

**SECTION 9  
SUPPLEMENTS**

**OPTIONAL EQUIPMENT SUPPLEMENTS**

Information contained in the following supplements applies only when the related equipment is installed.

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**NON-U.S. SUPPLEMENTS**

The following supplements contain additional information required by certain countries:

- Brazilian Supplement
- FATA Supplement (Russia)
- IAC AR Supplement
- Ukrainian Supplement

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FAA APPROVED  
R22 PILOT'S OPERATING HANDBOOK  
SUPPLEMENT 3  
TO  
ROBINSON MODEL R22

This supplement must be attached to the FAA Approved Robinson R22 Pilot's Operating Handbook when the helicopter is configured with optional police version equipment.

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.

FAA APPROVED *James M. Buebee*  
Supervisor, Flight Test Section  
FAA, Western Aircraft Certification Field Office  
Northwest Mountain Region

DATE *March 27, 1984*

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9-3.5	04 Nov 1994
9-3.6	04 Nov 1994

REVISIONS  
APPROVED BY *Ronald Amstrong*  
Manager, Flight Test Branch ANM-160L  
Federal Aviation Administration, LAACO  
Transport Airplane Directorate

DATE *Nov. 4, 1994*

SECTION 9  
R22

POLICE VERSION

INTRODUCTION

This supplement contains the changes and additional data applicable when the R22 helicopter is equipped with Police Version options.

SECTION 2: Limitations

VFR operation at night is permitted with either landing lights or searchlight operable. Instrument and anti-collision lights must be installed and operable.

SECTION 3: Emergency Procedures

No change.

SECTION 4: Normal Procedures

Additions to preflight check.

Add to number 10, fuselage left side.

PA Speaker . . . . . secure

Searchlight . . . . . secure

SECTION 5: Performance

No change.

SECTION 6: Weight & Balance

No change.

SECTION 7: Systems Description

The following optional equipment may be installed:

Airframe

Cabin doors with bubble windows to enhance downward and rearward visibility replace the standard doors.

Electrical System

A 14-volt, 70-ampere alternator replaces the standard 60-ampere unit.

Searchlight Installation

The searchlight installation consists of two lamps suspended below the cabin chin on a post which extends through the left hand side of the chin and cabin floor. The searchlight is controlled by means of a grip and switch(es) mounted on the post allowing operation by the passenger or pilot. Power is supplied to the searchlight through its own 20 amp circuit breaker and power relay. The searchlight will operate only when the landing lights are off. A friction control is located on the post just above the floor.

Two searchlight installations are available: one manufactured by Collins Dynamics and the other by Peak Beam Systems. The Collins Dynamics unit uses incandescent quartz halogen lamps controlled by a single on-off toggle switch on the grip. The Peak Beam Systems unit uses xenon arc lamps controlled by four momentary toggle switches on the grip. These switches control on-off, strobe (rapidly flashing) mode, and beam spread from 1° spot to 40° flood.

**CAUTION**

When operating the searchlight with the left seat cyclic installed, caution should be exercised to prevent interference with the cyclic control.

SECTION 7: Systems Description (Cont'd)

PA System

A 100-watt Whelen PA speaker and siren is located on the aft, left landing gear strut. The PA system control panel is located on the instrument panel. It allows the pilot or observer to select either PA, radio, yelp, or siren for broadcast through the PA speaker.

Remote Radio Transmit Switch

A hand-held remote radio transmit switch plugs into the receptacle on the front of the left seat. This switch allows the left seat occupant to transmit when the left cyclic is removed.

Circuit Breaker Panel

The circuit breaker panel is shown in Figure 1.

