KITFOX AIRCRAFT

KITFOX SUPER SPORT
WING ASSEMBLY

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Section A. Introduction

This chapter describes the construction and installation of the wing for the Series 7 Kitfox. The chapter is divided into seventeen sections, each of which describes in detail the assembly and installation procedures for a particular portion of the wing. We recommend you read the entire chapter **before** you begin construction. It is important to note that some items covered in one particular section of the manual may require either partial or total completion of another section in order to proceed. Plan ahead so you can develop the most efficient sequence for prepping and painting the various components of the wings.

DESCRIPTION

The Series 7 Kitfox wing has an area of approximately 132 square feet and uses a modified GA30U-612 airfoil section along its entire span. The wing features a detached, full-span flaperon (combined flap and aileron) with a GA35U-A315 airfoil section. One degree of washout is built into the wing to delay wing tip stall.

The wings have two spars which are 2-$^{1}/_{2}$" diameter 6061-T6 aluminum tubes with a wall thickness of .065". 6061-T6 aluminum I-beam inserts are installed at the lift strut attach points. The pre-assembled wing ribs are constructed of aircraft-grade birch plywood and are bonded to the main wing spars with structural adhesive. The wing has aluminum tube anti-drag trussing, three upper (and optional lower) false ribs in each wing rib bay, and an aluminum trailing edge. The flaperons have a tubular aluminum spar which has foam ribs bonded to it with a .016" thick aluminum skin covering the ribs.

The wings are designed to be easily folded for trailering or storage and are hinged at the rear spar and lower lift strut attachment points. Refer to Figure A-1 for a general overview of the Series 7 wing construction and its various major components.

WARNING

The aluminium spars on the Kitfox are the major load carrying members of the wings. These spars, along with their respective spar inserts and lift struts, are designed to handle load factors of +3.8 g's and -1.5 g's at maximum gross weight. Take care when working with the wing spars. DO NOT use a file on any outside or inside surface of the spars, and only use 3M 7447 Scotch-Brite™ when preparing the spars for adhesive. Try to sand lengthwise, not radially around the spar, when prepping for adhesives.

NOTE

These instructions will normally show left-hand parts and assemblies. Right-hand parts and assemblies are opposite (mirror-image) to the left unless otherwise noted.

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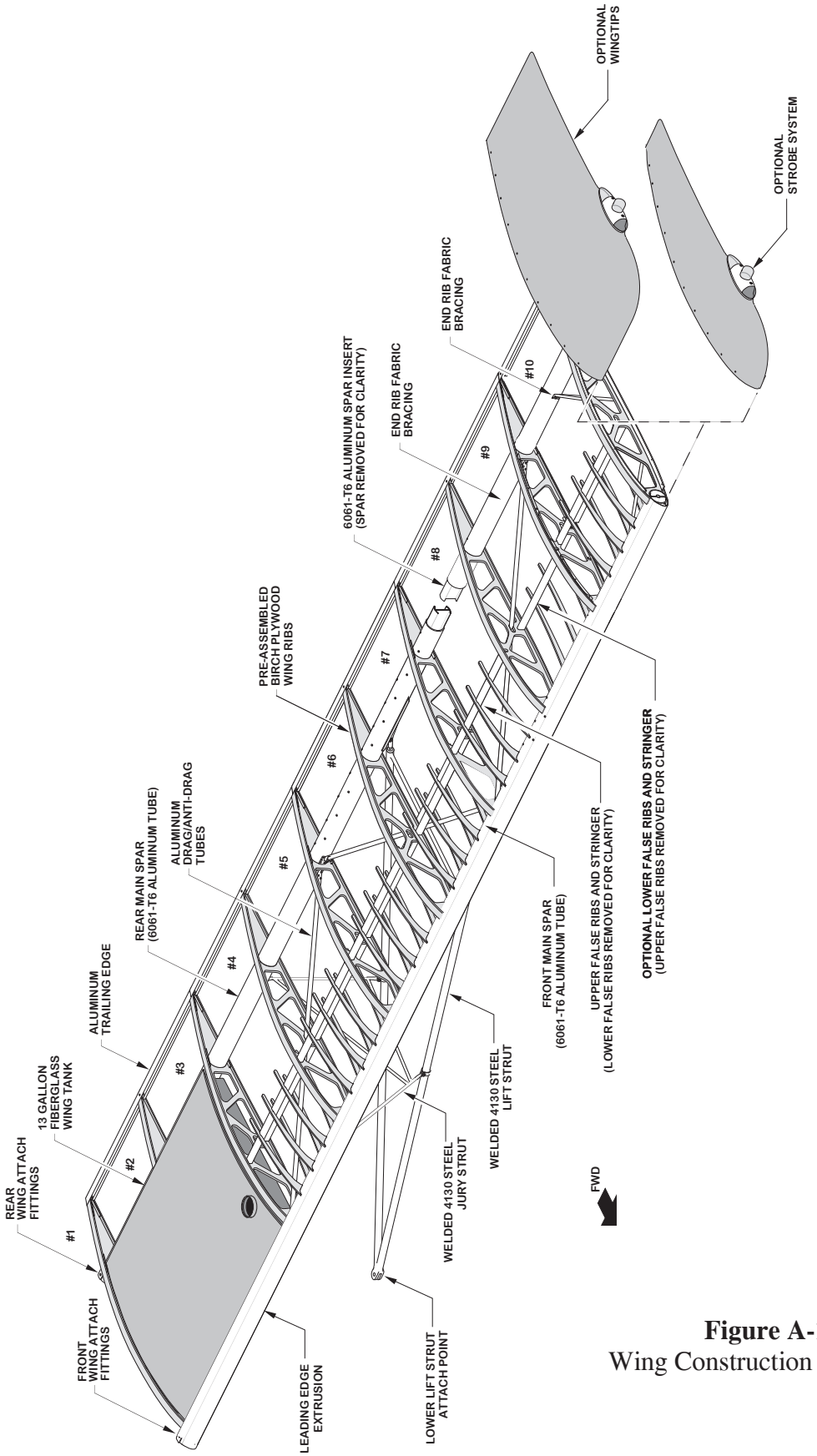


Figure A-1
Wing Construction Overview

Section B. Wing Parts Inspection

1. Carefully inspect the spar tubes to ensure that they have not been scraped, gouged, or dented during shipping. Check the two wing root, or #1, ribs (P/N: 27001.000) for capstrip-to-web squareness. Sight down the rib from the tail end and visually inspect the ribs. The rib capstrips should be perpendicular (90°) to the rib web (See Figure B-1). The rib capstrips must be square for the proper alignment of the flaperon brackets and hinges. Inspect the rib capstrips to make sure that they have been properly bonded to the rib web. Do this by carefully rocking the capstrip back and forth on the rib web. If the capstrip feels as though it may be loose, apply a small fillet of structural adhesive between the rib capstrip and web to strengthen the joint.

2. Sand the wing root ribs and false ribs with 220-grit sandpaper. Smooth all the sharp edges, including the routed, inner edges and remove any splinters or burrs. Remove, or carefully tap in, any staples in the rib capstrips that protrude above the capstrip surfaces. (The staples are used by the factory to temporarily hold the capstrips on the ribs while the adhesive cures.)

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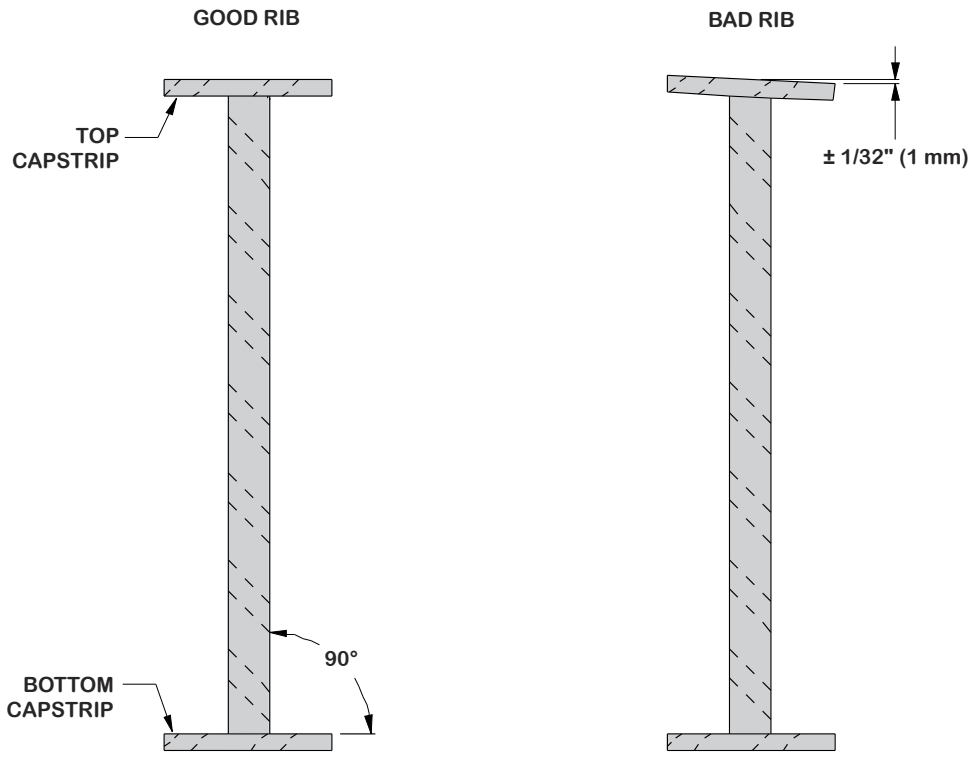


Figure B-1
Capstrip Inspection

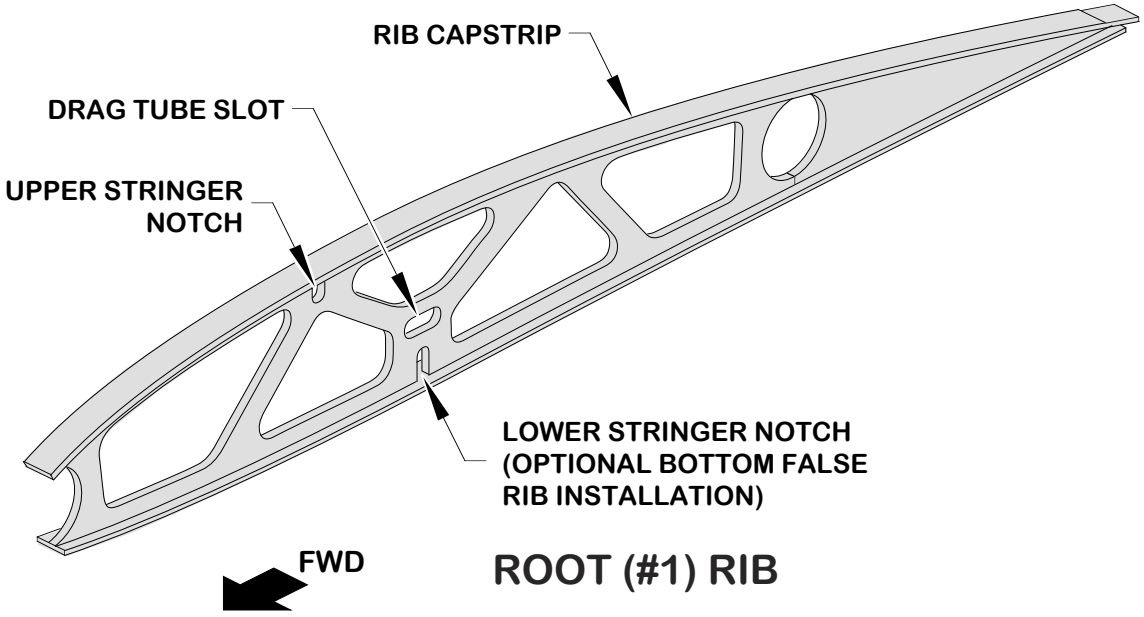


Figure B-2
Wing Rib Detail

Section C. Wing Installation Preparation

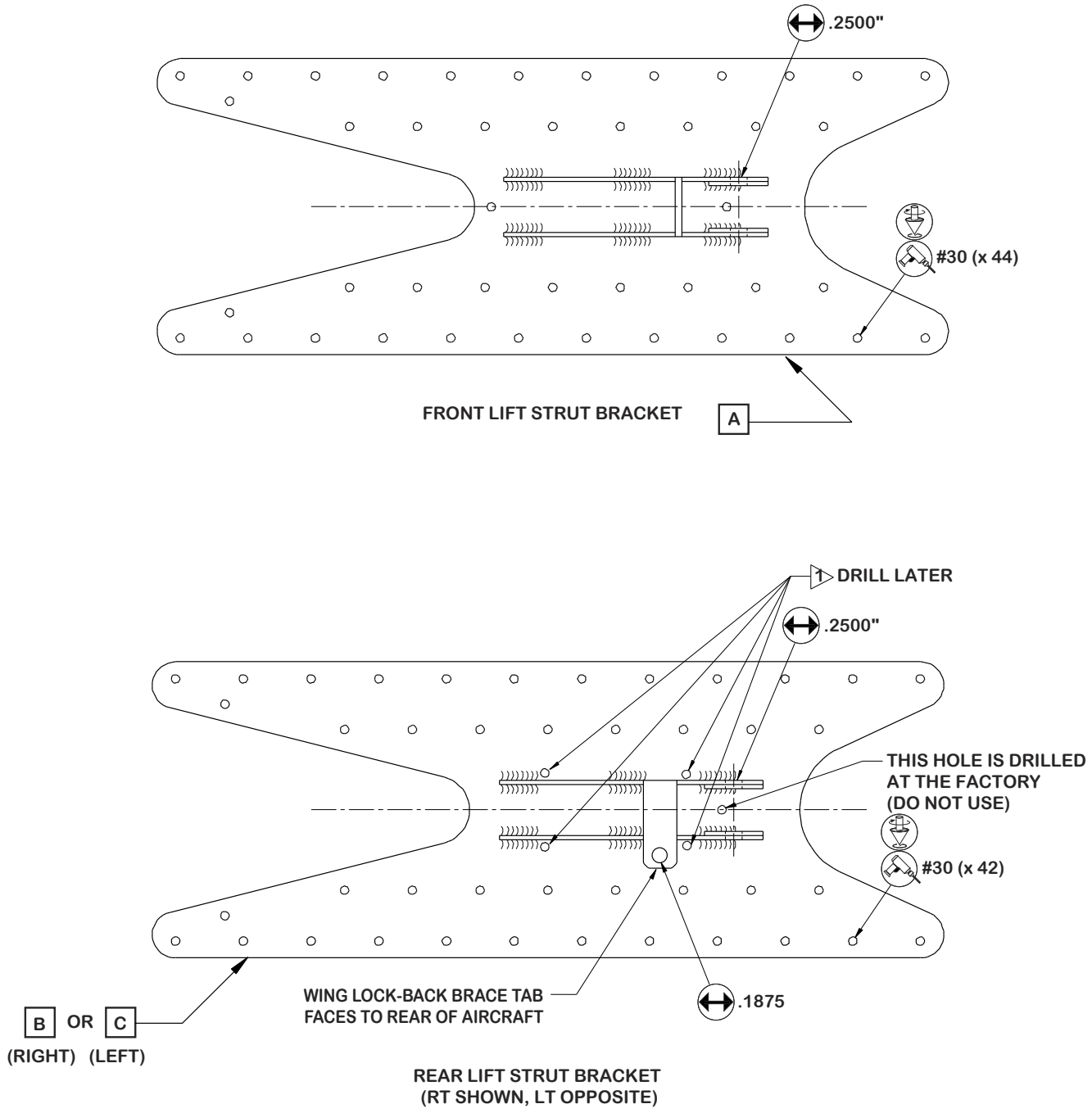
CAUTION
The center holes in each bracket are factory tooling holes. DO NOT drill through the center holes in the REAR brackets. The center holes in the FRONT brackets only will be used for installing rivets.

4. The lift brackets are pre-drilled. Ream the lift strut mounting holes in the ears of the brackets to .2500". Ream the holes in the lock back tabs of the rear brackets to .1875". See Figure D-8 for drilling instructions.

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LTR	DESCRIPTION	PART NO	QTY
A	FRONT LIFT STRUT BRACKET	23005.000	2
B	REAR LIFT STRUT BRACKET, RT	23006.000	1
C	REAR LIFT STRUT BRACKET, LT	23007.000	1

Figure C-1
Lift Strut Bracket Rivet Pattern

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NOTE

If you purchased the optional Pre-Fab Kit (P/N: 64829.000), you will receive the parts instead of the raw stock. Skip step 5.

NOTE

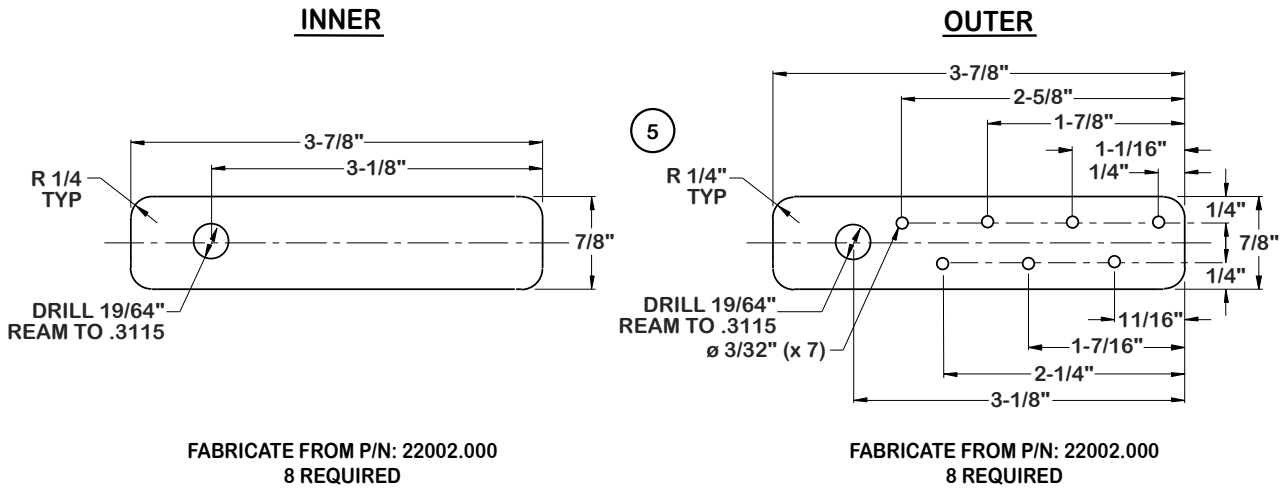
The spar reinforcement fittings will be bonded and riveted to the spars in Section D. If the fittings are not powder coated, the mating surface of the fittings can be masked-off when applying epoxy primer so that the adhesive will bond directly to the metal, thereby creating a stronger installation.

5. Fabricate the spar reinforcement fittings as shown in Figure C-2. Deburr the holes, clean with alcohol, and apply epoxy primer.

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FABRICATE FROM P/N: 22002.000
8 REQUIRED

FABRICATE FROM P/N: 22002.000
8 REQUIRED

DESCRIPTION	RAW STOCK PART NO	PRE-FAB PART NO	QTY
SPAR REINFORCMENT FITTING, INNER	22002.000	12044.102	8
SPAR REINFORCMENT FITTING, OUTER	22002.000	12044.104	8

Figure C-2
Spar Reinforcement Fittings

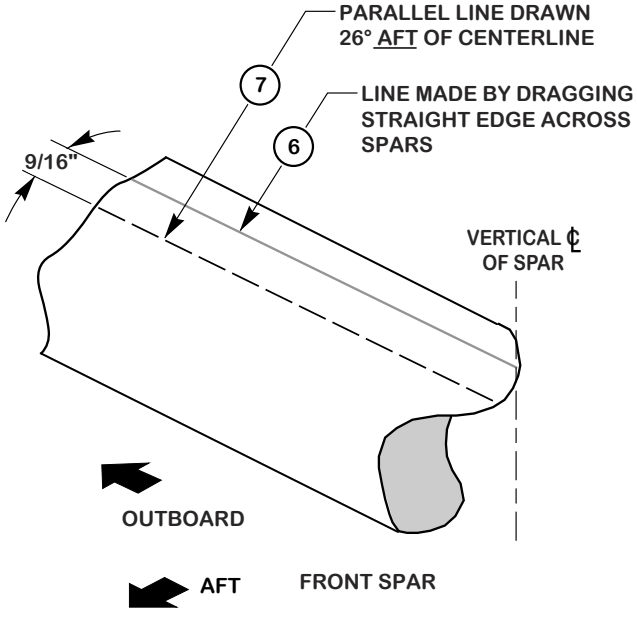


Figure C-3
Front Spar Lift Strut Attach Bracket Alignment

NOTE

If you ordered your wing with the factory pre-rigging option, you may skip steps 6 and 7. Carefully place the appropriate lift strut brackets onto the spars at the locations marked on the spars. Clamp the brackets to the spars with a pair of hose clamps, using small strips of rubber or cardboard under the hose clamp bands where they contact the spars to protect the spars from damage.

6. Set each wing upside down on sawhorses. Place a long, smooth straight edge across the front and rear spars in between ribs #6 and #7 and gently drag it back and forth to create a faint wear mark on the spars. This mark represents the vertical centerline of the spars. Carefully slip the appropriate lift strut bracket over the rear spars (the wing lock-back brace tab on the brackets must be oriented toward the trailing edge). Position the rear brackets so that the center tooling hole in each bracket lines up with the wear line on the rear spar. Adjust the brackets along the spars until the center of the lift strut mounting holes is 94-$^{1}/_{2}$" outboard from the root end. Clamp the brackets to the spars with a pair of hose clamps, using small strips of rubber or cardboard under the hose clamp bands where they contact the spars to protect the spars from damage.

7. On each of the front spars, measure back $^{9}/_{16}$" from the vertical centerline and draw a parallel line, as shown in Figure C-3. Slip the front lift strut brackets onto the front spars with the center of the lift strut mounting holes 95" outboard from the root end. Rotate the brackets until the new line just drawn is centered in the tooling hole. Clamp the brackets to the spars in the same manner as the rear brackets.

