ROBINSON
HELICOPTER COMPANY

EASA
European Aviation Safety Agency


# EASA Operational Suitability Data (OSD)
# Flight Crew Data

## R22

## RTR 165

## 11 December 2015

# Revision Record

| Revision No. | Section | Pages No. | Date |
|---|---|---|---|
| OSD report | All | All | 11/12/2015 |
| | | | |
| | | | |
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# Contents

## Abbreviations / Acronyms

| | |
|---|---|
| AC | Alternating Current |
| AMC | Acceptable Means of Compliance |
| ATR | Additional Type Rating |
| CPD | Common Procedure Document |
| DAU | Data Acquisition Unit |
| DC | Direct Current (electrical) |
| EASA | European Aviation Safety Agency |
| EDU | Electronic Display Unit |
| FADEC | Full Authority Digital Engine Control |
| FFS | Full Flight Simulator |
| FSTD | Flight Simulation Training Device |
| FTO | Flight Training Organization |
| GA/TU | Go Around / Transition Up |
| IEM | Interpretative and Explanatory Material |
| IFR | Instrument Flight Rules |
| IR | Instrument Rating |
| ITR | Initial Type Rating |
| MDR | Master Difference Requirements |
| MET-H | Multi Engine Turbine (Helicopter) |
| MGT | Measured gas (turbine) temperature |
| MTOM | Maximum Takeoff Mass |
| NAA | National Aviation Authority |
| N/A | Not Applicable |
| OAT | Outside Air Temperature |
| ODR | Operator Differences Requirements |
| OEI | One Engine Inoperative |
| OEB | Operational Evaluation Board |
| OPS | Flight Operations |
| OTD | Other Training Device |
| PFD | Primary Flight Display |
| PFL | Practice forced landing |
| PIC | Pilot in Command |
| POH | Pilot’s Operating Handbook |
| RFM | Rotorcraft Flight Manual |
| RPM | Revolution per Minute |
| SEP(H) | Single Engine Piston (Helicopter) |
| SET(H) | Single Engine Turbine (Helicopter) |
| SPH | Single-Pilot Helicopter |
| TRI | Type Rating Instructor |
| TRTC | Type Rating Training Course |
| TRTO | Type Rating Training Organization |

| | |
|---|---|
| VFR | Visual Flight Rules |
| VNE | Velocity Never Exceed |
| VTOL | Vertical Take Off & Landing |

| | |
|---|---|
| Part-ARA | Annex VI to Commission Regulation (EU) No 290/2012 of 30 March 2012 amending Regulation (EU) No 1178/2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-ARO | Annex II to Commission Regulation (EU) No 965/2012 of 05 Oct 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-CAT | Annex IV to Commission Regulation (EU) No 965/2012 of 05 Oct 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-FCL | Annex I to Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-ORA | Annex VII to Commission Regulation (EU) No 290/2012 of 30 March 2012 amending Regulation (EU) No 1178/2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-ORO | Annex III to Commission Regulation (EU) No 965/2012 of 05 Oct 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |
| Part-SPA | Annex V to Commission Regulation (EU) No 965/2012 of 05 Oct 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (as amended) |

# 1. General

## 1.1. Introduction

Where references are made to requirements and where extracts of reference texts are provided, these are at the amendment state at the date of evaluation or publication of this document. Users should take account of subsequent amendments to any references, in particular concerning requirement for civil aviation aircrew and air operations.

Determinations made in this document are based on the evaluations of specific configurations of aircraft models, equipped in a given configuration and in accordance with current regulations and guidance.

Modifications and upgrades to the aircraft evaluated require additional OSD assessment for type designation, training / checking / currency, operational credits, and other elements within the scope of the OSD evaluations.

In accordance with Commission Regulation (EU) No 69/2014 of 27 Jan 2014, the Operational Suitability Data contained in this document are identified as follows:

**[M]**…….Mandatory Operational Suitability Data, bearing the status of rule (see GM No 3 to 21A.15(d))

**[AMC]**…Non-mandatory Operational Suitability Data, bearing the status of Acceptable Means of Compliance (see GM No 3 to 21A.15(d))

## 1.2. Operational Evaluations – Group Composition

| Name | Organization | Function |
|---|---|---|
| Mr. Roel HUYSMANS | EASA | Chairman – OSD Expert |
| Mr. Fred CROSS | UK CAA | OSD Team Member |

## 1.3. Robinson Helicopter Company specialists involved in the evaluation

| Name | Position |
|---|---|
| Dr. Stephen TURNOUR | Certification Manager |
| Mr. Tim TUCKER | Test Pilot/ Instructor |

## 1.4 Purpose and Applicability

Data is being submitted by Robinson Helicopter in accordance with point 21.A.21(e) of Annex I to COMMISSION REGULATION (EU) No 69/2014 of 27 January 2014 for the R22 helicopter.

This document:

- Provides a general description of the R22
- Updates the Type Rating List for the R22 helicopter type
- Defines minimum training syllabus for type rating
- Defines Training Areas of Specific Emphasis (TASE).

# 2. Description of the R22

## 2.1. General

The Robinson R22 is a two-place, single main rotor, single piston-engine helicopter constructed primarily of metal. The primary fuselage structure is composed of welded steel tubing and riveted aluminum sheet. The tail cone is a monocoque structure in which aluminum skins carry most primary loads. Fiberglass and thermoplastics are used in secondary cabin structure and in various ducts and fairings. The cabin doors are also constructed of fiberglass and thermoplastics.

