FAA APPROVED
R22 PILOT'S OPERATING HANDBOOK

FEDERAL AIR TRANSPORT AGENCY
(FATA) SUPPLEMENT

This supplement must be included in the FAA-approved Robinson R22 Pilot's Operating Handbook for FATA-certified aircraft.

The 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 R22 Pilot's Operating Handbook. FATA approval is limited to the model R22 Beta with O-360-J2A engine (R22 Beta II). Information in this supplement is specific to the R22 Beta II.

This supplement is approved by the United States Federal Aviation Administration on behalf of the FATA.

This supplement corresponds with the basic manual dated October 26, 2016.

Approved By: Hien Tong Digitally signed by HIEN H TONG Date: 2019.09.19 10:40:05 -07'00'

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

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SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable to the R22 helicopter certified by the Federal Air Transport Agency.

FATA-certified R22s are equipped with an artificial horizon with inclinometer and a 121.5/406 MHz ELT as standard equipment. Three instrument calibration configurations are possible for FATA-certified R22s:

Instrument	Configuration Units		
	Obsolete	English	Metric
Altimeter	meters	feet	meters
Airspeed	knots	knots	km/h
Vertical Speed	fpm	fpm	m/s

The obsolete configuration is only valid for helicopters exported to Russia prior to 1 August 2014. Refer to Section 7 for operator-provided required equipment.

SECTION 2: LIMITATIONS

NOTE

All airspeeds given in km/h are indicated airspeed.

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED (V_{NE})

Up to 900 meters (3000 feet) density altitude: 189 km/h (102 KIAS)

Above 900 meters (3000 feet) density altitude, see placards on page 9-F7.6 and 9-F7.7.

POWERPLANT LIMITATIONS

Manifold Pressure: See placard on page 9-F7.6 for MAP schedule.

FLIGHT AND MANEUVER LIMITATIONS

Maximum operating density altitude 4270 meters (14,000 feet).

Maximum operating pressure altitude without supplemental oxygen is 2400 meters (8000 feet) with passengers on board or 3000 meters (10,000 feet) without passengers.

Maximum hover yaw rate is 120 degrees per second.

Maximum pitch angle except during flare in autorotation is 20 degrees.

Maximum bank angle with passengers on board is 45 degrees.

Maximum bank angle without passengers on board is 60 degrees up to 1000 meters (3300 feet) density altitude, reducing to 45 degrees at 3000 meters (10,000 feet) density altitude.

Maximum hover taxi maneuver speeds:
Left or Right: 46 km/h (25 knots)
Backwards: 46 km/h (25 knots)

SECTION 2: LIMITATIONS (cont'd)

FLIGHT AND MANEUVER LIMITATIONS (cont'd)

Maximum lateral ground slope angle is 7 degrees.

Maximum fore/aft ground slope angle is 5 degrees.

Flight above 60 degrees north latitude is prohibited without an approved GPS installed.

Flight in vicinity of thunderstorm activity is prohibited.

Flight in ambient temperatures below -30°C and above +38°C is prohibited.

NOTE

In ambient temperatures below -5°C, refer to cold weather operation procedures in Section 4 of this supplement.

FUEL LIMITATIONS

Approved Fuel Grades:

Б91/115 grade aviation fuel
Б95/130 grade aviation fuel

CAUTION

Make sure spark plugs are operating properly. If fouling of spark plugs is suspected, perform maintenance as prescribed in Lycoming Operator's Manual No. 60297-12 (Section 4) and in Lycoming Service Instruction 1070.

OIL LIMITATIONS

Use only Robinson Helicopter part number A257-2 gear oil in main rotor and tail rotor gearboxes.

SECTION 2: LIMITATIONS (cont'd)

INSTRUMENT MARKINGS

AIRSPEED INDICATOR (METRIC VERSION ONLY)

Green arc	93 to 189 km/h (50 to 102 KIAS)
Red line	189 km/h (102 KIAS)

AVIONICS LIMITATIONS

Terrain Proximity function of GTN 6XX/7XX is not approved.

PLACARDS

In clear view and readable by pilot in flight on helicopters equipped with a metric altimeter (metric and obsolete configurations):

LIMIT MANIFOLD PRESSURE - IN. HG

MAXIMUM CONTINUOUS POWER								
PRESS ALT-M	OAT - °C							
	-30	-20	-10	0	10	20	30	40
SL	21.2	21.5	21.8	22.1	22.3	22.6	22.9	23.2
500	20.9	21.2	21.5	21.7	22.0	22.3	22.6	22.8
1000	20.6	20.8	21.1	21.4	21.7	21.9	22.2	22.5
1500	20.3	20.5	20.8	21.1	21.3	21.6	21.9	22.1
2000	19.9	20.2	20.5	20.7	21.0	21.3	21.5	21.8
2500	19.6	19.9	20.1	20.4	20.6			
3000	19.3	FULL THROTTLE						
FOR MAX TAKEOFF POWER (5 MIN), ADD 0.9 IN.								

