WILLS WING

Falcon 3 145, 170, 195 and Tandem

Owner / Service Manual

January 2007 - Second Edition

Removing The Sail From The Airframe And Short Packing The Glider

Many maintenance and repair procedures will require the removal of the sail from the frame. In addition, the first step in short packing the glider to its shortest breakdown length is the removal of the sail. Please follow these instructions when removing the sail, short packing the glider, and reinstalling the sail. Please read all the instructions for each operation before beginning.

Note: The short pack procedures below incorporate the use of the optional short pack storage/transport container - a specially designed combination box and heavy-duty zippered bag designed to contain and protect your glider during storage and transport in the short pack configuration. The container is available through your Wills Wing dealer, or direct from Wills Wing.

45G-1310	BAG/BOX – GLIDER SHORT PACK 84	(Falcon 3 195)
45G-1311	BAG/BOX – GLIDER SHORT PACK 78	(Falcon 3 170)
45G-1312	BAG/BOX – GLIDER SHORT PACK 72	(Falcon 3 145)

Sail removal

You will need an unobstructed area six feet by thirty feet. Make sure the surface is clean. If it is abrasive, like rough concrete, you should either put down a protective tarp or be extremely careful not to scrape your sail.

1. Assemble the control bar, set the glider upright on the bar, and remove the bag, as if you were beginning the process of setting the glider up to fly. Remove the front velcro sail tie. Spread the wings slightly and remove the hang loops and set them aside.

2. Insert a #2 Phillips head screwdriver into the rear bolt securing the control bar apex and kingpost base to the keel. Use a 5/16 box end wrench to loosen and remove the clinch nut that secures the kingpost base bracket to the keel. Replace the nut on the bolt and tighten the nut one half turn so that it does not come loose and get lost. (Note - When removing the nut, use the screwdriver to hold the screw and turn the nut with the wrench, as opposed to trying to turn the screw.)

3. Remove the screw from the cap on the top of the kingpost, carefully remove the plastic kingpost cap, and remove the bridle pigtail, top rear wire, top front wire, and both top side wires from the kingpost top. Replace the bridle pigtail and re-install the kingpost top cap and screw.

4. Spread out the glider bag, and lay the glider on its side on the bag. Using a 1/2 inch wrench on the keyhole collar and a 7/16 inch wrench on the bolt, remove the bolt securing the bottom rear wire and keel pocket sail mount to the rear of the keel, store the bolt in the tang and re-install the keyhole collar on the bolt, tightening 1/2 turn to secure it against becoming lost.

5. Detach the bottom side wires from the control bar corners. Replace the bolt in the bracket and downtube, and tighten the nut 1/2 turn. Roll the glider directly onto its back. Remove the safety rings and clevis pins that secure the control bar downtubes to the top plugs, and set the control bar assembly aside. Re-install the clevis pins and safety rings in the control bar downtubes. Remove the screws that secure the sail at the nose, and replace the screws in the leading edges. Remove the remainder of the velcro sail ties. Spread the wings slightly, undo the Velcro tabs inside the rear ends of the leading edges and then dismount the sail from the rear leading edges by pulling straight aft on the webbing handles.

6. Pull straight aft on the rear leading edge tubes to remove the rear leading edges from the frame. (Note - You can skip this step if you are not short-packing the glider).

7. Prop the nose of the glider up on the breakdown storage/transport box and spread the wings slightly. Pull the crossbar sweep wire (and attached top rear wire) forward out through the keel pocket. If there are no alignment stickers installed at the joint between the inboard and outboard crossbars, use an indelible marker to mark a line across the splice on each crossbar and indicate L or R (left or right) on each of the four tubes at this junction. Remove the mid-crossbar safety rings and clevis pins.

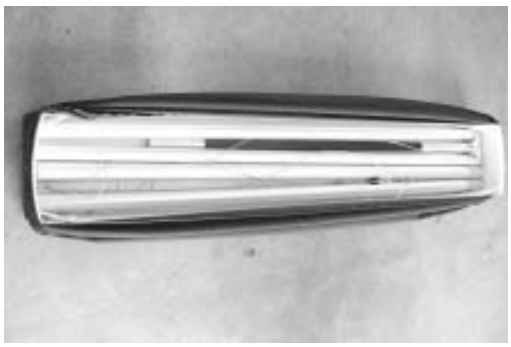
Pull the crossbar center towards the nose of the glider, working it up and down as necessary, to disengage the inboard crossbars from the outboard crossbars. Re-stow the clevis pins and safety rings in the inboard crossbars. When the inboard crossbars are disengaged from the outboard crossbars, turn the inboard crossbar assembly on its side and bring it around one side of the keel tube to remove it from the glider.

Feed the top side wires into the sail through the holes in the top surface. Swing the outboard crossbars to the rear to align them with the leading edges. Carefully slide the frame out through the nose of the glider. If you encounter resistance, stop and find out what is hanging up.

