drive while a recording is in progress as this will corrupt the video file. To remove a flash drive when the helicopter battery switch is on, first stop the recording using the record switch.

A blue flashing light on the camera housing indicates video is being recorded to the flash drive. A green steady light indicates the camera is powered and operating normally. The green light will change to an amber flashing light if an internal camera fault is detected, in which case video may not be recorded.

Video recorded on the flash drive can be viewed on a Windows PC or Mac computer. Video is recorded in sequential 4 GB files with each file approximately 25 minutes in length. Video files are labeled HELICAM_*xxxx*.MP4, where *xxxx* is a sequential number. GPS position and altitude are optionally displayed in the video and are also recorded separately to files labeled HELICAM_*xxxx*.GPX. A 128 GB flash drive (as supplied with helicopter) will record approximately 10 hours of video. When full, the earliest video file is overwritten with the last recording.

NOTE

Flash drives must meet the criteria described in the *Cockpit Camera User Guide* in order to function reliably.

COCKPIT CAMERA (OPTIONAL) (cont'd)

The *Cockpit Camera User Guide* is available on the Robinson website, www.robinsonheli.com, and includes additional information on camera operation, playback options, and troubleshooting.

CYCLIC GUARD (OPTIONAL)

The optional cyclic guard is a bar that extends from the inboard corner of the left seat to the instrument console. It is intended to act as a barrier to help prevent inadvertent interference with the cyclic control. The guard also provides a hand grip for a passenger's right hand.

In order to access the under seat compartment with the guard installed, pull the silver spring knob at the forward end of the guard and allow the aft end to rotate down away from the seat hinge. To re-secure the guard, lift the aft end and allow the spring knob to lock back in place.

It is recommended that the guard be installed whenever a non-pilot passenger occupies the left seat. A pilot flying from the left seat may find that the guard contacts the right leg when feet are on the pedals. The guard should be removed prior to flight if the pilot finds it objectionable.

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SECTION 8

HANDLING AND MAINTENANCE

CONTENTS

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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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SECTION 9

SUPPLEMENTS

OPTIONAL EQUIPMENT SUPPLEMENTS

The applicable supplement is required to be included in the helicopter's Pilot's Operating Handbook when any of the following equipment is installed. Information contained in the supplements applies only when the related equipment is installed.

CONTENTS

NON-U.S. SUPPLEMENTS

The following supplements contain additional information required by certain countries:

Brazilian Supplement

Canadian Supplement

EASA Supplement

FATA Supplement (Russia)

IAC AR Supplement

Indian Supplement

Ukrainian Supplement

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FAA APPROVED
R44, R44 II, R44 CADET
PILOT'S OPERATING HANDBOOK

LITHIUM-ION BATTERY SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the lithium-ion main battery is installed.

Information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: HIEN H TONG Digitally signed by HIEN H TONG Date: 2020.12.10 13:39:02 -08'00'

for Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: 10 DEC 2020

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* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains changes and additional data applicable when the lithium-ion main battery is installed.

SECTION 2: LIMITATIONS

No change.

SECTION 3: EMERGENCY PROCEDURES

WARNING/CAUTION LIGHTS

BATT FAULT — Indicates abnormal battery operation. Charging, discharging, or both may be disabled. Land as soon as practical. Alternator will continue to supply power in flight.

NOTE

Battery's internal circuitry may disable charge/discharge functions due to over-temperature, over/under voltage, or excessive current draw. A flashing light means the fault may be recoverable (battery will reset itself) either when the condition improves or during a power cycle at the next landing. A steady light means battery maintenance or replacement will likely be necessary.

SECTION 4: NORMAL PROCEDURES

STARTING ENGINE AND RUN-UP

After Battery switch ON, add:

Battery heater indicator light .....Extinguished

NOTE

The lithium-ion battery has a built-in heater. When the battery switch is ON, the BATT HEATER light illuminates during the heating cycle and extinguishes when the battery is warm enough to attempt a start. The indicator light is disabled after engine start, but the heater will continue to cycle as required to maintain optimum battery temperature.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

ELECTRICAL SYSTEM

A 17 amp-hour lithium-ion battery replaces the standard 24-volt lead-acid main battery. The lithium-ion battery includes built-in circuitry that monitors temperature, voltage, and current draw and manages battery charge and discharge. The circuitry automatically disables charge and/or discharge if any electrical or thermal problems are detected. The circuitry will also interrupt power if a start is attempted with insufficient charge to prevent permanent battery damage. The battery uses lithium-iron-phosphate chemistry which is less susceptible to thermal runaway than some other lithium battery chemistries.

