

Weight and Balance Exercises

(Figures 32 -34 and 60-61 appear after the questions)

1. (Refer to Figures 32 and 33.)

Calculate the weight and balance and determine if the CG and the weight of the airplane are within limits.

Front seat occupants: 350 lbs
 Rear seat occupants: 325 lbs
 Baggage: 27 lbs
 Fuel: 35 gallons

2. (Refer to Figure 34.)

What is the maximum amount of fuel that may be aboard the airplane on takeoff, if loaded as follows?

	Weight (lbs)	Moment/1000
Empty weight	1,350	51.5
Pilot and front passenger	340	
Rear passengers	310	
Baggage	45	
Oil (8 quarts)		

3. (Refer to Figure 60.)

How could the 500 lb weight be shifted to balance the plank on the fulcrum?

4. (Refer to Figure 61.)

If 50 lbs of weight is located at Point X and 100 lbs at Point Z, how much weight must be located at Point Y to balance the plank?

5. (Refer to Figures 32 and 33.)

With the airplane loaded as follows, what action could be taken to balance the airplane?

Front occupants: 411 lbs
 Rear occupants: 100 lbs
 Main wing tanks: 44 gallons

6. Given the following loading condition, what is the CG of the airplane?

	Weight (lbs)	Arm (inches)	Moment (Lb-inches)
Empty weight	1,495	101.4	151,593.0
Pilot and passengers	380.0	64.0	
Fuel (30 gallons usable)		96.0	

Useful load weights and moments

Baggage or 5th seat occupant		Occupants			
ARM 140		Front seats ARM 85		Rear seats ARM 121	
Weight	Moment 100	Weight	Moment 100	Weight	Moment 100
10	14	120	102	120	145
20	28	130	110	130	157
30	42	140	119	140	169
40	56	150	128	150	182
50	70	160	136	160	194
60	84	170	144	170	206
70	98	180	153	180	218
80	112	190	162	190	230
90	126	200	170	200	242
100	140				
110	154				
120	168				
130	182				
140	196				
150	210				
160	224				
170	238				
180	252				
190	266				
200	280				
210	294				
220	308				
230	322				
240	336				
250	350				
260	364				
270	378				

Usable fuel		
Main wing tanks ARM 75		
Gallons	Weight	Moment 100
5	30	22
10	60	45
15	90	68
20	120	90
25	150	112
30	180	135
35	210	158
40	240	180
44	264	198

Auxiliary wing tanks ARM 94		
Gallons	Weight	Moment 100
5	30	28
10	60	56
15	90	85
19	114	107

Empty weight~2,015

MOM/100~1,554

Moment limits vs weight

Moment limits are based on the following weight and center of gravity limit data (landing gear down).

*Oil		
Quarts	Weight	Moment 100
10	19	5

*Included in basic empty weight.

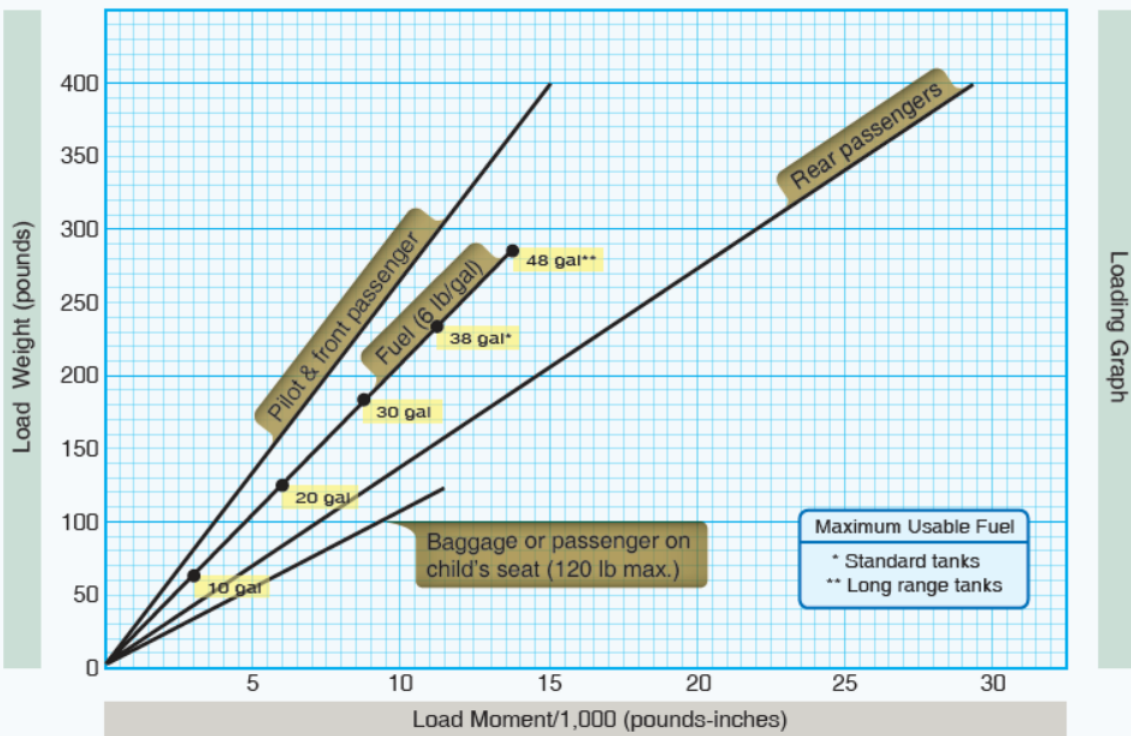
Weight condition	Forward CG limit	AFT CG limit
2,950 lb (takeoff or landing)	82.1	84.7
2,525 lb	77.5	85.7
2,475 lb or less	77.0	85.7

