## SECTION 2
### LIMITATIONS

### CONTENTS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>2-1</td>
</tr>
<tr>
<td>Color Code for Instrument Markings</td>
<td>2-1</td>
</tr>
<tr>
<td>Airspeed Limits</td>
<td>2-1</td>
</tr>
<tr>
<td>Rotor Speed Limits</td>
<td>2-2</td>
</tr>
<tr>
<td>Powerplant Limitations</td>
<td>2-2</td>
</tr>
<tr>
<td>Weight Limits</td>
<td>2-3</td>
</tr>
<tr>
<td>Center of Gravity Limits</td>
<td>2-3</td>
</tr>
<tr>
<td>Flight and Maneuver Limitations</td>
<td>2-5</td>
</tr>
<tr>
<td>Kinds of Operation Limitations</td>
<td>2-6</td>
</tr>
<tr>
<td>Fuel Limitations</td>
<td>2-6</td>
</tr>
<tr>
<td>Instrument Markings</td>
<td>2-7</td>
</tr>
<tr>
<td>Placards</td>
<td>2-9</td>
</tr>
</tbody>
</table>
SECTION 2
LIMITATIONS

GENERAL

This section includes operating limitations, instrument markings, and basic placards required for safe operation of the helicopter, its engine, and other standard systems. This helicopter is approved as a normal category rotorcraft under FAA Type Certificate No. H11NM as Model R44 in the serial number range 0002 to 9999.

COLOR CODE FOR INSTRUMENT MARKINGS

Red Operating limit. Edge of red line indicates limit. Pointer should not enter red during normal operation.

Red Cross-hatch Power-off $V_{ne}$.

Yellow Precautionary or special operating procedure range.

Green Normal operating range.

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED ($V_{ne}$)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Airspeed Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2200 lb (998 kg) TOGW and below</td>
<td>130 KIAS</td>
</tr>
<tr>
<td>Over 2200 lb (998 kg) TOGW</td>
<td>120 KIAS</td>
</tr>
<tr>
<td>Autorotation</td>
<td>100 KIAS</td>
</tr>
</tbody>
</table>

For $V_{ne}$ reductions with altitude and temperature, see placard on page 2-9.

ADDITIONAL AIRSPEED LIMITS

100 KIAS maximum at power above MCP.

100 KIAS maximum with any combination of cabin doors removed.
ROBINSON MODEL R44
SECTION 2 LIMITATIONS

ROTOR SPEED LIMITS

<table>
<thead>
<tr>
<th>TACHOMETER READING</th>
<th>ACTUAL RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power On</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>102%</td>
</tr>
<tr>
<td>Minimum*</td>
<td>101%**</td>
</tr>
<tr>
<td>Power Off</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>108%</td>
</tr>
<tr>
<td>Minimum</td>
<td>90%</td>
</tr>
</tbody>
</table>

* Transient operation at lower RPM permitted for emergency procedures training.
** 99% (396 RPM) permitted on R44s with tachometers showing engine green arc from 99% to 102%.

POWERPLANT LIMITATIONS

ENGINE
One Lycoming Model O-540-F1B5

OPERATING LIMITS

Engine Maximum Speed 2718 RPM (102%)
Cylinder Head Max Temperature 500°F (260°C)
Oil Maximum Temperature 245°F (118°C)
Oil Pressure
Minimum during idle 25 psi
Minimum during flight 55 psi
Maximum during flight 95 psi
Maximum during start & warm up 115 psi

Oil Quantitiy, minimum for takeoff 7 qt (6.6 liters)
Manifold Pressure: See placard on page 2-9 for MAP schedule.
WEIGHT LIMITS

Maximum gross weight 2400 lb (1089 kg)
Minimum gross weight 1550 lb (703 kg)
Maximum per seat including baggage compartment 300 lb (136 kg)
Maximum in any baggage compartment 50 lb (23 kg)

CENTER OF GRAVITY (CG) LIMITS

See figure on page 2-4. Reference datum is 100 inches forward of main rotor shaft centerline.

NOTE

With all doors installed, a solo pilot weight of 150 lb (68 kg) or greater will ensure CG within limits. For lower pilot weight, compute weight and balance; removable ballast may be required to obtain CG at or forward of aft limit. (See Loading Instructions in Section 6.)
CENTER OF GRAVITY LIMITS
FLIGHT AND MANEUVER LIMITATIONS

Aerobatic flight prohibited.

