Chapter 6: Preflight & Ground Operations

Introduction

Safe operation of a glider depends on careful assembly and preflight. Proper assembly techniques, followed by a close inspection of the glider using checklists contained in the Glider Flight Manual/Pilot's Operating Handbook (GFM/POH), provide for that safety. Pilots should conduct launch procedures systematically and consistently for each flight using appropriate methods and teamwork. Students and pilots unfamiliar with glider assembly should seek instruction from a glider flight instructor.

Assembly & Storage

Personnel preparing to assemble a glider should consider the following elements: location, number of helpers, tools, parts, and checklists that detail the appropriate assembly procedures. The GFM/POH should contain checklists for assembling and preflighting a glider. If not, personnel should develop one and follow it. Glider pilots should avoid distractions that may occur during assembly and check for required documents on board the glider.

During assembly of the glider, pilots normally check for documents carried on board, which include:

1. Airworthiness certificate displayed in the aircraft
2. Registration
3. Required placards
4. GFM/POH

Proper tools and accessories support glider assembly. [*Figure 6-1*] Some individuals place all the necessary hardware on a shelf or canvas with a spot for each item. An inventory of the hardware after assembly reduces the risk of a misplaced tool in the glider structure that could restrict or jam a flight control. Since detached tape could also cause control issues in flight, any person applying tape should use care when taping the wing roots, turtle deck (cover where the flight controls are attached), elevator, or other areas.

Figure 6-1. *Wing stands and wing dollies may assist assembling the glider.*

Depending on the type of glider, assembly may involve two or more people. After assembly, a thorough inspection of all attach points ensures proper installation and security of bolts and pins.

On many gliders, the wings routinely detach from the fuselage for storage. On some motor gliders, the wings fold. After folding or detaching the wings, persons can move the glider in and around the hangar area. [*Figure 6-2*] This allows assembly, disassembly, and storage in a normal size hangar. Hangars usually range between 35 and 45 feet in width. Because most glider wings span a minimum of 40 feet (12 meters) total length, a large hangar may save time and effort.

Figure 6-2. *Folding the wings of the glider reduces storage space.*

Once a glider has been completely assembled and before flight, the pilot inspects all critical areas to ensure completion of all flight control attachments. Many manufacturers provide a critical assembly checklist (CAC) for use after assembly. A positive control check (PCC) provides an additional means of verification that should occur even if appropriate personnel complete a CAC. The pilot should refer to a written checklist provided by the manufacturer or a commercial source that accurately reproduces glider checklists.

Trailering

Glider transport, storage, or retrieval uses specially designed trailers [*Figure 6-3*], and the glider components should fit snugly in the space provided, without being forced, and in a manner that prevents chafing. Glider trailers may also have storage areas to secure parts.

Figure 6-3. *Components of a glider stored and transported in a trailer.*

When towing a trailer, standard motor vehicle towing precautions and experience apply.

Tiedown & Securing

When tying down at airports shared by powered aircraft, propeller blast may cause damage to an improperly secured glider. Personnel should tie down a glider with the canopy closed and latched before leaving it unattended. If possible, the tie-

down spot should face into the wind. Permanent tie-downs often use straps, ropes, or chains for the wings and tail and do not adjust for variations in wind. Pilots should carry a proper tie down kit for a cross-country trip if no permanent tie-down exists at the destination. Pilots should consult the GFH/POH for specific tie-down procedures.

If expecting strong winds, pilots can tie the spoilers open with seat belts, or place a padded stand under the tail to reduce the angle of attack of the wings. When securing the glider for an extended period, gust locks on the control surfaces prevent them from banging against their stops. Pitot tube and total energy probe covers prevent entry of insects or debris. [*Figure 6-4*]

Figure 6-4. *Protecting the pitot tube and total energy probe.*

Glider canopy covers provide additional protection from damage while shielding the interior of the flight deck from ultraviolet (UV) rays. [*Figure 6-5*]

Figure 6-5. *Protecting the canopy.*

Water Ballast

If transporting a glider or parking a glider in cold weather, personnel should check for and drain any remaining water ballast. If unable to drain water ballast, adding antifreeze prevents freezing.