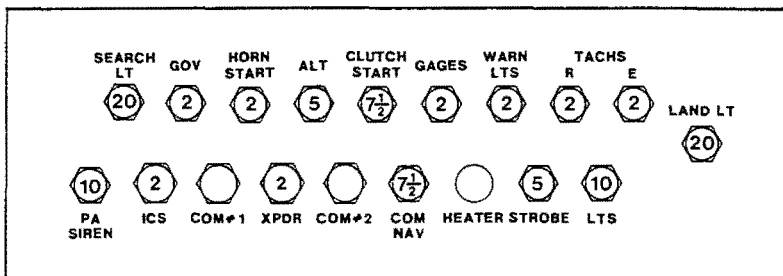


FIGURE 1

CIRCUIT BREAKER PANEL

**SECTION 8: Handling and Maintenance**

**Searchlight Installation**

To remove the searchlight from the helicopter, use the following procedure:

1. Loosen but do not remove two 1/4 in. diameter bolts in clamp on bottom end of post.
2. Remove clevis pin connecting lower end of tube through center of post to arms between lamps.
3. Disconnect wires from lamps at connectors on lamp housings.
4. Pull ring on spring loaded pin in post clamp and slide clamp with lamps off post.
5. Remove four screws holding post flange to cabin floor. Pull post up a few inches and disconnect wires at post connector. Before releasing, o-ring around the connector must be moved clear of retaining hooks. Pull post up and out of floor.
6. Cover connector under floor with tape and install sheet metal cover provided over hole in floor.

Installation is the reverse except:

1. Be sure to position o-ring on post wire connector under retaining hooks.
2. The letters "FWD" on post flange must face forward.
3. Be sure spring loaded pin in post clamp pops into place and torque 1/4 in. diameter bolts to 90 in.-lb (includes nut self-locking torque).

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FAA APPROVED  
R22 PILOT'S OPERATING HANDBOOK

SUPPLEMENT 4  
R22 MARINER/MARINER II

This supplement must be attached to the FAA Approved Robinson R22 Pilot's Operating Handbook when the helicopter is configured in the Mariner or Mariner II version.

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.

FAA APPROVED Frank J. Hoerman  
Supervisor, Flight Test Section  
FAA, Western Aircraft Certification Office  
Northwest Mountain Region

DATE Sept 7, 1985

LOG OF REVISIONS

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9-4.7	13 Oct 00		

REVISIONS  
APPROVED BY Donald C. ...  
Manager, Flight Test Branch, ANM-160L  
Federal Aviation Administration, LAACO  
Transport Airplane Directorate

DATE Oct-13, 2000

**SECTION 1: GENERAL**

**INTRODUCTION**

This supplement contains the changes and additional data applicable for R22 Mariner and Mariner II helicopters. R22 Mariner/Mariner II helicopters are equipped with either float or standard landing gear, additional corrosion protection, and a modified horizontal stabilizer angle of incidence. Except as noted in this supplement, information in the basic manual pertaining to the R22 Beta is applicable to the R22 Mariner and information pertaining to the Beta II is applicable to the Mariner II.

Float landing gear consists of inflated floats attached to the skid tubes, and skid extensions to support the aft portion of the float tubes. When float landing gear is installed, an additional stabilizer is installed at the bottom of the lower vertical stabilizer for improved controllability. Configuration changes between float and standard landing gear are permitted.

**SECTION 2: LIMITATIONS**

**AIRSPPEED LIMITATIONS**

**NEVER EXCEED AIRSPEED ( $V_{ne}$ ) WITH FLOATS**

Power-On: 95 KIAS up to 3000 ft density altitude.

Power-Off: 80 KIAS up to 7500 ft density altitude.

Above these density altitudes, see placard on page 9-4.4.

**CENTER OF GRAVITY (CG) LIMITS**

See figure on page 9-4.3. Datum line is 100 inches forward of main rotor shaft centerline.