On helicopters equipped with a metric altimeter and airspeed indicator (metric configuration):

NEVER EXCEED SPEED - KM/H

PRESS ALT-M	OAT - °C							
	-30	-20	-10	0	10	20	30	40
SL	189							
500							186	179
1000					187	180	173	167
1500				182	175	168	161	153
2000		185	177	170	163	154	144	135
2500	181	173	165	156	146	136	126	117
3000	168	160	149	138	128	118	108	
3500	153	142	130	120	110	NO FLIGHT		
4000	135	123	112	NO FLIGHT				

SECTION 2: LIMITATIONS (cont'd)

PLACARDS (cont'd)

On helicopters equipped with a metric altimeter only (obsolete configuration):

NEVER EXCEED SPEED - KIAS

PRESS ALT-M	OAT - °C							
	-30	-20	-10	0	10	20	30	40
SL								
500							100	97
1000			102			101	97	94	90
1500					98	94	91	87	83
2000		100	96	92	88	83	78	73
2500	97	93	89	84	79	73	68	63
3000	91	86	80	75	69	64	59	
3500	83	76	70	65	59	NO FLIGHT		
4000	73	66	61					

Near both fuel tank filler caps:

CIS FUEL GRADES:
Б91/115
Б95/130

Adjacent to altimeter (on R22 helicopters equipped with an altimeter calibrated in feet only):

FT x 1000	M
1	305
2	610
3	914
4	1219
5	1524
6	1829
7	2134
8	2438
9	2743
10	3048

SECTION 2: LIMITATIONS (cont'd)

PLACARDS (cont'd)

On both doors, inside and out:

ОТКРЫТО

(Open)

Outside both doors:

ОПУСТИТЬ ВНИЗ РУЧКУ
СДВИНУТЬ ВПЕРЕД
ОТКРЫТЬ ДВЕРЬ НАРУЖУ

(Lower handle downwards
Move handle forwards
Open door outwards)

Inside both doors:

ПОДНЯТЬ РУЧКУ ЗАМКА
ПЕРЕДВИНУТЬ ЕЕ ВПЕРЕД
ТОЛКНУТЬ ДВЕРЬ НАРУЖУ

(Lift handle
Slide handle forward
Push door outwards.)

Inside both baggage compartments:

МАКСИМАЛЬНЫЙ ВЕС БАГАЖА 23 КГ
МАКСИМАЛЬНАЯ НАГРУЗКА НА КРЕСЛО С УЧЕТОМ ВЕСА БАГАЖА 109 КГ

(Maximum compartment load 23 kg
Maximum seat plus compartment load 109 kg)

SECTION 2: LIMITATIONS (cont'd)

PLACARDS (cont'd)

Located near main fuel tank filler cap:

ОСНОВНОЙ БАК
АВИАЦИОННЫЙ БЕНЗИН

(Main fuel tank
Aviation Gasoline)

Located near aux fuel tank filler cap:

ДОПОЛНИТЕЛЬНЫЙ БАК
АВИАЦИОННЫЙ БЕНЗИН
ДЛЯ ПОЛНОЙ ЗАПРАВКИ СНАЧАЛА ЗАПРАВЬТЕ
ОСНОВНОЙ БАК И ДОЗАПРАВЬТЕ ЕГО ПОСЛЕ
ЗАПРАВКИ ДОПОЛНИТЕЛЬНОГО БАКА

(Aux fuel tank
Aviation gasoline
To insure full fuel
top off main tank
again after filling aux)

Near each collective stick:

НЕ ЗАГРОМОЖДАТЬ
СВОБОДНАЯ ЗОНА

(No stowage
Keep area clear)

In clear view of both occupants:

НЕ КУРИТЬ

(No smoking)

SECTION 3: EMERGENCY PROCEDURES

NOTE

The following procedures are unchanged from those of the basic manual. Altitudes are converted to meters and airspeeds are converted to km/h only.

POWER FAILURE ABOVE 150 METERS (500 FEET) AGL

1. Lower collective immediately to maintain rotor RPM.
2. Establish a steady glide at approximately 111 km/h (65 KIAS). (For maximum glide distance, see page 9-F7.11.)
3. Adjust collective to keep RPM between 97 and 110% or apply full down collective if light weight prevents attaining above 97%.
4. Select landing spot and, if altitude permits, maneuver so landing will be into wind.
5. A restart may be attempted at pilot's discretion if sufficient time is available (See "Air Restart Procedure", page 3-3 of basic manual).
6. If unable to restart, turn unnecessary switches and fuel valve off.
7. At about 12 meters (40 feet) AGL, begin cyclic flare to reduce rate of descent and forward speed.
8. At about 2.4 meters (8 feet) AGL, apply forward cyclic to level ship and raise collective just before touchdown to cushion landing. Touch down in level attitude with nose straight ahead.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

POWER FAILURE BETWEEN 2.4 METERS (8 FEET) AND 150 METERS (500 FEET) AGL

1. Lower collective immediately to maintain rotor RPM.
2. Adjust collective to keep RPM between 97 and 110% or apply full down collective if light weight prevents attaining above 97%.
3. Maintain airspeed until ground is approached, then begin cyclic flare to reduce rate of descent and forward speed.
4. At about 2.4 meters (8 feet) AGL, apply forward cyclic to level ship and raise collective just before touchdown to cushion landing. Touch down in level attitude and nose straight ahead.

