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 (constant)
Blade Twist	-8 degrees
Tip Speed @ 100% RPM	672 FPS

TAIL ROTOR

Articulation	Free to teeter, rigid inplane
Number of Blades	2
Diameter	3 feet 6 inches
Blade Chord	4 inches (constant)
Blade Twist	0 degrees
Precone Angle	1 degree 11 minutes
Tip Speed @ 100% RPM	599 FPS

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

DESCRIPTIVE DATA (cont'd)

POWERPLANT

Model: Lycoming O-320 or O-360

Type: Four cylinder, horizontally opposed, direct drive air cooled, carbureted, normally aspirated

Displacement: 319.8 (O-320) or 361.0 (O-360) cubic inches

Normal rating:

O-320-A2B or A2C	150 BHP @ 2700 RPM (Standard R22)
O-320-B2C	160 BHP @ 2700 RPM (R22 HP, Alpha, and Beta)
O-360-J2A	145 BHP (derated) @ 2700 RPM (R22 Beta II)

Maximum continuous rating in R22: 124 BHP at 2652 RPM (104% on tachometer)

5 minute takeoff rating for Beta and Beta II only: 131 BHP at 2652 RPM

Cooling system: Direct drive squirrel-cage blower

FUEL

Approved fuel grades and capacity: See Section 2.

OIL

Approved oil grades and capacity: See Section 8.

TACHOMETER FAILURE

If rotor or engine tach malfunctions in flight, use remaining tach to monitor RPM. If it is not clear which tach is malfunctioning or if both tachs malfunction, allow governor to control RPM and land as soon as practical.

NOTE

Each tach, the governor, and the low RPM warning horn are on separate circuits. Either the battery or the alternator can independently supply power to the tachs. A special circuit allows the battery to supply power to the tachs even if the master battery switch is off.

GOVERNOR FAILURE

If the engine RPM governor malfunctions, grip throttle firmly to override the governor, then switch governor off. Complete flight using manual throttle control.

WARNING/CAUTION LIGHTS (cont'd)

LOW FUEL — Indicates approximately one gallon of usable fuel remaining for all-aluminum fuel tanks or 1.5 gallons for bladder-style tanks. The engine will run out of fuel after approximately five minutes at cruise power for aircraft with all-aluminum tanks or ten minutes with bladder-style tanks.

CAUTION

Do not use low fuel caution light as a working indication of fuel quantity.

CLUTCH — Indicates clutch actuator circuit is on, either engaging or disengaging clutch. When switch is in the ENGAGE position, light stays on until belts are properly tensioned. Never take off before light goes out.

NOTE

Clutch light may come on momentarily during run-up or during flight to retension belts as they warm-up and stretch slightly. This is normal. If, however, the light flickers or comes on in flight and does not go out within 10 seconds, pull CLUTCH circuit breaker and land as soon as practical. Reduce power and land immediately if there are other indications of drive system failure (be prepared to enter autorotation). Inspect drive system for a possible malfunction.

ALT — Indicates low voltage and possible alternator failure. Turn off nonessential electrical equipment and switch ALT off and back on after one second to reset overvoltage relay. If light stays on, land as soon as practical. Continued flight without functioning alternator can result in loss of electronic tachometer, producing a hazardous flight condition.

DRIVE SYSTEM

A vee-belt sheave is bolted directly to the engine output shaft. Vee-belts transmit power to the upper sheave which has an overrunning clutch contained in its hub. The inner shaft of the clutch transmits power forward to the main rotor and aft to the tail rotor. Flexible couplings are located at the main gearbox input and at each end of the long tail rotor drive shaft.

The main gearbox contains a single-stage spiral-bevel gear set which is splash lubricated. A cooling duct under the box is connected to the top of the engine shroud. The main gearbox is supported by four rubber mounts.

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 four-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, and induction air filter. See Sections 1 and 2 for powerplant specifications and limitations.

A direct-drive, squirrel-cage fan 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 inlet on the right side of the fuselage and passes through a flexible duct to the carburetor air box. A hot air scoop supplies heated air to the air box. A sliding valve controlled by the pilot allows either cool or warm air to flow into the box, through the air filter, and up into the carburetor.

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

CLUTCH ACTUATOR

After the engine is started, it is coupled to the rotor drive system through vee-belts which are tensioned by raising the upper drive sheave. An electric actuator, located between the drive sheaves, raises the upper sheave when the pilot engages the clutch switch. The actuator senses compressive load (belt tension) and switches off when the vee-belts are properly tensioned. The clutch caution light illuminates whenever the actuator circuit is energized, either engaging, disengaging, or retensioning the belts. The light stays on until the belts are properly tensioned or completely disengaged.