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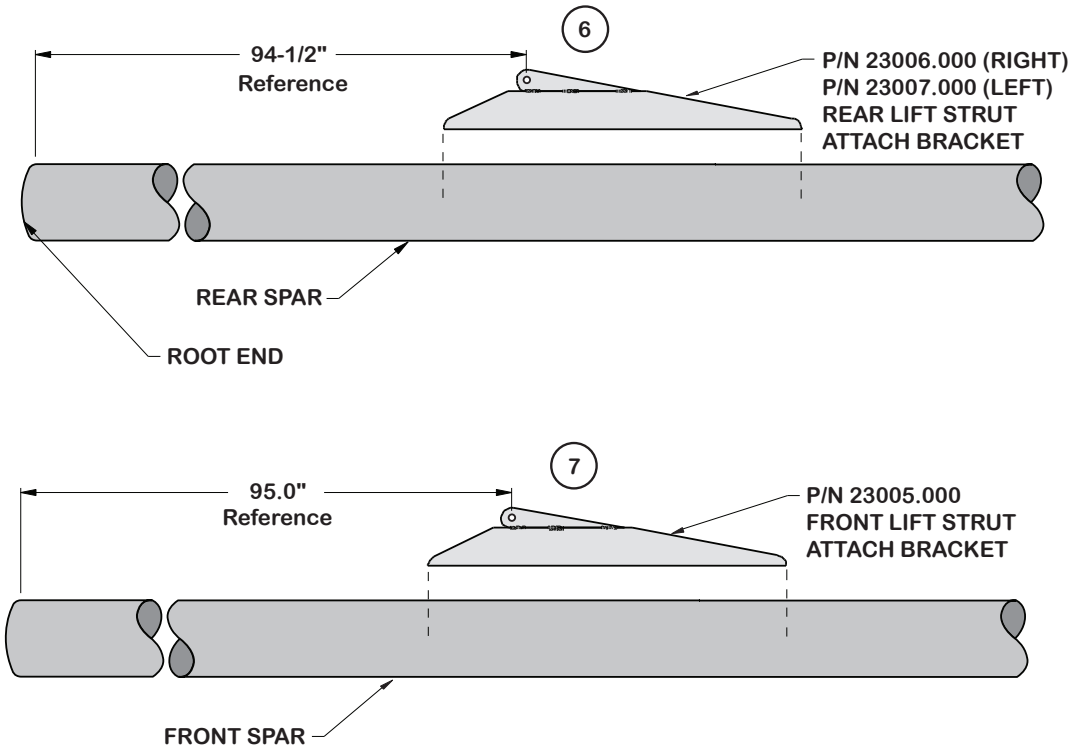


Figure C-4
Lift Strut Bracket Placement

CAUTION

Do not let the lift struts swing up or down while they are bolted to the lift strut brackets in the following step. The rod ends or lift struts could be damaged by excessive movement of the lift strut.

8. Fabricate a temporary lift strut brace which is approximately 36-$^{1}/_{2}$" long from a 2x4 board or similar material. Thread two check nuts and rod ends on each lift strut. Adjust each rod end so that $^{1}/_{4}$" of thread appears outboard of the check nut, as shown in Figure C-5. Connect the lift struts to the wings with bolts, washers, and nuts. Install the temporary lift strut brace between the lift strut and wing with clamps or tape to hold the lift strut in place while you install the wing on the fuselage.

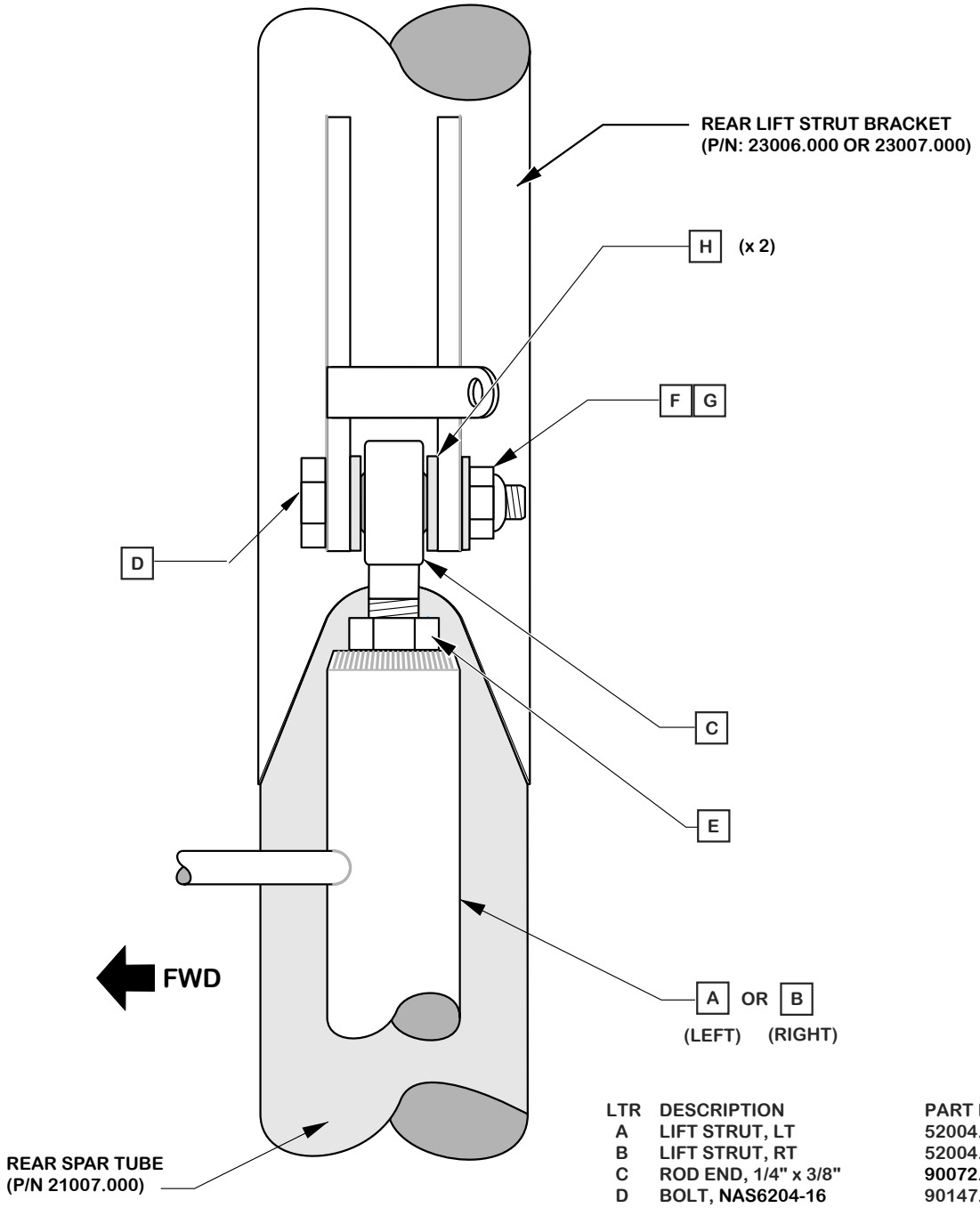
NOTE

Use an thin washer on one or both sides of the lift strut rod end bearings to take up any slack between the lift strut and the rod end (See Figure C-5).

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LTR	DESCRIPTION	PART NO	QTY
A	LIFT STRUT, LT	52004.201	1
B	LIFT STRUT, RT	52004.202	1
C	ROD END, 1/4" x 3/8"	90072.000	4
D	BOLT, NAS6204-16	90147.000	4
E	NUT AN316-6	90071.000	4
F	NUT MS21042-4	90046.000	4
G	WASHER AN960-416	91137.000	4
H	WASHER AN960-416L	91138.000	8

Figure C-5
Lift Strut/Bracket Installation

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Section D. Wing Installation

1. At this point in the wing assembly process you need to decide what particular engine you are going to install. The weight of the engine installation may require you to sweep your wings forward in order to obtain an acceptable center-of-gravity range. You must, therefore, select the engine before you can proceed with the wing installation procedures outlined below. Aircraft using the Rotax 912**,** 912S, or 914 engines **WILL NOT** require a wing sweep. Aircraft using the Continental O-200 or IO-240 or the Lycoming O-235 engines **WILL** require a 1° forward wing sweep.

NOTE

If you ordered your wing with the factory pre-rigging option, you may skip steps 2 and 3.

2. Set the fuselage on a low sawhorse or on jack stands placed under the lift strut attach fittings on the fuselage and under the tail (weight will need to be added to the tail to prevent the fuselage from tipping forward). Using the underside of the fuselage as a datum, level the fuselage front to back. Tape two equally-sized shims onto the ends of a 48" level (to clear the stands under the fuselage). Hold one end up against the lift strut carry-through tube and the other end up against the bottom tube of the front bulkhead. Also level the fuselage side to side. When you have the fuselage level in both directions, weight it down with sandbags or other heavy items so it will not tip over when you install one wing.

3. The following measurements are critical for the proper installation and rigging of the wings, so be as accurate as possible. Mark the top center of the forward fuselage carry-through tube. Measure the distance from this mark to the center of each of the forward spar attach lugs (approximately 18-$^{1}/_{2}$", as shown in Figure D-1). Measure the distance from the center of the lugs in the rear fuselage carry-through attach lugs to the center of the forward spar attach lugs (approximately 27-$^{1}/_{2}$"). Record these measurements for later reference below.

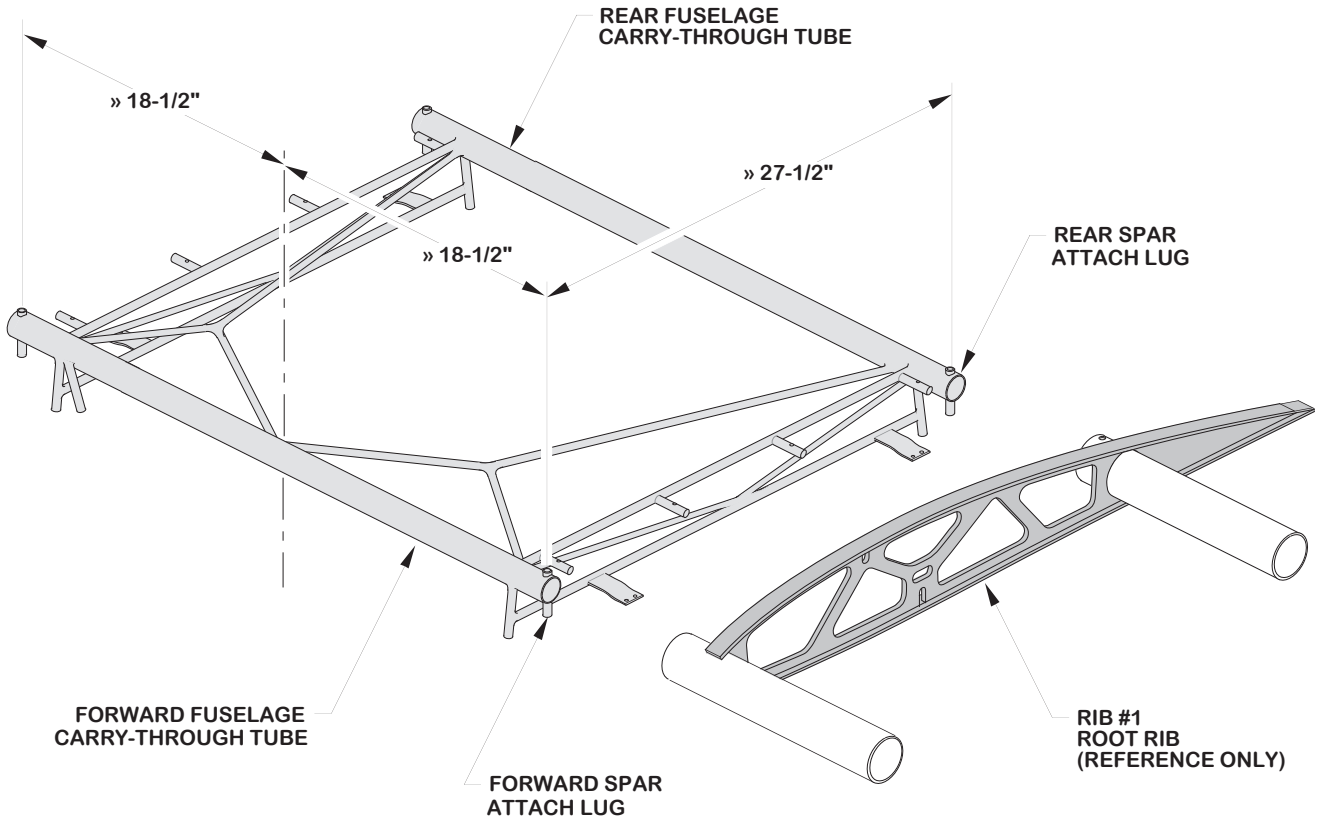
Right Measurements: _____ / _____

Left Measurements: _____ / _____

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FigureD-1
Fuselage Reference Dimensions

4. Ream the powdercoating out of all four spar attach lugs on the fuselage. Using a file, contour the top and bottom of each lug to match the inside radius of the wing spars. One way of doing this is to make a 2-$^{3}/_{8}$" hole in a piece of scrap wood or metal and use it as a contour template.

5. Ream the holes in the "fish mouth" on the lower end of the lift struts and the hole in the lift strut attach fittings on the lower end of the fuselage to .3750".

6. For wings being installed with a forward sweep, you will need to trim a portion of the root end of the **front spars** to allow the wings to sweep forward. Measure 37-$^{1}/_{4}$" from the center of rib #3 inboard. Make a mark at this location around the entire circumference of the front spar. Remove the spar material inboard of this mark. Refer to Figure D-2.

NOTE

You will need two people to safely perform this next step.

7. Temporarily secure rib #1 into position on the spars with strapping tape or bungee cords. Have someone hold up the tip end of the wing while you position the root end of the rear spar over the rear spar attach lug (use of an adjustable stand, if available, will help with this procedure). Drop an AN5-31 bolt though the spar and into the attach lug to secure the rear spar to the wing. Position the front spar over the forward spar attach lug. Attach the lower lift strut fitting to the fuselage with an AN6-12 bolt. Avoid any wing movement while the wing is being held on the fuselage without the bolts. Tape or clamp the front spar to the fuselage to prevent the wing from swinging backwards. Install the opposite wing in the same manner.

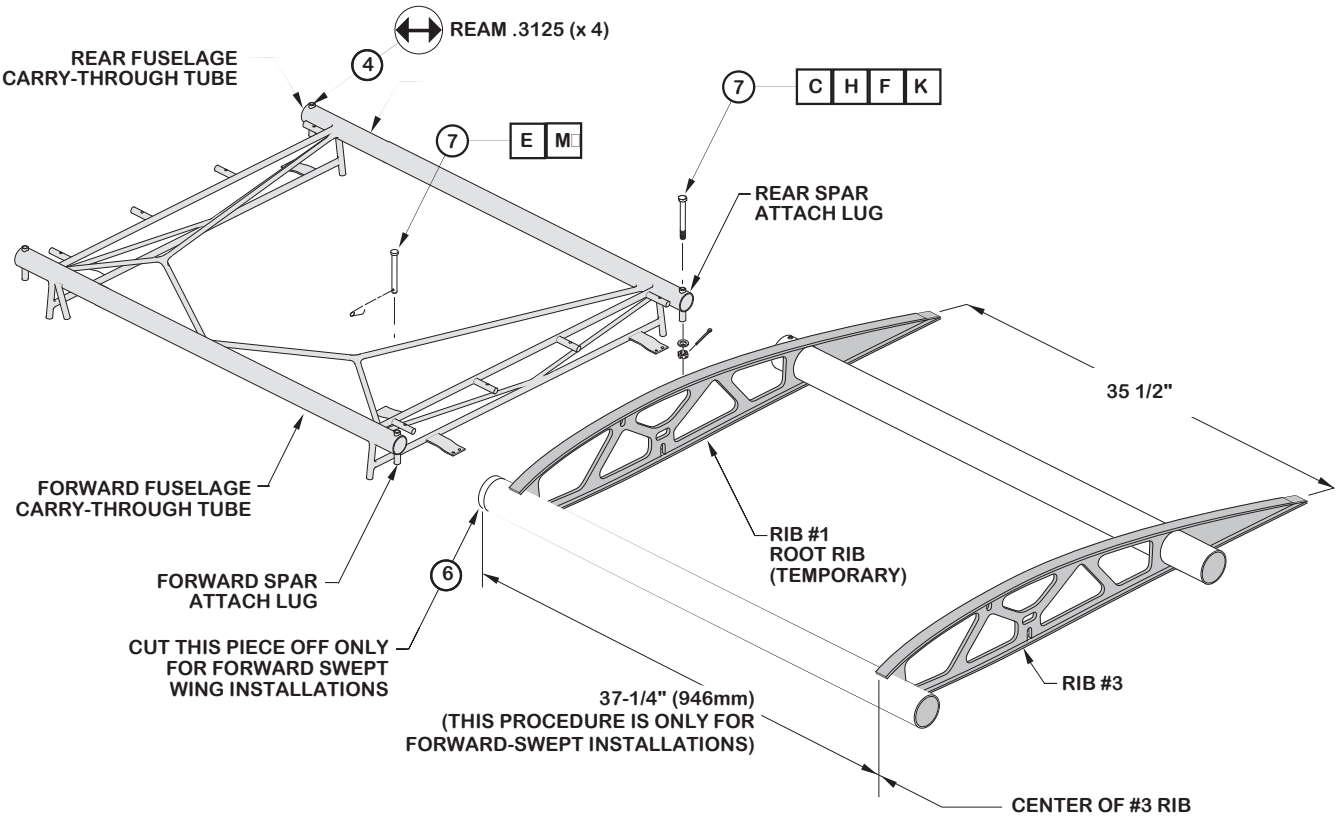
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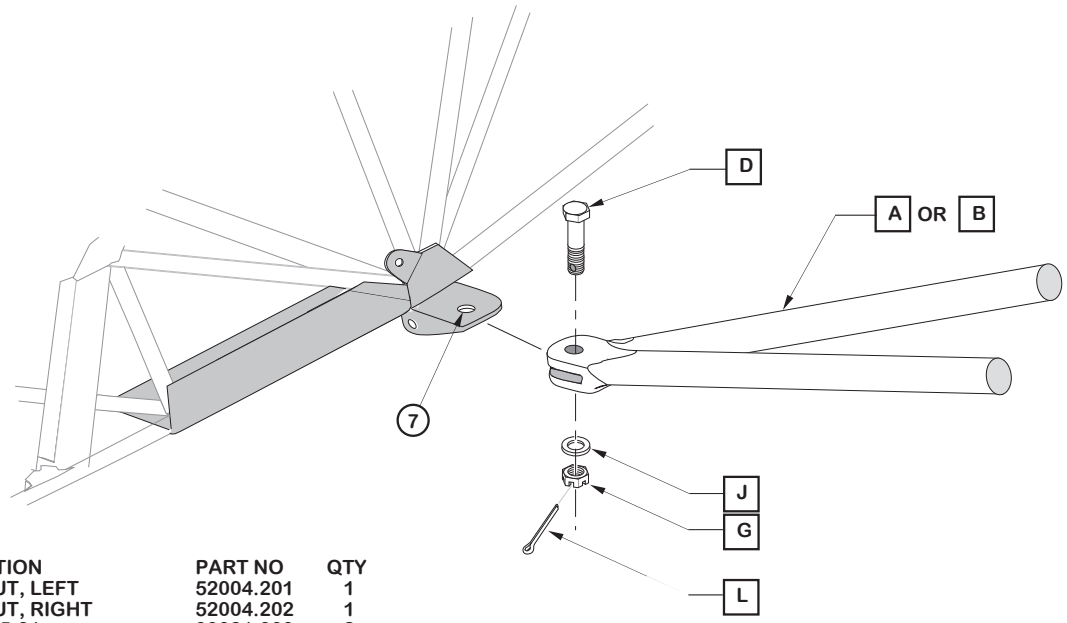
If you ordered your wing with the factory pre-rigging option, you may skip ahead to step 12.

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LTR	DESCRIPTION	PART NO	QTY
A	LIFT STRUT, LEFT	52004.201	1
B	LIFT STRUT, RIGHT	52004.202	1
C	BOLT, AN5-31	90081.000	2
D	BOLT, AN6-12	94173.000	2
E	CLEVIS PIN, AN395-89	98027.000	2
F	NUT, SHEAR,AN320-5	90047.000	2
G	NUT, CASTLE, AN310-6	91052.000	2
H	WASHER, AN960-516	91141.000	2
J	WASHER, AN960-616	91144.000	2
K	COTTER PIN, AN380-2-3	91073.000	2
L	COTTER PIN, AN380-3-3	91074.000	2
M	SAFETY PIN, AN416-1	91098.000	2

Figure D-2
Initial Wing Installation

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CAUTION

There are two positions that you can set your wing - no sweep and 1° forward sweep. Refer to Step 1 to determine the correct wing sweep for your aircraft. The following steps explain the procedures for installing the wings with or without wing sweep. Refer to Step 8 for aircraft with no wing sweep and Step 9 for aircraft with forward-swept wings.

8. **NO WING SWEEP** With the aircraft still leveled, tape a 1" block at the tip of each wing on the leading edge. Make a mark 120" out from the rear spar attach lug on the rear spar of each wing.

A. Run a length of fishing line from the right leading edge block to the left leading edge block. Put a small weight on the line, centered in the middle. This should allow the center of the line to be level with the forward fuselage carry-through tube.

B. Measure the distance from the leading edge of each wing spar root to the line. This measurement should be 1" for the proper wing position. Loosen the clamped (or taped) front spars and adjust the wings fore and aft as required to obtain this distance. Secure the front spars again.

C. Measure from the end of the middle rod end bushing (center rudder attachment point) on the vertical stabilizer tailpost to the mark on the right and left rear spars. Loosen the clamped (or taped) front spars and adjust the position of the wings as required until these two distances are within $^{1}/_{4}$" of being equal.

Completion Date

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NOTE

Repeat steps B and C until the proper measurements are achieved.

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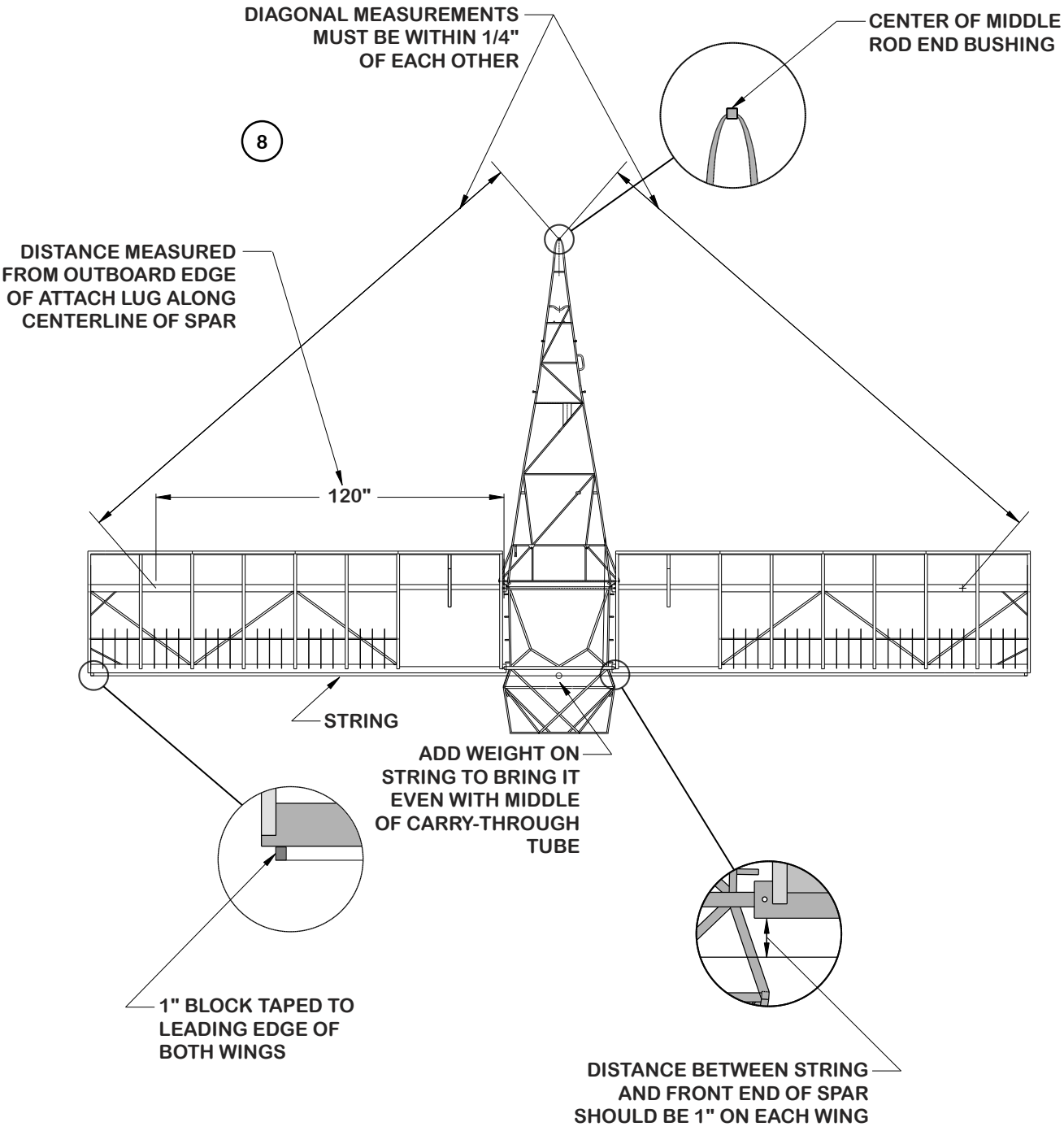


Figure D-3
Wing Installation - No Wing Sweep (0°)

9. **1° FORWARD WING SWEEP** While the aircraft is still leveled, measure outboard 120" from the outer edge of the front spar attach lug out to the front spar leading edge on each wing. Tape a 1" block in place at each of these locations. Make a similar mark 120" out from the rear spar attach lugs on the rear spars (no block is required for the rear spars).