POWER FAILURE BELOW 2.4 METERS (8 FEET) AGL

1. Apply right pedal as required to prevent yawing.
2. Allow aircraft to settle.
3. Raise collective just before touchdown to cushion landing.

MAXIMUM GLIDE DISTANCE CONFIGURATION

1. Airspeed approximately 139 km/h (75 KIAS).
2. Rotor RPM approximately 90%.
3. Best glide ratio is about 4:1 or one kilometer per 250 meters (one nautical mile per 1500 feet) AGL.

CAUTION

Increase rotor RPM to 97% minimum when autorotating below 150 meters (500 feet) AGL.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

LOSS OF TAIL ROTOR THRUST IN FORWARD FLIGHT

Failure is usually indicated by nose right yaw which cannot be corrected by applying left pedal.

1. Immediately enter autorotation.
2. Maintain at least 130 km/h (70 KIAS) airspeed if practical.
3. Select landing site, roll throttle off into overtravel spring and perform autorotation landing.

NOTE

When a suitable landing site is not available, the vertical stabilizers may permit limited controlled flight at very low power settings and airspeeds above 130 km/h (70 KIAS); however, prior to reducing airspeed, enter full autorotation.

SECTION 4: NORMAL PROCEDURES

RECOMMENDED AIRSPEEDS

Takeoff and Climb	111 km/h (60 KIAS)
Maximum Rate of Climb (V_Y)	98 km/h (53 KIAS)
Maximum Range	154 km/h (83 KIAS)*
Significant Turbulence	111 to 130 km/h* (60 to 70 KIAS)
Landing Approach	111 km/h (60 KIAS)
Autorotation	111 to 130 km/h* (60 to 70 KIAS)

* Certain conditions may require lower airspeeds. See placards on page 9-F7.6 and 9-F7.7.

CRUISE

CAUTION

In turbulence, reduce power and use a slower than normal cruise speed. If turbulence is significant or becomes uncomfortable for the pilot, use 111 to 130 km/h (60 to 70 KIAS).

SECTION 4: NORMAL PROCEDURES (cont'd)

COLD WEATHER OPERATION

Special precautions should be taken if the helicopter is to be started after a cold soak in ambient temperatures below -5°C. Ensure that the correct engine oil grade is used (Refer to Section 8 in the main body of this manual). Preheat engine oil, engine compartment and main rotor gearbox compartment to a minimum temperature of -5°C (Pilot judgment may be used to estimate this temperature). Preheating may be achieved by using a combination of an approved electric engine preheat system, portable heaters, and insulating covers. Use caution not to damage any equipment/wiring with excessive direct heat.

CAUTION

Failure to preheat engine before starting may result in internal engine damage.

When landing at ambient temperatures below -5°C in areas without preheating equipment, start the helicopter hourly and run-up to normal operating temperatures. More frequent starts may be required at colder temperatures. Be sure to run the helicopter long enough to recharge the battery after each start.

Avionics equipment may not function, or function improperly, after a rotorcraft cold soak. Warm up the cabin to pass avionics self-test successfully.

Using carburetor heat is recommended to assist in engine warming.

SECTION 4: NORMAL PROCEDURES (cont'd)

NOTE

The following procedures are unchanged from those of the basic manual. Altitudes are converted to meters and airspeeds are converted to km/h only.

PRACTICE AUTOROTATION – POWER RECOVERY

1. Adjust carb heat if required. (See page 4-11 of basic manual.)
2. Lower collective to down stop and adjust throttle as required for small tachometer needle separation.

CAUTION

To avoid inadvertent engine stoppage, do not chop throttle to simulate a power failure. Always roll throttle off smoothly for small visible needle split.

NOTE

Governor is inactive below 80% engine RPM regardless of governor switch position.

NOTE

When entering autorotation from above 1200 meters (4000 feet), reduce throttle slightly before lowering collective to prevent engine overspeed.

3. Adjust collective to keep rotor RPM in green arc and adjust throttle for small needle separation.
4. Keep airspeed 111 to 130 km/h (60 to 70 KIAS).
5. At about 12 meters (40 feet) AGL, begin cyclic flare to reduce rate of descent and forward speed.
6. At about 2.4 meters (8 feet) AGL, apply forward cyclic to level aircraft and raise collective to control descent. Add throttle if required to keep RPM in green arc.