Ground Handling

Moving a glider on the ground requires special handling procedures, especially during high winds. When moving a glider, all personnel should receive a briefing on procedures and signals.

When using a vehicle to move a glider, personnel should use a tow line more than half the wingspan of the glider. If one wingtip stops moving for any reason, this tow line length prevents the glider from pivoting and striking the tow vehicle

with the opposite wingtip. Since any wind or air currents from another aircraft can cause the glider canopy to close abruptly, a closed and latched canopy can prevent damage to the canopy frame or glass.

When starting to move the tow vehicle, the driver should slowly take up slack in the line to prevent jerking the glider. The towing speed should not exceed that of a brisk walk. The driver should use at least one wing walker. The wing walker(s) and the driver of the tow vehicle function as a team, alert for obstacles, wind, and any other factor that may affect the safety of the glider. The driver should stay alert for any signals from the wing walker(s). [*Figure 6-6*]

Figure 6-6. *Positioning the glider for the tow vehicle.*

Strong winds and gusts can damage the glider during ground handling. During ground movement in high winds, two or more crewmembers normally hold the wingtips and a pilot sits at the controls to deploy spoilers and hold the controls appropriately.

Another method of towing uses specially designed towing gear like a trailer tow bar that attaches directly to the vehicle towing a trailer. The tow bar and other equipment make guiding the glider much easier and allow the wing walkers to focus on wingtip clearances. [*Figure 6-7*]

Figure 6-7. *A wing dolly (left) ready for attachment and a tail dolly (right) being used for glider ground movement.*

Launch Equipment Inspection

While a glider pilot may inspect the tow rope, 14 CFR part 91, section 91.309(a) gives the person operating a civil aircraft towing a glider responsibility for the tow rope strength. [*Figure 6-8*] Since a weak spot could develop at any time, tow ropes should undergo inspection prior to every flight. The tow line should be free from excess wear; all strands should be intact, and the line should be free from knots. A knot in the tow line reduces its strength by up to 50 percent and creates a thick spot in the tow line more susceptible to wear. The ring to which the glider attaches may create a high-wear area. Operators may replace the tow rope periodically due to ultraviolet (UV) exposure from the sun or after a specific number of tows.

Figure 6-8. *Inspecting the tow line.*

Tow ropes and cables are made of materials such as nylon, step-index fiber from Red Polyester, Hollow Braid POLYPRO, Dacron, steel, and Polyethylene. [*Figure 6-9*]

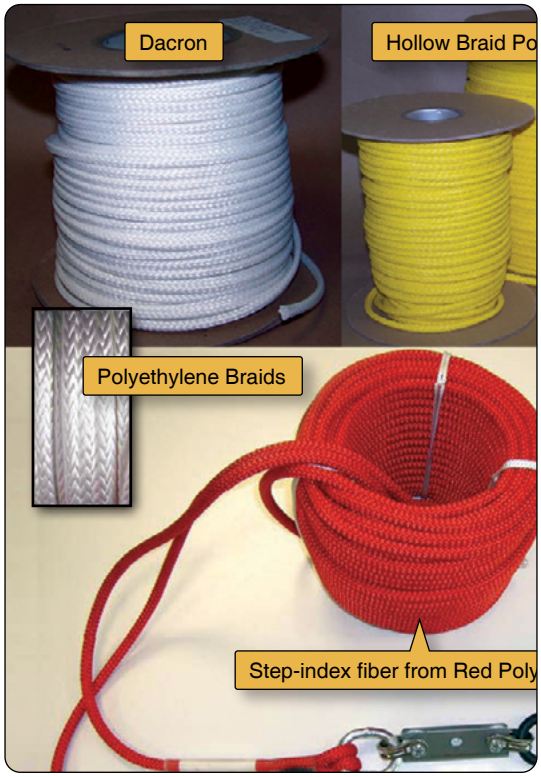

Figure 6-9. *Tow rope materials.*

Figure 6-10 shows the strength of some ropes typically used. The rope manufacturer can provide exact specifications. 14 CFR part 91, section 91.309(a)(3), requires tow line strength within a range of 80 to 200 percent of the maximum certificated weight of the glider. However, the tow line may have a breaking strength more than twice the maximum certificated operating weight of the glider if using safety links as specified in 14 CFR part 91, section 91.309(a)(3). Note that a specific model of glider may have a more stringent limitation on the maximum tow line strength. The POH would list this limitation.