A. Run a length of fishing line from the right leading edge block to the left leading edge block. Place a small weight on the line, centered in the middle. This should allow the center of the line to be level with the forward fuselage carry-through tube.

B. Measure the distance from the leading edge of each wing spar root to the line. This measurement should be 3-$^{3}/_{16}$" for the proper wing position. Loosen the clamped (or taped) front spars and adjust the wings fore and aft as required to obtain this distance. Secure the front spars again.

C. Measure from the end of the middle rod end bushing (center rudder attachment point) on the vertical stabilizer tailpost to the mark on the right and left rear spars. Loosen the clamped (or taped) front spars and adjust the position of the wings as required until these two distances are within $^{1}/_{4}$" of being equal.

NOTE

Repeat steps B and C until the proper measurements are achieved.

Completion Date

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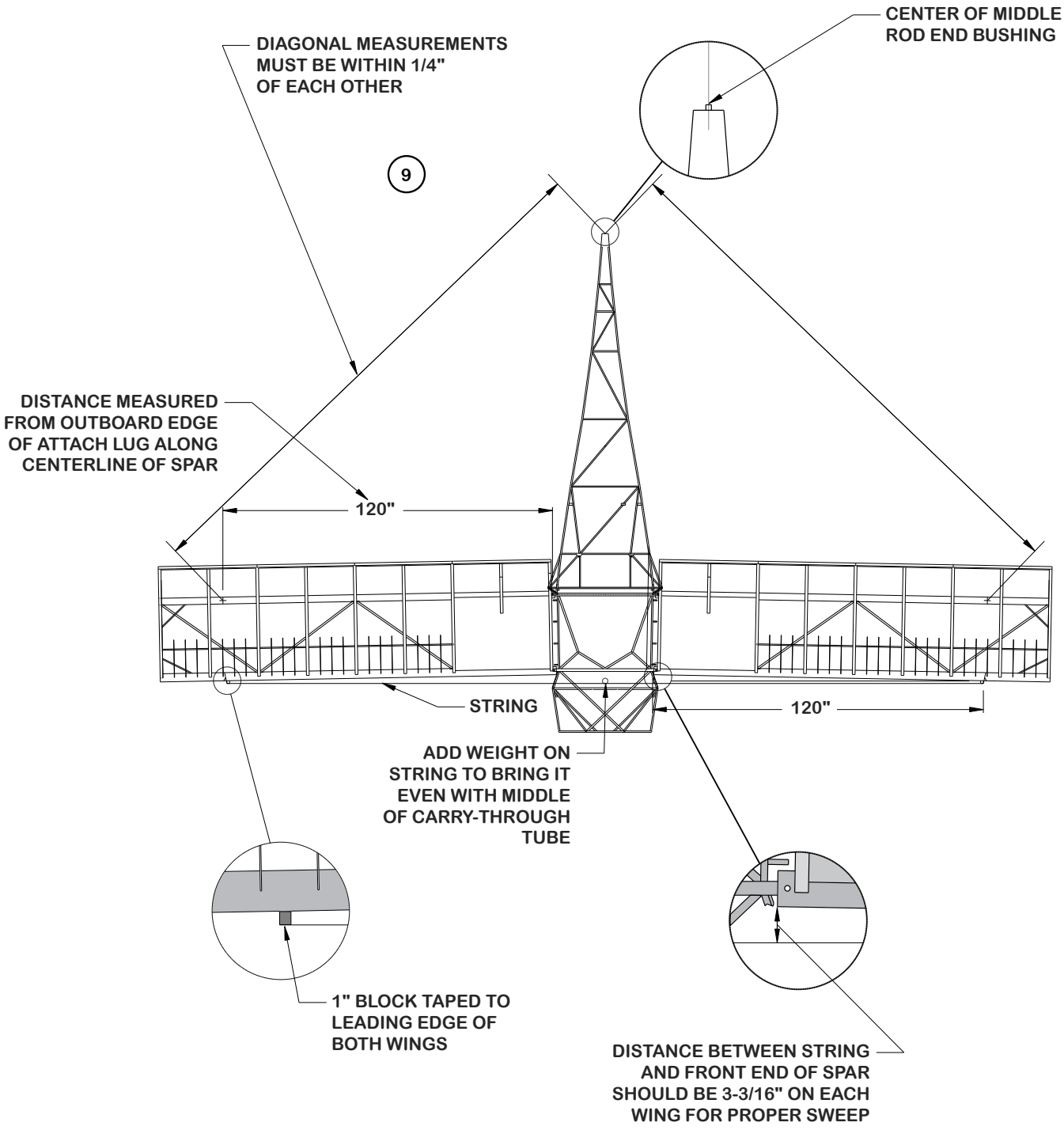


Figure D-4
Wing Installation- 1° Forward Wing Sweep

10. Make certain the aircraft is still leveled both longitudinally and laterally. Place a 48" level along the front spar near the wing root. Pivot the level on its inboard end until the bubble is centered. Measure the distance between the top of the outboard end of the level and the bottom of the front spar (Refer to Figure D-5). The correct dihedral of 1° is equal to $^{13}/_{16}$" ($\pm$ $^{1}/_{16}$") at the outboard end of the 48" level. Loosen the clamps on the lift strut brackets and move the brackets inboard (increasing the dihedral) or outboard (decreasing the dihedral) until the correct measurements are achieved. Make sure to move the front and rear lift strut brackets equal amounts. Tighten the clamps on the lift strut brackets to secure them once again.

11. Next, the twist, or "washout", of each wing must be adjusted. Make a mark on the bottom of each rear spar at 3" and 159" from the root end. Place a level across the bottom of the spars just outboard of the root rib. Clamp a straight edge or steel ruler perpendicular to the level so it will contact the rear spar at its center (see Figure D-6). With the level resting against the bottom of the front spar, adjust the ruler until the bubble indicates level and clamp the ruler in place. Move the level to the 159" mark and, with the level resting against the rear spar, insert a $^{1}/_{2}$"-thick block between the rear spar and the ruler. The bubble again should indicate level. If it does not, adjust the rear lift strut attach bracket position by loosening the clamps and moving it until the bubble indicates level.

12. In Step 3 you recorded the measurements from the center of the forward fuselage carry-through tube to the center of the forward spar attach lugs and from the center of the rear attach lug to the front. Using these dimensions, mark the location of the center of the forward spar attach lugs on to the top of the front spars. **These locations are already marked with a pilot hole if you ordered factory pre-rigged wings; the inboard hole is for wings with no sweep and the outboard hole is for 1° forward sweep.** Drill through the **upper surface** of the front spars with a $^{3}/_{16}$" drill. If the holes appear to be centered over the lugs, drill them out to $^{1}/_{4}$". Next, use a small "rattail" file to take the hole out to just under $^{5}/_{16}$". Finally, ream the holes to match the lug hole. Insert an AN395-89 clevis pin into the spar.

WARNING

Check the positions of the lift strut brackets relative to their original outline on the spars. If they have moved inboard or outboard, check to make sure that they are not positioned over any spar insert rivets. If their clocking has changed, verify that you will maintain $^{1}/_{4}$" from the center of the lift strut bracket rivet hole and the edge of the spar insert.

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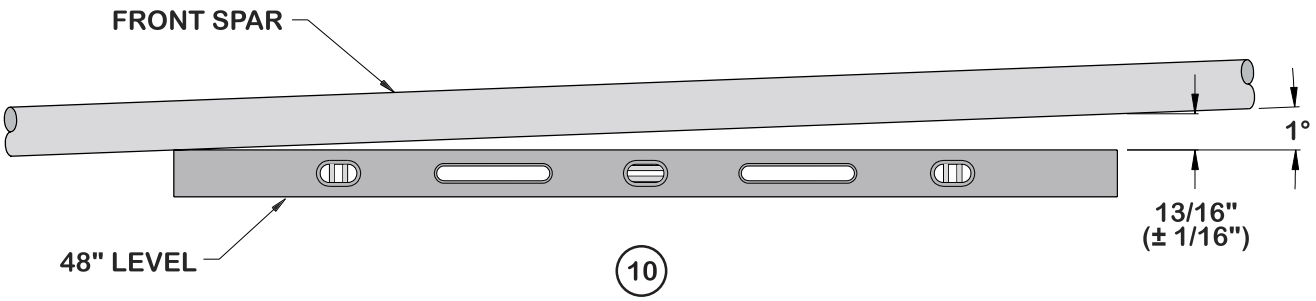


Figure D-5
Dihedral Adjustment

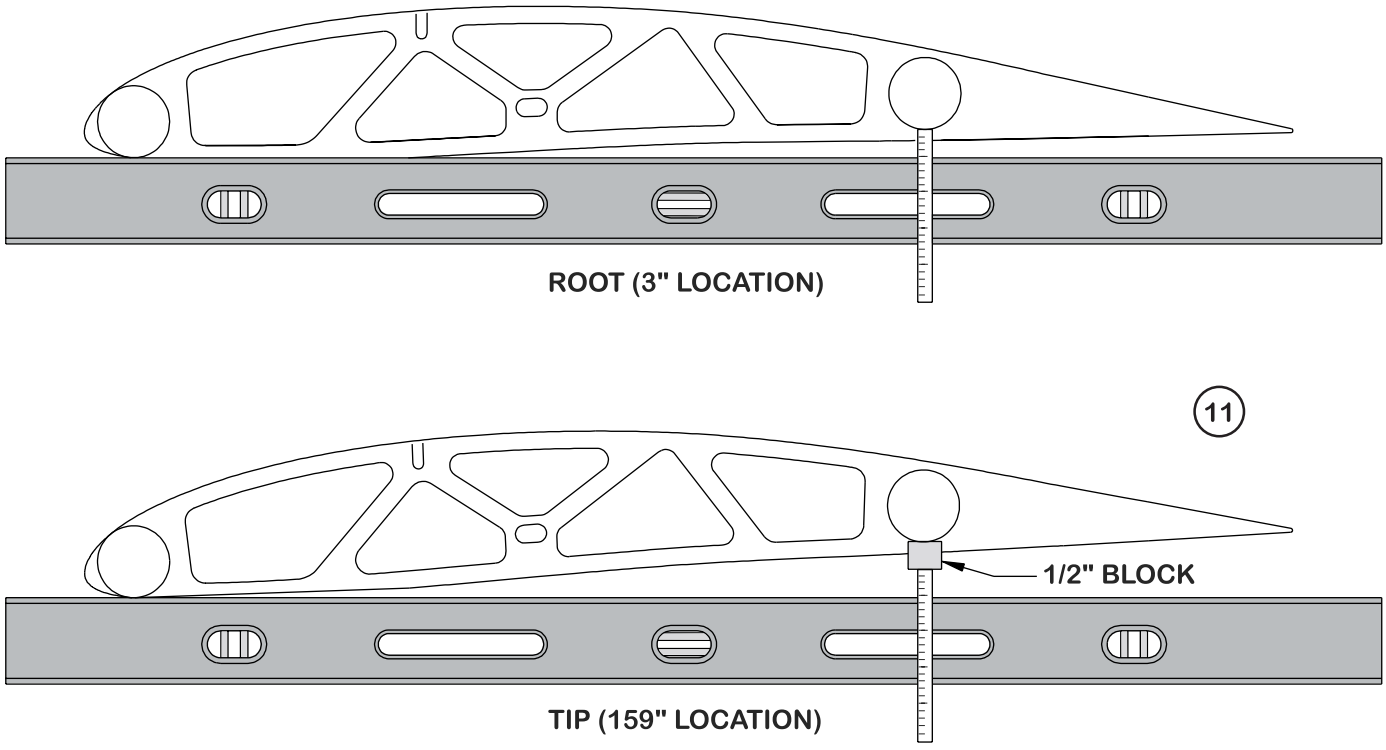


Figure D-6
Wing Twist Adjustment

CAUTION

Use a $^{5}/_{16}$" drill bit with 2-$^{1}/_{4}$" flutes or less. Drilling with flutes any longer than this could result in the top attach holes of the spars being oversized.

13. Remove the AN5-30 bolts from the rear spars. Using the spar attach lugs as a drill guide, drill down through the hole in the top of the rear spars and through the bottom of the spars. Replace the bolts. Drill the bottom holes in the front spars in the same manner. Secure the check nuts on the lift strut rod ends and remove the wings from the fuselage.

NOTE

Use a sharp drill bit to prevent elongation of the holes in the spar reinforcement fittings and spars in the following steps.

CAUTION

Mark, tape, number, or safety wire the pairs of spar reinforcement fittings together as you remove them from the spars. DO NOT mismatch the fittings.

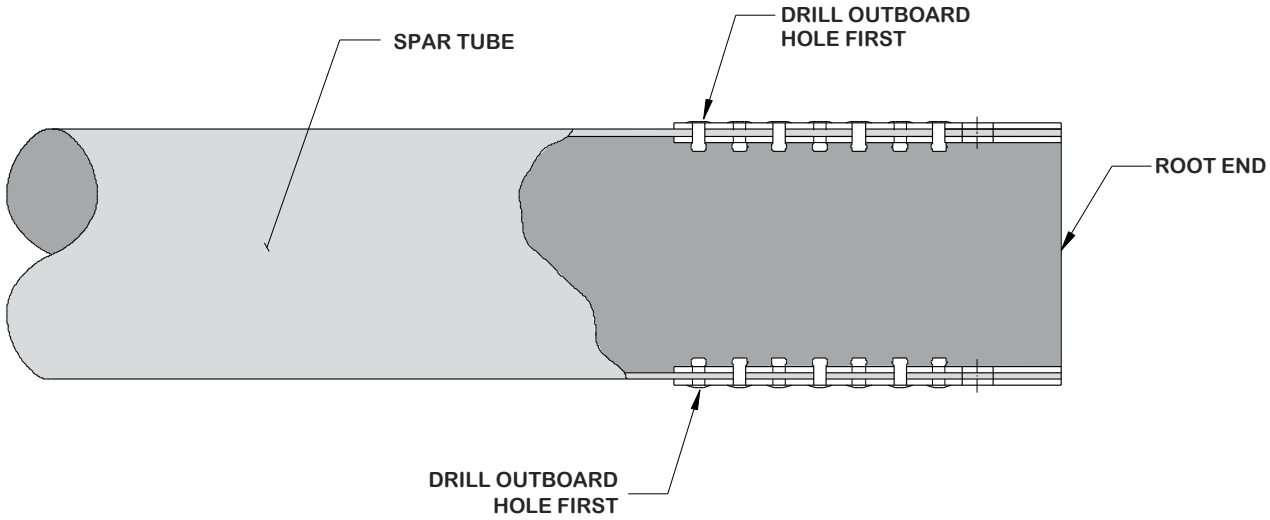
14. Place a pair of spar reinforcement fittings (inner and outer) on the upper surface of each of the spars. The outer fittings already have the $^{3}/_{32}$" holes drilled in them. Line the fittings up with the attach holes already drilled into the spars and insert the appropriate hardware (clevis pin or bolt) through the holes. Clamp the fittings to the spars and match-drill through the outboard holes in the fittings with a $^{3}/_{32}$" drill, clecoing the inside fittings, spar, and outside fittings together as you proceed. Once the holes are drilled, enlarge each of the holes with a #30 drill, again clecoing the parts together as you proceed. Repeat this procedure for the reinforcement fittings on the bottom of each of the spars. Mark the outline of the fittings on the spars with a fine point marking pen. Remove the fittings from the spars, making sure to keep the pairs together. Deburr all the rivet holes in the fittings and spars.

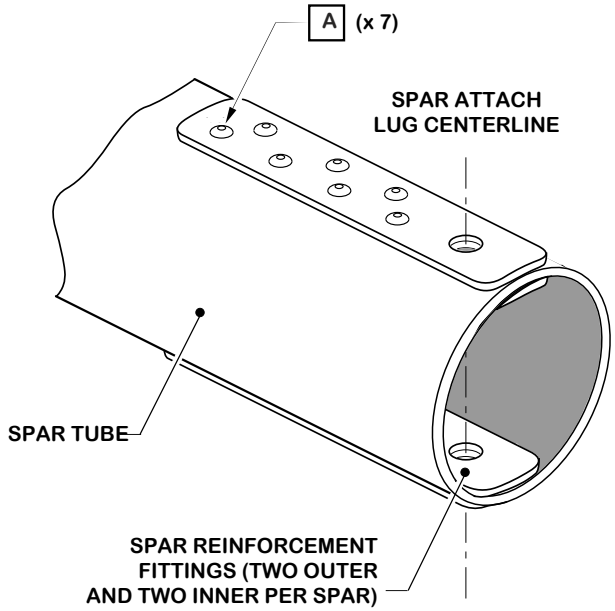
15. Prepare the mating surfaces of the fittings and spars with Scotch-Brite and clean with denatured alcohol. Install one pair of fittings at a time. Apply structural adhesive mixed with microballoons to the fittings and spar and cleco the fittings in place. Place the appropriate bolt or clevis pin into the mounting holes to make sure the holes are aligned. Install the spar attach fittings with the rivets shown in Figure D-7. Remove the bolt or pin and clecos and clean them with denatured alcohol. Remove any excess adhesive that has squeezed out from under the fittings with denatured alcohol. Repeat this procedure for the remaining pairs of fittings.

Completion Date

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LTR	DESCRIPTION	PART NO	QTY
A	RIVET, 1/8" x 1/4" SS	95004.000	56

Figure D-7
Front Spar Attach Reinforcement Fittings Installation

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16. Make sure the lift strut attach brackets are securely attached to the spars with hose clamps. Match-drill through the brackets into the spars with a #30 drill. Start at the center of each bracket, installing a cleco in each new hole as you work toward the ends. Remove the clamps so you can drill all the rivet holes in the bracket. Drill the four rivet holes on the **rear** lift strut attach brackets (refer to Flag 1 "Drill Later" shown in Figure C-1). These holes should line up with the spar insert rivet pattern. Locate the four flagged holes so they do not interfere with the welds on the bracket. Be careful not to drill into the web of the spar insert (refer to Figure D-8). Remove the brackets and deburr the holes in the spar.

17. Bond prep the mating surfaces of the lift strut attach brackets and the spars with Scotch-Brite and clean with denatured alcohol. Mix enough structural adhesive to coat the inner surface of one lift strut attach bracket. Coat the inner surface of the bracket with adhesive and cleco it in place on the spar. Use $^1/_8$" x $^1/_8$" SS rivets to attach the bracket to the spar, and $^1/_8$" x $^3/_8$" SS rivets to attach the bracket to the spar and spar insert. Refer to Figure D-8 for the required rivet locations. For hard to reach rivets, fabricate a spacer (or several small flat washers) that can fit over the shaft of the rivet and provide some space between the rivet and the rivet gun tip. Clean the clecos with denatured alcohol before the adhesive cures. Remove any excess adhesive that has squeezed out from under the bracket with denatured alcohol. Repeat this procedure for the remaining brackets.

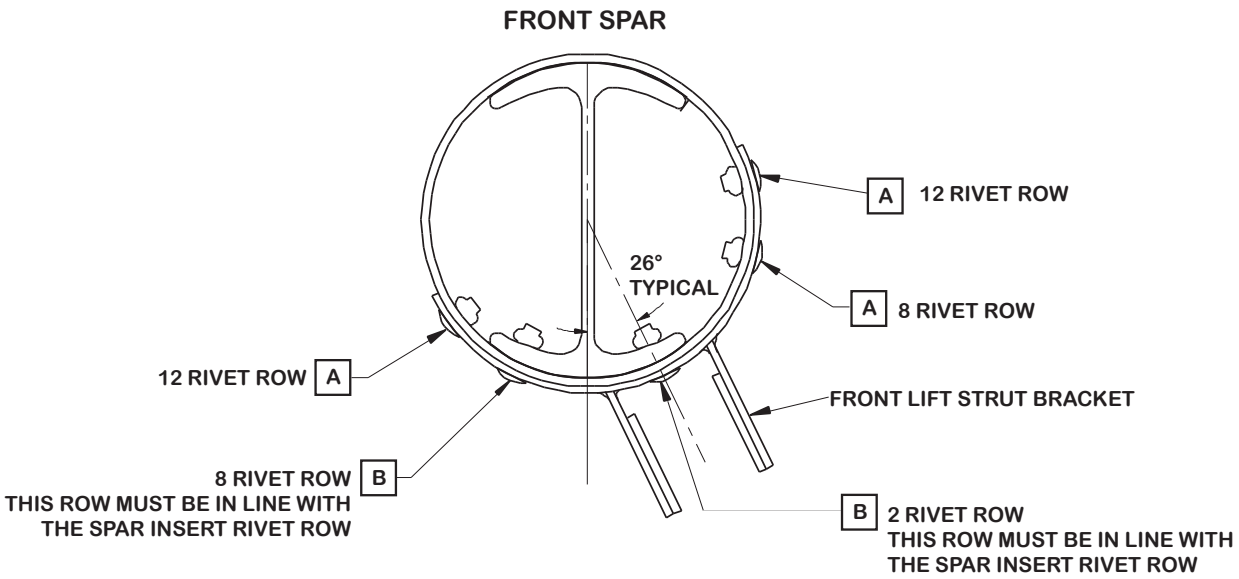
18. Install rib #1 on each wing. Notch the ribs so they will slip over the spar attach fittings. Bond prep the spars where the ribs will be installed with Scotch-Brite and clean with denatured alcohol. Slide the ribs onto the wing spars and reattach the wing to the fuselage. Apply a small amount of structural adhesive to the spars where the ribs will attach and slide the ribs into place. Adjust the ribs until they are in the proper position (see Figure D-2) and apply a fillet of structural adhesive thickened with cotton flox. Hold the rib securely to the front spar and let the adhesive set up overnight before continuing.