The metal battery case is designed to contain any heat or gases generated within the battery and is vented overboard. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, show battery status. The annunciator panel test button should cause these segments to illuminate along with the rest of the annunciator panel. The segments will also illuminate briefly when the battery switch is turned on after several hours of inactivity.

BATT FAULT illuminates if the battery has an over- or under-voltage condition, an over-temperature condition, or if current draw exceeds limits. A flashing light indicates a recoverable fault. The light may go out if the fault corrects itself (e.g. temperature decrease) or may go out as a result of a power cycle at the next landing. A steady light indicates battery maintenance or replacement may be required. The emergency procedure for a fault light (flashing or steady) is to land as soon as practical. The alternator will continue to supply electrical power during the landing.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

ELECTRICAL SYSTEM (cont'd)

The battery incorporates an internal heater for cold weather operation. The heater attempts to maintain a battery temperature of at least 50°F (10°C). When the battery is switched ON, BATT HEATER illuminates while the heater is warming the battery and extinguishes when the battery is warm enough to attempt an engine start. On very cold days, the heating cycle may take 10 minutes or more. The heater light is disabled while the engine is running but the heater will continue to function as long as the battery switch is ON.

SECTION 8: HANDLING AND MAINTENANCE

Nominal charging voltage for the lithium-ion battery is 28.8 volts. Some lead-acid chargers may not provide enough voltage to fully charge the battery. Ensure charging equipment is compatible with lithium-ion batteries.

Refer to the R44 Maintenance Manual for additional handling and maintenance instructions.

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PILOT KNOWLEDGE AND PROFICIENCY (cont'd)

- Flight planning *(Ref SNs 15, 26, and 43)*
  - Thorough preflight inspection
  - Fuel
  - Weather
  - Performance (hot/high/loading)
- Distractions *(Ref SNs 16, 34, 36, and 41)*
  - Failure to keep eyes outside scanning for wires, other obstacles, and traffic
  - High workload missions such as photo flights
  - Passengers
  - Avionics
  - Cell phones
- Low-G and mast bumping *(Ref SNs 11, 29, and 32)*
  - Avoidance
    - Reduce airspeed in turbulence
    - Monitor airspeed when lightly loaded
    - Ensure passenger controls are removed
  - Recognition and recovery

CAUTION

Never practice/demonstrate low-G in flight. Low-G training should be knowledge based only.

- Low RPM considerations *(Ref SNs 10, 24, and 29)*
  - Recognition and recovery
- Power failures *(Ref SNs 10, 24, and 29)*
  - Instinctive autorotation entry
  - Continuously consider emergency landing sites throughout every flight
- Practice autorotations *(Ref SN 38)*
  - Proven, safe methods

CAUTION

In-flight practice of Low RPM, power failures, and autorotations should only be conducted under the supervision of an instructor.

- Carburetor ice (Ref SNs 25 and 31)
  - Conditions conductive
  - Use of carb heat
- Confined area operations (Ref SN 22)
  - High and low reconnaissance
  - Assessing wind
  - Power margins

SAFETY NOTICES

The following Safety Notices have been issued by Robinson Helicopter Company as a result of various accidents and incidents. Studying the mistakes made by other pilots will help you avoid making the same errors. Safety Notices are available on the RHC website: www.robinsonheli.com.