Diameter	Nylon	Dacron	Polyethylene	Polypropylene	Polypropylene
			Hollow braid	Monofilament	Multifilament
3/16"	960	720	700	800	870
1/4"	1,500	1,150	1,200	1,300	1,200
5/16"	2,400	1,750	1,750	1,900	2,050

Figure 6-10. *Typical rope strengths.*

If using a tow line with a breaking strength more than twice the maximum certificated operating weight of the glider, 14 CFR part 91, section 91.309(a)(3) requires installation of two safety/weak links, either of which can break before excess tension on the tow line causes structural damage to either the glider or the tow plane. The weak link near the glider attachment point [*Figure 6-11*] requires the same breaking strength range as the tow rope, 80 to 200 percent of the maximum certificated operating weight of the glider. The weak link installed near the tow plane attachment point must have a breaking strength greater, but not more than 25 percent greater, than that of the weak link at the glider end of the tow line and not more than twice the maximum certificated operating weight of the glider. See *figure 6-12* for a sample weak link strength analysis.

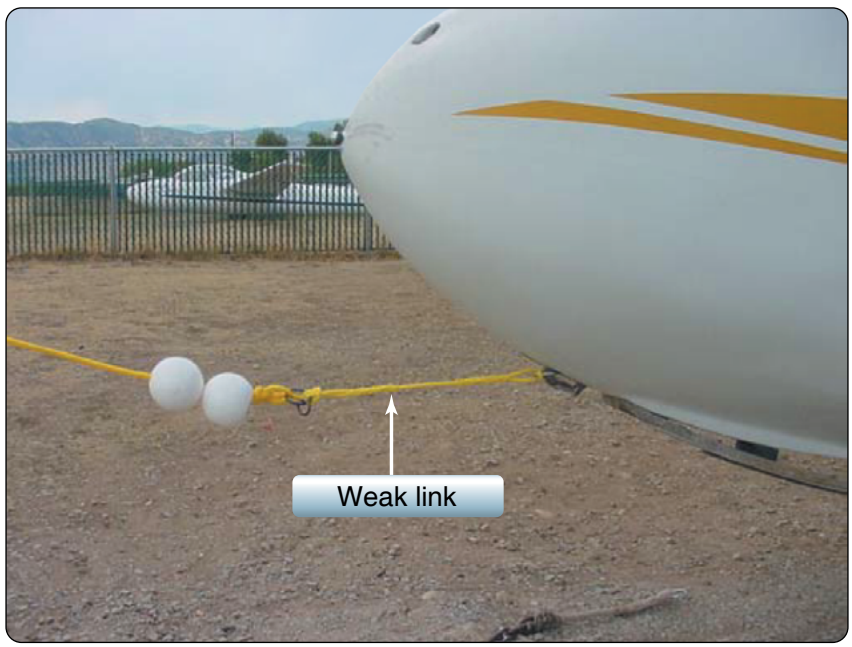

Figure 6-11. *A safety link. The foam added to the tow line prevents tow line abrasion.*