9. If you need to send the sail into the factory for repair, first remove the bridle cables, then fold and package the sail carefully. To detach the bridle cables from the sail, push on the end of each cable loop at the bridle ball to make the cable loop round, and allow it to be worked free of the notch in the bridle ball. Remove the ball from the cable and remove the bridle cable from the grommet in the sail. When you send in the sail, be sure to include written instructions of what you want done, your name and a phone number where you can be reached during the day.

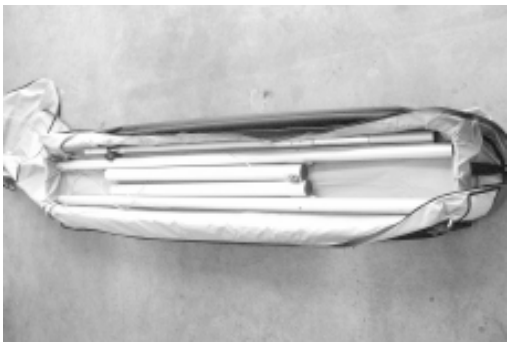
Completing The Short Packing Of The Glider

1. If there are no alignment stickers installed at the joint between the front and mid leading edges, use an indelible marker to mark a line across the splice on each leading edge and indicate L or R (left or right) on each of the four tubes at this junction. Remove the safety rings and clevis pins securing the mid-leading edges to the front leading edges, and remove the mid-leading edge / outboard crossbar assemblies. Swing the outboard crossbars towards the nose again. Re-stow the clevis pins and safeties in the front leading edges.
2. Remove the safety ring and clevis pin securing the rear keel to the front keel and remove the rear keel. Re-stow the clevis pin and safety ring in the front keel.
3. Unzip the short pack bag and fold the corners of the bag down around the outside of the corners of the box.



4. Lay the front leading edges / front keel assembly and the inboard crossbars assembly in the box. At each stage of the packing process, use the glider's cover pads, cover bags and any additional materials necessary to pad hardware fittings and protect the tubes from damage or abrasion.

5. Lay one end of the open glider bag flat over the first layer of tubes. Lay the mid-leading edge/ outboard crossbar assemblies and the rear keel in the box on top of the glider bag.



6. Fold another layer of the glider bag over this layer of tubes. Remove the basetube from the control bar. Lay the remaining tubes in the short pack box.

7. Remove the two longest battens from the batten bag, break them down to their short pack length, and return them to the batten bag. Lay the batten bag on top of the tubes, and fold the remainder of the glider bag over the top.

8. Fold the sail as follows -

    a. First fold the sail along the glider center line, laying the mylar pockets flat, one on top of the other.

    b. Then fold the body of the sail in segments over onto the mylar pockets, so that the resulting width of the folded sail equals the width of the short pack box.

    c. Finally, fold the sail in lengthwise segments equal to the length of the short pack box, and lay the sail in the top of the box.

9. Add any left over soft items on top of the sail (hang loops, any remaining cover bags, velcro ties, etc.). Fold the protective bag back over the corners of the box, and zip up the bag. Cinch the velcros on the bag to square up the box and compress the package to its minimum size.

Re-Assembling the Glider From the Short Pack Configuration

1. Prepare a clean, non abrasive work area, or lay down a clean protective tarp to work on.

2. Unzip the short pack bag and remove all of the contents.

3. Assemble the mid-leading edge/crossbar assemblies to the front leading edges, noting the left/right alignment stickers or marks that you made. At the leading edge / crossbar junctions, swivel the top and bottom side wires tangs so that they point towards the nose of the glider.

4. Swing the outboard crossbars towards the rear of the glider, and install the neoprene keel protectors over the ends of the tubes to protect the sail during insertion of the frame.

5. Remove the washout tubes from the rear leading edges, and install the rear leading edge tubes into the front leading edge tubes - taking proper note of right and left, and making sure to position the washout tube receptacle to the inside of the leading edge. Rotate the rear leading edges while maintaining forward pressure on them until the slot on the rear leading edge engages fully on the clevis pin of the front leading edge and the rear leading edges slide into the full forward position.

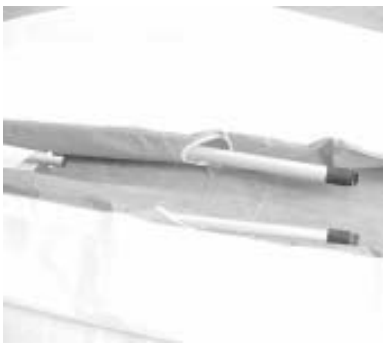
Reinstalling the sail on the frame

1. Position the sail on the floor with the keel pocket up and the wings folded over so that the leading edges lie along the length of the root line, with the top of the leading edge lying on top.

2. Prepare the frame, making sure that the side wires are pulled forward from the crossbar leading edge junction and are not wrapped around the frame. The outboard crossbars should be swung aft facing the rear end of the leading edges and aligned with the leading edges.