SECTION 4: NORMAL PROCEDURES (cont'd)

PRACTICE AUTOROTATION – POWER RECOVERY (cont'd)

CAUTION

Simulated engine failures require prompt lowering of collective to avoid dangerously low rotor RPM. Catastrophic rotor stall could occur if rotor RPM ever drops below 80% plus 1% per 300 meters (1000 feet) of altitude.

DESCENT, APPROACH, AND LANDING

1. Reduce power with collective as desired. Adjust carb heat as required. Observe airspeed limits.

CAUTION

Do not initiate a descent with forward cyclic. This can produce a low-G condition. Always initiate a descent by lowering collective.

2. Make final approach into wind at lowest practical rate of descent with initial airspeed of 111 km/h (60 KIAS).
3. Reduce airspeed and altitude smoothly to hover. (Be sure rate of descent is less than 1.5 m/s (300 FPM) before airspeed is reduced below 56 km/h (30 KIAS).
4. From hover, lower collective gradually until ground contact.
5. After initial ground contact, lower collective to full down position.

CAUTION

When landing on a slope, return cyclic control to neutral before reducing rotor RPM.

CAUTION

Never leave helicopter flight controls unattended while engine is running.

SECTION 4: NORMAL PROCEDURES (cont'd)

DESCENT, APPROACH, AND LANDING (cont'd)

CAUTION

Hold throttle closed if passenger is entering or exiting with engine running and left seat collective installed.

NOISE ABATEMENT

To improve the quality of our environment and to dissuade overly restrictive ordinances against helicopters, it is imperative that every pilot minimize noise irritation to the public. Following are several techniques which should be employed when possible.

1. Avoid flying over outdoor assemblies of people. When this cannot be avoided, fly as high as practical, preferably over 600 meters (2000 feet) AGL.
2. Avoid blade slap. Blade slap usually occurs during shallow high-speed descents, especially during turns. It can be avoided by using slower, steeper descents. With the right door removed, the pilot can easily determine those flight conditions which produce blade slap and develop piloting techniques to eliminate or reduce it.
3. When departing from or approaching a landing site, avoid prolonged flight over noise-sensitive areas. Always fly above 150 meters (500 feet) AGL and preferably above 300 meters (1000 feet) AGL.
4. Repetitive noise is far more irritating than a single occurrence. If you must fly over the same area more than once, vary your flight path to not overfly the same buildings each time.
5. When overflying populated areas, look ahead and select the least noise-sensitive route.

SECTION 4: NORMAL PROCEDURES (cont'd)

NOISE ABATEMENT (cont'd)

NOTE

Above procedures do not apply where they would conflict with Air Traffic Control clearances or instructions or when, in the pilot's judgment, they would result in an unsafe flight path.

INFORMATION PER FAA AD 95-26-04

Until the FAA completes its research into the conditions and aircraft characteristics that lead to main rotor blade/fuselage contact accidents, and corrective type design changes and operating limitations are identified, Model R22 pilots are strongly urged to become familiar with the following information and comply with these recommended procedures:

Main Rotor Stall: Many factors may contribute to main rotor stall and pilots should be familiar with them. Any flight condition that creates excessive angle of attack on the main rotor blades can produce a stall. Low main rotor RPM, aggressive maneuvering, high collective angle (often the result of high-density altitude, over-pitching [exceeding power available] during climb, or high forward airspeed) and slow response to the low main rotor RPM warning horn and light may result in main rotor stall. The effect of these conditions can be amplified in turbulence. Main rotor stall can ultimately result in contact between the main rotor and airframe. Additional information on main rotor stall is provided in the Robinson Helicopter Company Safety Notices SN-10, SN-15, SN-20, SN-24, SN-27, and SN-29.

Mast Bumping: Mast bumping may occur with a teetering rotor system when excessive main rotor flapping results from low "G" (load factor below 1.0) or abrupt control input. A low "G" flight condition can result from an abrupt cyclic pushover in forward flight.

SECTION 4: NORMAL PROCEDURES (cont'd)

INFORMATION PER FAA AD 95-26-04 (cont'd)

High forward airspeed, turbulence, and excessive sideslip can accentuate the adverse effects of these control movements. The excessive flapping results in the main rotor hub assembly striking the main rotor mast with subsequent main rotor system separation from the helicopter.

To avoid these conditions, pilots are strongly urged to follow these recommendations:

1. Maintain cruise airspeeds between 111 km/h (60 KIAS) and less than 0.9 V_{NE}, but no lower than 106 km/h (57 KIAS).
2. Use maximum "power-on" RPM at all times during powered flight.
3. Avoid sideslip during flight. Maintain in-trim flight at all times.
4. Avoid large, rapid forward cyclic inputs in forward flight, and abrupt control inputs in turbulence.