There are several models of the R22 but there are sufficient similarities for flight training purposes that only two variants are defined. The models covered by this document are as follows:

| Model Name | Commercial Name | Variant Name | Description |
|---|---|---|---|
| R22 | R22 | R22 | Original. 590 kg (1300 lb) max gross weight |
| | R22 HP | | As above, but with more powerful engine |
| R22 Alpha | R22 Alpha | | 621 kg (1370 lb) max gross weight |
| R22 Beta | R22 Beta | | Added takeoff power rating of 131 BHP |
| | R22 Beta II | | As above but with higher power engine |
| R22 Mariner | R22 Mariner | R22 Mariner | Same as R22 Beta, but with fixed floats |
| | R22 Mariner II | | Same as R22 Beta II, but with fixed floats |

## 2.2. Landing Gear

The helicopter is equipped with a skid-type landing gear. A spring and yield 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 center crosstube yields to absorb the impact. Slight yielding of the aft crosstube is acceptable. However, yielding which allows the tail skid to be within 61 cm (24 inches) of the ground for the model R22, and 91 cm (36 inches) for all other models, when the helicopter is sitting empty on level pavement requires crosstube replacement.

## 2.3. Rotor Systems

The main rotor has two all-metal blades mounted to the hub by coning hinges. The hub is mounted to the shaft by a teeter hinge. The coning and teeter hinges use self-lubricated bearings. Droop stops for the main rotor blades provide a teeter hinge friction restraint which normally prevents the rotor from teetering while starting or stopping. Pitch change bearings for each blade are enclosed in a housing at the blade root. The housing is filled with oil and

sealed with an elastomeric boot. Each blade has a thick stainless steel spar at the leading edge which is resistant to corrosion and erosion. The skins are bonded to the spar approximately one inch aft of the leading edge. Blades must be refinished if the paint erodes to bare metal at the skin-to-spar bond line. Bond may be damaged if bond line is exposed.

The tail rotor has two all-metal blades and a teetering hub with a fixed coning angle. The pitch change bearings have self-lubricated liners. The teeter hinge bearings either have self-lubricated liners or are elastomeric. The tail rotor blades are constructed with aluminum skins and forged aluminum root fittings.

### 2.4. 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. Cooling ducts under the box are 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 splash-lubricated spiral-bevel gear set. The tail gearbox output shaft is stainless steel to prevent corrosion.

### 2.5. Rotor Brake

The rotor brake system is used to stop the rotation of the rotor. The rotor brake is mounted on the aft end of the main gearbox and actuated by a cable connected to a pull handle located on the cabin ceiling. The brake must be released before starting the engine. When the brake is engaged, the starter is disabled.

## 2.6. Power Plant

The engines installations possible for the various R22 models are as follows. All are manufactured by Lycoming and are four-cylinder, horizontally-opposed, overhead-valve, air-cooled, carbureted engine with a wet sump oil system. All engines are equipped with a starter, alternator, shielded ignition, two magnetos, muffler, oil cooler, and induction air filter.

| Model | Engine | Description |
|---|---|---|
| R22 | O-320-A2B or O-320-A2C | Rated at 150 BHP, derated by RHC to 124 BHP |
| | O-320-B2C | Rated at 160 BHP, derated by RHC to 124 BHP |
| R22 Alpha | O-320-B2C | Rated at 160 BHP, derated by RHC to 124 BHP |
| R22 Beta & R22 Mariner | O-320-B2C | Rated at 160 BHP, derated by RHC to 124 BHP, 131 BHP takeoff |
| | O-360-J2A | Derated by Lycoming to 145 BHP, derated by RHC to 124 BHP, 131 BHP takeoff |

Induction air enters through an opening on the right side of the aircraft 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 carburetor heat control adjusts the mix of cool and heated air, which then flows through the air filter and up into the carburetor.

Note that while all models have the same rated maximum continuous power, the engine models with higher performance are able to deliver the rate power to a higher altitude.

## 2.7. Fuel system

The fuel system is gravity-flow (no fuel pumps) and includes a main tank, an optional auxiliary tanks, a shutoff valve control located behind the front left seat, and strainer (gascolator). Later aircraft have flexible bladders inside aluminum enclosures while earlier aircraft use all-aluminum fuel tanks. Fuel tank air vents are located inside the mast fairing.

Plunger-style drain valves are provided for the gascolator and for each fuel tank sump. The gascolator is located on the lower left side of the firewall. The drain valves for the auxiliary tank and bladder-style main tank are located inside the cowl door below the auxiliary tank. Plastic tubes attached to the valves allow fuel to be drained overboard. Fuel samples are taken by pushing on the plunger(s). For the all-aluminum main tanks, the drain is located on the left side of the fuselage and is opened by pushing in on the plastic tube. Fuel should be sampled from all three locations prior to the first flight of the day and after refueling to verify no contamination and correct grade.

The fuel gages are electrically operated by float-type transmitters in the tanks. When the gages read E the tanks are empty except for a small quantity of unusable fuel. The low fuel caution light is actuated by a separate electric sender located on the bottom of the main tank.

The auxiliary tank is interconnected with the main tank and is located somewhat higher so it will become empty first while fuel still remains in the main tank. The fuel shutoff valve controls flow from both tanks to the engine.

## 2.8. Electrical Power

A 14-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 beneath the instrument console.

The circuit breaker panel is on the ledge just forward of the left front seat. The battery switch controls the battery relay which disconnects the battery from the electrical system.

