

WING ASSEMBLY 23.5'

A VERY IMPORTANT NOTE found on many wing drawings states "Do not drill any unspecified holes into spar". This is extremely important as any extra holes may, under extreme conditions, WEAKEN THE SPAR. Note; refer to drawing number B96-INS-0780 for further details on drilling the spar.

First, place the wing D-cell in the foam stands provided with the kit. This will provide a stable support for wing construction. The perspective of most side views is from the bottom side of the wing (mounted to the fuselage). All top views are looking down onto the wing with the wing bottom (when mounted to the fuselage) toward the bottom of the page. As a result, to keep the drawing in perspective, build the wing from the bottom side. The quickest way to determine this is by examining the position of the wing fittings, as the wing fittings will stick out the bottom of the wing.

Locate drawing number B92-INS-0324 for the rib and hat section layout. Ribs are dimensioned on the top and the hat sections are dimensioned on the bottom side. All dimensions are taken from the center of the D-cell. You will need a fine point felt tip marker and 12' tape measure for the next steps.

Mark the rib and hat section locations, then with a machinist square or combination square, draw a line across the D-cell spar web at each rib and hat location. This will keep the bases of the ribs perpendicular to the D-cell.

Refer to drawing number B96-INS-0779 for the aft wing preparation (TW92-11). The .016" ribs may require some additional trimming where the flanges intersect. Be sure to only remove enough material to relieve any interference between the two flanges. Next you will want to mark the rib centerlines and rivet locations, using the wing skin pattern on drawing number B92-INS-0328. Referring to drawing number B96-INS-0784, you can make the wing skin rivet pattern templates (TW96-100 & TW96-101) out of 2" strips of .016" aluminum (they can also be supplied as an additional option). These templates can be used to mark rivet locations on the ribs, which you will need to know for the fluting procedure to follow. Note that the angles in the rivet pattern templates correspond to the angles on the trailing edge of the ribs.

Additionally, there is another method that can be used for locating the rib centerlines and rivet locations. This will require a piece of wafer board or plywood 1/4" thick. You can lay one of the .016" ribs with its flat surface down and take 2" strips of 1/4" material and outline the rib. Then you will need to mark the rivet locations on the board to form the outer perimeter. Note that the rivet pattern is different between the top and bottom side of the rib. The rivet pattern is dimensioned from the trailing edge of the ribs. While holding the aft wing flat in the jig, mark the rib centerlines and rivet locations.



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After you have marked the centerline and rivet locations on the ribs, check that all of the flanges are 90 degrees to the flat side of the rib. Next is fluting. It may be necessary to flute the ribs with fluting pliers to remove any bowing in the ribs caused in the forming process. Do not flute the ribs where any of the rivet locations are. Flute the rib flanges so that the groove is toward the inside. As you squeeze the pliers lightly, you should be able to see the bow in the ribs start to straighten. Do not try to remove all of the bow with just one flute, bring it inline over a number of flutes. After fluting, recheck the centerlines.

Next, you will want to pre-drill the hat sections and ribs, using the pattern on drawing number B92-INS-0324. Only drill the base of the ribs at this time. It is important that you drill the base on its centerline, as you will use this drill pattern to sight through or mark the alignment on the D-cell. *Caution* the two outside holes must be kept inline with the existing rivets in the spar caps, see drawing number B96-INS-0780. Not maintaining these hole locations can result in a catastrophic wing failure.

The first parts mounted to the wing D-cell are the 7-inch hat sections. Refer to drawing number B92-INS-0324 for details. On the side view of the drawing these parts resemble an upside down "V". The hat sections are dimensioned to their centerlines. The hat sections may be permanently installed at this time. Two different types of rivets are used to mount the hat sections.

Also found on drawing number B92-INS-0324 is the rib layout. There are four different ribs that get mounted to the D-cell. There should be 18 long ribs with 2 lightening holes, 2 shorter ribs and 2 different long ribs with 1 lightening hole. The 18 ribs are mounted to the wing with the flat side toward the right and the flanged side toward the left. These ribs are dimensioned to their centers. The flat side and flanges of the shorter ribs are positioned the same as the longer ribs. One of the shorter ribs mounts at the D-cell center and the other mounts flush with the left wing fitting. The final two long ribs mount 15 inches from the D-cell center. These two ribs are dimensioned to their inside edge and are positioned so their flat surface is toward the center of the wing. The two ribs form the wing box section. There is a right and left rib. If they are mounted on the correct side, their trailing edge should match the other long ribs. Do not permanently install the ribs at this time. Use clecos to hold everything in place and check for square and proper fit.