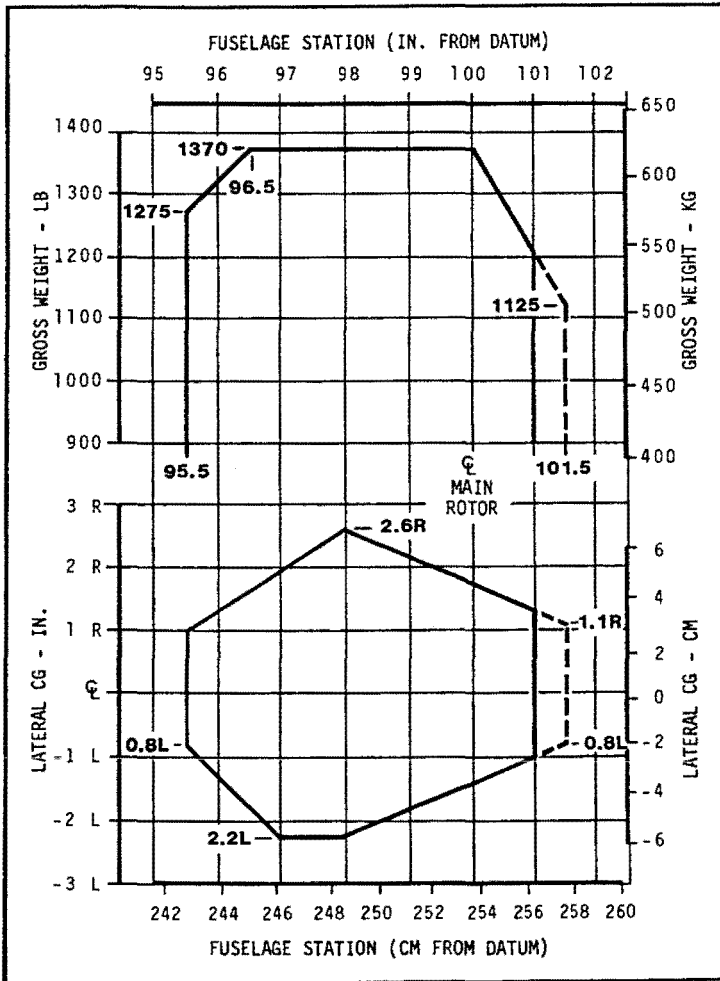
**KINDS OF OPERATION LIMITATIONS**

Only VFR day is approved when floats are installed.

SECTION 2: LIMITATIONS (cont'd)

WITH FLOATS \_\_\_\_\_

WITHOUT FLOATS - - - - -



R22 MARINER/MARINER II  
 CENTER OF GRAVITY LIMITS

**SECTION 2: LIMITATIONS (cont'd)**

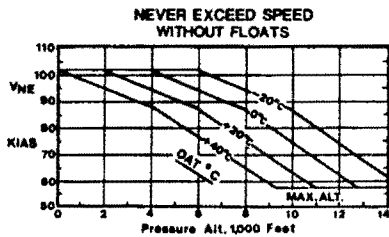
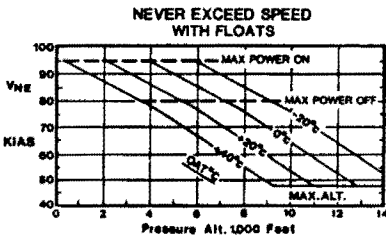
**PLACARDS**

In clear view of pilot:

THIS ROTORCRAFT IS APPROVED FOR  
DAY AND NIGHT VFR OPERATIONS  
WITHOUT FLOATS INSTALLED  
OR  
DAY VFR OPERATIONS ONLY  
WITH FLOATS INSTALLED

In clear view of pilot in flight:

**R22 Mariner**



**R22 Mariner II**

**NEVER EXCEED SPEED - KIAS  
WITH FLOATS**

PRESS ALT-FT	OAT - °C								
SL	-20	-10	0	10	20	30	40		
2000	95						94	91	88
4000			94	90	86	83	79		
6000			90	86	82	78	74	69	
8000	86	82	77	72	67	62	57		
10000	77	72	66	61	56	51			
12000	66	60	55	NO FLIGHT					
14000	54								