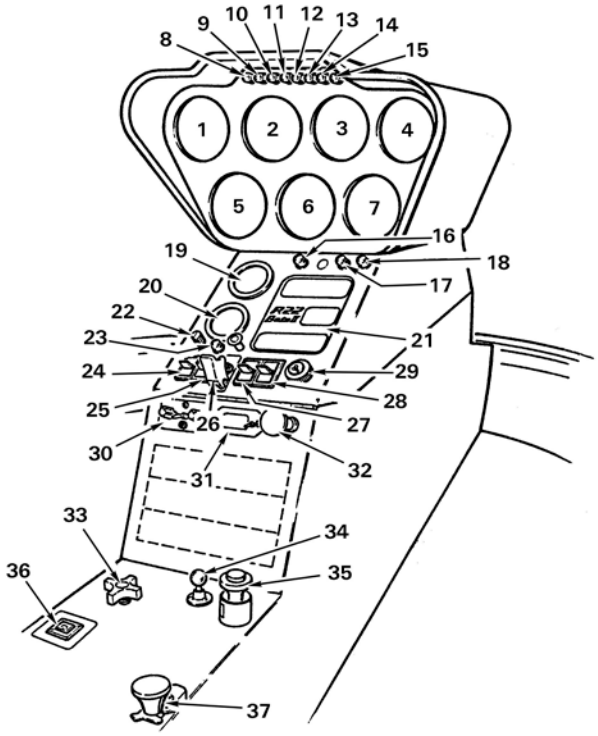
An alternator control unit protects the electrical system from overvoltage conditions. The ammeter indicates current to the battery ("-" indicates discharge) An ALT caution light or ammeter discharge indication in flight indicates low voltage and possible alternator failure.

Later aircraft have an avionics master switch which controls power to the avionics bus. This allows all avionics to be switched on and off by a single switch.

## 2.9. Instrument Panel

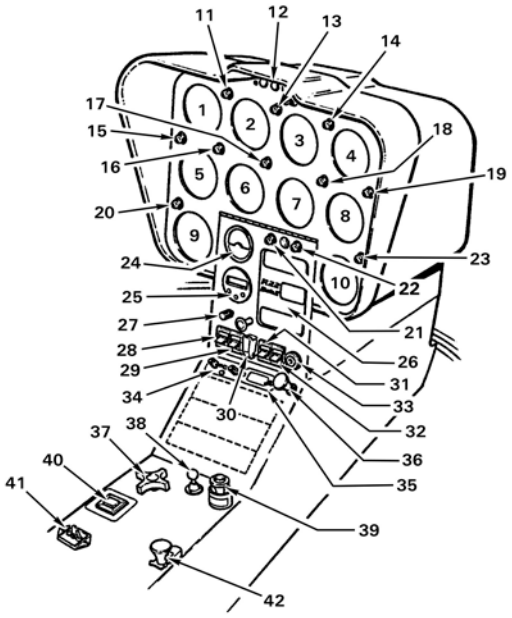
Standard primary instruments include an airspeed indicator, engine and rotor dual tachometer, altimeter, manifold pressure gage, and magnetic compass. Engine gages include an ammeter, oil pressure, oil temperature, cylinder head temperature, and fuel quantity for main and aux tanks. Also standard are a clock, and a digital outside air temperature gage. An hourmeter actuated by engine oil pressure is located on the ledge just forward of the pilot's seat. Views of typical instrument panels are given in the following figures.

- Typical Instrument Panel (Earlier Aircraft)



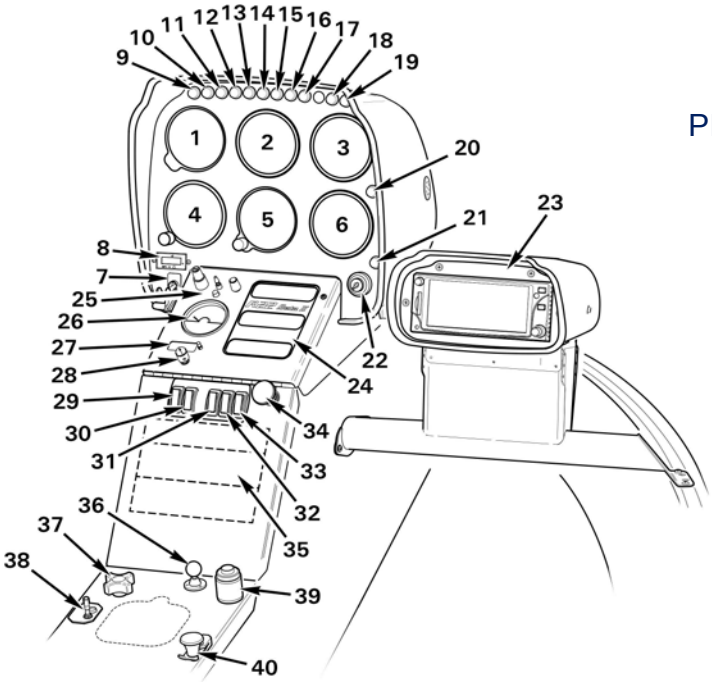

1. Vertical Speed Indicator
2. Optional Instrument
3. Airspeed Indicator
4. Engine and Rotor Tachs
5. Altimeter
6. Optional Instrument
7. Manifold Pressure Gage
8. Clutch Actuator Light
9. M.R. Gearbox Temp Light
10. M.R. Gearbox Chip Light
11. Carbon Monoxide Light
12. Starter-on Light
13. T.R. Gearbox Chip Light
14. Low Fuel Light
15. Low RPM Light
16. Alt Low Voltage Light
17. Oil Pressure Light
18. Governor-off Light
19. Clock or Carburetor Air Temp
20. Carburetor Air Temp or Clock
21. Engine Instruments
22. Panel Lights Dimmer
23. Rotor Brake Light
24. Navigation Lights Switch
25. Strobe Light Switch
26. Clutch Actuator Switch
27. Alternator Switch
28. Battery Switch
29. Ignition Switch
30. Intercom
31. Outside Air Temp/Voltmeter
32. Cabin Air
33. Cyclic Friction
34. Cyclic Right Trim
35. Mixture Control
36. ELT Switch (Optional)
37. Carburetor Heat