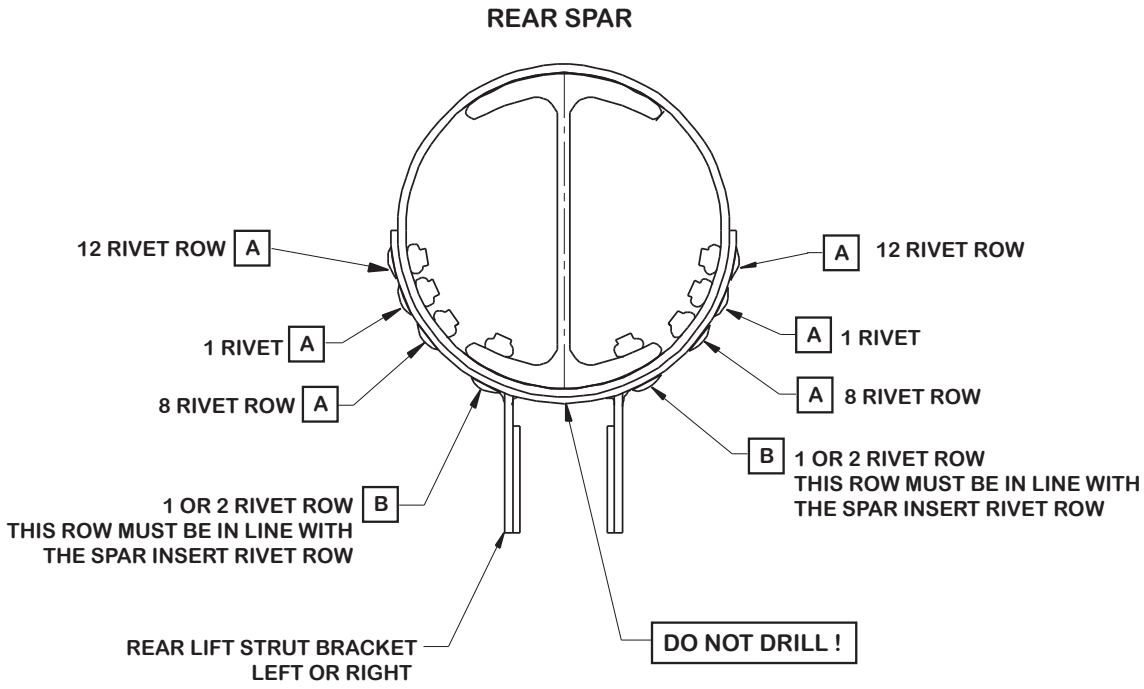
19. After the adhesive has cured, recheck the wing sweep, dihedral and twist. Make any minor adjustments by turning the lift strut rod ends in or out as required and secure the check nuts. After the wing has been checked for proper rigging, proceed to Section E while the wings are still attached to the fuselage.

Completion Date

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LTR	DESCRIPTION	PART NO	QTY
A	RIVET, 1/8" x 1/8" SS	95002.000	74
B	RIVET, 1/8" x 3/8" SS	95005.000	14

Figure D-8
Lift Strut Attach Bracket Installation

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Section E. Butt Rib Installation

NOTE

The wings must be mounted on the fuselage in order to install the butt ribs.

1. Drill two #30 holes in each butt rib bracket approximately 1" apart, on opposite sides of the tube, and in-line with the tabs. Drill one #30 hole in each bracket tab, centered so the hole clears the weld. Slide the brackets into place on the tubes welded to the fuselage headrack. You may have to ream the butt rib brackets so they fit over the tubes on the headrack. See Figure E-1.

2. Position the P/N: 27003.000 (left) and P/N: 27004.000 (right) butt ribs next to the #1 ribs on the wings. The flanges on the butt ribs should be oriented outboard toward the #1 ribs. Install temporary $^{1}/_{16}$" shims between the butt ribs and the #1 ribs. These will compensate for the thickness of the fabric on the ribs. The butt ribs should line up with the root ribs fore and aft.

3. Slide the brackets out against the butt ribs and match-drill through the bracket tabs into the ribs with a #30 drill and cleco. Match-drill with a #30 drill at both tube holes on each bracket and cleco. Label each bracket so they can be correctly relocated later. Remove the brackets and deburr all holes.

4. Trim the P/N: 22908.000 aluminum backing strips to fit on the underside of each upper butt rib capstrip. Position the backing strip as close to the butt rib web as possible. This aluminum strip will provide reinforcement for the windshield installation. Bond prep the strips and clean with denatured alcohol. Bond the strips to the underside of the upper butt rib capstrips. Use small spring clamps to hold the strips in position. Remove any excess adhesive with denatured alcohol.

NOTE

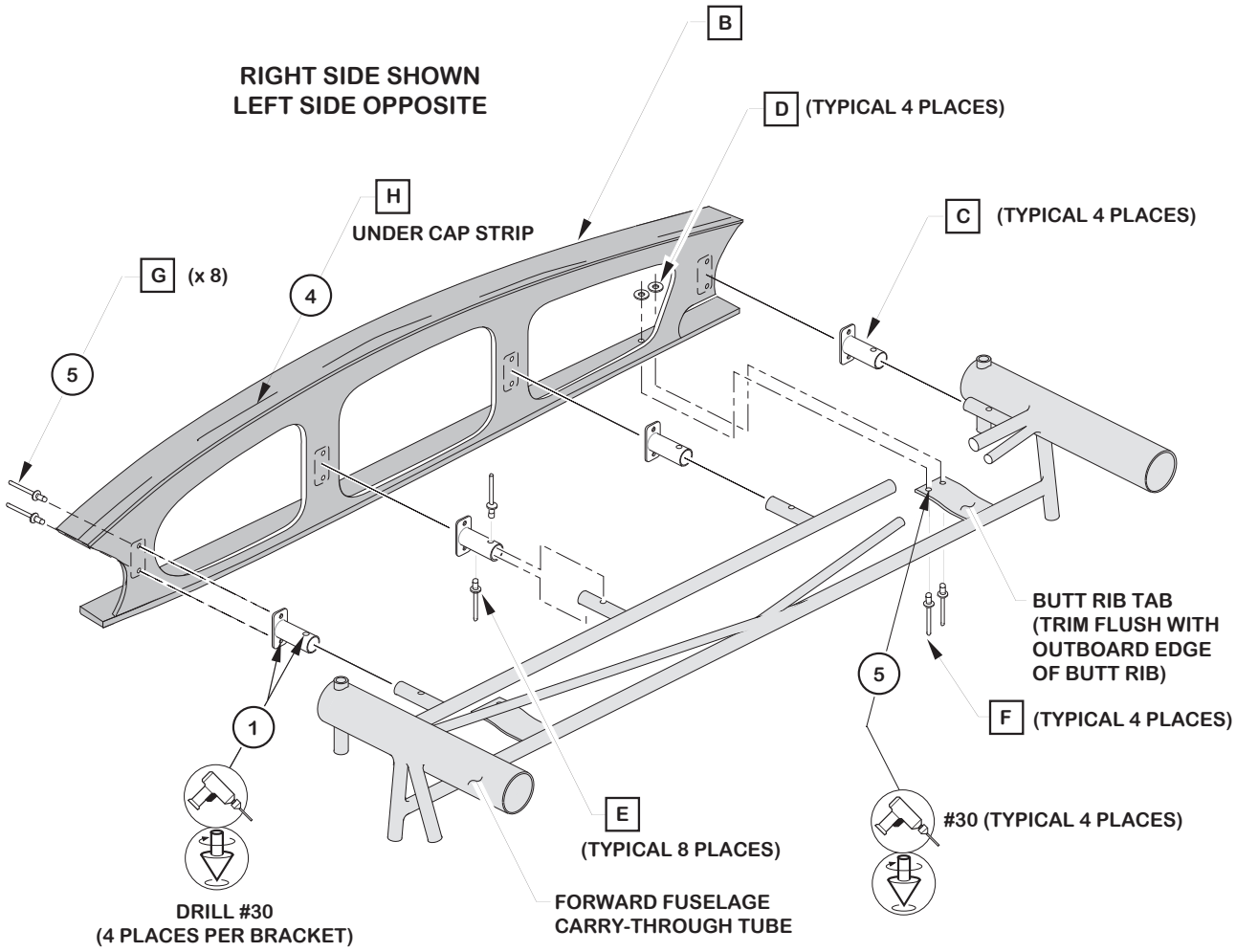
Apply two or three coats of epoxy varnish to the butt ribs before they are attached to the fuselage.

5. With the butt rib clecoed in place on the fuselage, mark and trim off any excess fuselage butt rib mounting tab material that protrudes outboard of the butt ribs. Bend the fuselage tabs upward or downward so they fit evenly against the bottom face of the lower butt rib capstrip. Layout two evenly spaced rivet holes in each fuselage tab. Drill through the tab and the butt rib capstrip with a #30 drill and cleco. Rivet the butt rib brackets to the headrack tubes with $^{1}/_{8}$" x $^{1}/_{8}$" SS pop rivets, the butt rib brackets to the butt ribs with $^{1}/_{8}$" x $^{3}/_{8}$" SS pop rivets, and the butt ribs to the fuselage tabs with $^{1}/_{8}$" x $^{1}/_{4}$" SS pop rivets and backup washers.

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LTR	DESCRIPTION	PART NO	QTY
A	BUTT RIB, LEFT	27003.000	1
B	BUTT RIB, RIGHT	27004.000	1
C	BUTT RIB BRACKET	51036.705	8
D	WASHER, ALUMINUM	90039.000	8
E	RIVET, 1/8" x 1/8" SS	95002.000	16
F	RIVET, 1/8" x 1/4" SS	95004.000	8
G	RIVET, 1/8" x 3/8" SS	95005.000	16
H	AL BACKING STRIP	22908.000	2

Figure E-1
Butt Rib Installation

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Section F. Jury Strut Installation

NOTE

If you purchased the optional Pre-Fab Kit (P/N: 64829.000), skip step 1. Otherwise, manufacture the brackets and skip step 2.

NOTE

The jury strut brackets will be bonded and riveted to the spars in the next installation sequence. The mating surface of the brackets can be masked off when applying epoxy primer so that the adhesive will bond directly to the metal, thereby creating a stronger installation.

1. Make eight jury strut attach brackets from the P/N: 23011.000 bracket material (see Figure F-1). The 90° bends can be made in a vise using a piece of aluminum or a light sheet metal doubler to provide a greater radius in the bend. Drill and deburr the holes in the brackets. File and sand smooth any rough edges, clean with denatured alcohol, and apply epoxy primer to the brackets before installation.

2. Modify the four pre-fab brackets as shown in Figure-F-1.

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3. Ream the bolt holes in the brackets to .1875".

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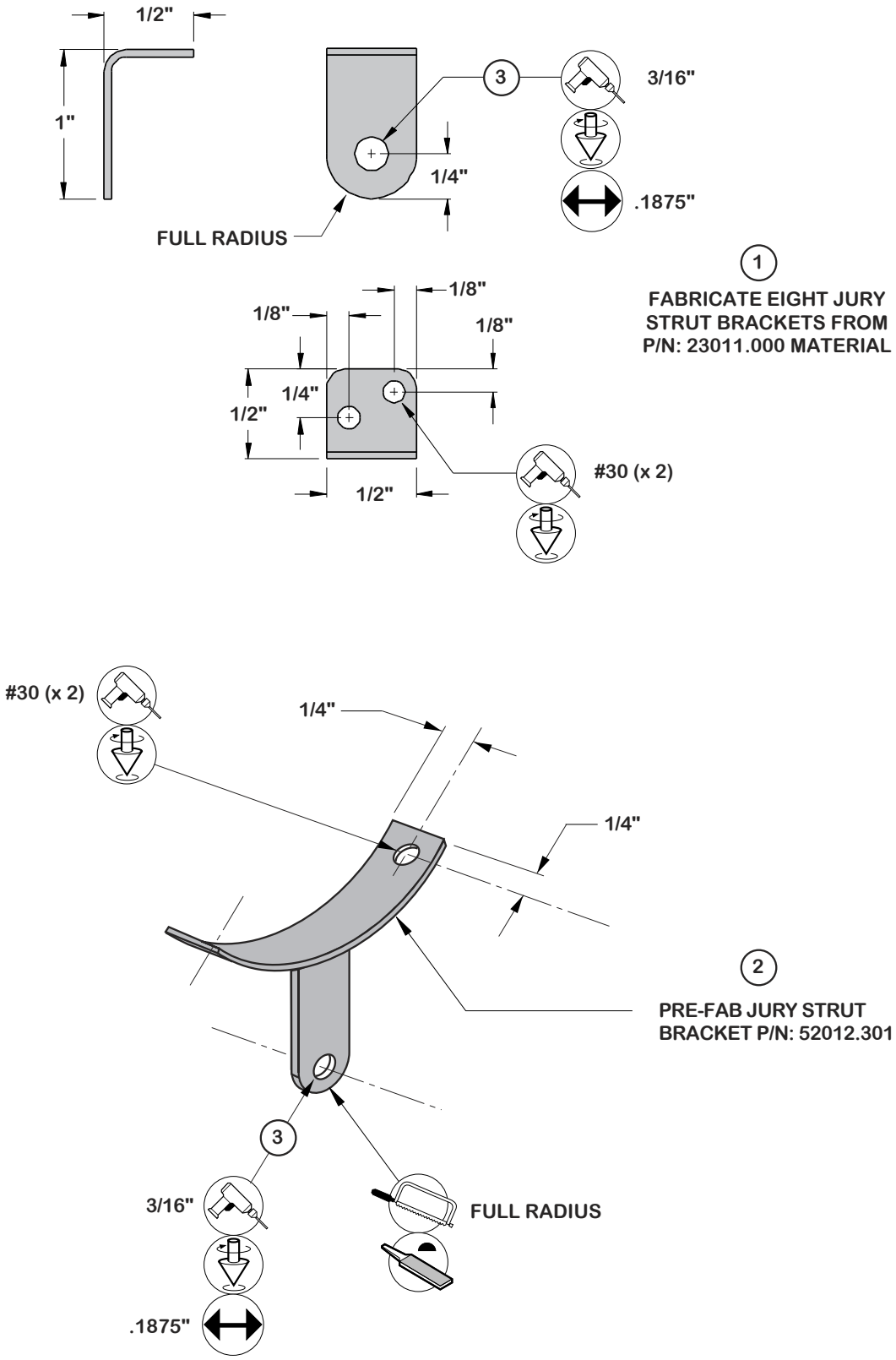


Figure F-1
Jury Strut Bracket Fabrication

NOTE

The wings must be installed on the fuselage in order to properly position and install the jury struts.

3. Match-drill the flanges of each P/N: 22911.000 clamp with a #13 drill and ream to .1875". Bolt the jury strut brackets onto the upper end of each jury strut. The pre-fab brackets are positioned on the outboard side of the jury strut. (see Figure F-2, Detail "A"). Position the jury struts approximately 53" outboard from the root end of the rear spar and perpendicular to the front spars (as viewed from the front of the aircraft). Use large hose clamps to hold the jury strut brackets to the spars. Wrap pieces of masking tape around the lift struts to prevent the clamps from scratching the powder coating when fitting the jury struts. Slip a jury strut clamp onto each lift strut and bolt the lower ends of the jury struts to the clamps (see Figure F-2, Detail "B").

CAUTION

The jury struts must position the lift strut tubes so they are absolutely straight. Hold a length of string along the lift strut tubes to verify that the jury struts do not cause them to bow up or down, fore or aft. The aft, vertical tube of the jury struts must be aligned with the center of the rear spar tube and the center of the aft lift strut tube. The forward tube in the jury struts must be aligned with the center of the front spar tube and the center of the front lift strut tube.

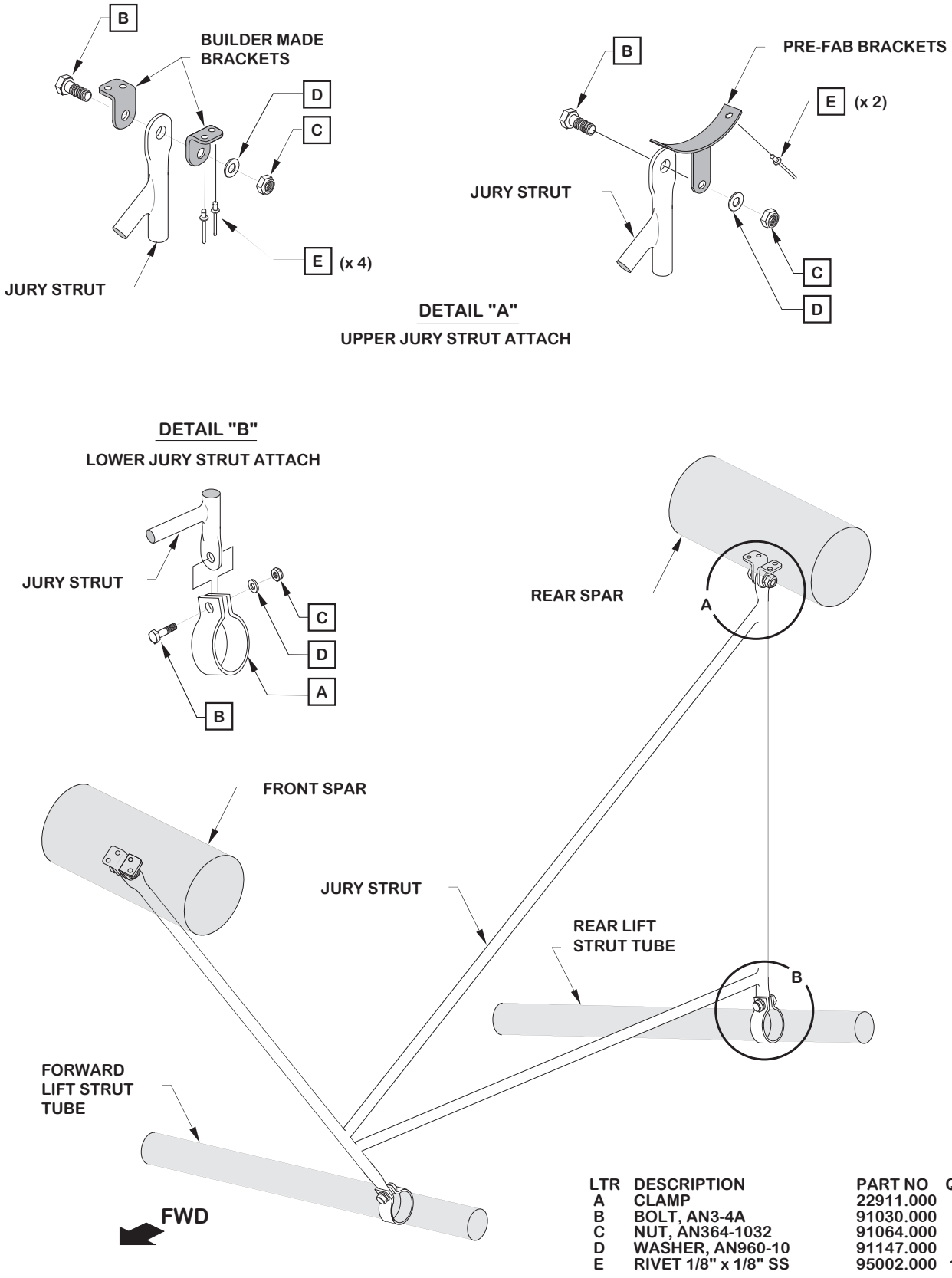
4. Adjust the jury struts until they are perpendicular with the floor of the fuselage. One method of aligning them is to level the fuselage longitudinally and laterally, hang a plumb bob from the spar in front of the jury struts, and visually align the jury struts with the string. It may be necessary to move the upper and lower ends of the jury struts inboard or outboard to properly position them. When you are satisfied with their position, drill through the jury strut brackets into the spars, installing clecos as you proceed. Remove the jury strut brackets and deburr all the holes. Bond prep the brackets and the wing spars using Scotch-Brite and clean with denatured alcohol. Bond the jury strut brackets in place with a structural adhesive/microballoons mixture and rivet as shown in Figure F-2, Detail "A".

5. Carefully measure and record the positions of the jury strut clamps on the lift struts for reassembly later.

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LTR	DESCRIPTION	PART NO	QTY
A	CLAMP	22911.000	4
B	BOLT, AN3-4A	91030.000	8
C	NUT, AN364-1032	91064.000	8
D	WASHER, AN960-10	91147.000	8
E	RIVET 1/8" x 1/8" SS	95002.000	16

Figure F-2
Jury Strut Installation

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Section G. False Rib Installation

As part of the standard quick-build wing that is included in your wing kit, the top false ribs are installed at the factory, with the exception of those between ribs #6 and #7. Those false ribs were not installed to facilitate the installation of the lift strut attach brackets. Once the lift strut attach brackets are installed, then those top false ribs can be installed.

CAUTION

Do not use pencil lead to mark the false rib locations on the wing spars. The graphite in the pencil lead can promote corrosion.

1. Use a fine point marking pen to make three marks on the stringers and front spars, equally spaced between the wing ribs.

2. Prep the front spar at each false rib location with Scotch-Brite and clean the spars with denatured alcohol. Finish sand the false ribs with 220-grit sandpaper.

3. Position the false ribs on the spar and stringer, making sure that the tops of the false ribs are even with the upper contour of the wing rib capstrips (you can temporarily secure the false ribs in place on the stringer with a small amount of super glue). When all the false ribs are in position, bond them to the spars and stringers with a fillet of structural adhesive/flox mixture. If you are installing the optional bottom false ribs, install only two false ribs between ribs #6 and #7, spaced evenly, adjacent to the lift strut bracket.

NOTE

If installing the optional bottom false ribs, install the bottom stringer per the instructions in Step 4, then repeat Steps 1 through 3 to install the bottom false ribs.

4. Slide the stringer through the slot in the wing rib webs leaving 6" inboard of the #3 rib and extend it $^{1}/_{4}$"-$^{3}/_{8}$" past the #10 rib web. Lightly clamp or tape the stringer against the bottom capstrip. Apply a small amount of structural adhesive in the rib web slots where it will mate with the stringer, then unclamp the stringer and push it into the round portion of the slots (towards the top capstrip). Use masking tape to hold the stringer in position. Apply a small fillet of adhesive around the stringers where they intersect the ribs and let the adhesive cure.

