Longitudinal CG Calculation					
Item	Scale (lb)	Tare Wt. (lb)	Nt. Wt. (lb)	Arm (inches)	Moment (in-lb)
Left Front	650	0	650	+55.16	35,854.0
Right Front	625	0	625	+55.16	34,475.0
Aft	710	0	710	+204.92	145,493.2
Total	**1,985**		**1,985**	**+108.73**	**215,822.2**
Lateral CG Calculation					
Item	Scale (lb)	Tare Wt. (lb)	Nt. Wt. (lb)	Arm (inches)	Moment (in-lb)
Left Front	650	0	650	−25	−16,250
Right Front	625	0	625	+25	+15,625
Aft	710	0	710	0	0
Total	**1,985**		**1,985**	**+.31**	**−625**

Figure 6-50. *Center of gravity calculation for Bell JetRanger.*

for the change in CG. *Figure 6-52* shows a close-up of the wing attach point, and the small amount of forward and aft movement that is available.

Powered Parachutes

Powered parachutes have many of the same characteristics as weight-shift aircraft when it comes to weight and balance. They have the same limited loading, with only one or two seats and a fuel tank. They also act like a pendulum, with the weight of the aircraft hanging beneath the inflated wing (parachute).

The point at which the inflated wing attaches to the structure of the aircraft is adjustable to compensate for pilots and passengers of varying weights. With a very heavy pilot, the wing attach point would be moved forward to prevent the aircraft from being too nose heavy. *Figure 6-53* shows the structure of a powered parachute with the adjustable wing attach points.

Weight and Balance for Large Airplanes

Weight and balance for large airplanes is almost identical to what it is for small airplanes, on a much larger scale. If a technician can weigh a small airplane and calculate its empty weight and EWCG, that same technician should be able to do it for a large airplane. The jacks and scales are larger, and it may take more personnel to handle the equipment, but the concepts and processes are the same.

Built-In Electronic Weighing

One difference that may be found with large airplanes is the incorporation of electronic load cells in the aircraft's landing gear. With this type of system, the airplane can weigh itself as it sits on the tarmac. The load cells are built into the axles of the landing gear, or the landing gear strut, and they work in the same manner as load cells used with jacks. This system is currently in use on the Boeing 747-400, Boeing 777, Boeing 787, McDonnell Douglas MD-11, and the wide body Airbus airplanes like the A-330, A-340, and A-380.

The Boeing 777 utilizes two independent systems that provide information to the airplane's flight management system (FMS). If the two systems agree on the weight and CG of the airplane, the data being provided are considered accurate and the airplane can be dispatched based on that information. The flight crew has access to the information on the flight deck by accessing the FMS and bringing up the weight and balance page.

Mean Aerodynamic Chord

On small airplanes and on all helicopters, the CG location is identified as being a specific number of inches from the datum. The CG range is identified the same way. On larger airplanes, from private business jets to large jumbo jets, the CG and its range are typically identified in relation to the width of the wing.

The width of the wing on an airplane is known as the chord.

Figure 6-51. *Weight and balance for a weight-shift control aircraft.*