- Optional Instrument Panel (Earlier Aircraft)

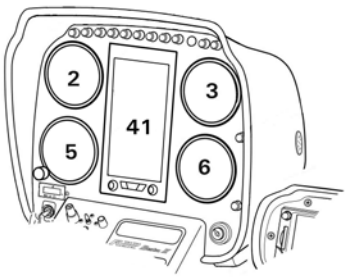



1. Engine and Rotor Tachs
2. Airspeed Indicator
3. Artificial Horizon
4. Altimeter
5. Manifold Pressure Gage
6. Turn Coordinator
7. HIS
8. Vertical Speed Indicator
9. Optional Instrument
10. Optional Instrument
11. M.R. Gearbox Temp Light
12. Marker Beacon
13. T.R. Gearbox Chip Light
14. M.R. Gearbox Chip Light
15. Starter-on Light
16. Low RPM Light
17. Low Fuel Light
18. Carbon Monoxide Light
19. Clutch Actuator Light
20. Governor-off Light
21. Alt Low Voltage Light
22. Oil Pressure Light
23. Rotor Brake Light
24. Carburetor Air Temp
25. Clock
26. Engine Instruments
27. Panel Lights Dimmer
28. Navigation Lights Switch
29. Strobe Light Switch
30. Clutch Actuator Switch
31. Alternator Switch
32. Battery Switch
33. Ignition Switch
34. Intercom
35. Outside Air Temp
36. Cabin Air
37. Cyclic Friction
38. Cyclic Right Trim
39. Mixture Control
40. ELT Switch (Optional)
41. HSI Slave Control
42. Carburetor Heat

- Typical Instrument Panel (Later Aircraft)




PFD Version:




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. Clock
9. Clutch Actuator Light
10. M.R. Gearbox Temp Light
11. M.R. Gearbox Chip Light
12. Carbon Monoxide Light
13. Starter-on Light
14. T.R. Gearbox Chip Light
15. Low Fuel Light
16. Low RPM Light
17. Alt Low Voltage 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 (Optional)
24. Engine Instruments
25. Intercom
26. Carburetor Air Temp
27. Outside Air Temp/Voltmeter
28. Panel Lights Dimmer
29. Navigation Lights Switch
30. Anti-Collision Light Switch
31. Avionics Master Switch
32. Alternator Switch
33. Battery Switch
34. Cabin Air
35. Avionics Stack
36. Cyclic Right Trim
37. Cyclic Friction
38. ELT Switch (Optional)
39. Mixture Control
40. Carburetor Heat
41. Aspen Primary Flight Display