NOTE

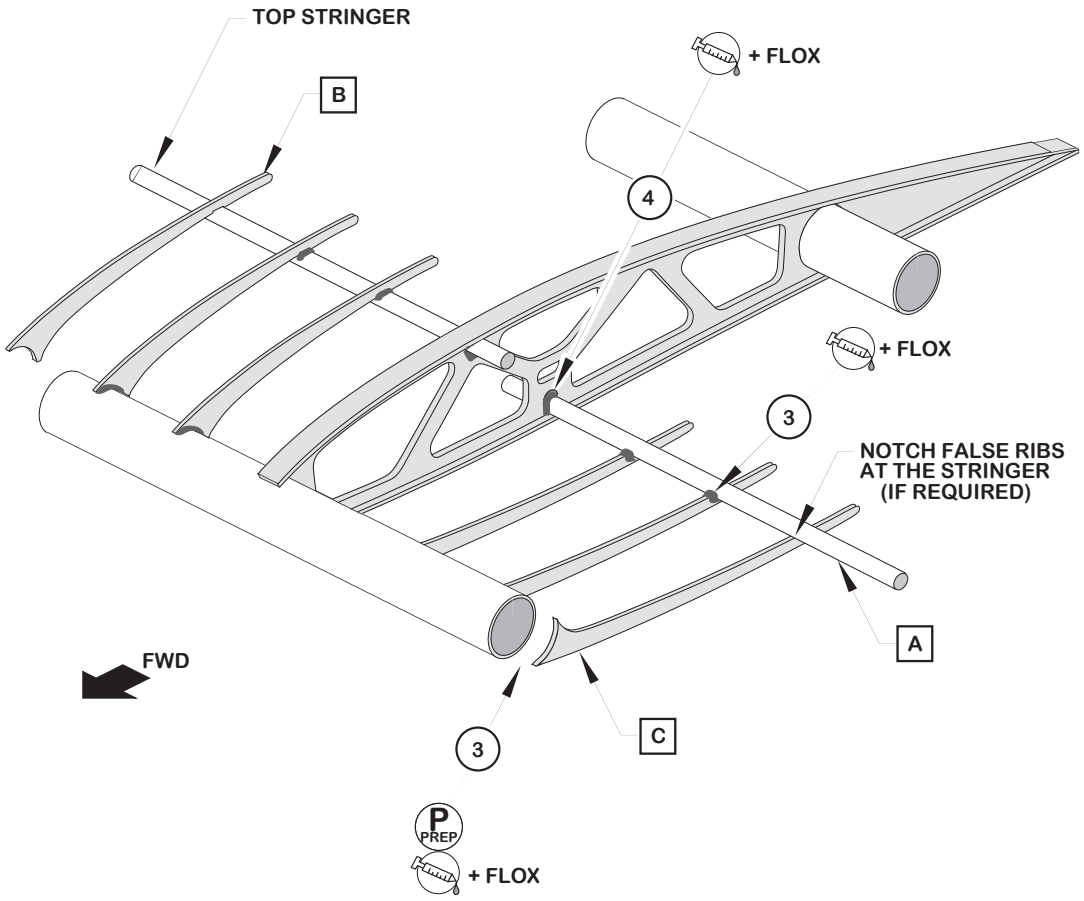
A very shallow notch filed on the false rib at the stringer allows a slight vertical adjustment of the false ribs to match the contour of the wing ribs, if necessary.

5. Lightly sand all the wood parts to prepare them for varnish, along with smoothing any sharp edges on the capstrips and false ribs where they will touch the fabric covering. Apply two or three coats of epoxy varnish to all the wood parts on the wings.

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LTR	DESCRIPTION	PART NO	QTY
A	ALUMINUM, 3/8 X .035 WALL	21902.000	
B	TOP FALSE RIBS	24006.000	
C	BOTTOM FALSE RIBS	24022.000	

Figure G-1
Stringer and False Rib Installation

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Section H. Fuel Tank Installation

This section of the wing manual describes the assembly and installation of the 13-gallon wing tanks. Note that the main difference between the left and right tank installations is that the right wing tank has an additional fitting for the header tank vent line.

CAUTION
The wing tanks should not be installed until the wings have been rigged for sweep, dihedral, washout, and the #1 ribs are installed.

1. Visually inspect the wing tanks for any damage. Gently press on the flanged areas and check for any cracks or delaminations in the fiberglass. Temporarily install the vent line fitting and a length of Tygon tubing onto the tank, and use packaging tape to seal all of the remaining holes (including the filler neck). Using LUNG POWER ONLY, blow into the Tygon tubing until the tape sealing the filler neck becomes crowned. Pinch off the Tygon tubing by folding it in half and clamping it together with a spring clamp (see Figure H-1). Spray all of the tank surfaces and seams with soapy water and visually inspect the tank for leaks. Gently press on the flanges again and look for any bubbles in the soap which might indicate a leak. If any leaks are detected in the tank, call Kitfox's Customer Service Department.

CAUTION
Tapping the tapered NPT fitting holes in the wing tanks too deeply can result in a hole that is oversized, which will not allow the fittings to seal properly.

2. Use a $^{1}/_{8}$" NPT tap to carefully clean the vent, drain, and sight gauge holes. Use a $^{3}/_{8}$" NPT tap to clean the fuel line fitting hole in the wing tank. Tape over all openings in the tank except the fuel filler opening with strapping tape. Fill the tank with a minimum one-quart of clean acetone and slosh it around inside the tank. Drain the acetone out through a paint filter and inspect the filter for any contaminants. Repeat the procedure with clean acetone until no contaminants are present and the acetone drains clear. Remove the tape and allow the tank to dry thoroughly. Tape over the openings in the tank until the it is ready to be installed. Cut a small slit in the filler cap tape to allow the pressure to vent.

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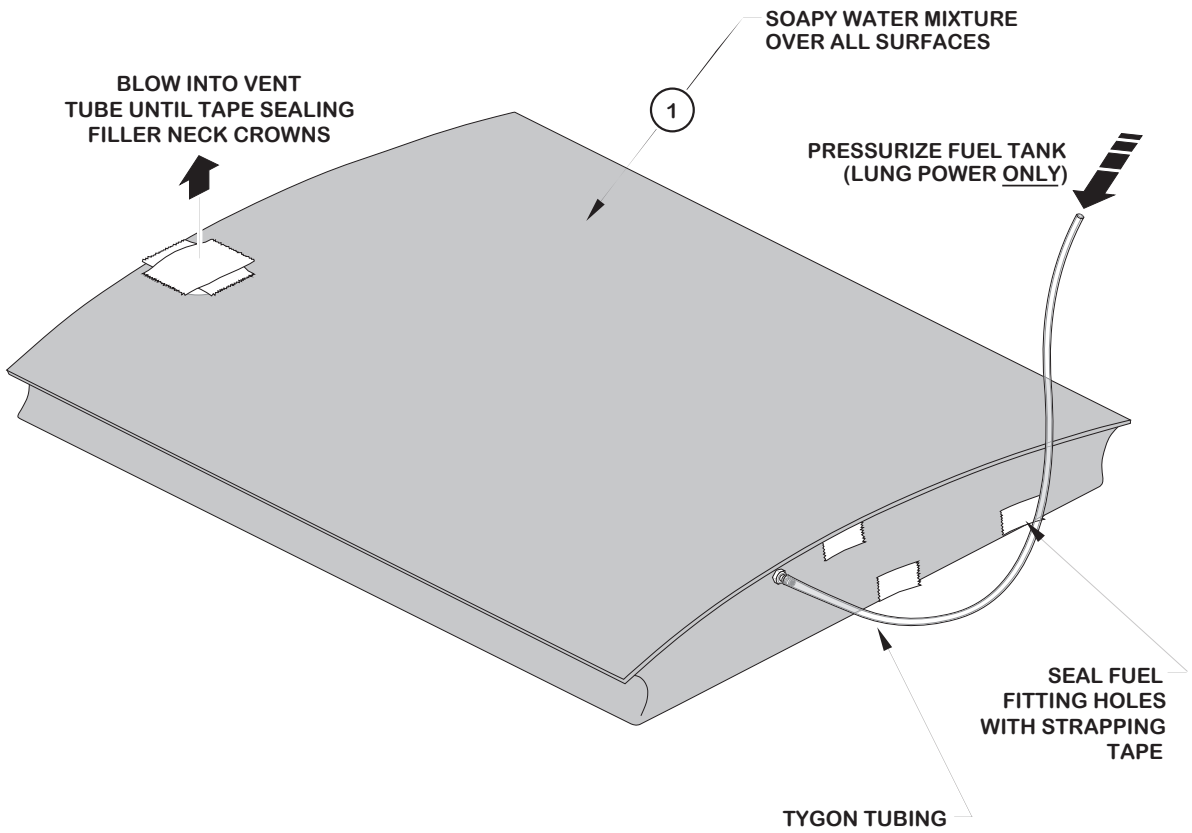


Figure H-1
Fuel Tank Pressure Test

CAUTION

Use a quality thread sealant that is impervious to gasoline on all fittings being threaded into the fiberglass wing tanks.

3. Thread the sight gauge fittings and the vent line fitting (right tank only) into the wing tank. The vent line fitting is installed in the forward-most hole in the right wing tank (see Figure H-2). Thread the finger strainer fitting into the $^{3}/_{8}$" hole in the tank and install the fuel line fitting into the finger strainer. Make sure to use thread sealant on all of the fittings. Only tighten the fittings until they are snug- overtightening can damage the threads in the tank!

NOTE

The quick-drain fitting will be installed in the bottom of the wing tanks AFTER the wings have been covered with fabric and painted.

4. Notch rib #1 to allow adequate clearance for the $^{5}/_{16}$" fuel lines and clamps near the rear spar. (The butt rib may also need to be notched for the fuel lines.) A $^{3}/_{8}$" sanding drum on a Dremel tool will work well for this step.

NOTE

Varnish the inboard side of the #3 rib and the outboard side of the #1 rib proir to installing the fuel tank

CAUTION

Use only the alcohol-based silicone adhesive provided with the kit to install the wing tanks. Ammonia-based silicone adhesives can promote corrosion on the aluminum spars.

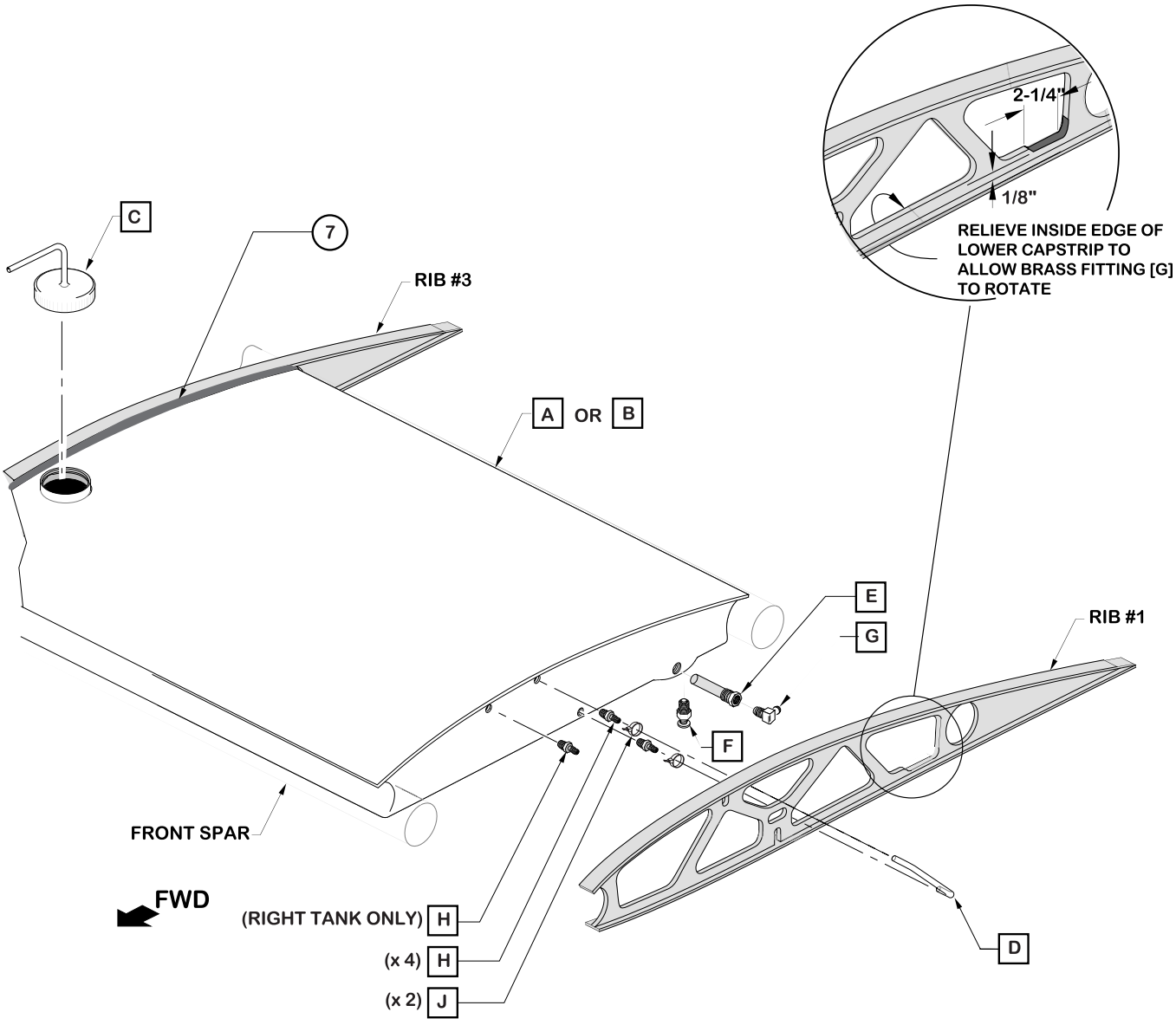
6. Bond prep the spars and wing tanks at their mating surfaces using Scotch-Brite on the spars and 220-grit sandpaper on the tanks and clean with denatured alcohol. Run a bead (approximately $^{3}/_{8}$" diameter) of the silicone adhesive on the wing tank where the tank mates with the front and rear spars. Use a wavy, or zigzag, bead pattern. DO NOT run the beads spanwise along the tank -the wavy silicon bead allows air to flow into the cavity and cure the silicon. Slide the tank onto the front spar first, then rotate the tank down onto the rear spar. Lightly clamp the tank to the spars and allow the adhesive to cure overnight.

7. Apply structural adhesive between the top cap strip and wing tank edge for the #1 and #3 rib.

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LTR	DESCRIPTION	PART NO	QTY
A	FUEL TANK, LEFT	10091.000	1
B	FUEL TANK, RIGHT	10090.000	1
C	FUEL CAP, VENTED	27012.000	2
D	SIGHT GUAGE TUBE	9007C.000	2
E	FINGER STRAINER	23013.000	2
F	QUICK DRAIN FITTING	24012.000	2
G	BARBED ELBOW, 5/16"	94002.000	2
H	FITTING, BARBED	94014.000	5
J	ZIP TIE, 4"	96003.000	4

Figure H-2
Fuel Tank Installation

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8. Cut the sight gauge plates out of the P/N: 12015.101 aluminum sheets provided. The top and bottom edges of the plates should be shaped so that they fit snugly between the inner faces of the rib #1 capstrips (see Figure H-4). Drill two $^{1}/_{2}$" holes in the plate and shear the plate into two pieces along the centerline of the holes. Temporarily install the sight gauge tubes into the fittings in each tank and position the sight gauge plates onto the #1 rib webs and around the sight gauge tubes. Shape the holes in the plates to fit around the tubes. Allow a slight gap between the tube and plate to prevent the plate from cutting into the plastic tube.

CAUTION

Use a drill stop when drilling the eight $^{7}/_{64}$" holes through the plate and the rib web so you do not inadvertantly drill into the side of the tank.

9. When you are satisfied with the position and fit of the sight gauge plates, clamp them in place and match drill eight $^{7}/_{64}$" holes through each plate and rib web (see Figure H-5). Remove the plates, deburr the holes, and smooth any rough edges. Prep and paint the plates before installation, if desired.

CAUTION

Do not overtighten the screws holding the sight gauge plates to the wing ribs.

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10. Fasten the two halves of the sight gauge plates to the root ribs with eight 4R x 1/4" THA screws.

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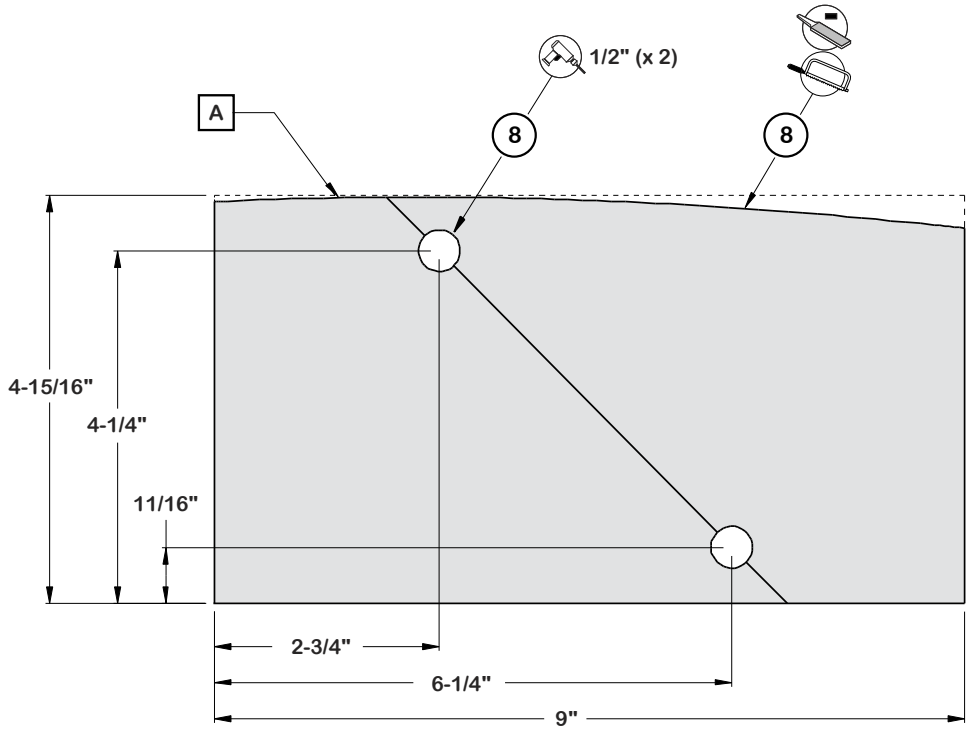


Figure H-4
Sight Gauge Plate Fabrication

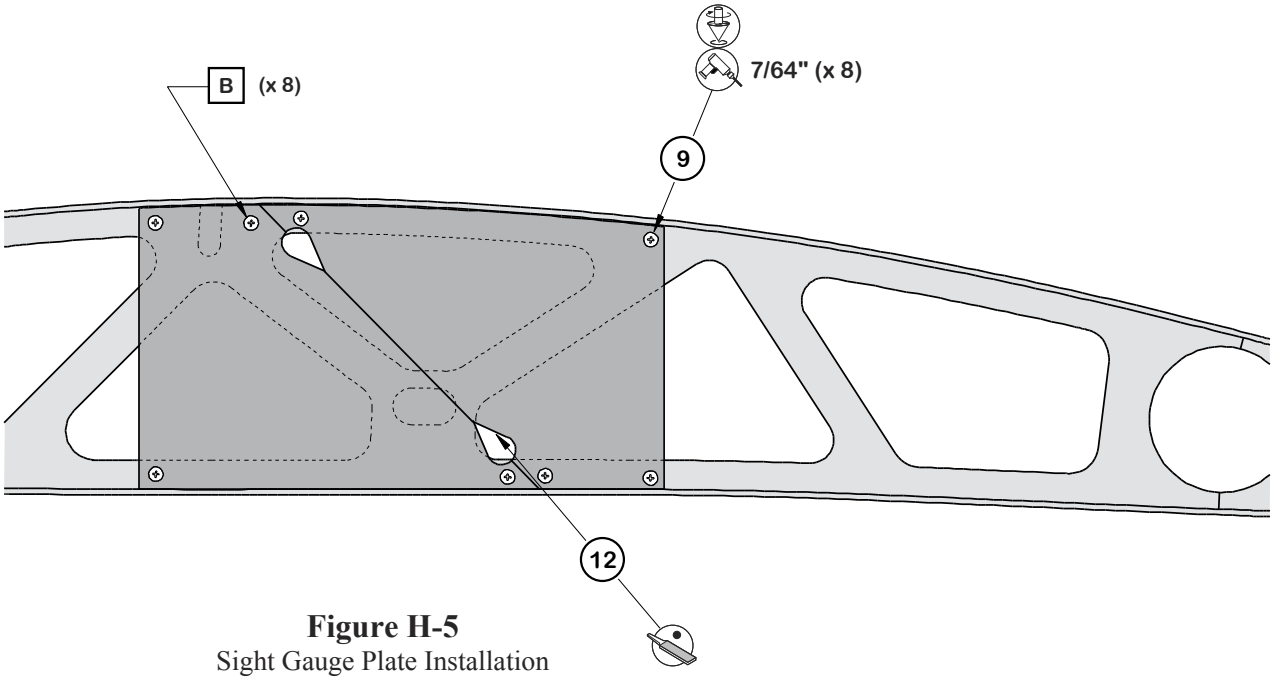


Figure H-5
Sight Gauge Plate Installation

LTR	DESCRIPTION	PART NO	QTY
A	ALUMINUM SHEET	12015.101	2
B	SCREW, 4R x 1/4" THA	91286.000	16

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13. Trim the partial rib (rib #2) to fit around the aft edge of the fuel tank. Make sure the rib butts up against the top lip of the wing tank and is fit snugly against the rear spar. Fabricate three to four shims out of scrap stringer material that can be placed between the fuel tank and the bottom rib capstrip. Fabricate the shims so that the partial rib bottom capstrip conforms to the airfoil profile of ribs #1 and #3. Bond the partial rib to the rear spar and the shims to the fuel tank with structural adhesive thickened with flox. Tape the rib in place while the adhesive cures, making sure that the rib is seated tightly against the rear spar and aligned with the capstrips of ribs #1 and #3.

14. Fabricate four end rib braces out of wood spacer material to fit between the wing tank and rib #1 (these braces will reinforce rib #1 against the pull of the fabric covering). Bond the braces, two on the top and two on the bottom, to the wing tank and rib #1 with structural adhesive (see Figure H-7, Detail "A").

15. Fabricate six optional bottom false ribs for installation underneath the wing tanks. These false ribs can be made by modifying the standard bottom false ribs supplied with the wing kit. Fabricate small plywood shims to fit between the wing tank and the false ribs so that the false ribs conform to the airfoil profile on the bottom of the wing. Bond the false ribs to the wing tank with structural adhesive thickened with flox. Tape the ribs in place while the adhesive cures.

16. Some light filing or sanding may be necessary to taper the sharp edges of the wing tanks so they will not contact the fabric covering. Use body filler to create a smooth transition between the wing tanks and the front spars.