FOR AUTOROTATION, USE 80 KIAS ABOVE HEAVY LINE

**NEVER EXCEED SPEED - KIAS  
WITHOUT FLOATS**

PRESS ALT-FT	OAT - °C							
SL	-20	-10	0	10	20	30	40	
2000	102						99	96
4000			98	94	91	87		
6000			98	94	90	87	82	77
8000	94	90	86	80	75	69	64	
10000	86	80	74	68	62	57		
12000	74	67	61	NO FLIGHT				
14000	61							

Located on floats:

SEE PILOT'S HANDBOOK FOR  
PROPER INFLATION PRESSURE

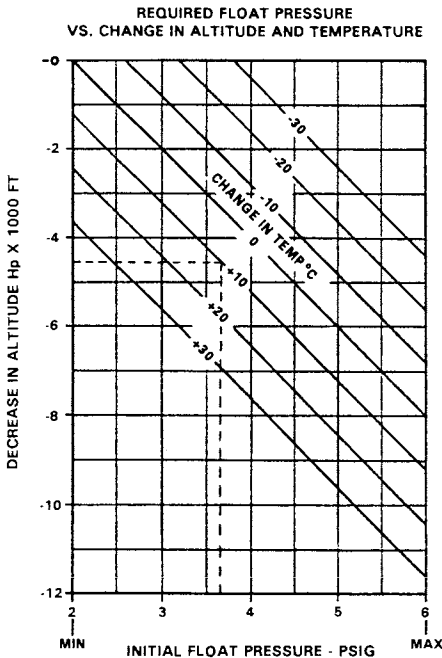
**SECTION 2: LIMITATIONS (cont'd)**

**FLOAT PRESSURE LIMITS**

Minimum Float Pressure: 2 psig (psi gage)

Maximum Float Pressure: 6 psig

The following graph shows minimum float pressure required for a decrease in altitude or temperature. An increase in either altitude or temperature can be ignored as pressure relief valves will limit pressure to 6 psig.



**CAUTION**

Failure to maintain required pressure can result in inadequate buoyancy or in-flight instability.

**SAMPLE CALCULATION:**

	<u>Pressure</u>	<u>Altitude</u>	<u>Temp</u>
Conditions at destination:	1000 ft	15°C	
Initial Conditions:	5500 ft	5°C	
Subtract to obtain expected change in altitude and temp:	-4500 ft	+10°C	

Using graph, locate -4500 ft line, read across to +10°C line, then down for minimum initial float pressure required, approximately 3.7 psig.

**SECTION 3: EMERGENCY PROCEDURES**

**GENERAL**

Without floats, emergency procedures in the basic manual apply. The following procedures are applicable when floats are installed.

**POWER FAILURE ABOVE 500 FEET AGL**

Autorotation to Land: Same as non-float R22.

Autorotation to Water: Steps 1-7 same as non-float R22.

8. At about 8 feet AGL, apply forward cyclic to level helicopter and raise collective just before touchdown to cushion landing. Touchdown in slight nose high attitude with nose straight ahead.
9. Maintain cyclic in touchdown position and hold collective up until forward motion has stopped. See caution below.

**POWER FAILURE BETWEEN 8 AND 500 FEET AGL**

Autorotation to Land: Same as non-float R22.

Autorotation to Water: Steps 1-4 same as non-float R22.

5. At about 8 feet AGL, apply forward cyclic to level helicopter and raise collective just before touchdown to cushion landing. Touchdown in slight nose high attitude with nose straight ahead.
6. Maintain cyclic in touchdown position and hold collective up until forward motion has stopped.

**CAUTION**

Lowering collective or applying forward cyclic while helicopter is moving forward on water can cause floats to submerge and helicopter to nose over.

**DITCHING**

Not applicable when floats are installed.

**SECTION 4: NORMAL PROCEDURES**

**DAILY OR PREFLIGHT CHECKS**

14. Inflatable Floats

- Float Pressure . . . . . Check (See Section 2)
- Float Condition . . . . . Check

**CAUTION**

Helicopters equipped with inflated floats have an adverse roll characteristic; when sideslipping nose left or right the helicopter will tend to roll in the opposite direction. To avoid adverse roll, keep helicopter trimmed with zero sideslip and exercise extreme caution when performing simulated power failures.