# 3. Aircraft Main Characteristics:

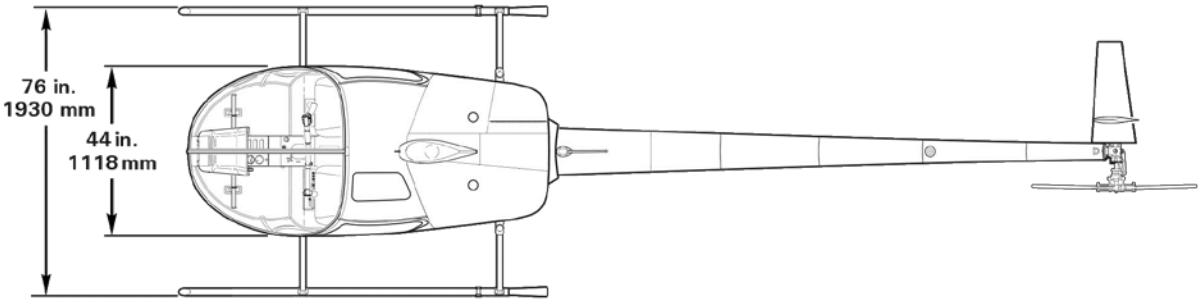
## 3.1. Summary

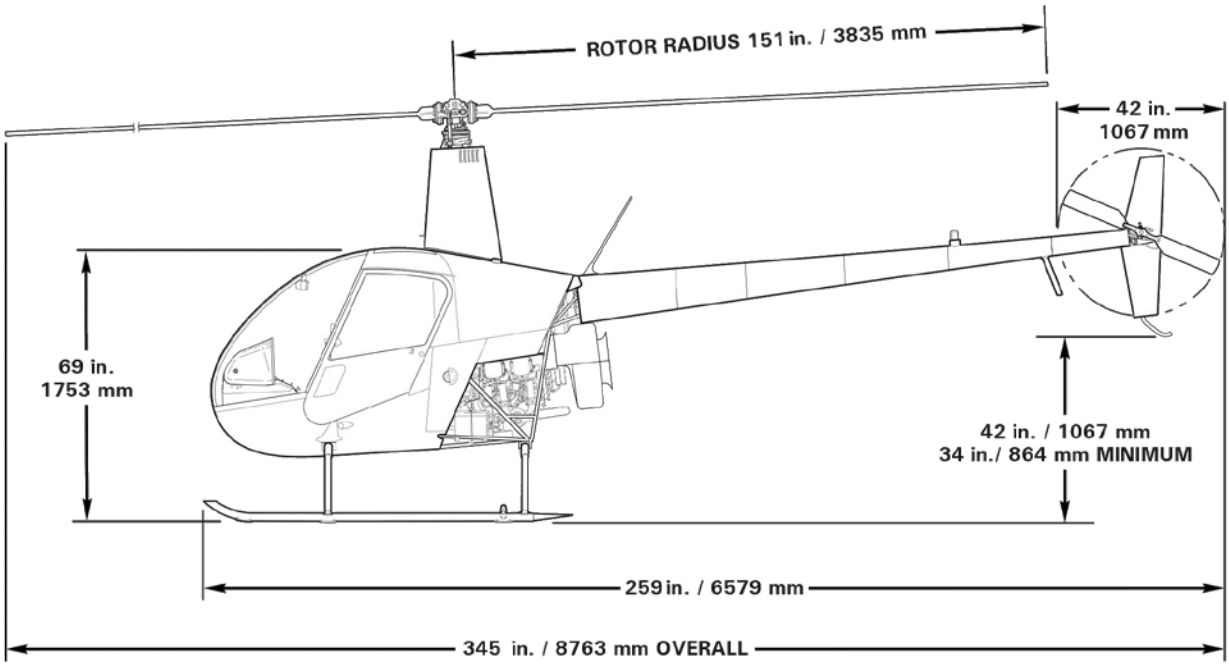
| | | | |
|---|---|---|---|
| Dimensions | Fuselage | Length (maximum) | 8763 mm (345 inches) |
| | | Width | 1118mm (44 inches) |
| | | Height | 2718 mm (107 inches) |
| | Main rotor | Diameter | 7671 mm (302 inches) |
| | Tail rotor | | 1067 mm (42 inches) |
| Number of Main Rotor Blades | | | 2 |
| | | | |
| Minimum Flight Crew | VFR | | 1 |
| | IFR | | N/A |
| Seating Capacity | Including Pilot Seats | | 4 |
| Engine | | | See table in section 2.6 |
| | | | |
| Fuel tanks | Tanks with bladders | Main usable | 64 liters (16.9 US gallons) |
| | | Aux usable | 36 liters (9.4 US gallons) |
| | | Combined usable | 100 liters (26.3 US gallons) |
| | Tanks without bladders | Main usable | 73 liters (19.2 US gallons) |
| | | Aux usable | 40 liters (10.5 US gallons) |
| | | Combined usable | 112 liters (29.7 US gallons) |
| | | | |
| Air Speed | Power ON | | 102 KIAS |
| | Power OFF | Absolute $V_{NE}$ | 102 KIAS |
| | Recommended | Takeoff & Climb | 60 KIAS |
| | | Max Climb Rate | 53 KIAS |
| | | Max Range | 83 KIAS* |
| | | Landing Approach | 60 KIAS |
| | | Autorotation | 65 KIAS* |
| | | | |
| Rotor Speed | Power ON | Maximum | 530 RPM |
| | Power OFF | Minimum | 459 RPM |
| | | | |
| Maximum Operating | Density Altitude | | 14000 ft. |
| | | | |
| Maximum gross weight | R22 | | 590 kg (1300 lb) |
| | All other R22 models | | 622 kg (1370 lb) |

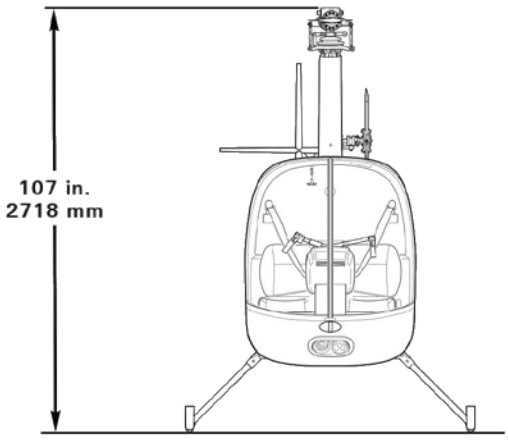
*Certain conditions may require lower airspeeds.
(Reading mode: column by column from the left to the right side →)