FIGURE 32.—Airplane Weight and Balance Tables.

Moment limits vs weight (continued)

Weight	Minimum Moment	Maximum Moment	Weight	Minimum Moment	Maximum Moment
	100	100		100	100
2,100	1,617	1,800	2,500	1,932	2,143
2,110	1,625	1,808	2,510	1,942	2,151
2,120	1,632	1,817	2,520	1,953	2,160
2,130	1,640	1,825	2,530	1,963	2,168
2,140	1,648	1,834	2,540	1,974	2,176
2,150	1,656	1,843	2,550	1,984	2,184
2,160	1,663	1,851	2,560	1,995	2,192
2,170	1,671	1,860	2,570	2,005	2,200
2,180	1,679	1,868	2,580	2,016	2,208
2,190	1,686	1,877	2,590	2,026	2,216
2,200	1,694	1,885	2,600	2,037	2,224
2,210	1,702	1,894	2,610	2,048	2,232
2,220	1,709	1,903	2,620	2,058	2,239
2,230	1,717	1,911	2,630	2,069	2,247
2,240	1,725	1,920	2,640	2,080	2,255
2,250	1,733	1,928	2,650	2,090	2,263
2,260	1,740	1,937	2,660	2,101	2,271
2,270	1,748	1,945	2,670	2,112	2,279
2,280	1,756	1,954	2,680	2,123	2,287
2,290	1,763	1,963	2,690	2,133	2,295
2,300	1,771	1,971	2,700	2,144	2,303
2,310	1,779	1,980	2,710	2,155	2,311
2,320	1,786	1,988	2,720	2,166	2,319
2,330	1,794	1,997	2,730	2,177	2,326
2,340	1,802	2,005	2,740	2,188	2,334
2,350	1,810	2,014	2,750	2,199	2,342
2,360	1,817	2,023	2,760	2,210	2,350
2,370	1,825	2,031	2,770	2,221	2,358
2,380	1,833	2,040	2,780	2,232	2,366
2,390	1,840	2,048	2,790	2,243	2,374
2,400	1,848	2,057	2,800	2,254	2,381
2,410	1,856	2,065	2,810	2,265	2,389
2,420	1,863	2,074	2,820	2,276	2,397
2,430	1,871	2,083	2,830	2,287	2,405
2,440	1,879	2,091	2,840	2,298	2,413
2,450	1,887	2,100	2,850	2,309	2,421
2,460	1,894	2,108	2,860	2,320	2,428
2,470	1,902	2,117	2,870	2,332	2,436
2,480	1,911	2,125	2,880	2,343	2,444
2,490	1,921	2,134	2,890	2,354	2,452
			2,900	2,365	2,460
			2,910	2,377	2,468
			2,920	2,388	2,475
			2,930	2,399	2,483
			2,940	2,411	2,491
			2,950	2,422	2,499

FIGURE 33.—Airplane Weight and Balance Tables.



Notes: 1. Lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant CG range.

2. Engine Oil: 8 qt = 15 lb at -0.2 Moment/1,000

Note: The empty weight of this airplane does not include the weight of the oil.