SAFETY NOTICE	TITLE
SN-1	Inadvertent Actuation of Mixture Control in Flight
SN-9	Many Accidents Involve Dynamic Rollover
SN-10	Fatal Accidents Caused by Low RPM Rotor Stall
SN-11	Low-G Pushovers - Extremely Dangerous
SN-13	Do Not Attach Items to the Skids
SN-15	Fuel Exhaustion Can Be Fatal
SN-16	Power Lines Are Deadly
SN-17	Never Exit Helicopter with Engine Running Hold Controls When Boarding Passengers Never Land in Tall Dry Grass
SN-18	Loss of Visibility Can Be Fatal Overconfidence Prevails in Accidents
SN-19	Flying Low Over Water is Very Hazardous
SN-20	Beware of Demonstration or Initial Training Flights
SN-22	Vortex Ring State Catches Many Pilots By Surprise
SN-23	Walking into Tail Rotor Can Be Fatal
SN-24	Low RPM Rotor Stall Can Be Fatal
SN-25	Carburetor Ice
SN-26	Night Flight Plus Bad Weather Can Be Deadly
SN-27	Surprise Throttle Chops Can Be Deadly
SN-28	Listen for Impending Bearing Failure Clutch Light Warning
SN-29	Airplane Pilots High Risk When Flying Helicopters
SN-30	Loose Objects Can Be Fatal
SN-31	Governor Can Mask Carb Ice
SN-32	High Winds or Turbulence
SN-33	Drive Belt Slack
SN-34	Aerial Survey and Photo Flights - Very High Risk
SN-35	Flying Near Broadcast Towers
SN-36	Overspeeds During Liftoff
SN-37	Exceeding Approved Limitations Can Be Fatal
SN-38	Practice Autorotations Cause Many Training Accidents
SN-39	Unusual Vibration Can Indicate a Main Rotor Blade Crack
SN-40	Post-Crash Fires
SN-41	Pilot Distractions
SN-42	Unanticipated Yaw
SN-43	Use Extra Caution During Post-Maintenance Flights
SN-44	Carrying Passengers

Safety Notice SN-30

Issued: Jun 94 Rev: Apr 2009

LOOSE OBJECTS CAN BE FATAL

Fatal accidents have occurred due to loose objects flying out of the cabin and striking the tail rotor. Any object striking the tail rotor can cause failure of a tail rotor blade. Loss of or damage to a tail rotor blade may cause a severe out-of-balance condition which can separate the tail rotor gearbox or entire tail assembly from the tailcone, resulting in a catastrophic accident. Accidents have also been caused by fuel caps, birds, and other objects striking the tail rotor. Before each flight perform the following:

1) Walk completely around the aircraft checking fuel cap security and tail rotor condition. Ensure no loose objects or debris in helicopter vicinity. Verify cotter rings or pins are installed in all door hinge pins.

2) Stow or secure all loose objects in the cabin. Even with doors on, items such as charts can be sucked out of a vent door.

3) Instruct passengers regarding the dangers of objects striking the tail rotor. Warn them never to throw anything from the helicopter or place items near vent doors where they could get sucked out.

4) Firmly latch all doors.

5) Never fly with a left door removed. (Remove only the right door for ventilation.)

Safety Notice SN-31

Issued: Dec 96

GOVERNOR CAN MASK CARB ICE

With throttle governor on, carb ice will not become apparent as a loss of either RPM or manifold pressure. The governor will automatically adjust throttle to maintain constant RPM which will also result in constant manifold pressure. When in doubt, apply carb heat as required to keep CAT out of yellow arc during hover, climb, or cruise, and apply full carb heat when manifold pressure is below 18 inches.

Also remember, if carb heat assist is used it will reduce carb heat when you lift off to a hover and the control may require readjustment in flight.

Safety Notice SN-32

Issued: Mar 1998 Revised: June 2020

HIGH WINDS OR TURBULENCE

Flying in high winds or turbulence should be avoided.

A pilot's improper application of control inputs in response to turbulence can increase the likelihood of a mast bumping accident. If turbulence is encountered, the following procedures are recommended:

1. Reduce power and use a slower than normal cruise speed. Mast bumping is less likely at lower airspeeds.
2. For significant* turbulence, reduce airspeed to 60–70 knots.
3. Tighten seat belt and rest right forearm on right leg to minimize unintentional control inputs. Some pilots may choose to apply a small amount of cyclic friction to further minimize unintentional inputs.
4. Do not overcontrol. Allow aircraft to go with the turbulence, then restore level flight with smooth, gentle control inputs. Momentary airspeed, heading, altitude, and RPM excursions are to be expected.
5. Avoid flying on the downwind side of hills, ridges, or tall buildings where turbulence will likely be most severe.