At this point the flap torque tube (TC92-98) should be inserted into the wing with flap bushings (TC92-99) and flap driver weldments (TC92-97). It may be necessary to temporarily remove three of the .016" ribs. Refer to drawing number B92-INS-0326. If you have the electric flap option, refer to drawing numbers B95-INS-0593 and B95-INS-0595. At this point the aileron torque tubes should be inserted into the wing. Refer to drawing number B92-INS-0325. Do not permanently install the torque tubes at this time.



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The intermediate spar (TW92-25) should be mounted next. Refer to drawing number B92-INS-0327. Position the intermediate spar between the .025" ribs so that the top of the intermediate spar is 15" from the D-cell and flush with the .025" ribs. One method used to insure that you get everything square is to make two strips from 1/8" aluminum, 42" long and 1/2" wide. With a #30 drill bit, drill a hole 1" in and on center on one end of each strip. Next, you will need to strap duplicate one of the pre-drilled holes in the spar cap on the top side near the base of each .025" rib. Cleco the strips at the spar cap and clamp at the opposite .025" near its trailing edge, so the two strips form an "X" across the wing box area. Add clamps as needed to hold the wing box secure. Additional support can be achieved by clamping a straight edge on the opposite side across the .025" ribs. After square and proper fit have been checked, refer to drawing numbers B92-INS-0232 and B92-INS-0327 for the intermediate spar to rib rivet hole locations. The intermediate spar flange to rib rivet line is as follows: outer two holes must be a minimum of 1/2" in from the .025" rib flanges and intermediate spar to center section rib rivet line and a minimum of 1/2" in from the edge of the rear spar flange. Do not permanently install the intermediate spar at this time.

The rear spar should be mounted next. Refer to drawing numbers B92-INS-0327 and B96-INS-0749 for this procedure. It is very important that the ribs remain perpendicular to the D-cell spar during this process. The rear spar comes in two 96" sections and two 24" sections. One method used to insure everything is square is to take on 96" aft spar and place it along the base of the ribs so that one of the spar flanges can be slid between the D-cell skin and the spar caps. The inboard side of the aft spar is inset by 1/16" to the flat side of the .025" rib. Transfer the centerline marks from the ribs on top to the aft spar using a combination square. Place the aft spar in position on the aft wing ribs. Align the aft with the centerline marks on the ribs and spar. Clamp each rib in place as you get them aligned. Next is the 24" aft spar, refer to drawing numbers B96-INS-0635 and B96-INS-0749.

The 24" and 96" spar sections combined should have a total length of 114". There are two methods available: the butt-splice method is more cosmetic while the over lap method is designed for simplicity. Either method is equally functional.

Now install the hat section to both sides of the wing. They also come in 96" and 24" sections. Use the same method to mark the rib centerline locations on the aft spar. Refer to drawing number B92-INS-0327. The 96" hat section will be installed so that it sets in the "V"s of the .016" aft wing ribs and is beneath the .025" rib flange. Combine the hat sections for a total span of 114". Clamp the hat sections in place. It is important that the ribs remain perpendicular to the D-cell spar, as it will be necessary to locate the ribs for installing the wing skins. Check to make sure the wing is square. Now drill and cleco the hat section and aft spar to the rib. Any surface that comes in contact with the wing skin should not be riveted, as the skin will not lay flat when installed.