**OPERATION ON WATER**

Maximum recommended water taxi speed is 5 knots. Some application of collective is required.

**CAUTION**

If starting or stopping rotor on water, ensure area is clear as helicopter can rotate one complete turn while tail rotor RPM is low.

**CAUTION**

To avoid contacting rotor teeter stops, do not apply full cyclic control during water taxi.

**NOTE**

Safe operation on water has been demonstrated in waves up to 12 inches (trough to crest).

**SECTION 4: NORMAL PROCEDURES (cont'd)**

**PRACTICE AUTOROTATION - WITH GROUND CONTACT**

Same as non-float R22 except rear of floats may be scuffed on pavement during touchdown. Protective tape should be applied to bottom of floats and inspected for wear after touchdowns.

**PRACTICE AUTOROTATION - WITH WATER CONTACT**

Same as practice autorotation with ground contact in basic manual except touch down in slight nose high attitude with nose straight ahead. Maintain cyclic in touchdown position and collective up until forward motion has stopped.

**CAUTION**

Lowering collective or applying forward cyclic while helicopter is moving forward on water can cause floats to submerge and helicopter to nose over.

**SECTION 5: PERFORMANCE**

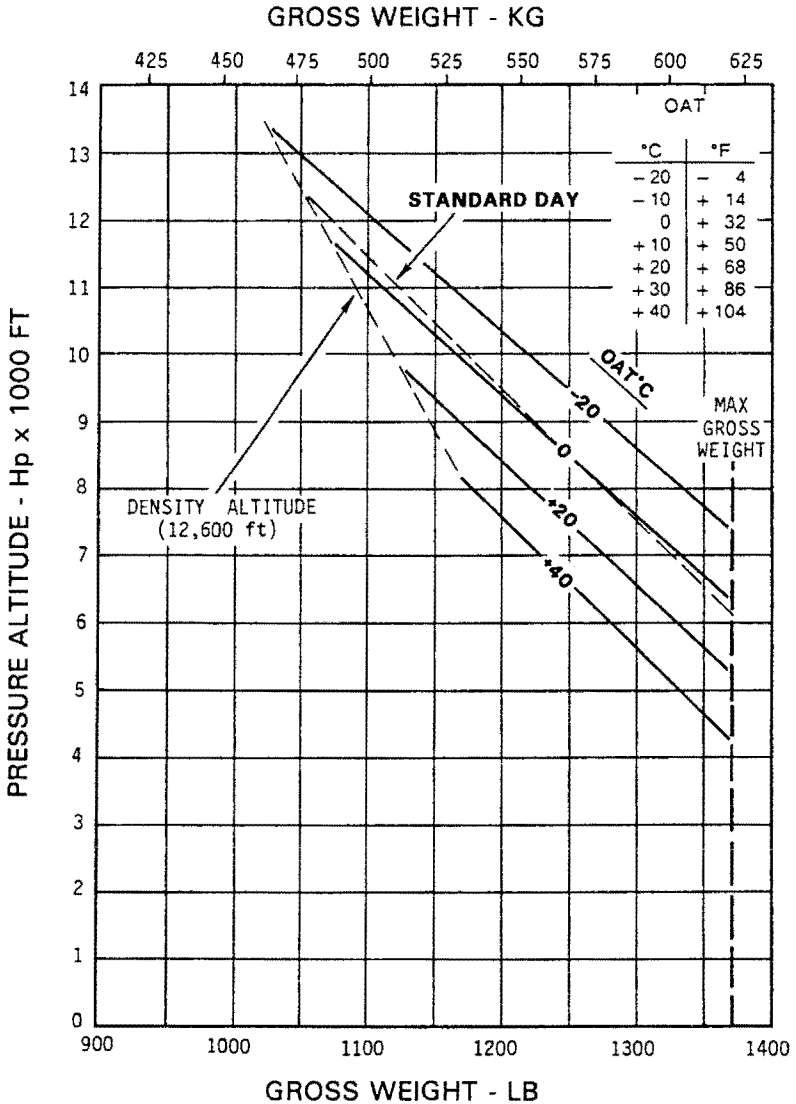
**HOVER PERFORMANCE**

In-ground-effect (IGE) and out-of-ground-effect (OGE) hover performance charts for the R22 Mariner are on pages 9-4.9 and 9-4.10.