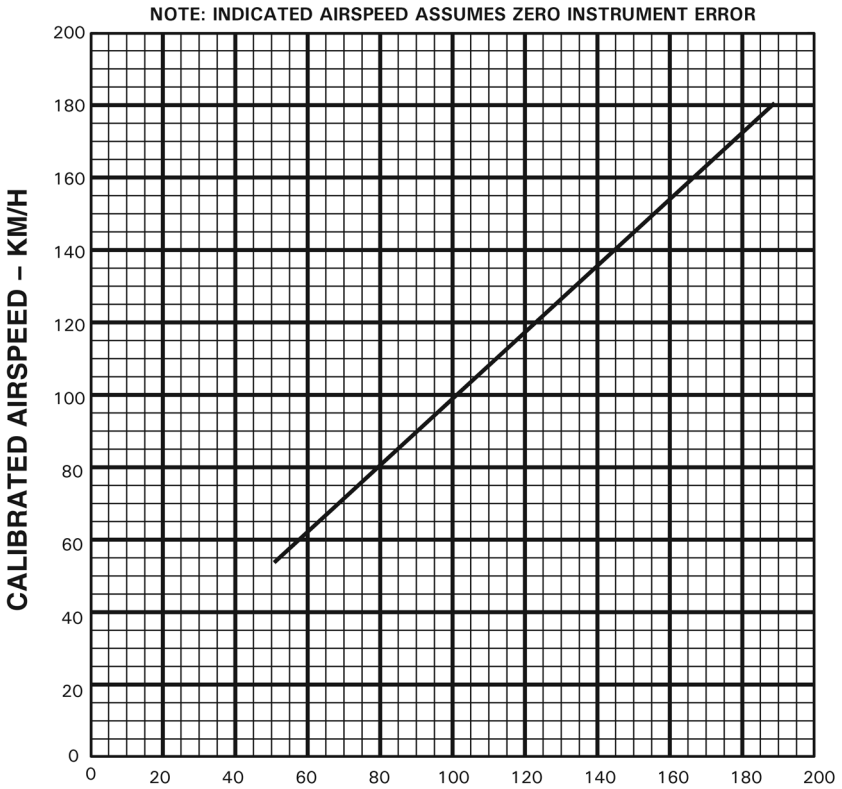
SECTION 5: PERFORMANCE

GENERAL

Hover controllability has been substantiated in 31 km/h (17 knot) wind from any direction up to 2990 meters (9800 feet) density altitude. Refer to IGE hover performance data for allowable gross weight.

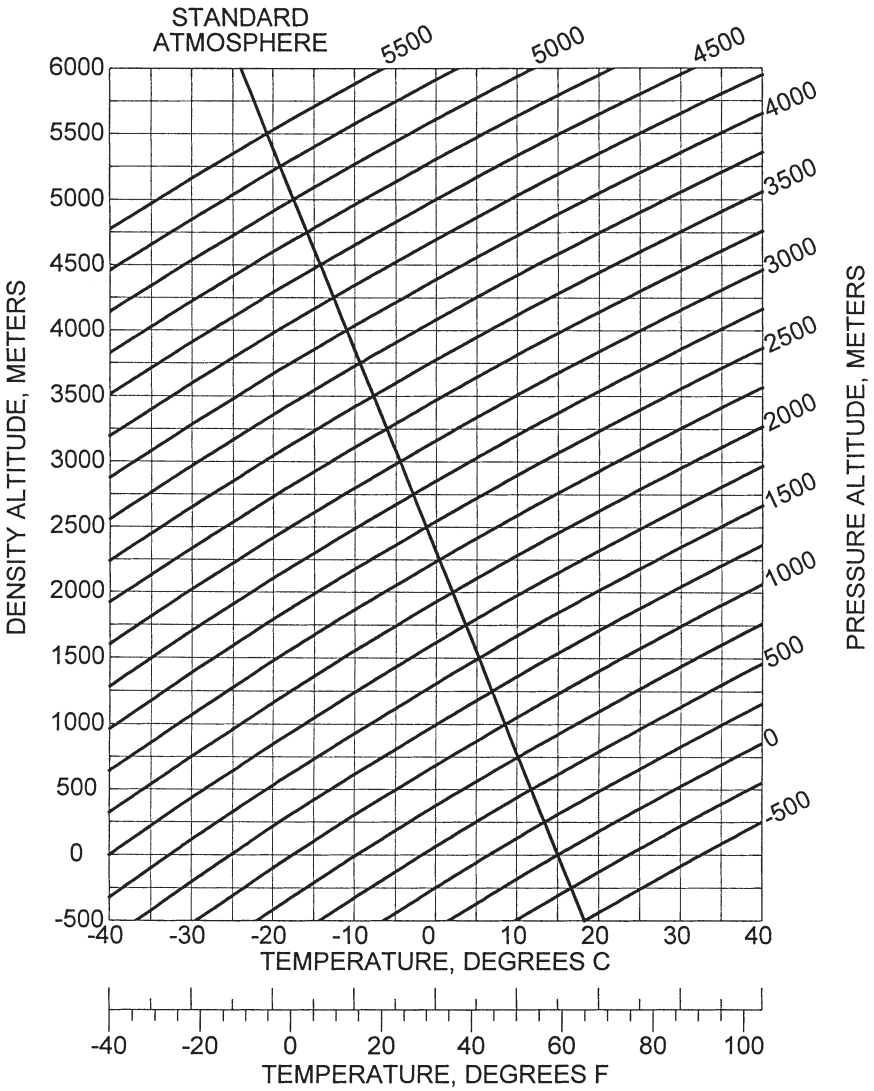
NOTE

Hover performance data given is with carburetor heat off. Full carburetor heat reduces hover ceilings by up to 610 meters (2000 feet).