## 3.2. Exterior Dimensions

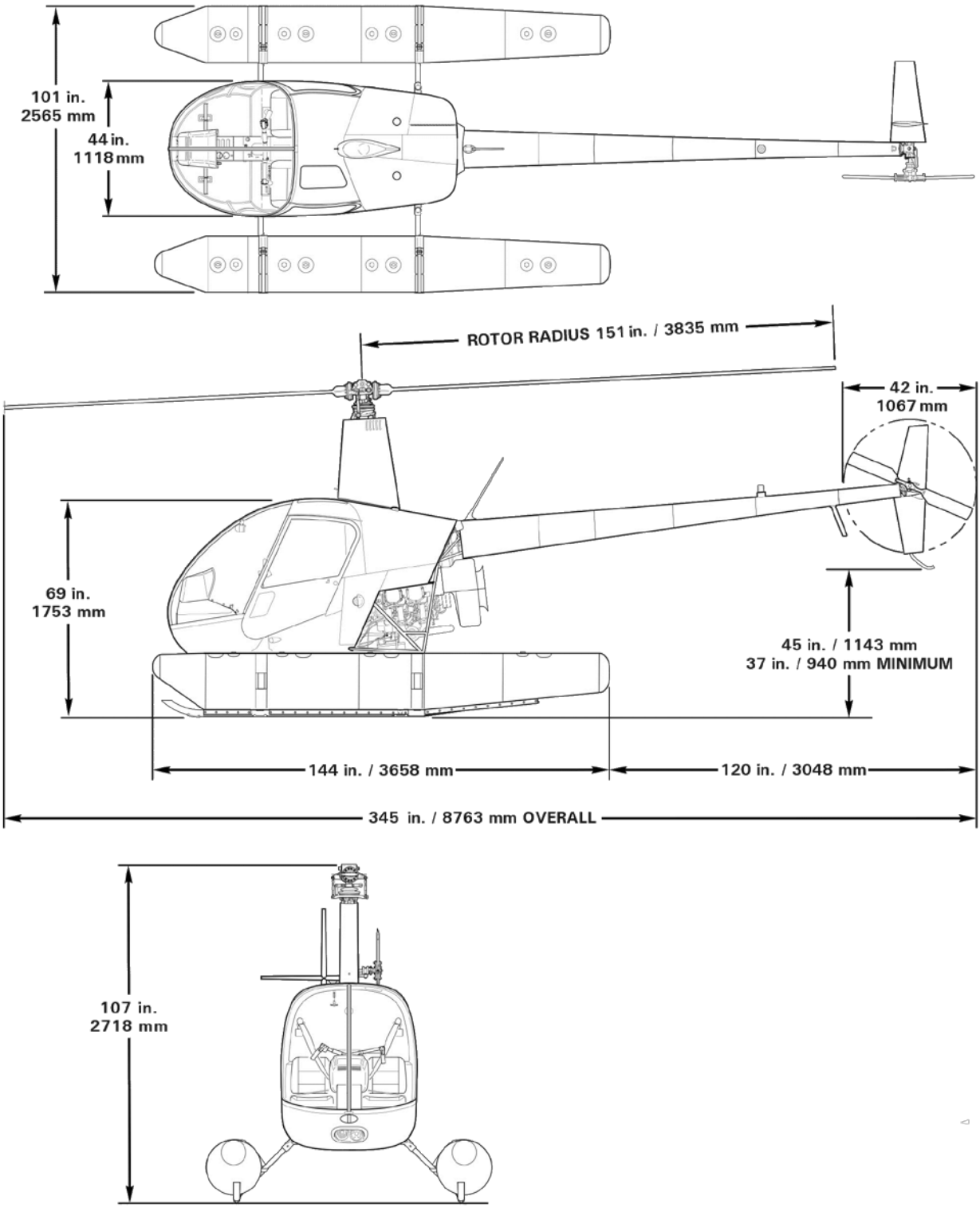
### 3.2.1. R22 Alpha & Beta



### 3.2.2. R22 Mariner



## 4. Operator Difference Requirement (ODR) Tables [M]

See appendix 1

## 5. Optional Specific Equipment

Several instrument console layouts for the R22 exist, however all utilize standard analog gauges for the basic flight instruments. Familiarization with optional instruments and avionics equipment should be made through self-study of manuals or online training material.

# 6. Master Difference Requirement (MDR) Tables [M]

## 6.1. Difference Level Summary

Difference levels are summarized in the table below for training, checking, and currency. This table is an extract only and complete descriptions of difference levels for training, checking and currency are given in CS-FCD.

DIFFERENCE LEVEL TABLE

| DIFFERENCE LEVEL | TRAINING | CHECKING | CURRENCY/ RECURRENT TRAINING |
|---|---|---|---|
| A | SELF INSTRUCTION | NOT APPLICABLE (OR INTEGRATED WITH NEXT PC) | NOT APPLICABLE |
| B | AIDED INSTRUCTION | TASK OR SYSTEM CHECK | SELF REVIEW |
| C | SYSTEMS DEVICES | PARTIAL CHECK USING DEVICE | DESIGNATED SYSTEM |
| D | MANEUVER DEVICES** | PARTIAL PC USING DEVICE* | DESIGNATED MANOEUVRE(S) |
| E | SIMULATOR C/D OR AIRCRAFT # | FULL PC USING SIMULATOR C/D OR AIRCRAFT* | AS PER REGULATIONS (TAKEOFFS & LANDINGS IN SIMULATOR C/D OR THE AIRCRAFT) |

*IOE/SLF/LIFUS/line MAY BE REQUIRED ACCORDING TO REGULATIONS PC = PROFICIENCY CHECK

**FFS or aircraft may be used to accomplish specific manoeuvres

## 6.2. Training, Checking, and Recurrent Training difference requirements

| | From Helicopter | | |
|---|---|---|---|
| To Helicopter | Models | R22, R22 Alpha, R22 Beta | R22 Mariner |
| | R22, R22 Alpha, R22 Beta | | A/B/B |
| | R22 Mariner | B/B/B | |

# 7. Type Rating List and License Endorsement List [M]

## 7.1. Type Rating List

OSD updates the Class & Type Rating List as follows:

- Type Rating List (Helicopters)

| Manufacturer | Helicopter Model / Name | Differences | License Endorsement | Complex | OSD report |
|---|---|---|---|---|---|
| Robinson<br>- SE Piston - | R22<br>R22 Alpha<br>R22 Beta<br>R22 Mariner | | R22 | | X |

# 8. Specification for Training

## 8.1. General

The Type Rating Training courses proposed by Robinson Helicopter Company fulfilled the minimum requirements of EASA Air Crew Part-FCL. The assessment was based on the R22, Pilot Initial Type Rating Training syllabi.

The OSD defined that pilot type rating training courses are divided into the following phases for approval in Approved Training Organizations (ATO) and also for operator specific training, provided the operator specific documentation is used throughout the course.

- Prerequisites for entry onto the specific course,
- Theoretical knowledge instruction syllabus and test summary,
- Helicopter flight training courses,
- Skill test.

## 8.2. Course pre-entry requirements

All candidates must fulfil the requirements of Part-FCL.725 for the issue of class and type ratings

## 8.3. Licensing requirements

All students must fulfil the requirements of Part-FCL Appendix 9, Flight instruction and skill test.

The requirement of the issue of class and type rating for the R22 is defined as follows:

- for an initial issue of a SEP(H), an approved flight instruction of at least:

| Helicopter types | In Helicopter | In Helicopter and FSTD associated training Credits |
|---|---|---|
| SEP(H) | 5hrs | Using FFS level C/D: At least 2h00 helicopter and at least 6h00 total<br>Using FTD level 2/3: At least 4h00 helicopter and at least 6h00 total |

- for an additional issue of a SEP (H), an approved flight instruction of at least:

| Helicopter types | In Helicopter | In Helicopter and FSTD associated training Credits |
|---|---|---|
| SEP(H) | 5hrs | Using FFS level C/D: At least 2h00 helicopter and at least 6h00 total<br>Using FTD level 2/3: At least 4h00 helicopter and at least 6h00 total |

Note:

These requirements have to be considered as the bare minimum, additional training could be necessary depending on:

- Complexity of the aircraft type, handling characteristics, level of technology;
- Category of helicopter (SEP or SET helicopter, multi-engine turbine and multi pilot helicopter);
- Previous experience of the applicant.