The helicopter is more susceptible to turbulence at light weight. Reduce speed and use caution when flying solo or lightly loaded.

*What is considered significant turbulence will depend on pilot experience and comfort level.

Safety Notice SN-33

Issued: March 1998 Revised: July 2013; July 2021

DRIVE BELT SLACK

Pilots must ensure R22 and R44 drive belts do not have excessive slack during engine start. Belts that are too loose may jump out of their sheave grooves while being tensioned, but the pilot has no way of observing this. Therefore, the following checklist items are very important.

1. Per preflight checklist, with clutch disengaged, deflect belts inboard just above fan scroll on aircraft right side. Verify a maximum of 1.5 inches (4 cm) deflection. If belts deflect further, have belt tension actuator adjusted prior to flight.
2. Per run-up checklist, verify rotor turns within 5 seconds after engaging clutch switch. If time is longer, shut down and have belt tension actuator adjusted prior to flight.

Safety Notice SN-41

Issued: May 2013 Revised: July 2021

PILOT DISTRACTIONS

Pilot distractions from mobile phones have been the cause of several recent fatal accidents.

Modern avionics and personal electronic devices, in particular mobile phones, can easily divert the pilot's attention from the primary duty of controlling the helicopter. Reading charts and attending to passengers are other common distractions.

During flight, be conscious of distractions and vigilant about keeping eyes focused outside as much as possible. Any avionics programming that takes more than a few seconds should be done while on the ground. Mobile phones should be carried in case of an unscheduled or emergency landing but should never be used by the pilot during flight.

When hovering, keep both hands on the controls. If tuning a radio or other task is required, first land and reduce collective pitch. When dealing with distractions in forward flight, reduce power, slow down, and frequently look outside to verify straight and level flight.

Occasionally, pilots neglect to latch a door before taking off. Never attempt to latch a door while hovering or in flight. It is safer to land before closing a door.

Safety Notice SN-42

Issued: May 2013 Rev: Jul 2019

UNANTICIPATED YAW

A pilot's failure to apply proper pedal inputs in response to strong or gusty winds during hover or low-speed flight may result in an unanticipated yaw. Some pilots mistakenly attribute this yaw to loss of tail rotor effectiveness (LTE), implying that the tail rotor stalled or was unable to provide adequate thrust. Tail rotors on Robinson helicopters are designed to have more authority than many other helicopters and are unlikely to experience LTE.

To avoid unanticipated yaw, pilots should be aware of conditions (a left crosswind, for example) that may require large or rapid pedal inputs. Practicing slow, steady-rate hovering pedal turns will help maintain proficiency in controlling yaw. Hover training with a qualified instructor in varying wind conditions may also be helpful.

Note that thrust of any tail rotor decreases significantly as RPM decreases. Low RPM combined with high torque, as occurs when over-pitching, may result in an uncontrollable right yaw (see also Safety Notice SN-34).

Safety Notice SN-43

Issued: January 2015

USE EXTRA CAUTION DURING POST-MAINTENANCE FLIGHTS

A number of fatal accidents have occurred during flights immediately following maintenance. In several cases, the cause was incorrect or incomplete reassembly of the helicopter, and the error would have been detectable during a careful preflight inspection.

Even the best maintenance personnel can become distracted and make a mistake. Pilots should conduct an especially thorough preflight inspection after maintenance has been performed. If possible, speak to the technicians who performed the work, find out exactly what was done, and pay special attention to those areas. Professional maintenance personnel will appreciate the pilot's commitment to safety and will welcome an additional check of their work.

Any work done on the flight control system deserves special attention because a flight control disconnect is almost always catastrophic. During track and balance work, always climb up to the rotor head for a close inspection of the pitch link and control tube fasteners after each adjustment. Never rush or skip preflight steps.