AIRSPEED CALIBRATION CURVE

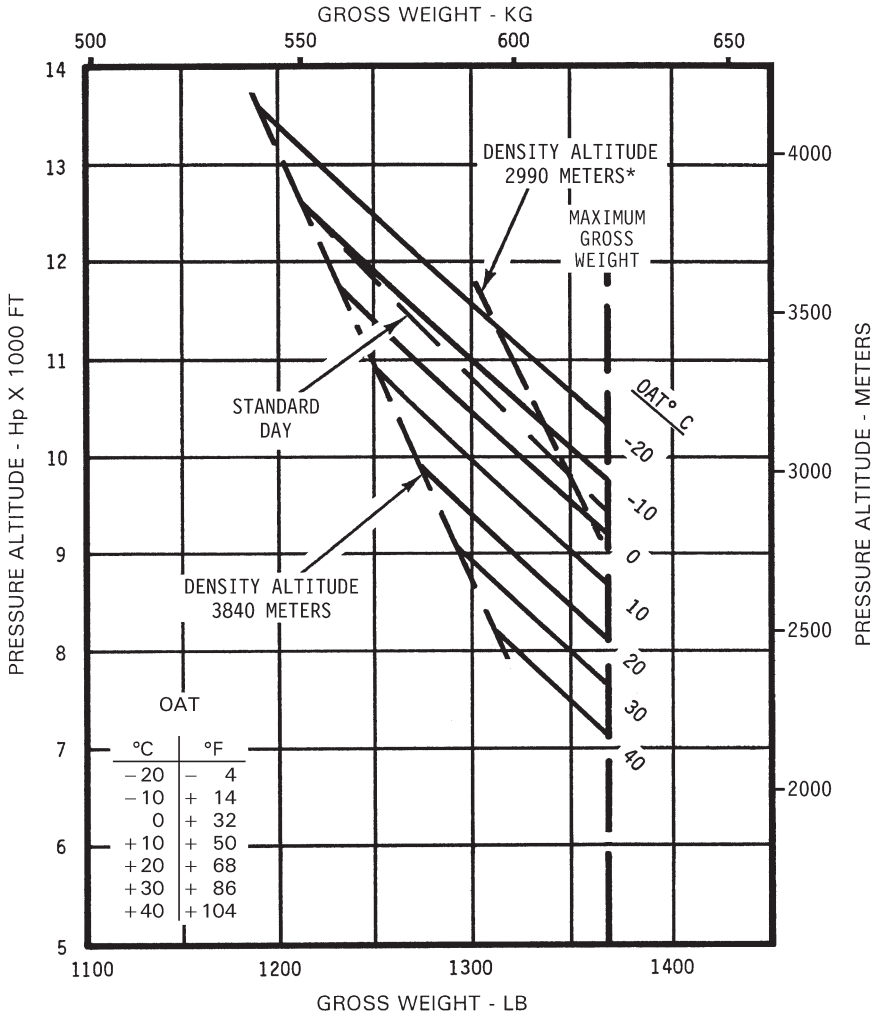
SECTION 5: PERFORMANCE (cont'd)



DENSITY ALTITUDE CHART

SECTION 5: PERFORMANCE (cont'd)