R22 Mariner II hover performance is equivalent to R22 Beta II hover performance.

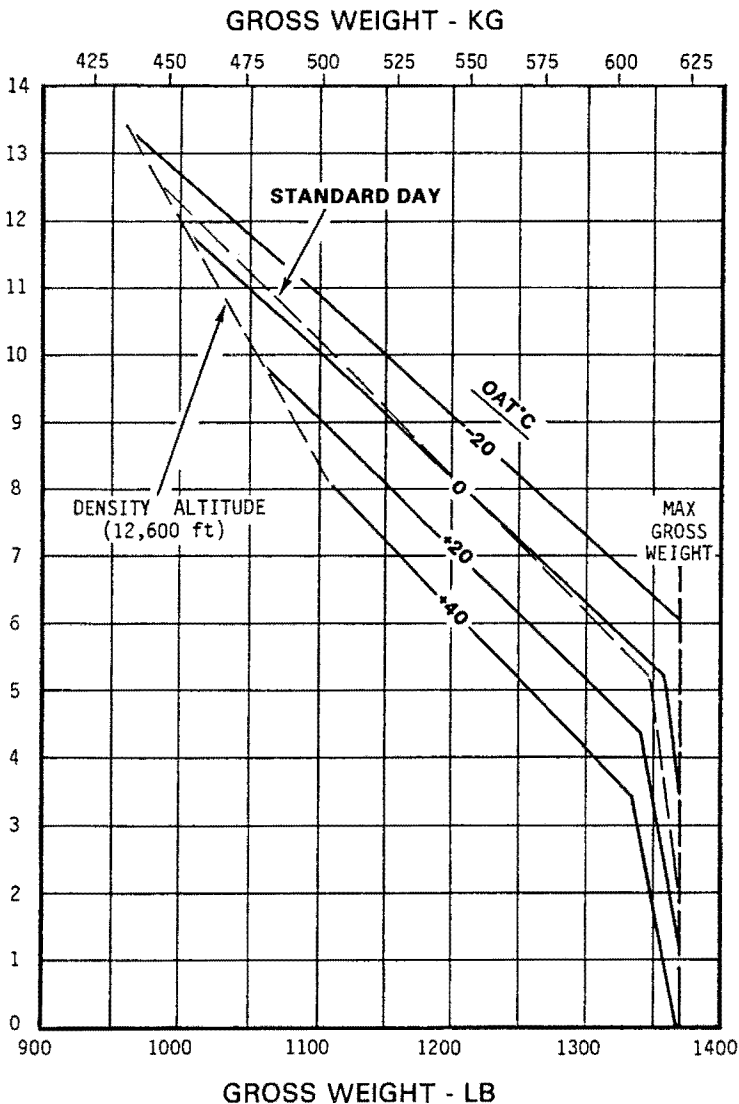


**IN GROUND EFFECT AT 2 FOOT SKID CLEARANCE  
FULL THROTTLE AND 104% RPM**



**R22 MARINER  
O-320-B2C Engine  
IGE HOVER CEILING VS. GROSS WEIGHT**

OUT OF GROUND EFFECT  
TAKEOFF POWER OR FULL THROTTLE AT 104% RPM



R22 MARINER  
O-320-B2C Engine  
5 Minute Takeoff Rating  
OGE HOVER CEILING VS. GROSS WEIGHT

**SECTION 6: WEIGHT AND BALANCE**

**CAUTION**

When changing from float-equipped to non-float configuration or vice versa, weight and balance for basic helicopter must be revised and autorotation RPM readjusted per R22 Maintenance Manual.