## 8.4. Type Rating Training Program Summary [AMC]

| QUALIFICATION HELD | ITR | ATR |
|---|---|---|
| Single-Engine Piston → | | √ |
| Single-Engine Turbine → | √ | |
| Multi-Engine Turbine → | √ | |
| Total of theoretical knowledge instruction and test | 9h00 | 7h30 |
| Flight training | 5h00 | 5h00 |

## 8.5. Theoretical knowledge syllabus and test summary [AMC]

Theoretical instruction should be provided in accordance with Part FCL Subpart H – Section 1 –FCL.725

The following sections present a summary of the material that an Initial and ~~A~~dditional Type Rating training program should consider. Training providers should ensure their type specific courses cover the pertinent material.

| Initial and Additional Type Rating theoretical knowledge syllabus | ITR | ATR |
|---|---|---|
| Helicopter structure, engine, transmissions, electrical, fuel, rotors and equipment, normal and abnormal operation of the systems | 4h00 | 3h30 |
| Limitations (*) | 0h30 | 0h30 |
| Performance, flight planning and monitoring (*) | 0h30 | 0h15 |
| Weight and balance | 0h30 | 0h15 |
| Emergency procedures (*) | 0h30 | 0h30 |
| Awareness Training:, low-G hazards (loss of control, mast bumping); and rotor RPM decay (energy management, blade stall). | 1h00 | 1h00 |
| Pilots pre-flight walk around, ground handling, equipment installation removal, pilots servicing (**) | 1h00 | 0h30 |
| Optional equipment | Additional | Additional |
| Total Theoretical Knowledge Syllabus | 8h00 | 6h30 |
| Theoretical examination session | 1h00 | 1h00 |
| TOTAL (HOURS) | 9h00 | 7h30 |

Note:

(*) Theoretical instruction elements that can be covered during the ground training course and/or during flight training briefing phase.
(**) Instruction elements that can be covered during ground training course and/or during flight training briefing phase

## 8.6. Flight training course summary [AMC]

The following table indicates the minimum flight training required with and without regards to previous SEP experience. Each helicopter flight session could be extended or reduced at the discretion of the instructor, but the total minimum flight time is unchanged. Additional flight could be necessary at the discretion of the instructor if the trainee has not successfully demonstrated the ability to perform all maneuvers with a high degree of proficiency.

| Type Rating Flight Training Syllabus | SEP ITR | ATR |
|---|---|---|
| Helicopter exterior visual inspection, cockpit inspection, starting procedures, pre-take off /landing procedures, taxiing, air taxiing, general handling, climbing/descending / turns, circuits. | 1h15 | 1h15 |
| Take off / landing various profiles including simulated maximum take-off mass, sloping ground / crosswind take off and landings. | 1h15 | 1h15 |
| Basic and advanced autorotations, recognition and recovery from low RPM, steep turns. | 1h30 | 1h30 |
| Abnormal & emergency procedures, governor-off, simulated instrument flight. | 1h00 | 1h00 |
| Total Flight Time | 5h00 | 5h00 |
| Skill Test | As required | As required |

## 8.7. Training Areas of special emphasis (TASE) [M]

The following training procedures require attention and should be read in conjunction with the R22 POH, Robinson Safety Notices(1) and the Robinson Maneuver Manual found with the R22/R44 Flight Training Guide.

Training providers must comply with the following elements:

### 8.7.1. TASE / Training Methodology for Pilots and Instructors

- Liftoff
    - To avoid dynamic rollover, a two-step liftoff technique should always be used with just enough collective pulled to be light on the skids and equilibrium felt before the helicopter is then gently lifted into the air.
- Hovering
    - Hovering exercises should not be practiced close to the ground or obstacles, and maintaining a skid height of at least 1.5 m (5 feet) above the ground when practicing sideward or rearward flight.
- Autorotation / Autorotative landings
    - Autorotation training as detailed in Section 4 of the POH shall be conducted within gliding distance of a suitable landing area.
    - Autorotation training shall be performed with a trainee and an Instructor only.
    - When conditions conducive to carburetor icing are suspected, full carburetor heat must be applied prior to entry to an autorotation regardless of the carburetor air temperature gauge indication.
    - Practice autorotation entry
        - Collective lever should be lowered to the down stop and the throttle adjusted to give a small tachometer needle split. The throttle is then held fully closed to override the governor (inactive below 80%). To avoid inadvertent engine stoppage, the throttle should not be “chopped” and the engine must be recovered immediately if the engine is running roughly or the engine RPM continues to decrease.
        - To initiate the autorotation above 4000 ft the throttle should be reduced slightly before lowering the collective to prevent engine overspeed.
        - Recommended airspeed of 60-70kts should be maintained with the RPM in the green.
- Power recovery procedure

- At approximately 40ft AGL a cyclic flare should be commenced to reduce forward speed and rate of descent, and smoothly roll throttle full on to recover engine power
- At 8 feet AGL the aircraft should be levelled and collective applied to control descent.