IN GROUND EFFECT AT 0.6 METER SKID CLEARANCE
FULL THROTTLE
103 – 104% RPM
ZERO WIND



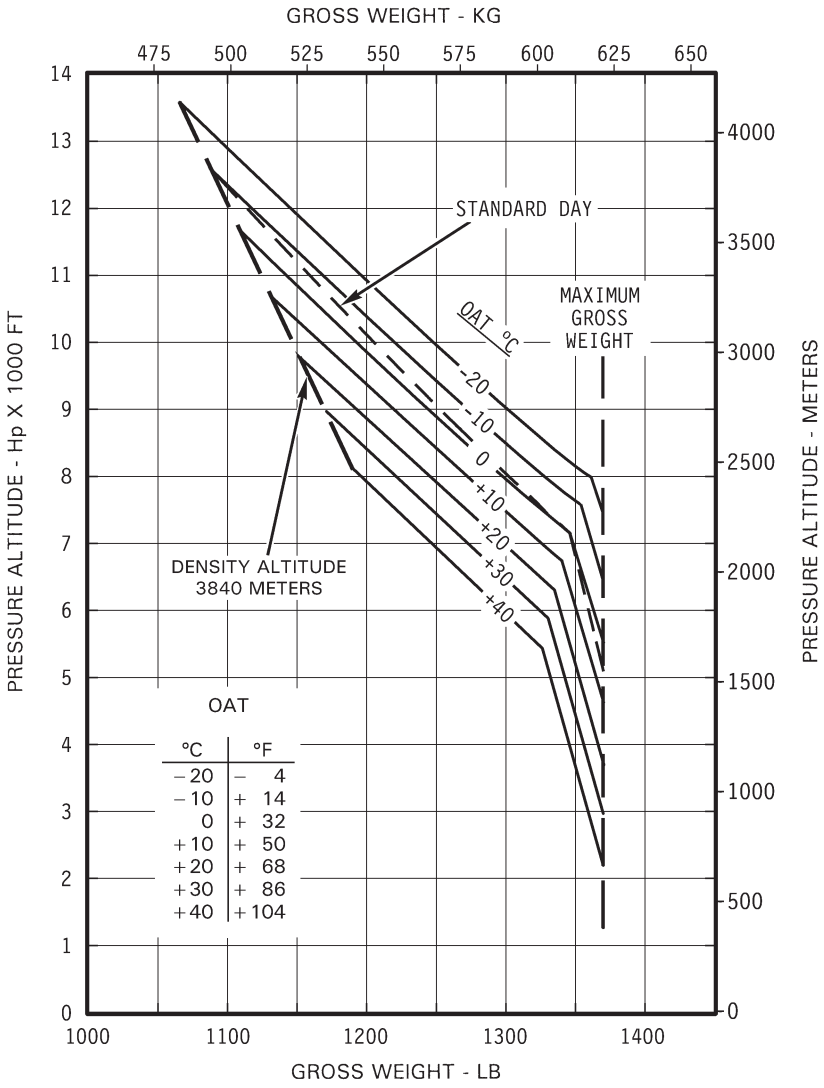
R22 BETA II
O-360-J2A ENGINE

IGE HOVER CEILING VS. GROSS WEIGHT

*Hover controllability with 31 km/h (17 knot) wind substantiated up to 2990 meters (9800 feet) density altitude.

SECTION 5: PERFORMANCE (cont'd)