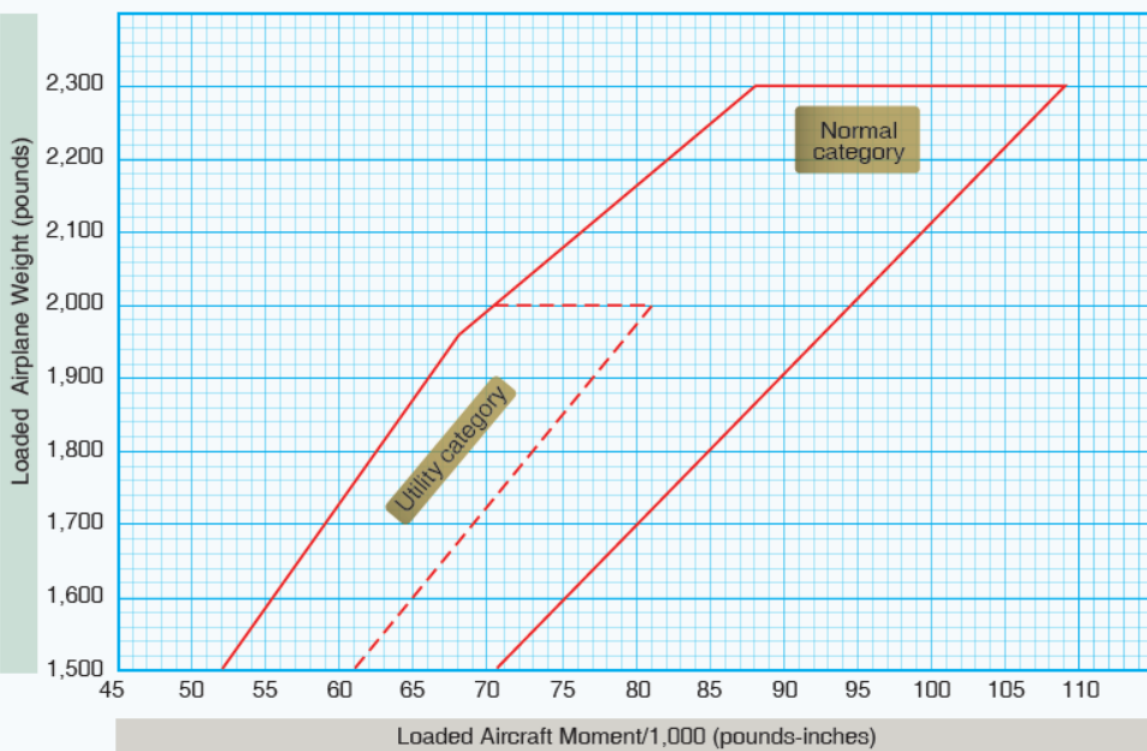


FIGURE 34.—Airplane Weight and Balance Graphs.

