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Approved By: LAN-GLENN V TO Digitally signed by LAN-GLENN V TO Date: 2024.02.22 09:57:12 -08'00' _____, *FTE, AIR-713 for,*

Manager, Flight Test & Human Factors Branch, AIR-710
Federal Aviation Administration

Date of Approval: 22 Feb 2024

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SECTION 1

GENERAL

CONTENTS

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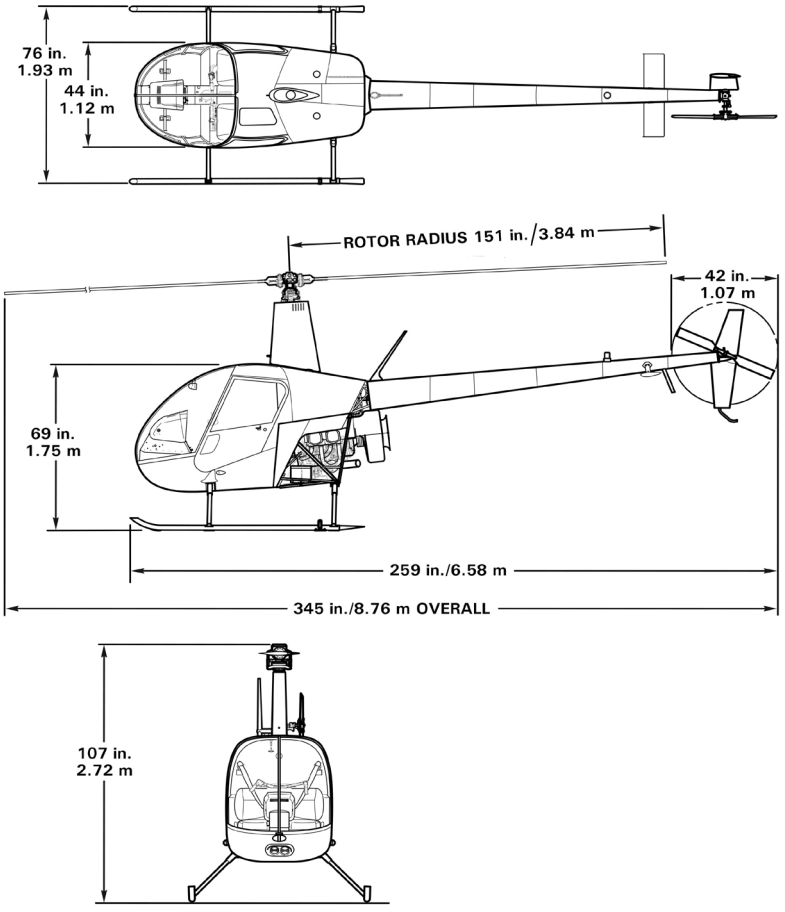
EXTERNAL DIMENSIONS



R22 EXTERNAL DIMENSIONS
(LATER AIRCRAFT SHOWN)

