

**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 an under-seat 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 135 lb pilot (130 lb pilot without auxiliary fuel tank) must be within CG limits. Following modification, adjustment to fixed nose ballast may be required. See R22 Maintenance Manual.

**WEIGHT AND BALANCE RECORD (cont'd)**

**WEIGHT AND BALANCE RECORD**  
(Continuous History of Changes in Structure or Equipment Affecting Weight and Balance)

HELIICOPTER MODEL R22		SERIAL NUMBER:											
		WEIGHT CHANGE						WEIGHT (lb)			LONGITUDINAL		
DATE	DESCRIPTION OF ARTICLE OR MODIFICATION	ADDED (+)	REMOVED (-)	LONGITUDINAL	LATERAL (+ = RIGHT SIDE)		WEIGHT (lb)	Arm (in.)	Moment (in.-lb)	Arm (in.)	Moment (in.-lb)	Arm (in.)	Moment (in.-lb)
		WEIGHT (lb)	Arm (in.)	Moment (in.-lb)	Arm (in.)	Moment (in.-lb)							
	HELICOPTER AS WEIGHED												

**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 and baggage under right seat		78.0*	+ 10.7
Passenger and baggage under left seat		78.0*	- 9.3
Main fuel**		108.6	- 11.0
Aux fuel**		103.8	+ 11.2
Doors	5.2 each	77.5	± 21.0
Removable cyclic	0.8	68.0	- 8.0
Removable collective	1.0	80.7	- 19.5
Removable pedals (both pedals)	0.8	46.5	- 9.5

\* Use 79.0 in. for aircraft prior to S/N 0256 with early-style seats. If additional backrest cushion is used, subtract thickness of compressed cushion.

\*\* A longitudinal arm of 106.9 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. These may 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.) + = Right Side	Long. (in.-lb)	Lat. (in.-lb)
Basic empty weight	880	104.0	-0.1	91,520	-88
Remove right door	-5.2	77.5	21.0	-403	-109
Remove left door		77.5	-21.0		
Remove cyclic		68.0	-8.0		
Remove collective		80.7	-19.5		
Remove pedals (both)		46.5	-9.5		
Right seat pilot and baggage	170	78.0	10.7	13,260	1819
Left seat passenger and baggage	160	78.0	-9.3	12,480	-1488
<b>Zero usable fuel weight and CG*</b>	<b>1204.8</b>	<b>97.0</b>	<b>0.1</b>	<b>116,857</b>	<b>134</b>
Usable main fuel at 6 lb/gal.	101.4	108.6	-11.0	11,012	-1115
Usable aux fuel at 6 lb/gal.	56.4	103.8	11.2	5854	632
<b>Takeoff Gross Weight and CG*</b>	<b>1362.6</b>	<b>98.1</b>	<b>-0.3</b>	<b>133,723</b>	<b>-349</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.) + = Right Side	Long. (in.-lb)	Lat. (in.-lb)
Basic empty weight					
Remove right door		77.5	21.0		
Remove left door		77.5	-21.0		
Remove cyclic		68.0	-8.0		
Remove collective		80.7	-19.5		
Remove pedals (both)		46.5	-9.5		
Right seat pilot and baggage		78.0	10.7		
Left seat passenger and baggage		78.0	-9.3		
<b>Zero usable fuel weight and CG*</b>					
Usable main fuel at 6 lb/gal.		108.6**	-11.0		
Usable aux fuel at 6 lb/gal.		103.8**	11.2		
<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 106.9 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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