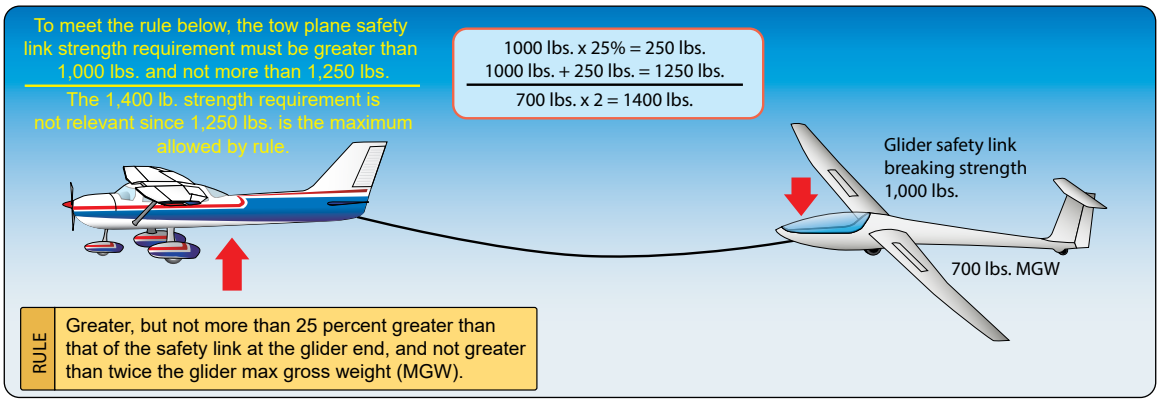

Figure 6-12. *Safety link strength requirements assuming a 1,000 lb. safety link installed near the glider.*

The two most common types of tow hook are an over-the-top design, such as a Schweizer hook, or a grasping style, such as a Tost hook. Pilots should inspect and verify that any tow hook is free from damage and operates freely. [*Figure 6-13* and *Figure 6-14*]

Figure 6-13. *Schweizer-type tow hook.*

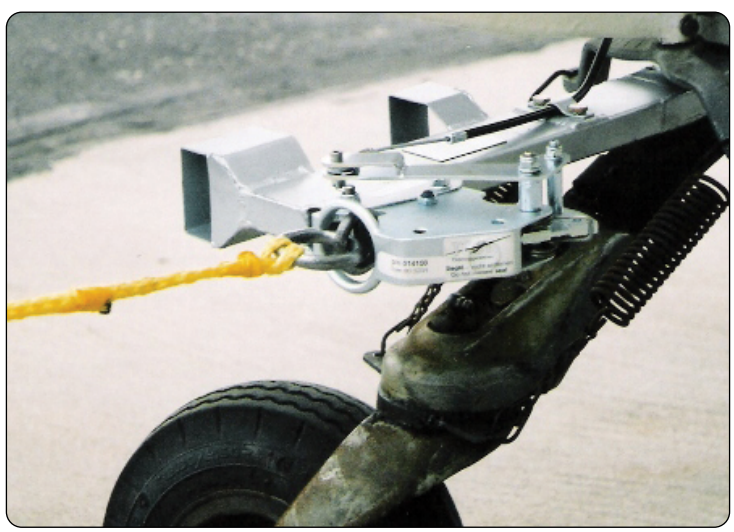

Figure 6-14. *Tost hook.*

Glider Preflight Inspection

Pilots should conduct a thorough inspection of the glider before launch. If the glider GFM/POH does not contain a preflight checklist, the pilot should develop a checklist using the guidelines contained in *Figure 6-15*.

- Begin by assessing the overall condition of the fiberglass or fabric.
- Be alert for signs of damage or excessive wear.
- Ensure that the canopy is clean and free from damage.
- Verify the interior wing and control connections are safe and secure.
- If a battery is used, ensure that it is charged and safely fastened in the proper spot.
- Ensure that seat harnesses are free from excessive wear.
- Buckle and tighten any harness that will not be used to prevent it from inadvertently interfering with controls.
- Test the tow hook to ensure it is operating correctly.
- Inspect top, bottom, and leading edge of wings, ensuring they are free from excess dirt, bugs, and damage.
- Inspect spoilers/dive brakes for mechanical damage. They should be clear of obstructions. Perform control continuity check.
- Inspect the wingtip and wingtip skid or wheel for general condition.
- Inspect ailerons for freedom of movement, the condition of hinges and connections, and the condition of the gap seal. Perform control continuity check.
- Check the condition of flaps for freedom from damage and for appropriate range of motion. Perform control continuity check.
- Inspect the general condition of the empennage.
- Check static ports, pitot tube, and total energy probe to ensure they are free from obstruction.
- Check top, bottom, and leading edge of tailplane for bugs, dirt, and damage.
- Check the landing gear for signs of damage or excessive wear. The brake pads should be checked if they are visible; otherwise, the brakes can be checked by pulling the glider forward and applying the brakes. Note that the landing gear is frequently a problem area for gliders used in training.
- Check elevator and trim tab for condition of connections, freedom of movement, and condition of gap seal. Perform control continuity check.
- Check rudder freedom of movement and condition of connections. Perform control continuity check.