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The hat sections are best drilled from the inside. Drill through the center of the flange on the "V"s of the .016" ribs into the hat sections. Refer to drawing numbers B92-INS-0327 and B96-INS-0749 for the aft spar rivet patterns. Drill and cleco in place. Before drilling the aft spar, mark the ribs that will have a hinge doubler, do not drill the four rivets in these ribs, as the hinges will be installed later. Hinge doublers can now be installed beneath the aft spar and on top of the ribs. Outboard aileron hinge doublers are to be flush with the end of the wing. The inboard flap hinge doublers are to be flush to the rib. To make the hinge doubler rivet line, drill 1 1/4" in from the spar line at five evenly spaced locations with one being through the rib. The hinge doublers should be bonded to the aft spar to aid in the skinning process. At this time only rivet the aft spar, intermediate spar, and hat sections. The ribs should still be clecoed to the D-cell.

Referring to drawing number B92-INS-0329, check the wings washout. If the washout is not at the angle and tolerances specified, shim the ribs until they are reached. After the washout is set, the ribs may be riveted into place. The ribs are riveted with two types of rivets.

Install the intermediate spar webs. Drawing number B92-INS-0232 describes this process. Ensure the 1 5/8" hole is drilled in the proper location. The intermediate spar webs may be permanently installed.

Refer back to drawing number B92-INS-0325 for installation of the aileron control system. Please ensure each aileron driver is installed in its proper position. Stands may be constructed to aid in this. Also make sure the torque tubes form a straight line with each other, as illustrated in the drawing. The aileron controls may be permanently installed at this time.

Permanently install the flap control system next. Drawing number B92-INS-0326 explains the procedures. Take time to ensure the flap drivers are installed correctly. Note which direction they point in relation to the top and bottom of the wing. Ensure that all moving parts ride on the nylon bushings and not any metal surfaces. Refer to drawing numbers B95-INS-0593, B95-INS-0595, and B96-INS-0732.

Refer back to drawing number B92-INS-0327 and install the flap mount hat section. Do not rivet to any surfaces that come in contact with the skin. Do not install the flap mount hat section when using the electric flap system.

Check the washout. If it is still set, the skinning process can begin. If not, adjust the wing until the proper washout is set. Refer to drawing number B92-INS-0328 for the wing skin installation. Take time to ensure each skin is laying flat and is tight against the wing structure. This will help prevent any "oil canning" effect with the skins. The washout must be checked frequently during the skinning process. Once the skins are installed, the washout cannot be adjusted.



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After all the skins have been fitted, remove and prep them for bonding. If needed, run wiring for navigation and strobe lights through the wing. The channel formed by the hat section on the top surface of the wing is the best for running wing tip wiring. Skins may be permanently installed with rivets and Uralane 5776 A & B at this time. The inspection holes may now be drilled into the bottom wing skin to allow access to the control systems. Refer to drawing number B92-INS-0218 for their locations. Inspection hole covers are provided. We recommend using lexan. The 5" diameter hole is moved over 1" for the electric flap, the new dimension is 9 1/2".

Mount hinges and counterweight to the ailerons referring to drawing number B92-INS-0258. Mount hinges to the flaps using drawing number B92-INS-0261. When mounting the hinges, ensure they are flush with the surface of the ailerons or flaps as illustrated in the upper right corner of both drawings.

Mount the aileron on the wing such that the counterweight is 1/8 of an inch from the wing tip as shown in drawing number B92-INS-0262. Install push/pull rod so both aileron and aileron drivers are in the neutral position.

Referring to drawing number B92-INS-0263, mount flaps to the wing, making sure the bolt on the aileron control horn will clear the flaps as the aileron is operated. With flap push/pull rods installed, the flaps and flap drivers should be in the neutral position.

Once the ailerons and flaps have been installed, the flap handle may be mounted. Refer to drawing number B92-INS-0242 for details. When first examined, this appears to be fairly complicated setup. Therefore, a sketch of completed flap handle system is located in the bottom left hand corner of the page. Do not install with the electric flap system.

Referring to drawing numbers B92-INS-0264 and B92-INS-0265, install the wingtip ribs. After the wingtip ribs have been installed, mount the wingtips to the wing. The wingtips will have to be trimmed to allow the aileron and counterweight to move. The wingtips may be painted. Do not allow acetone, paint, paint thinner or lacquer thinner to come in contact with the wing's D-cell. The D-cell contains a foam core and would be damaged by those materials. Note; navigational and strobe lights must be installed before permanently installing the wingtips.

The wing is now ready to be mounted to the fuselage.