**CAUTION**
Aerobatic flight prohibited. Abrupt control inputs may produce high fatigue stresses and cause catastrophic failure of a critical component.

Low-G cyclic pushovers prohibited.

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

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

Flight in known icing conditions prohibited.

Maximum operating density altitude 14,000 feet.

Maximum operating altitude 9000 feet AGL to allow landing within 5 minutes in case of fire.

Alternator, RPM governor, low rotor RPM warning system, OAT gage, and cyclic trim or hydraulic control system must be operational for dispatch.

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

Forward left seat belt must be buckled.

Operation up to 100 KIAS approved with any combination of cabin doors removed. All seat belts must be buckled and loose items in cabin must be properly secured during doors-off flight.
KINDS OF OPERATION LIMITATIONS

VFR day and night operations are approved.

VFR operation at night is permitted only when landing, navigation, instrument, and anti-collision lights are operational. Orientation during night flight must be maintained by visual reference to ground objects illuminated solely by lights on the ground or adequate celestial illumination.

Note: There may be additional requirements in countries outside the United States.

FUEL LIMITATIONS

APPROVED FUEL GRADES

<table>
<thead>
<tr>
<th>Grade</th>
<th>Color</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Green</td>
<td>ASTM D910</td>
</tr>
<tr>
<td>100LL</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>100VLL</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>UL 91</td>
<td>Clear to Yellow (no dye)</td>
<td>ASTM D7547</td>
</tr>
<tr>
<td>UL 94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HJELMCO 91/96 UL</td>
<td>Clear to Yellow (no dye)</td>
<td>Hjelmco Oil, Inc. Sollentuna, Sweden</td>
</tr>
<tr>
<td>91</td>
<td>Yellow</td>
<td>TU 38.5901481-96 Ukrainian National Standard</td>
</tr>
<tr>
<td>B91/115</td>
<td>Green</td>
<td>GOST 1012-72 Russian National Standard</td>
</tr>
<tr>
<td>B95/130</td>
<td>Amber</td>
<td></td>
</tr>
</tbody>
</table>
FUEL LIMITATIONS (cont’d)

FUEL CAPACITY

<table>
<thead>
<tr>
<th></th>
<th>Total Capacity</th>
<th>Usable Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US gallons (liters)</td>
<td>US gallons (liters)</td>
</tr>
<tr>
<td>Tanks with bladders:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main tank</td>
<td>30.5 (115)</td>
<td>29.5 (112)</td>
</tr>
<tr>
<td>Auxiliary tank</td>
<td>17.2 (65)</td>
<td>17.0 (64)</td>
</tr>
<tr>
<td>Combined capacity</td>
<td>47.7 (180)</td>
<td>46.5 (176)</td>
</tr>
<tr>
<td>Tanks without bladders:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main tank</td>
<td>31.6 (120)</td>
<td>30.6 (116)</td>
</tr>
<tr>
<td>Auxiliary tank</td>
<td>18.5 (70)</td>
<td>18.3 (69)</td>
</tr>
<tr>
<td>Combined capacity</td>
<td>50.1 (190)</td>
<td>48.9 (185)</td>
</tr>
</tbody>
</table>

Note: Per R44 Service Bulletin SB-78B, fuel tanks without bladders should no longer be in service.

INSTRUMENT MARKINGS

NOTE

Red lines offset so instrument pointer should not enter red. See color code on page 2-1.

AIRSPEED INDICATOR

Green arc               0 to 110 KIAS
Yellow arc*             110 to 130 KIAS
Red cross-hatch         100 KIAS
Red line                130 KIAS

*Earlier airspeed indicators without yellow arc must have the following placard adjacent:

DO NOT EXCEED 110 KIAS EXCEPT IN SMOOTH AIR

ROTOR TACHOMETER

Lower red line         90%
Green arc              90 to 108%
Upper red line         108%
INSTRUMENT MARKINGS (cont’d)

ENGINE TACHOMETER**
- Lower red line: 101%
- Green arc: 101 to 102%
- Upper red line: 102%

**Earlier tachometers show green arc from 99 to 102% and lower red line at 99%.

OIL PRESSURE
- Lower red line: 25 psi
- Lower yellow arc: 25 to 55 psi
- Green arc: 55 to 95 psi
- Upper yellow arc: 95 to 115 psi
- Upper red line: 115 psi

OIL TEMPERATURE
- Green arc: 75 to 245°F (24 to 118°C)
- Red line: 245°F (118°C)

CYLINDER HEAD TEMPERATURE
- Green arc: 200 to 500°F (93 to 260°C)
- Red line: 500°F (260°C)

MANIFOLD PRESSURE
- Green arc: 16.0 to 24.7 in. Hg
- Yellow arc: 21.8 to 26.3 in. Hg
- Red line: 26.3 in. Hg

Yellow arc denotes variable MAP limits. See placard on page 2-9.