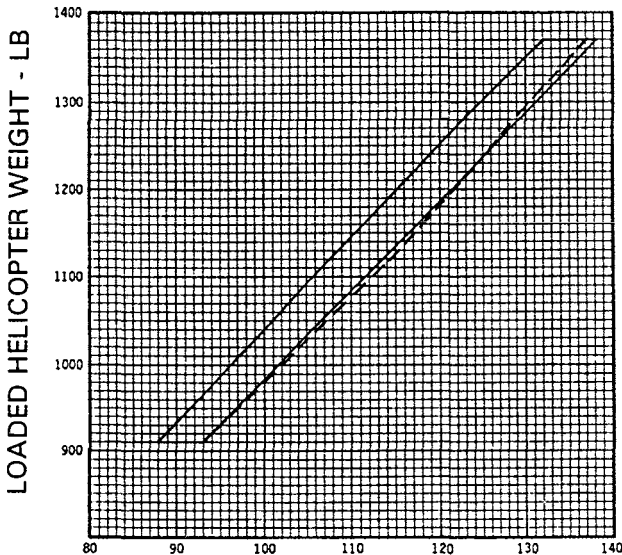
**WEIGHT AND BALANCE RECORD**

Basic empty weight and CG in float and non-float configurations is included in the Weight and Balance Data provided with the helicopter. Modifications are to be recorded on page 6-5 of the basic manual.

**LOADING INSTRUCTIONS**

Determine loaded helicopter weights and moments per page 6-7. These values must fall within the Weight and Moment envelope shown below.

**WITHOUT FLOATS**      **WITH FLOATS**



LOADED HELICOPTER MOMENT - 1000 inch-lbs.

**R22 MARINER/MARINER II**  
**Allowable CG Moment vs. Gross Weight Envelope**

**SECTION 7: SYSTEMS DESCRIPTION**

No change.

**SECTION 8: HANDLING, SERVICING AND MAINTENANCE**

**GROUND HANDLING**

When floats are installed, special ground handling wheels are required. Refer to the R22 Maintenance Manual for wheel installation and removal procedures.

**FLOAT TUBES**

To promote long float tube life:

1. Do not inflate floats to a higher pressure than required in the Limitations section.
2. Do not arbitrarily inflate floats to the relief valve pressure.
- 3 Reduce pressure in floats if solar heating is causing an excessive pressure buildup.
4. Do not allow floats to sit uninflated for long periods of time, always maintain some pressure to keep shape when not in use.

**CAUTION**

When inflating chambers individually (without the use of a manifold), increase pressure in each chamber in 0.5 psig increments.

**SECTION 10: SAFETY TIPS**

Flight characteristics and handling qualities of a helicopter with inflated floats are more critical than those for helicopters with conventional landing gear. For instance, helicopters with floats installed have an adverse roll characteristic, i.e. when sideslipping nose right or left, the helicopter will tend to roll in the opposite direction out of the turn. This could be extremely dangerous if a student or instructor failed to put in right pedal or put in the wrong pedal during a simulated power failure. Also, aerodynamic lift produced by the floats makes both RPM and longitudinal attitude control more difficult during autorotation entries. Helicopters with floats installed are also more gust sensitive and therefore more difficult to fly in turbulence.

For these reasons, it is strongly recommended that floats be removed and standard gear installed when the helicopter is being used for primary flight instruction. When floats are installed, pilots must keep the helicopter trimmed with zero sideslip and exercise extreme caution when performing simulated power failures.

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**FAA APPROVED  
R22 PILOT'S OPERATING HANDBOOK  
OPTIONAL AVIONICS SUPPLEMENT**

This supplement must be included in the FAA-approved Pilot's Operating Handbook when certain factory-supplied optional avionics are 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: Nevada Jo Ryan Digitally signed by Nevada Jo Ryan  
Date: 2019.06.20 10:08:15 -07'00'  
Manager, West Flight Test Section, AIR-716  
Federal Aviation Administration  
Los Angeles, CA

DATE: 20 JUN 2019

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\* Manufacturer's data, not FAA approved.

