

**SECTION 6  
WEIGHT AND BALANCE**

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**SECTION 6**

**WEIGHT AND BALANCE**

**GENERAL**

The helicopter must be flown only within weight and balance limits specified in Section 2. Loadings outside these limits can result in insufficient control travel for safe operation.

The center of gravity may be adjusted by adding removable ballast (any appropriate item of mass) to any baggage compartment. Recalculate weight and balance after adding ballast, and verify ballast meets baggage compartment limits given in Section 2.

Loaded helicopter weight and balance can be determined using the method given under **LOADING INSTRUCTIONS**.

In accordance with FAA procedures, the detail weight and balance data of this section are not subject to FAA approval. The loading instructions of this section, however, have been approved by the FAA as satisfying all requirements for instructions on loading of the rotorcraft within approved limits of weight and center of gravity and on maintaining the loading within such limits.

***CAUTION***

Fuel burn causes CG to move forward during flight. Always determine safe loading with empty fuel as well as with takeoff fuel. Payload may be limited by forward CG as fuel is burned.

## **WEIGHT AND BALANCE RECORD**

The following form should be used to maintain a continuous record of your helicopter's weight and balance. Each time an item of equipment is removed or installed, an entry must be made and the new empty CG determined. The original factory weight and balance and an equipment list is supplied with each helicopter on a form which is inserted at the end of this section. This weight and balance provides the first entry in the Weight and Balance Record form.

### ***NOTE***

Calculated CG with full fuel and 150 lb (68 kg) pilot must be within CG limits. Following modification, adjustment to fixed nose ballast may be required. See R44 Maintenance Manual.



**LOADING INSTRUCTIONS**

The following table may be used when calculating loaded helicopter weight and CG position.

COMMON ITEM WEIGHT & CG

| Item  | Weight (lb) | Longitudinal arm (in.) | Lateral arm (in.) (+ = right side) |
|---|-------------|------------------------|------------------------------------|
| Pilot (right seat)                              |             | 49.5*                  | + 12.2                             |
| Passenger (left seat)                           |             | 49.5*                  | - 10.4                             |
| Baggage under seats                             |             | 44.0                   | ± 11.5                             |
| Aft baggage compartments and deck               |             | 78.0                   | ± 12.2                             |
| Main fuel**                                     |             | 106.0                  | - 13.5                             |
| Aux fuel**                                      |             | 102.0                  | + 13.0                             |
| Forward doors                                   | 7.5 each    | 49.4                   | ± 24.0                             |
| Aft doors                                       | 7.0 each    | 75.4                   | ± 23.0                             |
| Removable controls (cyclic, collective, pedals) | 2.0         | 31.0                   | - 13.0                             |

\* If additional backrest cushion is used, subtract thickness of compressed cushion.

\*\* A longitudinal arm of 104.5 in. may be used for combined main and aux fuel.

**LOADING INSTRUCTIONS (cont'd)**

The following sample calculation demonstrates how to determine loaded helicopter weight and center of gravity. A worksheet is provided on the page following the sample calculation for a weight and balance calculation for your helicopter. Calculated weight and balance must be compared with the CG limits given in Section 2 to determine safe loading. Both takeoff and empty fuel conditions must be within limits.

Lateral CG usually falls well within limits for conventional loadings. If an unusual lateral installation or loading occurs, lateral CG should be checked against the CG limits given in Section 2. The lateral reference datum is the aircraft centerline with items to the right positive and items to the left negative.

**LOADING INSTRUCTIONS (cont'd)**

**SAMPLE LOADING CALCULATION**

| Item                                   | Weight (lb)   | Location        |                                  | Moment         |               |
|--|---------------|-----------------|----------------------------------|----------------|---------------|
|  |               | Long. Arm (in.) | Lat. Arm (in.)<br>+ = Right Side | Long. (in.-lb) | Lat. (in.-lb) |
| Basic empty weight                     | 1460          | 106.2           | 0.2                              | 155,052        | 292           |
| Remove forward right door              | -7.5          | 49.4            | 24.0                             | -371           | -180          |
| Remove forward left door               |               | 49.4            | -24.0                            |                |               |
| Remove aft right door                  |               | 75.4            | 23.0                             |                |               |
| Remove aft left door                   |               | 75.4            | -23.0                            |                |               |
| Remove left seat controls              |               | 31.0            | -13.0                            |                |               |
| Pilot (right seat)                     | 170           | 49.5            | 12.2                             | 8415           | 2074          |
| Passenger (left seat)                  | 170           | 49.5            | -10.4                            | 8415           | -1768         |
| Baggage under right seat               |               | 44.0            | 11.5                             |                |               |
| Baggage under left seat                |               | 44.0            | -11.5                            |                |               |
| Aft right compartment and deck         | 20            | 78.0            | 12.2                             | 1560           | 244           |
| Aft left compartment and deck          | 10            | 78.0            | -12.2                            | 780            | -122          |
| <b>Zero usable fuel weight and CG*</b> | <b>1822.5</b> | <b>95.4</b>     | <b>0.3</b>                       | <b>173,851</b> | <b>540</b>    |
| Usable main fuel at 6 lb/gal.          | 177           | 106.0           | -13.5                            | 18,762         | -2390         |
| Usable aux fuel at 6 lb/gal.           | 102           | 102.0           | 13.0                             | 10,404         | 1326          |
| <b>Takeoff Gross Weight and CG*</b>    | <b>2101.5</b> | <b>96.6</b>     | <b>-0.2</b>                      | <b>203,017</b> | <b>-524</b>   |

\* CG location (arm) for loaded helicopter is determined by dividing total moment by total weight.



**LOADING INSTRUCTIONS (cont'd)**

**LOADING CALCULATION WORKSHEET**

| Item                                   | Weight (lb) | Location        |                                  | Moment         |               |
|--|-------------|-----------------|----------------------------------|----------------|---------------|
|  |             | Long. Arm (in.) | Lat. Arm (in.)<br>+ = Right Side | Long. (in.-lb) | Lat. (in.-lb) |
| Basic empty weight                     |             |                 |                                  |                |               |
| Remove forward right door              |             | 49.4            | 24.0                             |                |               |
| Remove forward left door               |             | 49.4            | -24.0                            |                |               |
| Remove aft right door                  |             | 75.4            | 23.0                             |                |               |
| Remove aft left door                   |             | 75.4            | -23.0                            |                |               |
| Remove left seat controls              |             | 31.0            | -13.0                            |                |               |
| Pilot (right seat)                     |             | 49.5            | 12.2                             |                |               |
| Passenger (left seat)                  |             | 49.5            | -10.4                            |                |               |
| Baggage under right seat               |             | 44.0            | 11.5                             |                |               |
| Baggage under left seat                |             | 44.0            | -11.5                            |                |               |
| Aft right compartment and deck         |             | 78.0            | 12.2                             |                |               |
| Aft left compartment and deck          |             | 78.0            | -12.2                            |                |               |
| <b>Zero usable fuel weight and CG*</b> |             |                 |                                  |                |               |
| Usable main fuel at 6 lb/gal.          |             | 106.0**         | -13.5                            |                |               |
| Usable aux fuel at 6 lb/gal.           |             | 102.0**         | 13.0                             |                |               |
| <b>Takeoff Gross Weight and CG*</b>    |             |                 |                                  |                |               |

\* CG location (arm) for loaded helicopter is determined by dividing total moment by total weight.

\*\* A longitudinal arm of 104.5 in. may be used for combined main and aux fuel. Do not use combined main and aux fuel if calculating lateral arm.

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