DESCRIPTIVE DATA

MAIN ROTOR

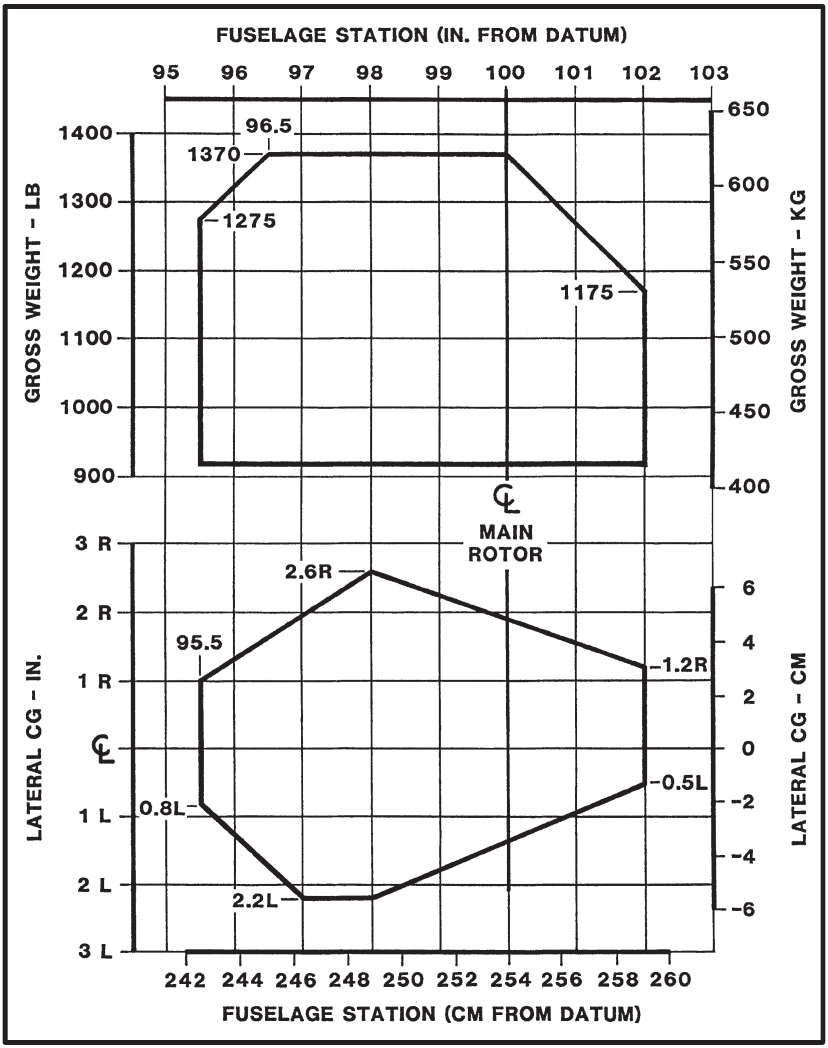
Articulation	Free to teeter and cone, rigid inplane
Number of Blades	2
Diameter	25 feet 2 inches
Blade Chord	7.2 inches inboard, 7.7 inches outboard
Blade Twist	-8 degrees
Tip Speed at 104% RPM	698 feet per second

TAIL ROTOR

Articulation	Free to teeter, rigid inplane
Number of Blades	2
Diameter	42 inches
Blade Chord	4 inches (constant)
Blade Twist	0 degrees
Precone Angle	1 degree 11 minutes
Tip Speed at 104% RPM	622 feet per second

DRIVE SYSTEM

Engine to Upper Sheave:	Two double Vee-belts with .8536:1 speed reducing ratio
Upper Sheave to Drive Line:	Sprag-type overrunning clutch
Drive Line to Main Rotor:	Spiral-bevel gears with 11:47 speed reducing ratio
Drive Line to Tail Rotor:	Spiral-bevel gears with 3:2 speed increasing ratio



R22 ALPHA, BETA, AND BETA II
CENTER OF GRAVITY LIMITS

FLIGHT AND MANEUVER LIMITATIONS

Aerobatic flight prohibited.

CAUTION

Abrupt control inputs may produce high fatigue stresses and cause catastrophic failure of a critical component.

Low-G cyclic pushovers prohibited.

CAUTION

A pushover (forward cyclic maneuver) performed from level flight or following a pull-up causes a low-G (near weightless) condition which can result in catastrophic loss of lateral control. To eliminate a low-G condition, immediately apply gentle aft cyclic. Should a roll commence during a low-G condition, apply gentle aft cyclic to reload rotor before applying lateral cyclic to stop the roll.

Flight prohibited with governor selected off, with exceptions for in-flight system malfunction or emergency procedures training.

Flight in known icing conditions prohibited.

Maximum operating density altitude 14,000 feet.