## **SECTION 1: GENERAL**

### **INTRODUCTION**

This supplement provides additional information for certain avionics options. A set of manufacturers' instructions for all installed avionics is provided with each new helicopter.

The following equipment is addressed in this supplement:

- Aspen Avionics EFD 1000H PFD

#### ***NOTE***

For the Robinson Primary Flight Display (PFD) installation, the airspeed indicator, altimeter, compass, tachometer, and engine instruments are retained. Pilots should use the traditional instruments as primary unless fully familiar with the installed avionics.



<b>SECTION 2: LIMITATIONS</b>	No change.
<b>SECTION 3: EMERGENCY PROCEDURES</b>	No change.
<b>SECTION 4: NORMAL PROCEDURES</b>	No change.
<b>SECTION 5: PERFORMANCE</b>	No change.
<b>SECTION 6: WEIGHT AND BALANCE</b>	No change.
<b>SECTION 7: SYSTEMS DESCRIPTION</b>	See below.
<b>SECTION 8: HANDLING AND MAINTENANCE</b>	
No change.	

**SECTION 7: SYSTEMS DESCRIPTION**

**ASPEN EFD 1000H PFD**

The Aspen Electronic Flight Display (EFD) 1000H is a Primary Flight Display (PFD) optimized for helicopter use. It is available in a "Pilot" (basic) version or "Pro" (with more advanced navigation features) version.

A typical instrument panel is illustrated on the following page.

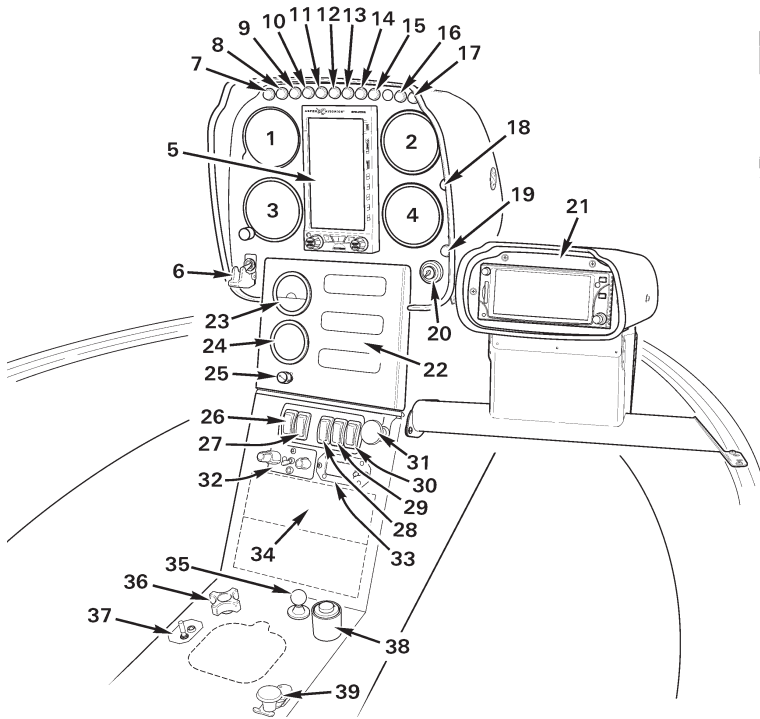
The manufacturer's document for the EFD 1000H is:

Title	Document No.
<i>Aspen Avionics Evolution Flight Display EFD 1000H PFD Pilot's Guide</i>	091-00012-001

**NOTE**

A Robinson part no. D327-4 light filter may be used to reduce reflections in the windshield at night. The light filter is installed by clipping it to the front of the display. Filter use is at pilot discretion.

**SECTION 7: SYSTEMS DESCRIPTION (cont'd)**



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

**OPTIONAL INSTRUMENT PANEL WITH  
ASPEN EFD 1000H PFD**

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

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