CARBURETOR AIR TEMPERATURE
- Yellow arc: −19°C to +3°C
PLACARDS

In clear view and readable by pilot in flight:

### LIMIT MANIFOLD PRESSURE - IN. HG

<table>
<thead>
<tr>
<th>PRESS ALT-FT</th>
<th>OAT °C</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL</td>
<td>22.9</td>
<td>23.2</td>
<td>23.5</td>
<td>23.8</td>
<td>24.1</td>
<td>24.4</td>
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<tr>
<td>2000</td>
<td>22.5</td>
<td>22.8</td>
<td>23.1</td>
<td>23.4</td>
<td>23.7</td>
<td>24.0</td>
</tr>
<tr>
<td>4000</td>
<td>22.2</td>
<td>22.5</td>
<td>22.8</td>
<td>23.1</td>
<td>23.4</td>
<td>23.7</td>
</tr>
<tr>
<td>6000</td>
<td>21.8</td>
<td>22.1</td>
<td>FULL THROTTLE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FOR MAX TAKEOFF POWER (5 MIN), ADD 1.6 IN. HG

### NEVER EXCEED SPEED – KIAS

**2200 LB TOGW & BELOW**

<table>
<thead>
<tr>
<th>PRESS ALT-FT</th>
<th>OAT °C</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL</td>
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<tr>
<td>2000</td>
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<tr>
<td>4000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>126</td>
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<tr>
<td>6000</td>
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<td>126</td>
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<tr>
<td>8000</td>
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<td>96</td>
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<tr>
<td>10000</td>
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</tr>
<tr>
<td>12000</td>
<td>101</td>
<td>95</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14000</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NO FLIGHT

OVER 2200 LB TOGW, SUBTRACT 10 KIAS
FOR AUTOROTATION, SUBTRACT 30 KIAS
PLACARDS (cont’d)

Near main fuel tank filler cap:

FUEL
100 OCT MIN GRADE AVIATION GASOLINE

or

FUEL
AVIATION GASOLINE – GRADE 100 LL
OR SEE PILOT’S HANDBOOK

Near aux fuel tank filler cap:

AUX FUEL
100 OCT MIN GRADE AVIATION GASOLINE

or

AUX FUEL
AVIATION GASOLINE – GRADE 100 LL
OR SEE PILOT’S HANDBOOK

Near fuel shut-off valve:

FUEL

On fuel shut-off valve:

ON    OFF

Near main tank fuel gage:

For bladder style tank

29.5 US GAL

For aluminum (non-bladder) tank

30.6 US GAL
PLACARDS (cont’d)

Near aux tank fuel gage:
   For bladder-style tank
      AUX 17.0 US GAL
   For aluminum (non-bladder) tank
      AUX 18.3 US GAL

In clear view of pilot:

   MINIMUM SOLO PILOT WEIGHT 150 LB
   (SEE PILOT’S HANDBOOK)

   or

   SEE PILOT’S HANDBOOK FOR SOLO PILOT
   WEIGHT LESS THAN 150 LB (68 KG)

   THIS ROTORCRAFT APPROVED FOR
   DAY AND NIGHT VFR OPERATIONS

   LOW-G PUSHOVERS PROHIBITED

On removable cyclic grip:

   SOLO FROM RIGHT SEAT ONLY

On or near collective controls:

   NO STOWAGE
   KEEP AREA CLEAR

On aircraft without ashtray, in clear view of all occupants:

   NO SMOKING

On aircraft with ashtray, in clear view of all occupants:

   NO SMOKING IN FRONT SEATS
PLACARDS (cont’d)

Inside each baggage compartment:

---

**CAUTION**

DO NOT EXCEED ANY OF THE FOLLOWING:
- COMPARTMENT CAPACITY: 50 LB MAX
- COMBINED SEAT PLUS COMPARTMENT: 300 LB MAX
- ROTORCRAFT GROSS WEIGHT LIMIT

SEE ROTORCRAFT FLIGHT MANUAL FOR ADDITIONAL LOADING INSTRUCTIONS.