Configuration of the Aircraf

Consult the aircraft service manual regarding position of the landing gear shock struts and the control surfaces for weighing. When weighing a helicopter, the main rotor must be in its correct position.

Jacking the Aircraft

Aircraft are often weighed by rolling them onto ramps in which load cells are embedded. This eliminates the problems associated with jacking the aircraft off the ground. However, many aircraft are weighed by jacking the aircraft up and then lowering them onto scales or load cells.

Extra care must be used when raising an aircraft on jacks for weighing. If the aircraft has spring steel landing gear and it is jacked at the wheel, the landing gear will slide inward as the weight is taken off of the tire, and care must be taken to prevent the jack from tipping over.

For some aircraft, stress panels or plates must be installed before the aircraft is raised with wing jacks to distribute the weight over the jack pad. Be sure to follow the recommendations of the aircraft manufacturer in detail anytime an aircraft is jacked. When using two wing jacks, take special care to raise them simultaneously, keeping the aircraft so it does not slip off the jacks. As the jacks are raised, keep the safety collars screwed down against the jack cylinder to prevent the aircraft from tilting if one of the jacks should lose hydraulic pressure.

Leveling the Aircraft

When an aircraft is weighed, it must be in its level fligh attitude so that all of the components are at their correct distance from the datum. This attitude is determined by information in the TCDS. Some aircraft require a plumb line to be dropped from a specified location so that the point of the weight (the bob) hangs directly above an identifiable point. Others specify that a spirit level be placed across two leveling lugs, often special screws on the outside of the fuselage. Other aircraft call for a spirit level to be placed on the upper door sill.

Lateral level is not specified for all light aircraft, but provisions are normally made on helicopters for determining both longitudinal and lateral level. This may be done by built-in leveling indicators, or by a plumb bob that shows the conditions of both longitudinal and lateral level.
The actual adjustments to level the aircraft using load cells are made with the jacks. When weighing from the wheels, leveling is normally done by adjusting the air pressure in the nosewheel shock strut.

Safety Considerations

Special precautions must be taken when raising an aircraft on jacks.

1. Stress plates must be installed under the jack pads if the manufacturer specifies them
2. If anyone is required to be in the aircraft while it is being jacked, there must be no movement.
3. The jacks must be straight under the jack pads before beginning to raise the aircraft.
4. All jacks must be raised simultaneously and the safety devices are against the jack cylinder to prevent the aircraft tipping if any jack should lose pressure. Not all jacks have screw down collars, some use drop pins or friction locks.

Determining the CG

When the aircraft is in its level flight attitude, drop a plumb line from the datum and make a mark on the hangar floor below the tip of the bob. Draw a chalk line through this point parallel to the longitudinal axis of the aircraft.

Then, draw lateral lines between the actual weighing points for the main wheels, and make a mark along the longitudinal line at the weighing point for the nosewheel or the tailwheel. These lines and marks on the floor allow accurate measurements between the datum and the weighting points to determine their arms.

Determine the CG by adding the weight and moment of each weighing point to determine the total weight and total moment. Then, divide the total moment by the total weight to determine the CG relative to the datum. As an example of locating the CG with respect to the datum, which in this case is the firewall, consider the tricycle landing gear airplane as detailed in the *Figure 3-5* table and illustrated in *Figure 3-6.*

When the airplane is on the scales with the parking brakes

Weighing point	Scale reading (lb)	TARE weight (lb)	Net weight (lb)	Arm (in)	Moment (lb-in)	CG
Right side	846	16	830	46.0	38,180	
Left side	852	16	836	46.0	38,456	
Nose	348	8	340	−32.0	−10,880	
Total			2,006		65,756	32.8

Figure 3-5. *Locating the CG of an airplane relative to the datum.*