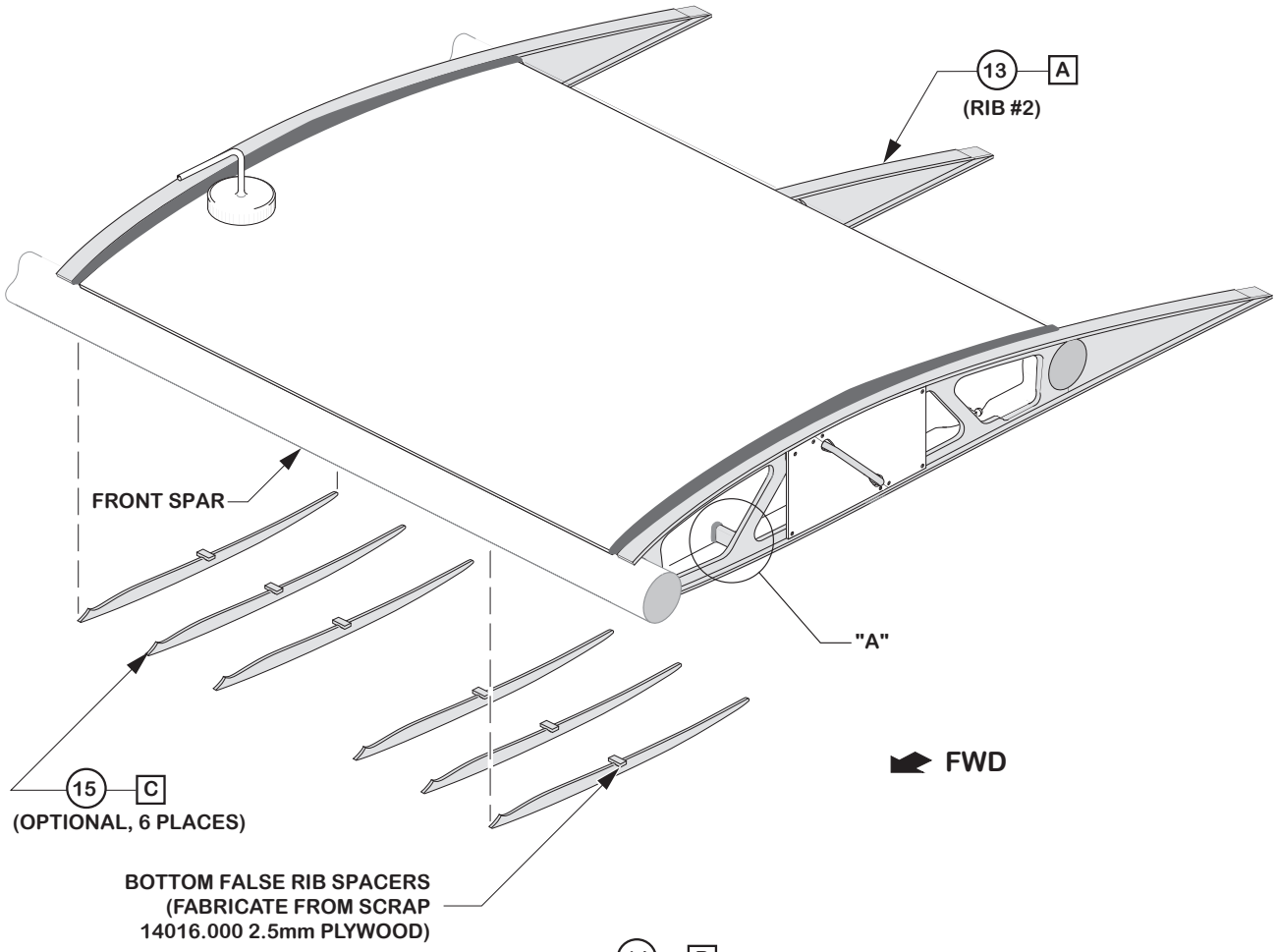
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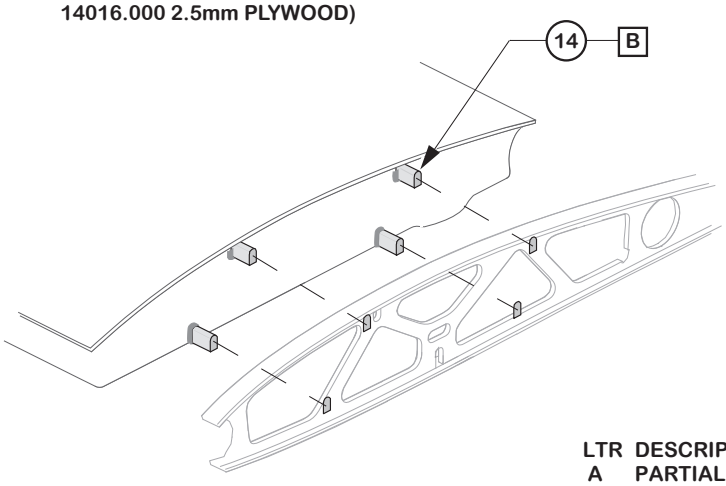
The sight gauge calibration marks will be installed onto the sight gauge plate AFTER the fuel tanks have been calibrated during final assembly of the aircraft.

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DETAIL "A"

LTR	DESCRIPTION	PART NO	QTY
A	PARTIAL WING RIB	27023.000	1
B	WOOD SPACER MATERIAL	10611.102	14"
C	FALSE BOTTOM RIB	24022.000	6

Figure H-7
Fuel Tank Installation

Section I. Trailing Edge Installation

1. Trim the trailing edge pieces to fit between ribs #1 and #3 on each wing. The outboard end should butt up against the adjacent trailing edge piece at the centerline of rib #3. The inboard end should be flush with the inboard side of the capstrips of rib #1. The upper and lower surfaces of the trailing edges should fit flush with the rib capstrips, with the forward "lip" of the trailing edge facing up and notched to fit around the wing ribs.

CAUTION

Do not install any rivets into the trailing edges at the odd-numbered rib locations. The trailing edges of the wing at the odd numbered ribs will be riveted in place with the flaperon hanger brackets after the wing has been covered with fabric.

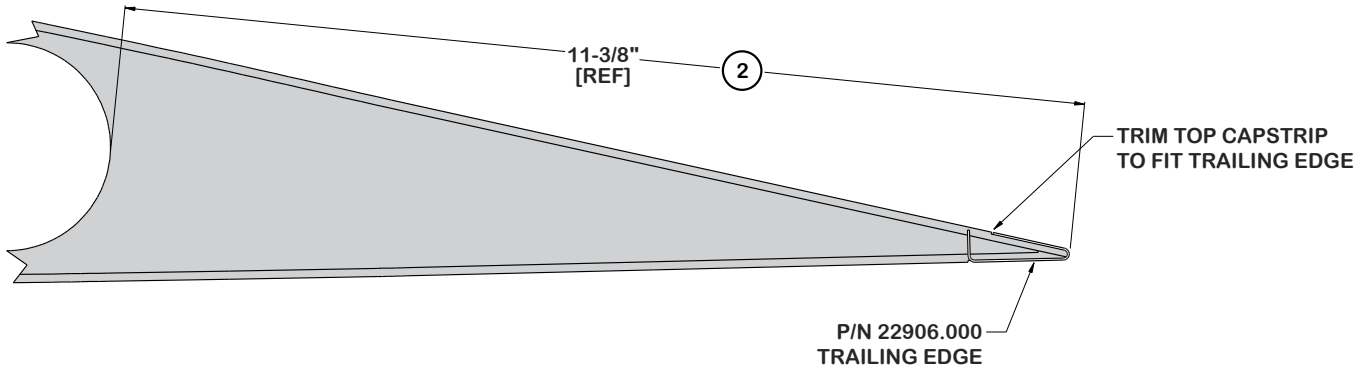
2. Set the distance from the aft edge of the trailing edge to the aft edge of the rear spar to 11-$^{3}/_{8}$", which will match the trailing edge pieces already installed (see Figure I-1). You may have to file or trim the ribs slightly in order to properly fit the trailing edge to the wing. To make sure that the trailing edge is straight, stretch a length of fishing line or string down the length of the wing and position the trailing edge so that it is in line with the installed trailing edge pieces. Clamp the trailing edge to the ribs and drill two #40 holes through the trailing edge and into rib #2, one on the top and one on the bottom, on opposite sides of the rib web (see Figure I-1) Remove the trailing edge and deburr the rivet holes. Rough up the mating surfaces of the trailing edge with Scotch-Brite where they meet the wing ribs and clean with denatured alcohol before installation.

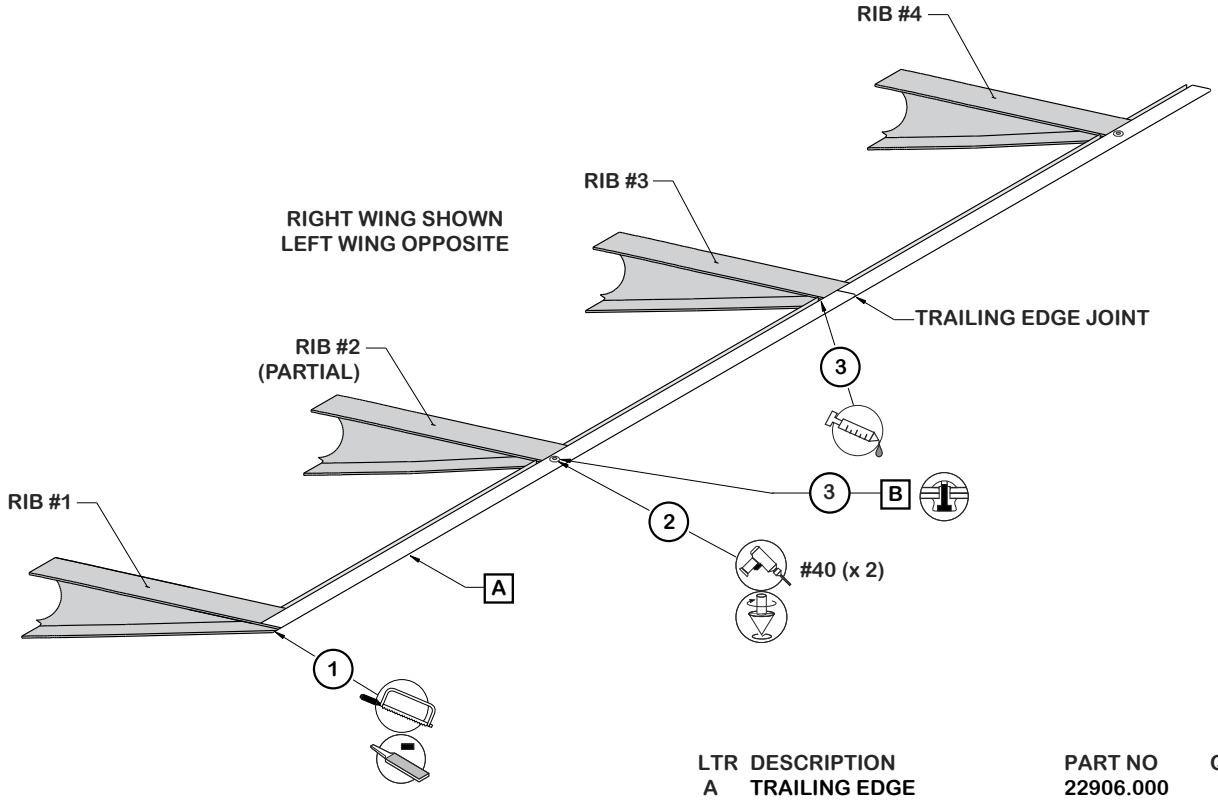
3. Prepare a small batch of structural adhesive and bond the trailing edge pieces to the ribs. **Do not add flox to the adhesive** - this could prevent the trailing edge pieces from fitting flush up against the wing ribs and prevent proper installation of the flaperon brackets. Trowel a thin fillet of adhesive inside and against the bottom sides of the trailing edge. Make sure to fill any voids between the rib capstrips, webs, and the trailing edge. Recheck the trailing edge with the fishing line or string to make sure it is straight, and clamp in place. Rivet the trailing edge to rib #2 with $^{3}/_{32}$" x $^{1}/_{8}$" aluminum rivets and allow the adhesive to cure.

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LTR	DESCRIPTION	PART NO	QTY
A	TRAILING EDGE	22906.000	2
B	RIVET, 3/32" x 1/8" AL	95001.000	4

Figure I-1
Trailing Edge Installation

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Section J. Leading Edge Installation

1. Glue the full-size leading edge template (see P/N: 82035.101 template sheet) onto a piece of plywood or scrap aluminum and cut and sand to the proper shape.

CAUTION

The leading edge extrusion is not symmetrical. Use Figure J-1 as a guide to determine the correct orientation on the spar.

2. Sand the concave mating surfaces of the **leading edge extrusion** with 80-100 grit sandpaper and clean with denatured alcohol. Bond prep the mating surface area of the **spars** with Scotch-Brite and clean with denatured alcohol.

3. Set the wings on saw horses right-side up. Trim the plastic leading edge extrusion to fit around the forward lift strut attach brackets on the front spars. The leading edge should be flush with the outboard end of the rib #10 capstrip and flush with the root end of the spar tubes (a little extra material extending past the spar ends is acceptable - it can be trimmed flush after the adhesive cures). Use the template to position the leading edge on the spar and secure its upper edge to the spar with masking tape.

NOTE

A method of holding the leading edge extrusion in place is to run 1" masking tape lengthwise along the upper spar/leading edge seam from tip to root. The masking tape should overlap the spar and leading edge evenly along the seam line. This creates a "hinge" that allows the leading edge to pivot out of the way for trimming at the lift strut attach bracket. It also keeps the leading edge extrusion straight and keeps the adhesive from squeezing out during the bonding process. This same method can be applied to the bottom seam line after the excess adhesive has been cleaned off.

4. Turn the wing upside down on the saw horses. Mix a batch of structural adhesive to bond the leading edge extrusion to the spar. Apply the adhesive to the mating surfaces. Position the leading edge on the spar and tape the bottom edge in place. Wrap tape around the leading edge and spar every foot or so to pull the leading edge tight up against the spar. Clean up any excess adhesive that may squeeze out with denatured alcohol. Allow the adhesive to cure.

Completion Date

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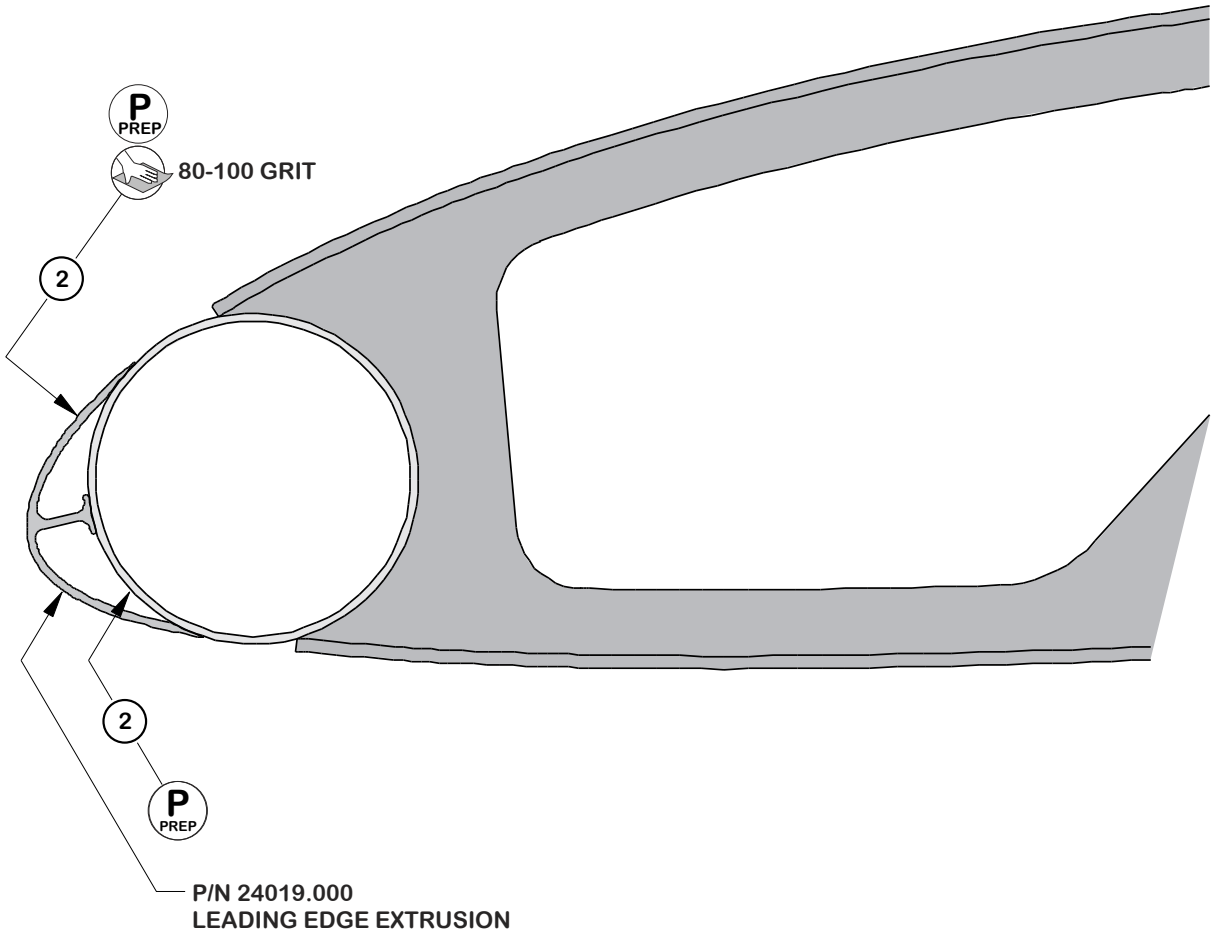


Figure J-1
Leading Edge Installation

WARNING

Do not sand or file the wing spars. Use aluminum tape to cover and protect the spars while you are sanding.

Completion Date

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68. Use Super-Fil or structural adhesive mixed with microballoons to create a smooth transition from the rib capstrips to the front spars and from the front spars to the leading edge (see Figure J-2). Use the leading edge template as a reference to make sure that the leading edge and rib capstrip transitions conform to the airfoil section of the wing. Re-varnish the rib capstrips if necessary.

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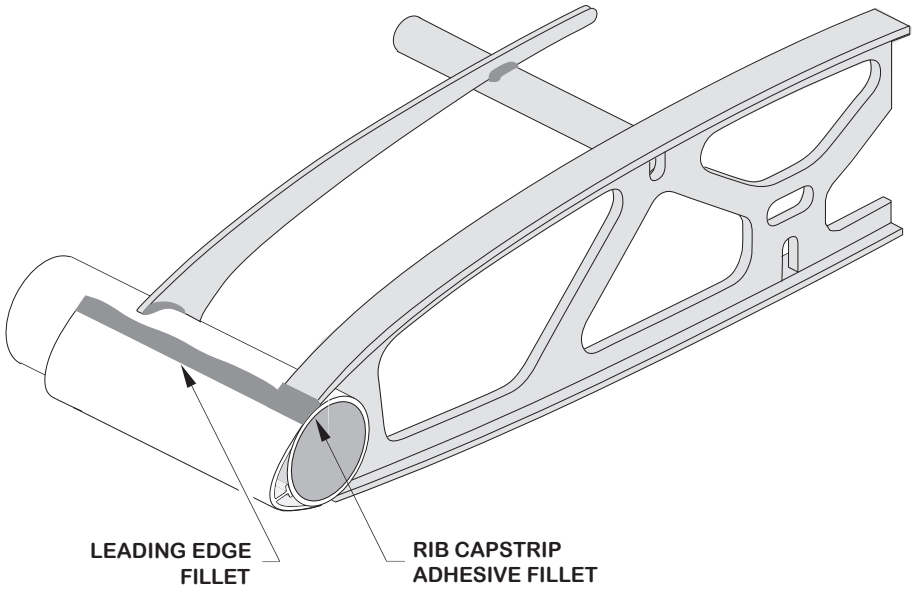


Figure J-2
Wing Ribs/Leading Edge/Spar Transition

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Section K. Wingtip Installation

1. Cut the aluminum strips for attaching the wingtips to length for installation on the outer edges of the rib #10 capstrips. The strips must be cut into two pieces to fit around the rear spar. The front of the strips should be located as far forward as possible near the intersection of the rib capstrips and the front spar. Extend the aft edge until it is just short of the trailing edge of the rib (see Figure K-1).

2. Layout a rivet hole pattern with 2" spacing along the outboard edge of the capstrips on the rib. Clamp the aluminum strips to the inside of the capstrips and drill through both with a #30 drill, clecoing as you proceed. Due to the curvature of the rib, you will find it easier to start at one end and work your way along the capstrip. Remove the attachment strips, deburr, and prep and paint the parts as needed. Carefully countersink the capstrips on the wood ribs for the flush head pop rivets.

NOTE

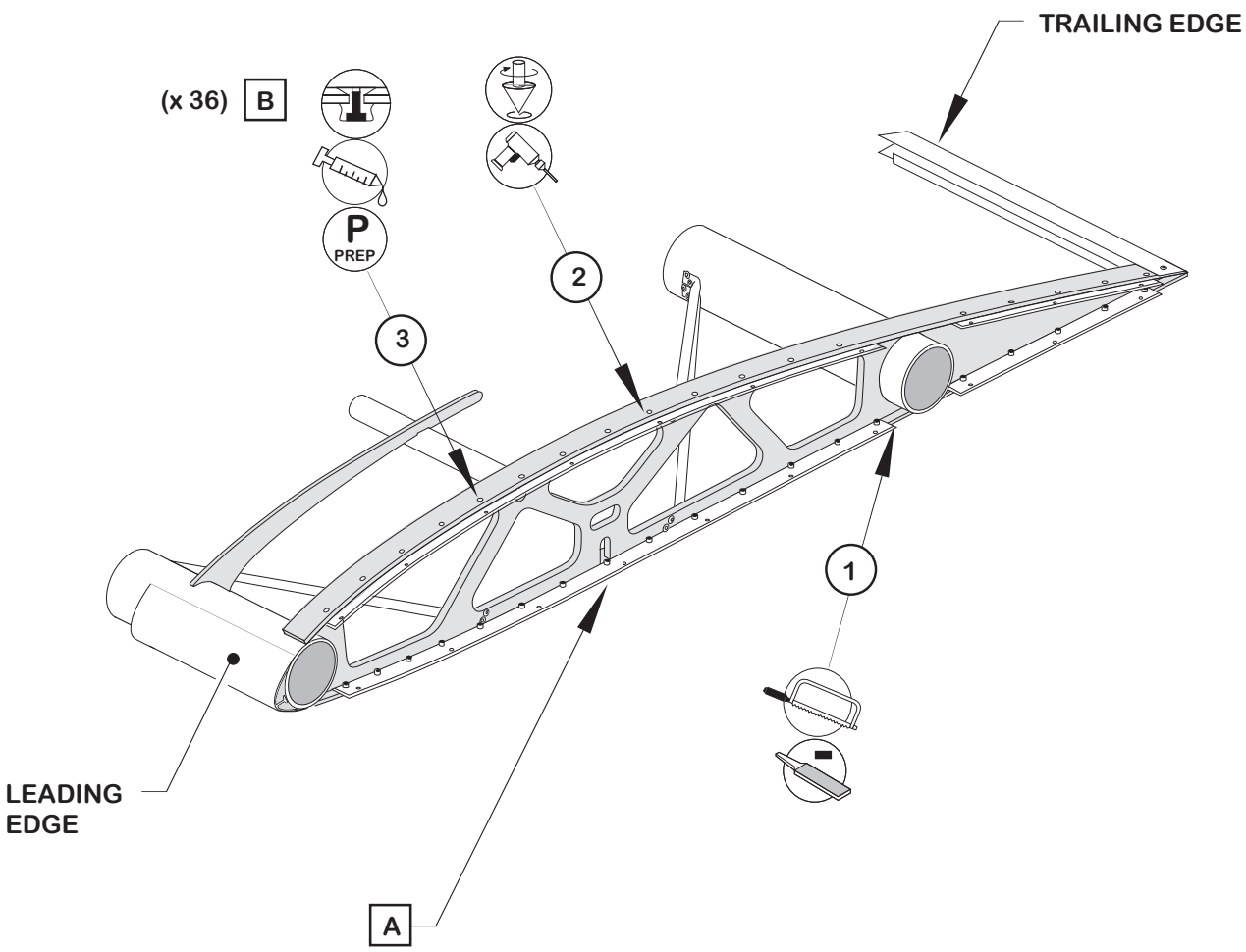
The attachment strips will not be riveted to the wings until the wings have been covered with fabric.