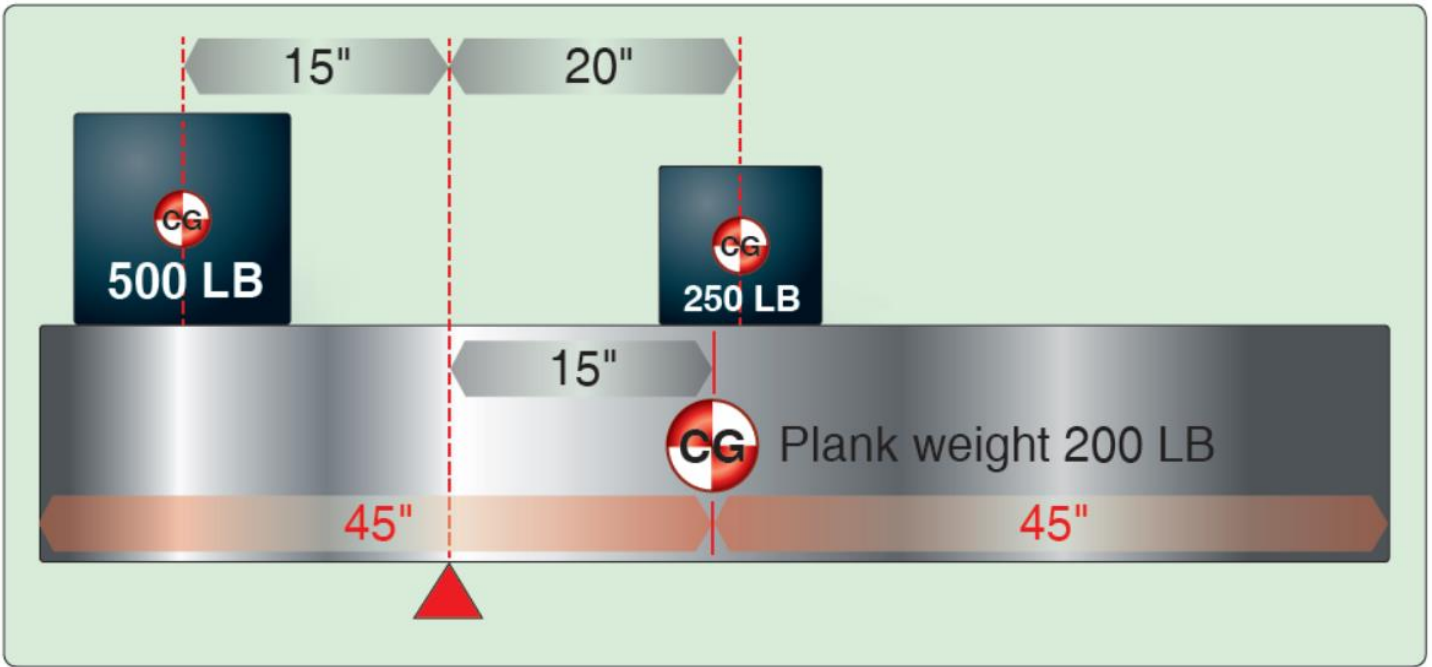


FIGURE 60.—Weight and Balance Diagram.

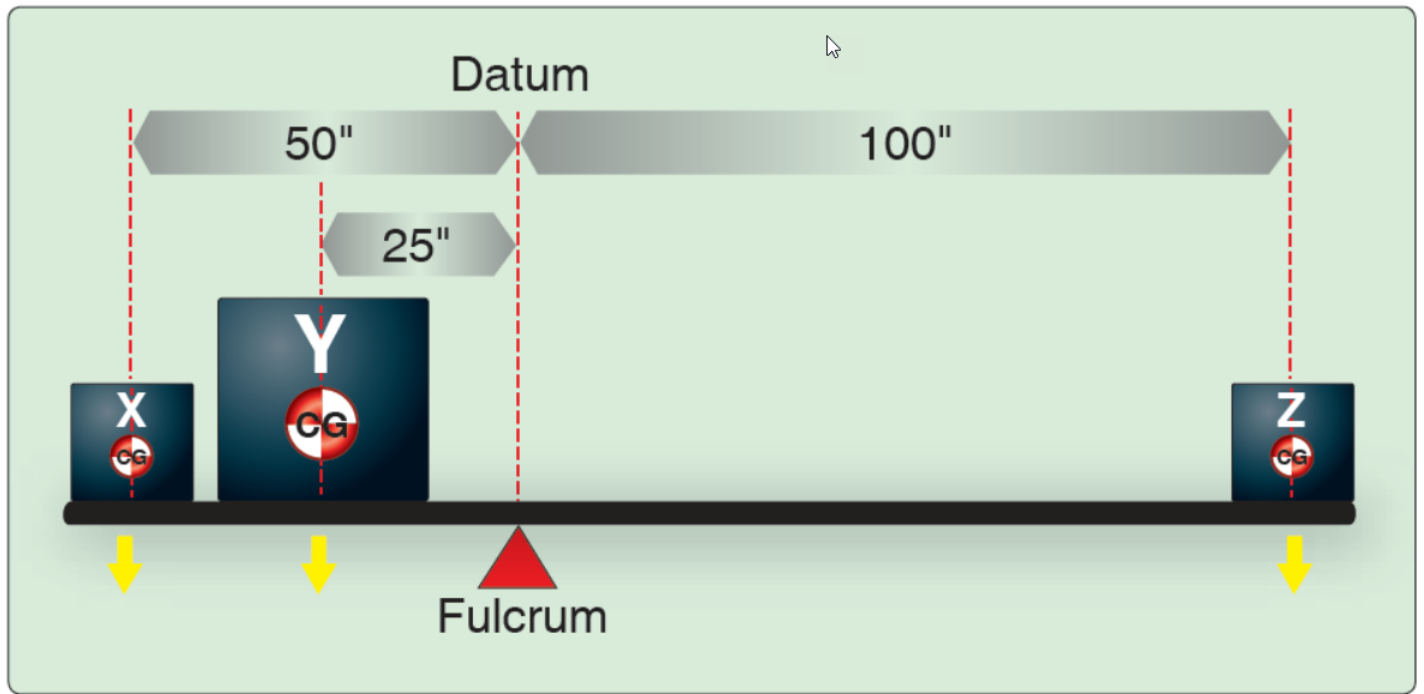


FIGURE 61.—Weight and Balance Diagram.