OUT OF GROUND EFFECT, ZERO WIND
TAKEOFF POWER OR FULL THROTTLE
104% RPM



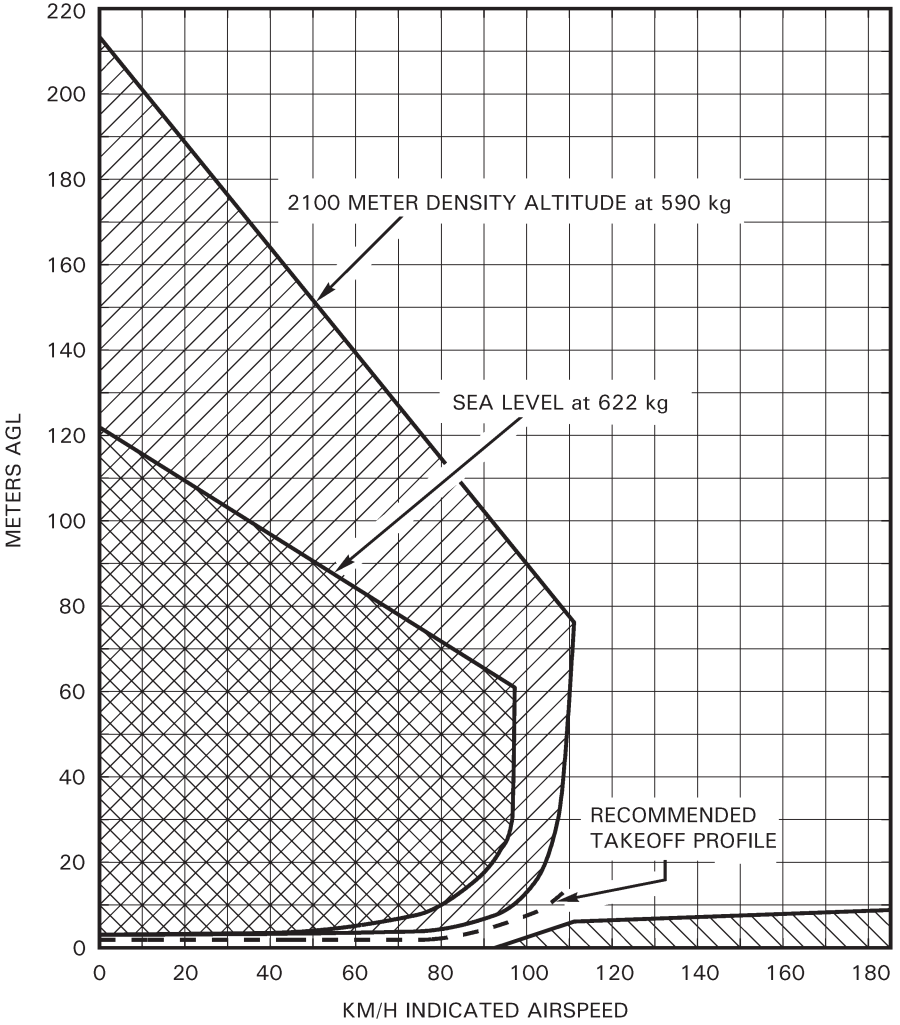
R22 BETA II
O-360-J2A ENGINE

OGE HOVER CEILING VS. GROSS WEIGHT

SECTION 5: PERFORMANCE (cont'd)

DEMONSTRATED CONDITIONS:
SMOOTH HARD SURFACE
WIND CALM
GOVERNOR ON

AVOID OPERATION IN SHADED AREAS
ISA CONDITIONS

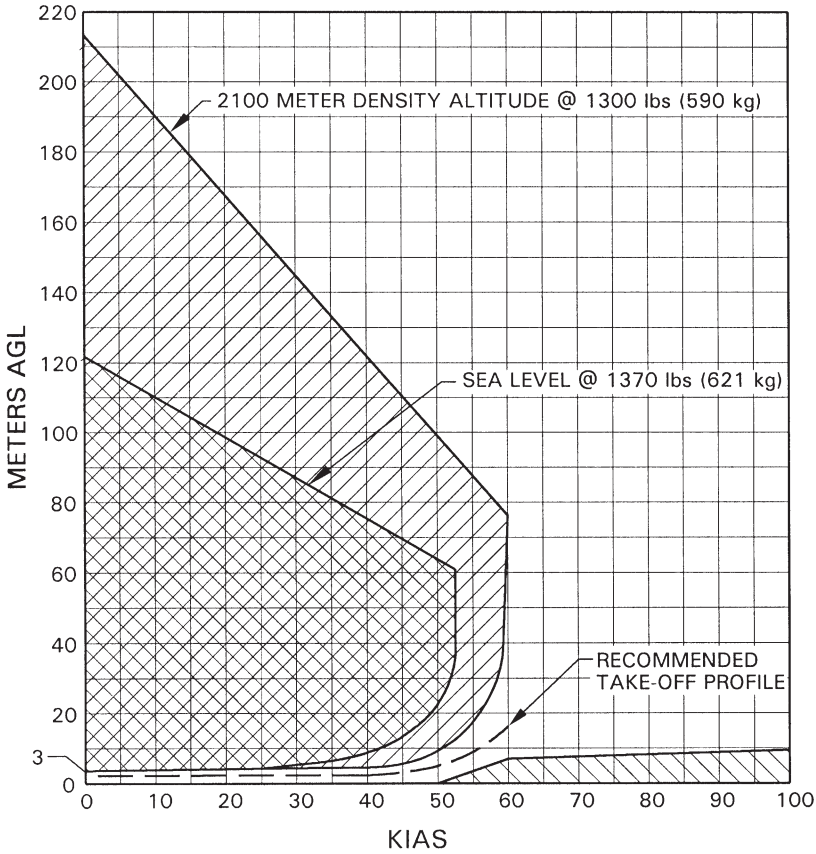


HEIGHT – VELOCITY DIAGRAM (METRIC)

SECTION 5: PERFORMANCE (cont'd)

DEMONSTRATED CONDITIONS:
SMOOTH HARD SURFACE
WIND CALM
GOVERNOR ON

AVOID OPERATION IN SHADED AREAS
ISA CONDITIONS



HEIGHT – VELOCITY DIAGRAM (OBSOLETE)

SECTION 5: PERFORMANCE (cont'd)

NOISE CHARACTERISTICS

For operating conditions specified in ICAO Annex 16, Chapter 11 the sound exposure level for the R22 Beta II is 78.0 db(A).

NOTE

No determination has been made by the Certifying Authority that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of any airport.

SECTION 6: WEIGHT AND BALANCE No change.

SECTION 7: SYSTEMS DESCRIPTION

EMERGENCY LOCATOR TRANSMITTER

Aircraft operated in difficult to reach and sparsely populated areas must be equipped with a VHF-band emergency radio or a portable COSPAS-SARSAT VHF/UHF-band emergency locator transmitter stowed under the pilot's seat. The operator is responsible for providing this equipment.

FIRST-AID KIT

A first-aid kit provided by the operator is required equipment for FATA-certified aircraft and should be stowed under the pilot's seat.

FLIGHT CONTROLS

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

CAUTION

At high power settings above 1200 meters (4000 feet), the throttle is frequently wide open and RPM must be controlled with the collective.

SECTION 8: HANDLING AND MAINTENANCE No change.

SECTION 9: SUPPLEMENTS No change.