Belt slack during engine start should be adjusted such that blades begin turning within five seconds of clutch engagement. Excessive slack may cause belts to jump out of sheave grooves during start. Periodic readjustment by a mechanic may be required as belts wear in service.

A fuse located on or near the test switch panel prevents an actuator motor overload from tripping the circuit breaker and turning off the caution light prematurely.

CAUTION

Never take off while clutch caution light is on.

WARNING AND CAUTION LIGHTS

Warning and caution lights include clutch, main gearbox over-temperature, main and tail gearbox chip, starter on (later aircraft), low fuel, low RPM, alternator, low oil pressure, rotor brake, carbon monoxide (aircraft with cabin heater), and full throttle (later aircraft). The clutch light indicates that the clutch actuator is operating. The low RPM light and horn indicate rotor RPM at 97% or below. The low oil pressure and low fuel lights are actuated by sensors in those systems and are independent of the gage indicators. The alternator light warns of a possible alternator failure. The governor-off light indicates the governor is switched off.

The main and tail gearbox chip detectors are magnetic devices located in the drain plug of each gearbox. When metallic particles are drawn to the magnets they close an electrical circuit, illuminating the caution light. Metal particles may be caused by a failing bearing or gear, thus giving warning of impending gearbox failure. The main gearbox over-temp light is actuated by a temperature switch located near the input pinion.

The carbon monoxide light is actuated by a sensor above the pilot's heater outlet and indicates elevated cabin carbon monoxide levels.

The full throttle light is activated by a switch in the throttle linkage and indicates that the engine is near full throttle.

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LISTEN FOR IMPENDING BEARING FAILURE

An impending ball or roller bearing failure is usually preceded by a noticeable increase in noise. The noise will typically start several hours before the bearing actually fails or before there is any increase in bearing temperature. To detect pending failure of a drive system bearing, the pilot should uncover one ear and listen to the sound of the drive system during start-up and shutdown. After the pilot becomes familiar with the normal sound of the drive system, he should be able to detect the noise made by a failing bearing. The failing bearing will produce a loud whine, rumble, growl, or siren sound. Upon hearing an unusual noise, the pilot must immediately ground the aircraft and have the bearings thoroughly inspected by a qualified mechanic. Failure of a bearing in flight could result in a serious accident.

Do not rely on Telatemps to indicate impending bearing failure. A failing bearing may not run hot enough to black out the Telatemps until it actually starts to disintegrate. This may occur only seconds before complete failure.

CLUTCH LIGHT WARNING

It is normal for the clutch light to come on occasionally in flight for a short time (approximately 3 to 6 seconds) to re-tension the drive belts. If the clutch light flickers or does not go out within 10 seconds, it can indicate a belt or bearing failure. If abnormal clutch light indication occurs, pull clutch circuit breaker and reduce power. Select a safe landing site and make a precautionary landing to check drive system. If additional symptoms of drive system failure (smell of hot rubber, noise, or vibration) are present, land immediately. If tachometer needle split occurs, enter autorotation.

After landing, shut down and check the drive belts to insure that the belts are in their grooves and not damaged. Check the upper and lower actuator bearings for seal damage. Also check the Telatemp indicator readings. If drive system problems are found, have the aircraft inspected by a mechanic before further flight.

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DRIVE BELT SLACK

R22 and R44 drive belts must have the proper slack prior to engine start. Belts which are too loose may jump out of their sheave grooves during engine start while clutch is engaging.

1. During preflight, with clutch disengaged, press in on belts with fingers just above fan scroll. Verify belts deflect approximately 1½ inches (4 cm). If belts are significantly looser than this, have actuator adjusted prior to engine start.
2. After engine start, engage clutch and verify rotor turns within 5 seconds. If rotor does not turn within 5 seconds, shut down and have actuator adjusted prior to flight.

New drive belts may be tight and cause the rotor to turn during engine start. This places unnecessary strain on the starter and drive system. If necessary, stretch new belts as follows:

1. During shutdown, do not disengage clutch.
2. After battery switch is off, put clutch switch in DISENGAGE position. If the clutch switch is left in ENGAGE position, the tachometers still draw power and can drain the battery.
3. Switch battery on and allow clutch to disengage during next preflight.