3. Rivet the attachment strips after the wing has been covered with fabric and heat-shrunk, but before the finishing tapes are applied. Attach the aluminum strip with structural adhesive and flush head pop rivets, as shown in Figure K-1.

Completion Date

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LTR	DESCRIPTION	PART NO	QTY
A	ALUMINUM	22913.000	4
B	RIVET 1/8 x 1/4 AL	95012.000	72

Figure K-1
Attachment Strips Installation

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4. Place a length of masking tape along the inboard edge of the scribe line on the top surface of the P/N: 27019.000 (right) and P/N: 27020.000 (left) fiberglass wing tips. The masking tape improves the visual clarity of the scribe line. Trim the **top** of each wing tip along the scribe line. This cut should extend from the middle of the leading edge to the tip of the trailing edge. A pair of shears or a large fiberglass-reinforced cutting disk on a Dremel tool work well for doing this step.

5. Clamp the tops of the wingtips on to the upper aluminum attachment strips. Make sure that the leading edge of each wingtip is even with the leading edge of the wing and that the upper surface of the wingtip is flush with, and butted up against, the rib capstrip. Lay a long straight edge across the tops of the last two wing ribs and the wingtip and adjust the top of each wingtip so that it is even with the ribs. When it is in the correct position, clamp the lower surface of each wingtip to the lower attachment strip. Use a fine-point marking pen to mark the **inboard** edge of the rib capstrip onto the inside of the lower surface of each wingtip. Measure outboard one inch from this line and make a second line. Trim the lower surface of each wingtip to this second line.

6. Reposition the wingtip and mark the location of the ends of each strip. Remove the wingtip and layout a screw pattern using 4" spacing. Replace the wingtip onto the wing and drill a #40 hole at each location marked through both the wingtip and the aluminum strip. Start at one end and work your way to the opposite end, clecoing as you go. Remove the wingtip and deburr the holes.

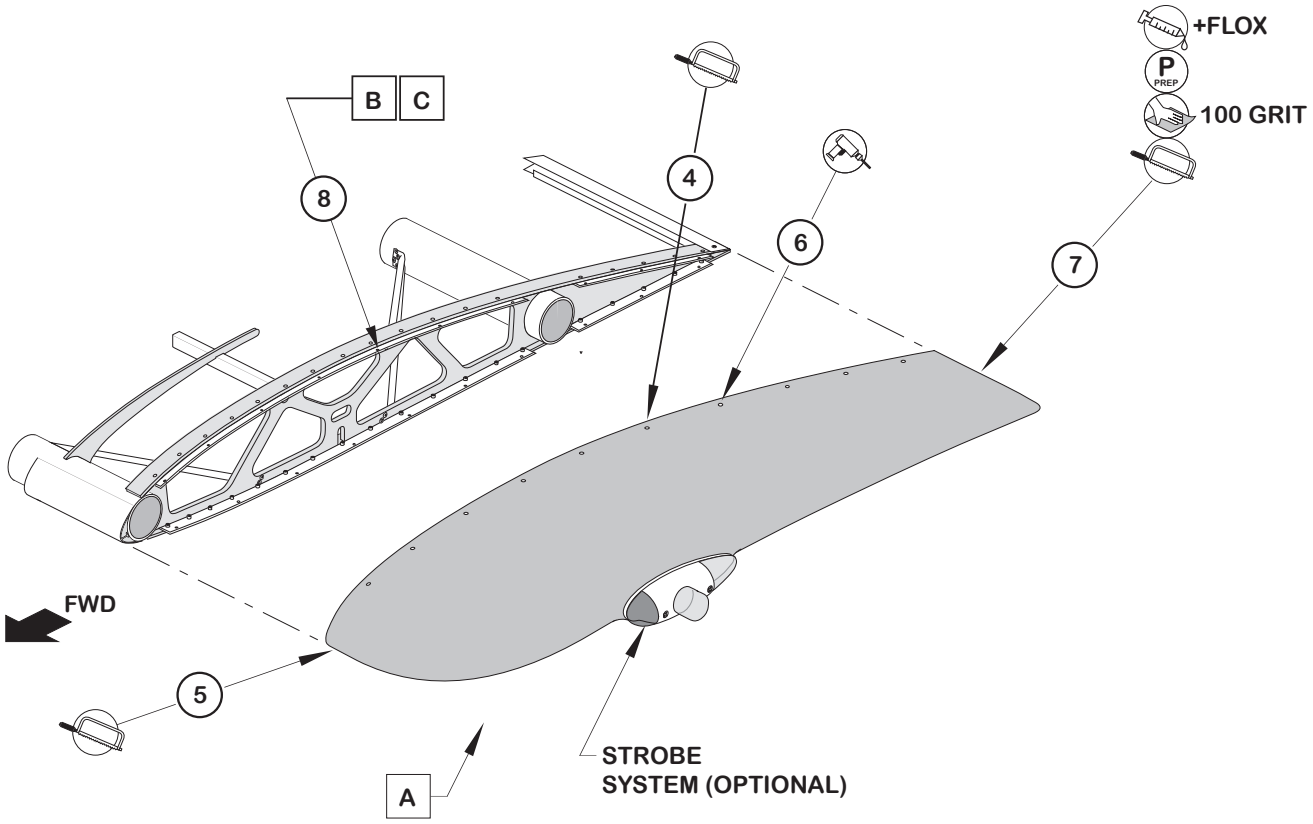
7. With the wingtip clecoed to the wing, mark a cut line for the trailing edge of the wingtip. Use a long ruler to extend the line of the trailing edge of the wing onto the wingtip. Remove the wingtips and trim the trailing edge of the wingtips along the cutline and sand smooth. Bond prep the mating surfaces of the wingtip trailing edge with 100-grit sandpaper and clean with denatured alcohol. Apply structural adhesive mixed with flox to the two halves, and clamp and bond in place. Use two pieces of wood between the wingtips and clamps to maintain a straight edge while the adhesive cures.

8. Install the nutplates to the aluminum wing tip strips accordingly.

Completion Date

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LTR	DESCRIPTION		PART NO	QTY
A	WING TIPS	RIGHT	27019.501	1
		LEFT	27020.502	1
B	NUTPLATE MS21047L08		91204.000	40
C	RIVET SOLID AN426AD3-4		91100.000	80
D	SCREW AN526832R10		91118.000	40
E	WASHER AN960-8		91252.000	40

Figure K-2
Wingtip Installation

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Section L. Fabric Reinforcement Plates Fabrication

NOTE

If you purchased the optional Pre-Fab Kit (P/N: 64829.000), some of the parts used in this section have already been made for you. Some of them may appear slightly different or may be installed in a different manner than shown here. Refer to the instructions which are supplied with that kit for specific details.

1. Set one wing upside down on the sawhorses and remove the jury and lift struts (if installed). Fabricate two front and two rear reinforcement plates from the P/N: 54019.000 aluminum sheet. Use the patterns from the P/N: 82035.101 template sheet as a guide for the outline of the plates (see Figure L-1). Drill four $^{3}/_{16}$" holes in each plate and use a pair of small hand snips or a sheet metal nibbling tool to shape the plates to fit over the lift strut brackets on the wing.

2. File the edges of the plates to remove any sharp edges that might cut into the fabric. Gently bend and shape the front reinforcement plates so that they conform to the shape of the wing. It is important that the fabric on the wing dictates the shape of the plates. Prep the plates by roughening with Scotch-Brite on the face that will contact the fabric when installed and clean the plates with denatured alcohol. You may also alodine the plates, if desired.

NOTE

These plates will be glued to the inside surface of the bottom wing fabric before the top wing fabric is installed during the covering process.

Completion Date

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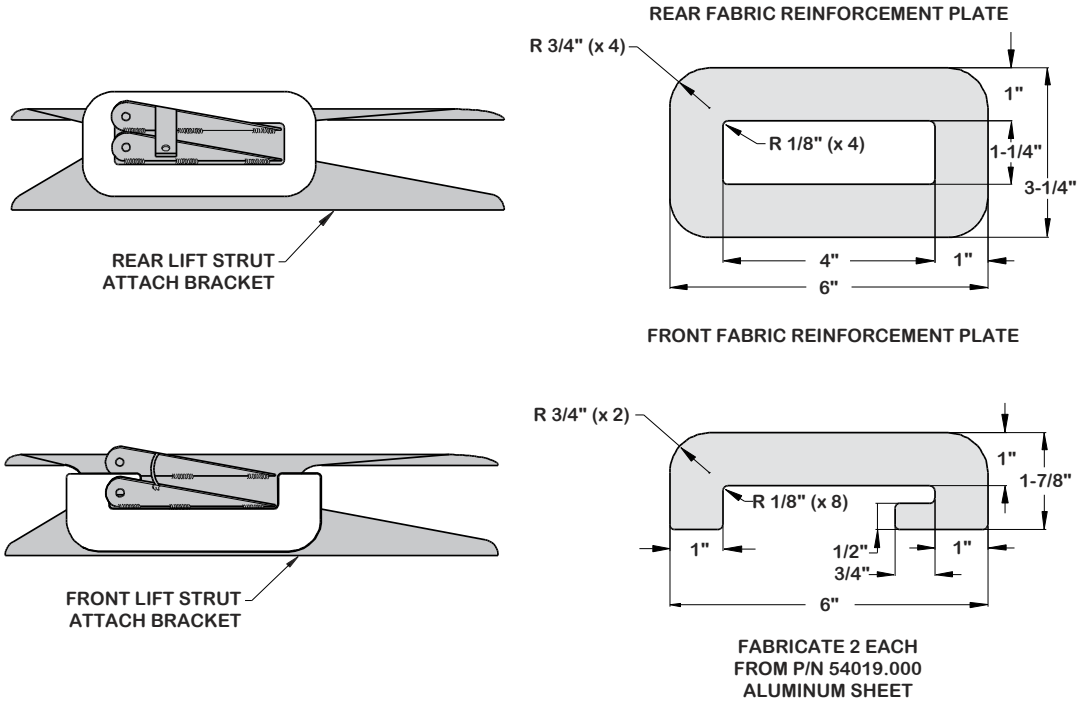


Figure L-1
Fabric Reinforcement Plates

Section M. Pitot Tube Installation

1. Begin the installation of the pitot tube by bonding the mounting plate at the junction of rib #7 and the bottom stringer on the left wing using structural adhesive. Place the plate on top of the capstrip and butt it against the stringer. If you did not install the bottom stringer, bond a section of stringer material to the rib long enough to support the mounting plate.

2. Drill a 7/16" hole in the mounting plate for the bulkhead union fitting. Install the fitting from the bottom up (with the mounting nut on the top side of the plate) and tighten the mounting nut.

3. Form a piece of small aluminum tubing to connect the fitting to the pitot tube hose. Connect the two parts with a small piece of tygon tubing and zip ties. See Figure M-1 Detail A.

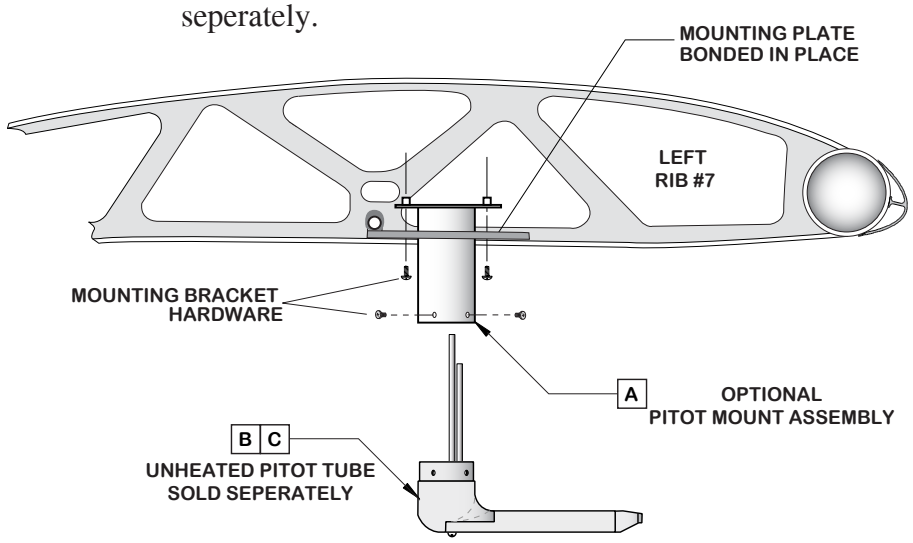
4. Route the black plastic tubing from the union fitting through to the outboard wing, into the rear spar, and toward the fuselage. Coil the excess tubing at the root end for now to keep it out of the way as you complete the assembly, covering, and finishing of the wing.

Completion Date

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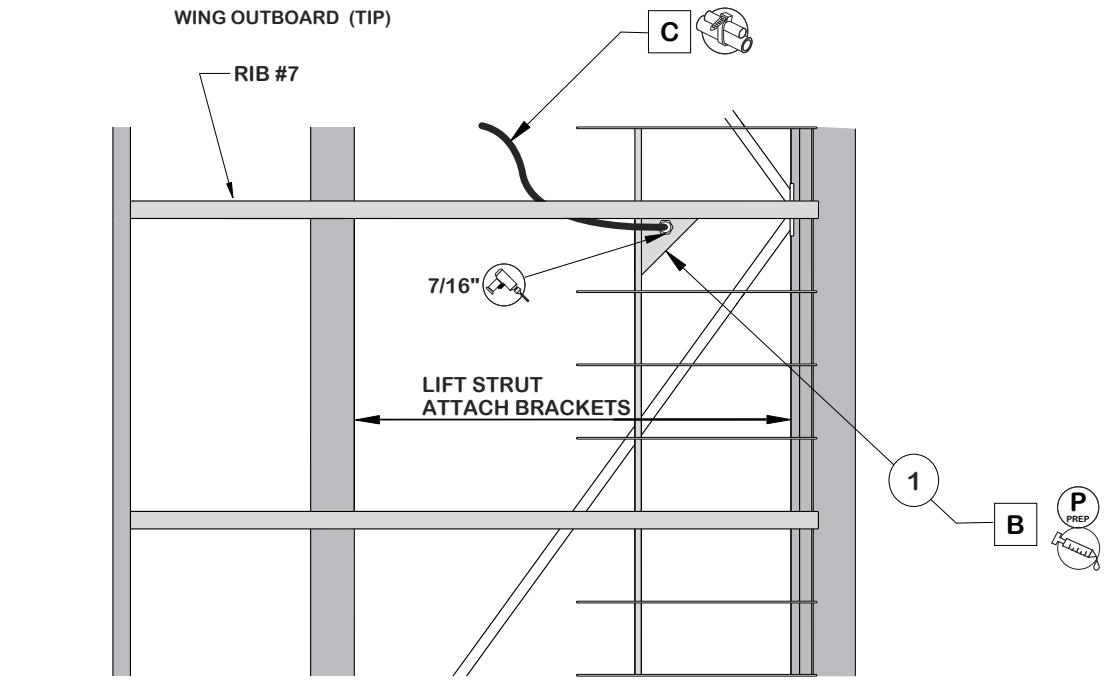
Optional Pitot Tubes

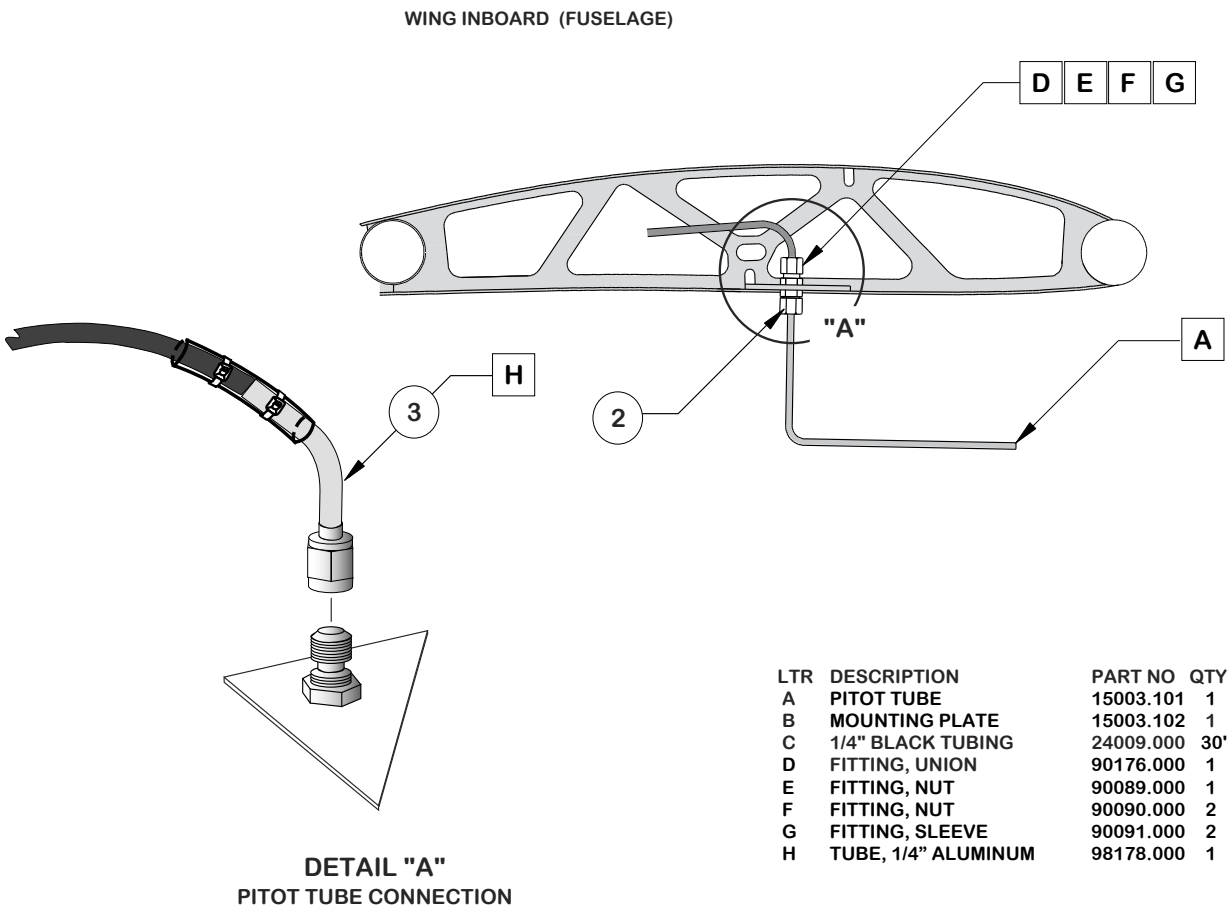
There are many different types of pitot tubes available today.
Dynon Avionics, Advanced Flight Systems and Garmin EFIS equipment share a similar design that also have the built in utility of Angle of Attack (AOA). The installation of these pitot tubes is very different and should be accomplished prior to covering the wings. We have a kit for the installation of this type of pitot in the Kitfox wing.
Part Number: 98231.000. The unheated pitot tube is also available and sold seperately.



LTR	DESCRIPTION	PART NO	QTY
A	PITOT TUBE MOUNT ASSEMBLY	98231.000	1
B	GARMIN PITOT TUBE GAP26	98233.000	1
	OR		
C	DYNON PITOT TUBE	98232.000	1

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LTR	DESCRIPTION	PART NO	QTY
A	PITOT TUBE	15003.101	1
B	MOUNTING PLATE	15003.102	1
C	1/4" BLACK TUBING	24009.000	30'
D	FITTING, UNION	90176.000	1
E	FITTING, NUT	90089.000	1
F	FITTING, NUT	90090.000	2
G	FITTING, SLEEVE	90091.000	2
H	TUBE, 1/4" ALUMINUM	98178.000	1

DETAIL "A"
PITOT TUBE CONNECTION

Figure M-1
Pitot Tube Installation

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CAUTION

Do not use oils with aromatic solvents (ketones, aldehydes, naphthalenes) or chloride, acetate, or acrylate esters to lubricate the flaperons. Kitfox recommends using LPS-1 or AVL-2 oil to lubricate the flaperon bearings.

CAUTION

The white plastic film on the flaperon skin is a protective cover installed by the aluminum mill to prevent scratches in shipping. This covering can be left attached to the flaperon skin and peeled back as required. However, there have been cases of the plastic film hardening and becoming extremely difficult to remove when the flaperons have been stored for long periods of time.

CAUTION

Always support the flaperons with sandbags or blankets.

1. Drill #40 rivet holes on the trailing edge of the flaperons at approximately 8" intervals, spaced $^{1}/_{4}$" in from the trailing edge. Drill the rivet hole at the tip end of the flaperon approximately $^{1}/_{4}$" in from the end. Deburr the holes and rivet. If you have access to aircraft flush riveting equipment, you may wish to use $^{3}/_{32}$" solid, flush-head rivets on the trailing edge. Drill a $^{3}/_{16}$" drain hole in the bottom skin, aft of, and centered on, each flaperon hinge, $^{3}/_{4}$" ahead of the trailing edge of the flaperon. Refer to Figure N-1.

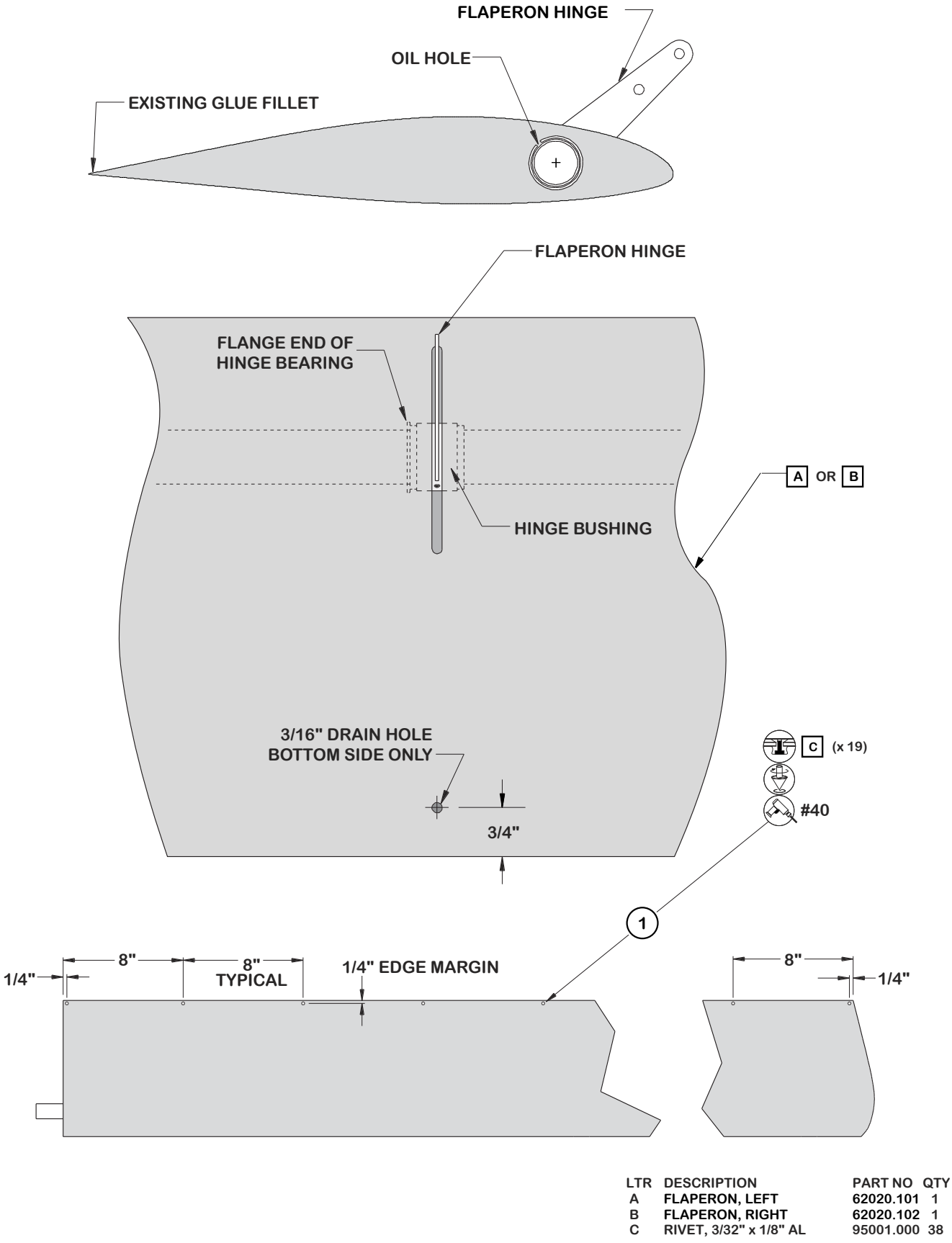
CAUTION

Do not drill or mar the upper flaperon skin when drilling the drain holes in the lower flaperon skin.