Alternator, RPM governor, low rotor RPM warning system, and OAT gage must be operational for dispatch.

Minimum crew is one pilot in the right seat. A flight instructor may act as pilot in command from the left seat. Solo flight from right seat only.

Left seat belt must be buckled.

Operation approved with either or both cabin doors removed. Loose items in cabin must be properly secured during doors-off flight.

A functioning headset must be worn by each pilot.

SECTION 5

PERFORMANCE

CONTENTS

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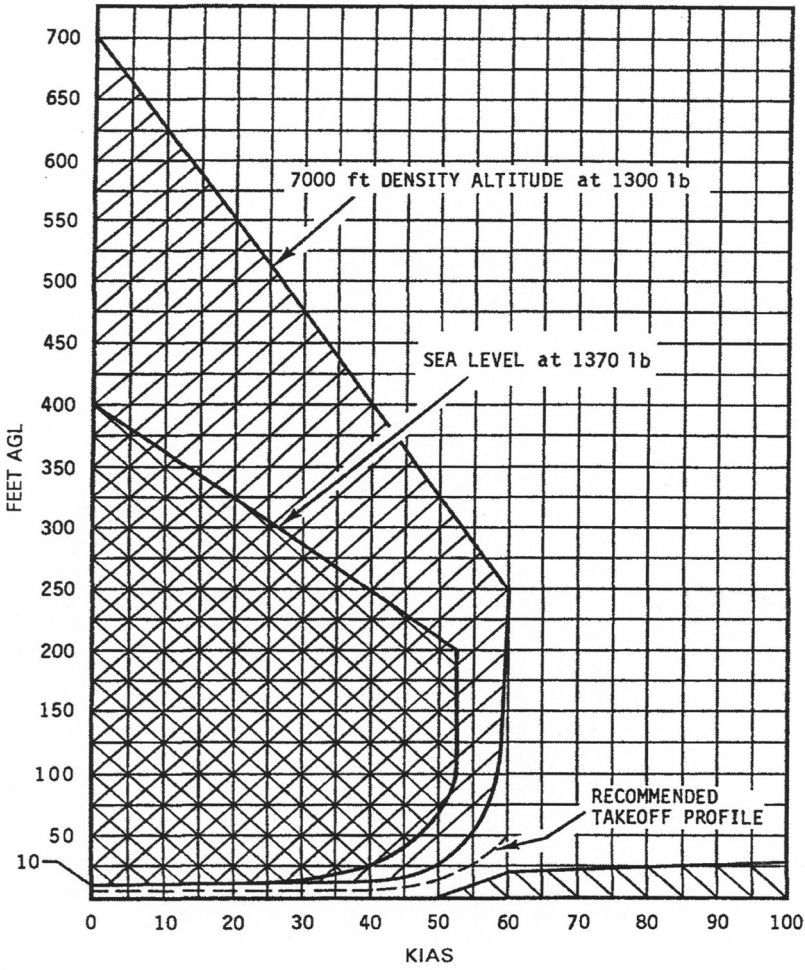
DEMONSTRATED CONDITIONS:
SMOOTH HARD SURFACE
WIND CALM
103-104% RPM

AVOID OPERATION IN SHADED AREAS



HEIGHT - VELOCITY DIAGRAM

NOISE CHARACTERISTICS

The following noise level complies with 14 CFR Part 36, Appendix J and ICAO Annex 16, Chapter 11 noise requirements for later versions with the horizontal stabilizer mounted under the tailcone forward of the tail rotor. The noise level was obtained from FAA-approved noise test data.

Models:	R22	R22 Alpha & Beta
Engine:	Lycoming 0-320-A2B, 0-320-A2C, & 0-320-B2C	Lycoming 0-320-B2C & 0-360-J2A
Gross Weight:	1300 lbs (590 kg)	1370 lbs (622 kg)
V_h:	95 KTAS	

The flyover sound exposure level (SEL) is 77.4 dB(A). This noise level meets the requirements for a Stage 3 helicopter as defined in 14 CFR Part 36.