3. Position the frame with the bottom of the noseplate facing up and with the rear end of the leading edges at the nose of the sail. Slide the frame into the nose of the sail, taking care not to disengage the rear leading edges from the front, and making sure that the leading edges of the frame and the crossbar halves pass properly into the bottom surface of the sail and not into the mylar pockets, and that they don't get caught at the rear of the bottom surface near the root. Feed the keel outside the bottom surface and through each of the keel pockets. As you feed the frame slowly into the sail, check periodically to see that none of the hardware is snagging on the sail. As the crossbar ends reach the leading edge junction cut outs in the sail, bring them out through these holes.





4. After the frame is fully inserted, swing the outboard crossbar halves forward.

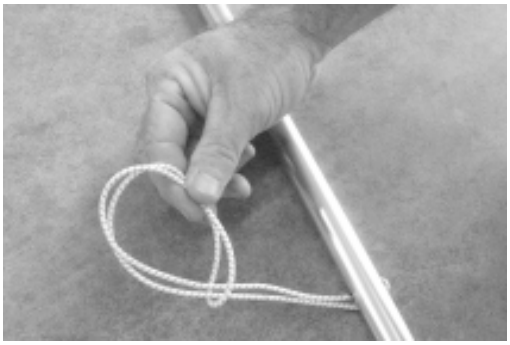
5. Working through the crossbar cut out hole, insert the top wires through the holes in the sail, making sure that no cable is wrapped around a leading edge or crossbar, and that no thimbles are cocked or twisted. Pull the bottom side wires out through the crossbar cut out hole.

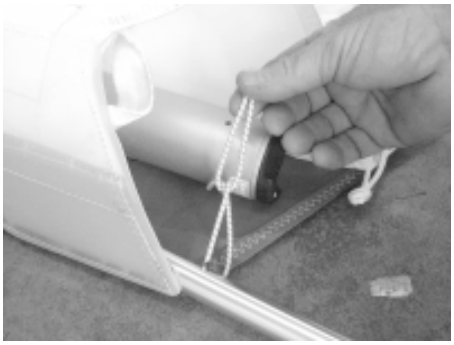
6. Feed the top front wire through the hole in the sail. Attach the sail mount tangs to the leading edge tube with the screws near the noseplate. Prop the nose of the glider on the short pack box, and spread the wings slightly. Position the crossbar center section as shown and feed the crossbar center into the glider around one side of the keel.

When properly positioned, the crossbar center should lie below the keel (because the glider is upside down) with the central nut on the center hinge bracket joint facing the floor. Install the inner crossbars onto the outer crossbars, matching up the alignment marks, and secure by installing the clevis pins and safety rings. Feed the top rear wires and crossbar sweep wire along the keel through the keel pockets and out the rear of the sail. Install the washout tubes as follows:

   a. First make a loop as shown in the bungee.

   b. Next slide the long end of the washout tube into the open end of the sail at the tip and slide the loop onto the rear leading edge.





   c. Pass the washout tube out of the sail through the hole at the receptacle, and position the bungee forward of the washout tube receptacle.

   d. Pull the remainder of the washout tube outside of the sail through the hole in the sail at the washout tube receptacle.

7. Verify that the rear leading edges are still properly and fully mounted in the front by first pulling aft no more than 1/4 inch, then pushing them forward until the front leading edge clevis pin bottoms out in the slot, and then try to twist the rear leading edge to confirm that the slot is engaged and it is locked against rotation. (You will feel some very small amount of rotational play in the slot / pin engagement, but no more than a very small amount.) Mount the rear of the sail by pulling the webbing anchor loops over the rear leading edge endcaps and into the slot in the endcaps.

Make sure you mount the inner webbing loops in the endcap slots, not the outer “handle” loops! Make sure that the webbing lies flat and smooth in the slot, and that the sail is properly aligned when mounted (not twisted or rotated 180 degrees). Secure the Velcro retainer tabs. Re-assemble the control bar basetube to the downtubes at this time, taking care to make sure that the basetube and the front and rear wires are properly oriented. Bolt the bottom rear wires to the rear of the keel attaching the rear sail mount at the same time. Install the control bar downtubes onto the plugs at the apex bracket, and attach the bottom side wires to the control bar corners. Flip the glider up onto the control bar.

8. Pull the crossbar sweep wire tang out through the kingpost hole and pull tight on the sweep wire while looking up into the sail towards the crossbar center. Correctly position the left and right sweep wires on the proper sides of the top centerline of the keel.

Re-insert the sweep wire into the kingpost hole and down along the top of the keel into the rear keel pocket. Install the kingpost base bracket onto the top of the keel, keeping the sweep wires properly positioned on either side of the kingpost. Pass the top rear wire out of the rear of the keel pocket and feed it between the left and right bridle cables and under the bridle cable ring. Remove the kingpost top cap and bridle pigtail and place the top front, top side and top rear wires ball swages in the kingpost top. Install the bridle pigtail in the kingpost top on top of the top rear wire, and install the kingpost top cap and screw.

9. Spread the wings slowly and carefully, making sure that the sail does not catch on any hardware and that there are no improper assemblies restricting the deployment of the wings.

10. If the bridles were disconnected from the sail as part of a sail repair, re-connect them to the sail at this time. Proceed with a normal setup and complete pre-flight inspection of the glider following the procedures set forth earlier in this manual.