Figure 6-15. *A glider preflight inspection checklist.*

Prelaunch Checklist

The pilot should conduct a positive control check with the help of an additional crewmember, especially if the glider was just assembled. The pilot moves the control stick and rudder pedals while the crewmember provides resistance, holding each aileron, the elevator, spoilers, flaps, and the rudder to ensure correct and secure control connections. [*Figure 6-16*] A stick or pedal that moves freely with the corresponding control surfaces restricted indicates the connections are not secure, and the glider is not airworthy. Pilots should adjust the pilot or passenger seats, as well as adjustable controls, such as rudder pedals, prior to buckling the seat belt and shoulder harness. Caution should be exercised to avoid crimping or clamping any onboard oxygen supply.

Figure 6-16. *Positive control check of spoilers.*

If the GFM/POH does not provide a specific prelaunch checklist, then some good generic checklists are CB SWIFT CBE and ABBCCCDDE, which are explained in *Figure 6-17*. Pilots should follow each step carefully regardless of the checklist used.

Before Takeoff Checklist

Phase I:
- Controls (plural)
- Ballast

Phase II:
- Straps (plural)
- Wind
- Instruments (plural)
- Flaps (singular)
- Trim

Phase III:
- Canopy
- Brakes (singular for most gliders, plural for a Blanik, since the wheel brake is not at the end of the air brake travel)
- Emergency plan (the three phases plus the return speed that can and should be prebriefed prior to closing the canopy)

A	Altimeter set to correct elevation
B	Ballast
B	Seat belts and shoulder harnesses fastened and tightened
C	Controls checked for full and free movement
C	Canopy closed, locked, and checked
C	Cable or towline properly connected to the correct hook
D	Dive brakes closed and locked
D	Direction of wind checked
E	Emergency Plan reviewed

Figure 6-17. *Generic prelaunch checklists.*

Glider Care

Depending on the type of glider, different cleaning methods should be employed. After all flights, the pilot or ground personnel can wipe down the glider with a soft cloth or a wet chamois. This removes any debris or bugs. Delaying this process allows bugs to dry and makes removal difficult.

Gliders made of fabric should be cleaned with spray-on and wash-off products. Anyone cleaning a glider should avoid using large amounts of water as the water may penetrate cracks and holes, especially on earlier wood or fabric gliders, which damages and reduces the life of the wood or fabric. Persistent and prolonged moisture exposure can damage any glider over time. On metal gliders, personnel can use a low-pressure hose and mild detergent for cleaning. High-performance fiberglass gliders use a special spray or paste for cleaning. Care must be taken when using a powered buffer, as the buffer may burn the fiberglass if not used in a proper manner. Anyone cleaning a canopy should use only recommended cleaners for that purpose. The GFH/POH or a glider supply store or organization can suggest appropriate cleaning materials based on the type of glider.

After cleaning, a coat of wax or a sealer may be applied to fabric, metal, and fiberglass gliders. However, wax containing silicon adheres to the pores of fiberglass and complicates future fiberglass repair. After applying any wax, personnel may use a clean, soft cloth to wipe off excess wax and buff the area by hand.

An owner or pilot may perform minor repairs on a fiberglass glider such as fixing a scratch or a chip. Individuals should consult a fiberglass expert prior to making any minor repair and use approved parts and materials when conducting these repairs. All gliders, including those certified as standard or experimental, should be repaired in accordance with the manufacturer's recommended procedures and 14 CFR part 43.

Preventive Maintenance

Pilots may conduct preventive maintenance on their glider. Preventive maintenance does not involve complex assembly operations. For the list of permissible pilot-performed maintenance activities and for more information on preventive maintenance, refer to Appendix A of 14 CFR Part 43, Major Alterations, Major Repairs, and Preventive Maintenance found at www.ecfr.gov.

Chapter Summary

This chapter introduces recommended safety practices for assembly, storage, tie-down, securing, and ground handling for a glider. The final authority for any glider is the specific Flight Manual or Pilot's Operating Handbook (POH) developed by the aircraft manufacturer and approved by the FAA.