NOTE

No determination has been made by the Federal Aviation Administration that the noise level of this aircraft is or should be acceptable or unacceptable for operation at, into, or out of any airport.

WEIGHT AND BALANCE RECORD (cont'd)

WEIGHT AND BALANCE RECORD

(Continuous History of Changes in Structure or Equipment Affecting Weight and Balance)

HELICOPTER MODEL R22

SERIAL NUMBER:

DATE	DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE					RUNNING BASIC EMPTY WEIGHT				
		ADDED (+) REMOVED (—) WEIGHT (lb)	LONGITUDINAL		LATERAL (+ = RIGHT SIDE)		WEIGHT (lb)	LONGITUDINAL		LATERAL	
			Arm (in.)	Moment (in.-lb)	Arm (in.)	Moment (in.-lb)		Arm (in.)	Moment (in.-lb)	Arm (in.)	Moment (in.-lb)
	HELICOPTER AS WEIGHED										

LOADING INSTRUCTIONS

The following table may be used when calculating loaded helicopter weight and CG position.

COMMON ITEM WEIGHT & CG

Item	Weight (lb)	Longitudinal arm (in.)	Lateral arm (in.) (+ = right side)
Pilot and baggage under right seat		78.0*	+10.7
Passenger and baggage under left seat		78.0*	−9.3
Main fuel**		108.6	−11.0
Aux fuel**		103.8	+11.2
Doors	5.2 each	77.5	±21.0
Removable controls (cyclic, collective, pedals)	2.6	66.3	−12.9
Items on accessory mount bars		53.0	±12.0

* Use 79.0 in. for aircraft prior to S/N 0256 with early-style seats. If additional backrest cushion is used, subtract thickness of compressed cushion.

** A longitudinal arm of 106.9 in. may be used for combined main and aux fuel.

LOADING INSTRUCTIONS (cont'd)

The following sample calculation demonstrates how to determine loaded helicopter weight and center of gravity. A worksheet is provided on the page following the sample calculation for a weight and balance calculation for your helicopter. Calculated weight and balance must be compared with the CG limits given in Section 2 to determine safe loading. Both takeoff and empty fuel conditions must be within limits.

Lateral CG usually falls well within limits for conventional loadings. If an unusual lateral installation or loading occurs, lateral CG should be checked against the CG limits given in Section 2. The lateral reference datum is the aircraft centerline with items to the right positive and items to the left negative.

LOADING INSTRUCTIONS (cont'd)

SAMPLE LOADING CALCULATION

Item	Weight (lb)	Location		Moment	
		Long. Arm (in.)	Lat. Arm (in.) + = Right Side	Long. (in.-lb)	Lat. (in.-lb)
Basic empty weight	880	104.0	−0.1	91,520	−88
Remove right door	−5.2	77.5	21.0	−403	−109
Remove left door		77.5	−21.0		
Remove left seat controls		66.3	−12.9		
Right seat pilot and baggage	170	78.0	10.7	13,260	1819
Left seat passenger and baggage	160	78.0	−9.3	12,480	−1488
Items on accessory mount bars	5	53.0	12.0	265	60
Zero usable fuel weight and CG*	**1209.8**	**96.8**	**0.2**	**117,122**	**194**
Usable main fuel at 6 lb/gal.	101.4	108.6	−11.0	11,012	−1115
Usable aux fuel at 6 lb/gal.	56.4	103.8	11.2	5854	632
Takeoff Gross Weight and CG*	**1367.6**	**98.0**	**−0.2**	**133,988**	**−289**

* CG location (arm) for loaded helicopter is determined by dividing total moment by total weight.