- Autorotative landing
  - Practice autorotative landings to the ground should be performed in the same manner as a power recovery except the throttle should be kept closed throughout the maneuver. Always contact the ground heading straight ahead with skids level.
- Simulated Power Failure
  - Before simulating a power failure, it is critical that communication and understanding are established between instructor and student. To prevent the students from being surprised, they should be given a few minutes advance notice that a power failure will be simulated. The power failure should be loudly announced as the throttle is rolled off. The manifold pressure should be less than 1 inches and the throttle rolled off smoothly, never “chopped”.
- Low "G" Mast Bumping
  - Low-G cyclic pushovers are prohibited. Excessive rotor flapping can be caused by low-G Conditions leading to catastrophic rotor hub impact with mast, or blade impact with airframe.
  - Never attempt to demonstrate or experiment with low-G maneuvers regardless of pilot skill or experience level.
  - Avoid abrupt forward cyclic movements and initiate descent with collective.
  - In the event of inadvertent low-G condition, recover thrust by aft cyclic (to reload the disks) rather than lateral cyclic roll, then correct laterally.
  - Ensure smooth input on controls; not abrupt, full range, un-coordinated input.
  - If turbulence is expected, reduce power and use a slower than normal cruise speed. (60-70 KIAS) Mast bumping is less likely at lower airspeeds. Firmly rest right forearm on right leg to prevent unintended control inputs. Allow aircraft to go with the turbulence then restore level flight with smooth, gentle control inputs.
- Low RPM Recognition and Recovery
  - Low RPM warning horn and light activates when RPM decays below 97%.
  - The recovery technique for low RPM condition is simultaneous lowering of the collective and rolling-on of the throttle.
  - In forward flight, aft cyclic may also be used to recover RPM.

- Use of Carburetor Heat
    - When conditions conducive to carburetor icing are suspected, carburetor heat shall be applied. Carburetor ice can occur at OATs as high as 30°C. Even in generally dry air, local conditions such as a nearby body of water can be conducive to carburetor ice. When in doubt, assume conditions are conducive to carburetor ice and apply carburetor heat as required.
    - On aircraft equipped with the carb heat assist system, the control knob should be left unlatched unless it is obvious that conditions are not conducive to carburetor ice.
- Governor-off flight
    - In normal operation, rotor speed is controlled through an engine governor. The governor senses engine RPM changes and applied corrective inputs to the throttle.
    - In the event of a governor failure, the pilot must monitor rotor speed and adjust the throttle as necessary to maintain the nominal rotor speed.
    - A “correlator” applies throttle changes to compensate for changes in collective control input and thereby reduces the amount of throttle adjustment necessary for the pilot to maintain the nominal rotor speed.
    - Note that governor-off flight is prohibited except for in-flight system malfunction or emergency procedures training.
- Initial Training Flights
    - Before allowing someone to manipulate the controls they should be fully briefed about the extreme sensitivity of the controls. They must be instructed to never make large or sudden control movement of the controls. The instructor must be prepared to instantly grip the controls should the student start to make a wrong move.
- High winds or turbulence encounters
    - In accordance with Safety Notice SN-32, when encountering high winds or turbulence reduce power and fly at a slower than normal cruise speed (60-70 KIAS), avoid over control, and avoid flying on the downwind side of hills, ridges or tall buildings.

Notes: **[M]**

(1) An in-depth study of **all safety tips and safety notices** listed in the R22 Pilot’s Operating Handbook is required.

# 9. Specification for Testing, Checking, Currency & Recent Experience

## 9.1. Skill test

As required by Part-FCL.725 (c).

## 9.2. Proficiency Checks

As required per FCL.740 and AMC FCL.740H(a)(3).

## 9.3. Specification for Recent Experience

As required by Part FCL.060

## 9.4. Pre-Solo Requirement [M]

A person who does not hold a helicopter licence must have had a minimum of 20 hours of dual instruction in a Robinson R22 or R44 helicopter prior to operating it in solo flight. In addition, the person must obtain an endorsement from a flight instructor that the individual is proficient to solo a Robinson R22. This endorsement is valid for a period of 90 days. The dual instruction must include the following abnormal and emergency procedures flight training:

(i) Enhanced training in autorotation procedures,
(ii) RPM control without the use of the governor, and
(iii) Low rotor RPM recognition and recovery.

## 9.5. Flight Instructor Pre-Requites [M]

A flight instructor may provide instruction in a Robinson R22 only if that instructor--

(i) Completes the awareness training in paragraph 8.5

(ii) Has a minimum of 200 flight hours in helicopters, a minimum of 50 flight hours of which were in the Robinson R22 or R44,

(iii) Has completed flight training in a Robinson R22 on the following abnormal and emergency procedures--

(a) Enhanced training in autorotation procedures;

(b) RPM control without the use of the governor; and

(c) Low rotor RPM recognition and recovery.

## 10. Specification for Flight Simulation Training Devices

No FSTD’s exists at the time of publication of this document.

# 11. Appendix

Appendix 1: ODR tables

## ODR Tables

| **Definitions used in the ODR Tables:** |
|---|
| X = Flight Manual/Pilot's Operating Handbook and/or FM Supplement |
| AI = Aided Instruction |
| CBT = Computer Based Training |
| ICBT = Interactive Computer Based Training |
| FTD = Flight Training Device (Level 1 to 7) |
| FBS = Fixed Base Simulator (Level 5 to 7) |
| FFS = Full Flight Simulator (Level A, B, C, D) |

| OPERATOR DIFFERENCE REQUIRMENTS TABLE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Difference Helicopter: R22 Mariner<br>Base Helicopter: R22, R22 Alpha, or R22 Beta | | | | Compliance Method | | | | | |
| Design Feature | Remarks | Flight Characteristics | Procedures Change | Training | | | | Chk/Curr | |
| | | | | LVL A | LVL B | LVL C | LVL D | Chk | Curr |
| Float Landing Gear | Addition of fixed float landing gear. | Minor: Adverse roll characteristics. Operation on water. | Minor: Operation on water. | | AI | | | N/A | N/A |