LOADING INSTRUCTIONS (cont'd)

LOADING CALCULATION WORKSHEET

Item	Weight (lb)	Location		Moment	
		Long. Arm (in.)	Lat. Arm (in.) + = Right Side	Long. (in.-lb)	Lat. (in.-lb)
Basic empty weight					
Remove right door		77.5	21.0		
Remove left door		77.5	−21.0		
Remove left seat controls		66.3	−12.9		
Right seat pilot and baggage		78.0	10.7		
Left seat passenger and baggage		78.0	−9.3		
Items on accessory mount bar		53.0	±12.0		
Zero usable fuel weight and CG*					
Usable main fuel at 6 lb/gal.		108.6**	−11.0		
Usable aux fuel at 6 lb/gal.		103.8**	11.2		
Takeoff Gross Weight and CG*					

* CG location (arm) for loaded helicopter is determined by dividing total moment by total weight.

** A longitudinal arm of 106.9 in. may be used for combined main and aux fuel. Do not use combined main and aux fuel if calculating lateral arm.

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SEATS, BELTS, AND BAGGAGE

The seats are not adjustable but each helicopter is supplied with a removable back cushion to position the pilot farther forward. This allows shorter pilots to reach the pedals, the cyclic grip in its most forward position, and controls on the center console.

Each seat is 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.

A baggage compartment is located under each seat. Seat cushions hinge forward for access.

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 34 inches (24 inches for R22 Standard or HP) of the ground when the helicopter is sitting empty on level pavement requires crosstube replacement.

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).

ROTOR BRAKE

If installed, 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 above and behind the pilot's left shoulder. 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 located in front of the right seat near the hourmeter. 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 is installed if the optional cabin heater is installed. It 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.

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 Avoidance, Recognition, and Recovery
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

ROBINSON
HELICOPTER COMPANY

Safety Notice SN-22

Issued: July 1986 Revised: June 1994; October 2016, January 2024

VORTEX RING STATE AVOIDANCE, RECOGNITION, AND RECOVERY

A vertical descent or steep approach, particularly downwind, can cause the rotor to fly into its own downwash. At certain descent rates, large vortices develop as the downwash is recirculated through the rotor disk. This condition is known as vortex ring state (VRS). Once VRS exists, adding power (raising collective) can unexpectedly increase descent rate due to the increase in downwash recirculating through the rotor. Recovery can only be accomplished by moving the rotor disk out of its own downwash.

To avoid VRS, reduce rate of descent before reducing airspeed. A good rule to follow is never allow your airspeed to be less than 30 knots until your rate of descent is less than 300 feet per minute.

Signs that VRS is developing include increased vibration levels, decreased control authority ("mushy controls"), and a rapid increase in sink rate. Pilots should always be aware of wind conditions and plan descents to avoid VRS. Pilots should be particularly alert to the possibility of VRS during OGE hover operations or steep approaches.

A recovery should be initiated as soon as VRS is suspected. Early recognition and immediate recovery by moving the rotor out of its downwash is essential. Large control inputs are not necessary and should be avoided. After recovery, increasing collective and/or airspeed will help to avoid re-entering VRS.

ROBINSON
HELICOPTER COMPANY

Safety Notice SN-23

Issued: Jul 86 Rev: Jun 94

WALKING INTO TAIL ROTOR CAN BE FATAL

Non-pilot passengers have been killed by inadvertently walking into a rotating tail rotor. Every possible precaution must be taken by the pilot to prevent this tragic type of accident. The following rules should always be observed:

1) Never allow anyone to approach the helicopter unless they are escorted or have been properly instructed. If necessary, shut down and stop rotors before boarding passengers.

2) Always have strobe light flashing when rotors are turning.

3) Instruct passengers to establish and maintain eye contact with pilot when approaching helicopter. (This will force them to approach only from the nose or side, never the tail).

4) Instruct passengers to leave the helicopter in full view of the pilot and walk only around the nose, never the tail.

5) Be especially careful when landing off airports as unseen children or adults might approach the helicopter from the rear.