Completion Date

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LTR	DESCRIPTION	PART NO	QTY
A	FLAPERON, LEFT	62020.101	1
B	FLAPERON, RIGHT	62020.102	1
C	RIVET, 3/32" x 1/8" AL	95001.000	38

Figure N-1
Flaperon Drain Holes and Trailing Edge Riveting

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2. Place the P/N: 52010.301 and 52010.302 end ribs so that they are flush with the inboard end of the flaperon skins. You may have to file the aft tip of the ribs to obtain a proper fit in the flaperon. Lay out a rivet pattern for five evenly-spaced holes with a $^1/_4$" edge distance, as shown in Figure N-2. Match drill through the flaperon skin and end rib flange with a #40 drill, clecoing as you go. Remove the end ribs and deburr all the holes. Prep the end rib flanges and the inside face of the flaperon skins for bonding. Apply structural adhesive to the end rib flanges and install them with pop rivets as shown.

NOTE

Balsa wood may be used in lieu of foam for forming the flaperon tips.

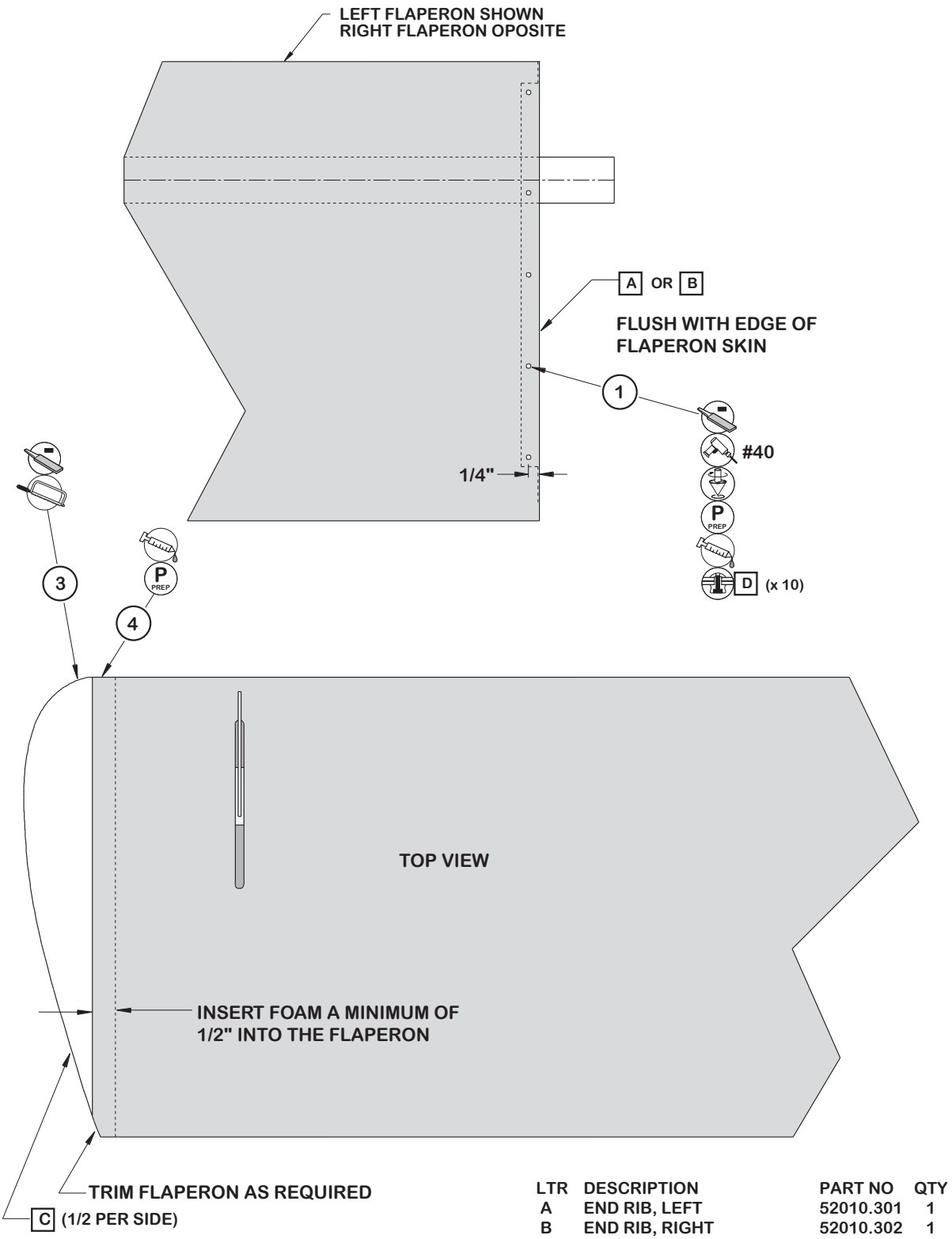
3. Cut the P/N: 24018.000 foam block in half lengthwise to form the two flaperon tips. Press the foam piece against the outboard tip of the flaperon to make an impression in the foam. Cut straight through the foam along the flaperon outline. Use a rasp and sandpaper to shape the foam as illustrated in Figure N-2 (you may also leave it flush with the end of the flaperon). Allow $^1/_2$" of foam to extend into the inside of the flaperon. Trim the corner of the flaperon trailing edge as shown in Figure N-2 to create a smooth transition to the flaperon tip.

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4. Mix a small batch of structural adhesive and bond the foam tips into the flaperon ends. Coat the mating surface of the foam tips with adhesive and slide them into the flaperon ends. Let the adhesive cure overnight, then coat the foam tips with a thin layer of structural adhesive to provide a good sanding base for the primer and paint.

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LTR	DESCRIPTION	PART NO	QTY
A	END RIB, LEFT	52010.301	1
B	END RIB, RIGHT	52010.302	1
C	FOAM BLOCK	24018.000	1
D	RIVET, 3/32" x 1/8" MONEL	90045.000	20

Figure N-2
Flaperon End Rib and Tip Installation

Section O. Mass Balance Weight Installation

1. Drill eleven #40 holes in each flaperon mass balance weight, as shown in Figure O-1, and deburr.

CAUTION
Use a drill stop when drilling through the center holes of the balance weights into the flaperon skin to avoid damaging the flaperon spar.

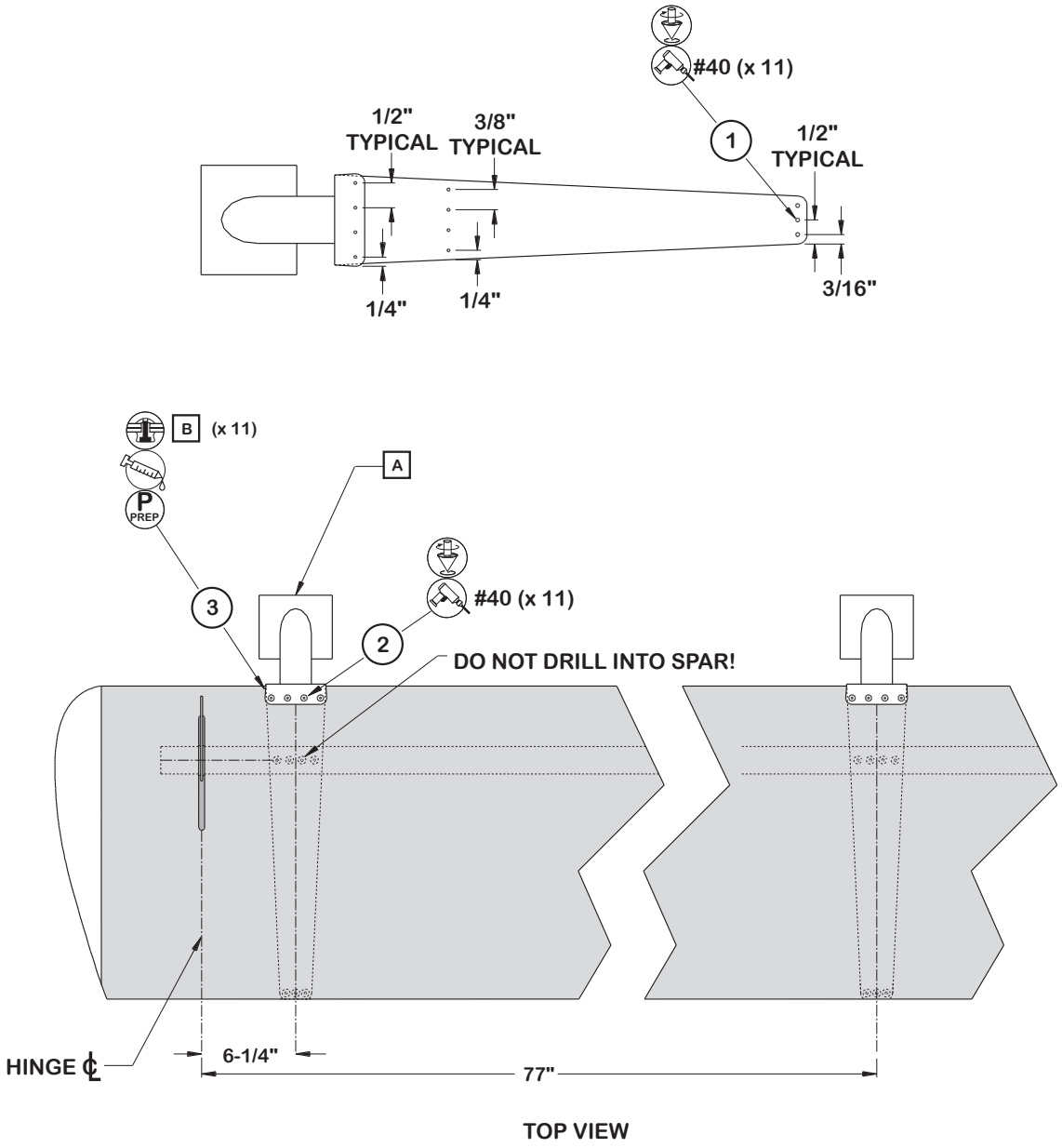
2. Mark the location of the mass balance weights on the top of the flaperon skin with a fine-point marking pen, as shown. Hold the balance weight tightly against the leading edge of the flaperons at the marked location, then match drill the four center holes with a #40 drill and cleco. Match drill the four holes near the leading edge, then drill the three holes at the trailing edge of the balance weights, clecoing as you drill. Repeat for each of the mass balance weights. Remove the weights and deburr all the holes in the flaperon skin.

3. Prep the mating surfaces of the mass balance weights and the flaperons for bonding inside the outline marked on the flaperon skin. Prepare a batch of structural adhesive with microballoons, and apply to the mass balance weights. Rivet the weights to the flaperon skins as shown. Clean up any excess structural adhesive with denatured alcohol.

Completion Date

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LTR	DESCRIPTION	PART NO	QTY
A	MASS BALANCE WEIGHT	25023.000	4
B	RIVET, 3/32" x 1/8" MONEL	90045.000	44

Figure O-1
Mass Balance Weight Installation

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Section P. Flaperon Control Horn Assembly

1. Cut two 12" and two 14" long pieces from 2" x 2" wood stock. Clamp two pieces together and drill through both with a $^1/_4$" bit, as shown in Figure P-1. Counterbore the outside of the holes so that a socket will fit over the head of a $^1/_4$" bolt. Countersink the holes deep enough to allow the head of a bolt and a $^1/_4$" nut to not protrude beyond the surface of the wood. Bolt the two halves of the fixture together with common $^1/_4$" bolts, nuts, and washers. The height of the fixture halves must be 1-$^1/_2$" $\pm^1/_{32}$" to allow proper rigging of the flaperon control horns. With the two pieces still bolted together, use a hole saw to make a hole that will allow the flaperon spar to fit in it. Place the fixture over the spar and trace the flaperon outline onto each clamping fixture, as shown. Make sure that the centerline of the flaperon is lined up with the seam line between the fixture halves. Disassemble the fixture halves and use a bandsaw to cut out the flaperon outline. Sand the wood smooth where it will contact the flaperon skin.

CAUTION

The bottom face and seam face of the bottom block of the clamping fixture must be parallel in order for the flaperon control horns to be rigged properly.

2. Attach a clamping fixture at each end of a flaperon and place the assembly on the workbench. Make sure that the flaperon fixtures are resting flat on the workbench, and support the flaperon mid-span with sandbags or towels.

Completion Date

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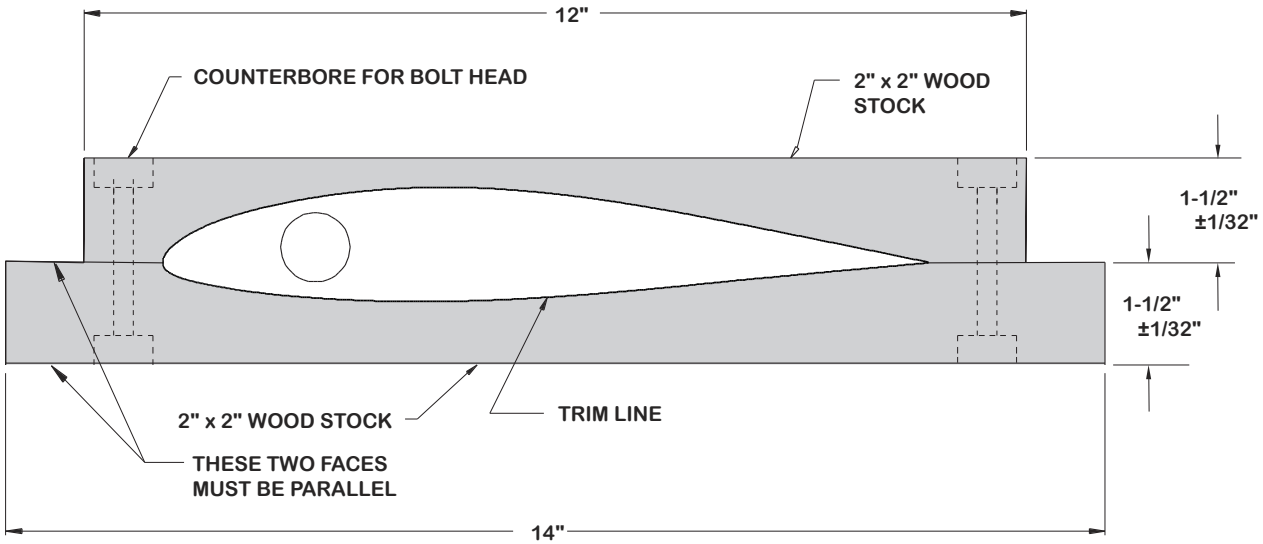


Figure P-1
Flaperon Clamping Fixture

3. Trim each P/N: 12045.201 nylon bearing until they are $^{13}/_{32}$" long, as measured from the flange (approximately $^{1}/_{2}$" overall length). Sand the cut edges smooth with 320-grit sandpaper and make sure that the P/N: 52015.101 flaperon hinges will rotate freely on the bearings (see Figure P-2).

4. Cut a slot in each P/N: 21001.000 retention ring (the slot allows the ring to be expanded and slipped on to the flaperon spar) and file the slot to remove any burrs or roughness.

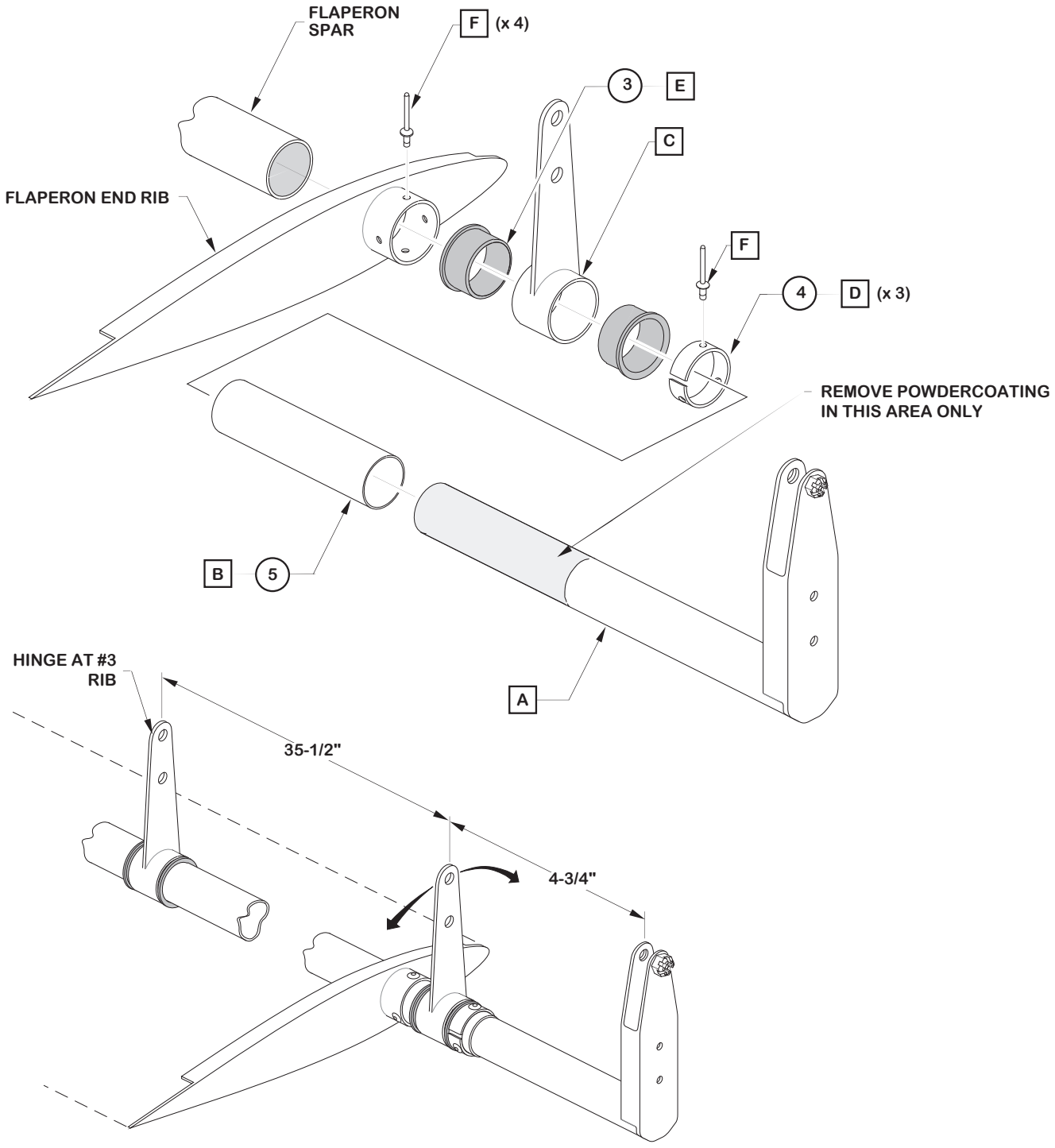
5. Deburr and smooth the ends of the P/N: 21002.000 shims. Check to make sure that the control horn will slide freely into the shim. You will probably have to remove some powdercoating to allow the horn to fit into the shim. To keep the shim and horn in place during assembly, remove only enough powder coating to allow the horn to be slid into place on the shim. Remove the powdercoating on the horn only where the shim makes contact (the outboard end of the shim should be flush with the outboard end of the horn). If bare metal is showing on the horn after sanding, paint the horn with epoxy metal primer to prevent rust. Ream the hole in the flaperon control horn arms to .1875", being careful not to let the reamer contact the threads of the welded on castle nut. You may need to use a 10-32 tap to remove any powdercoating on the threads of the nut.

6. Slide a nylon bearing, flaperon hinge, a second nylon bearing, and a retention ring onto the flaperon spar, as illustrated in Figure P-2. Allow $^{1}/_{32}$" clearance between the flaperon hinge and the shoulder of each nylon bearing. Slide the shim and control horn into place on the inside of the flaperon spar.

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LTR	DESCRIPTION	PART NO	QTY
A	FLAPERON HORN	25009.000	2
B	SHIM	21002.000	2
C	FLAPERON HINGE	52015.101	2
D	RETENTION RING	21001.000	2
E	BEARING, NYLON	12045.201	4
F	RIVET, 1/8" x 3/16" SS	95003.000	14

Figure P-2
Flaperon Control Horn and Rib #1 Flaperon Hinge Assembly

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NOTE

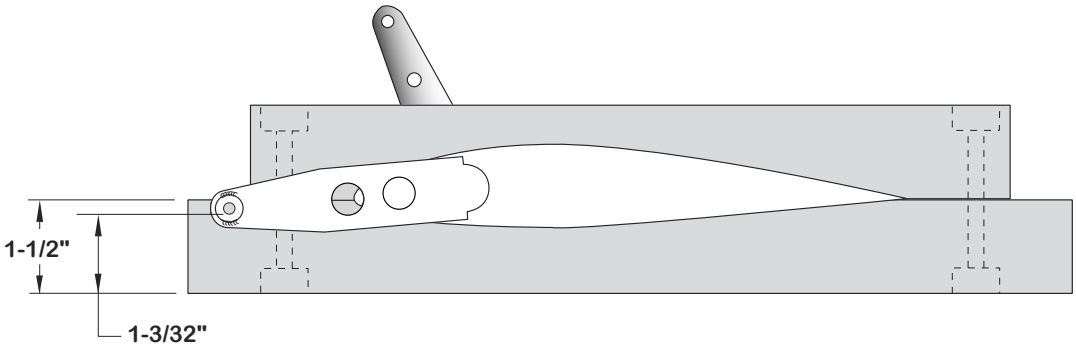
It is recommended that the riveting of the control horn assembly be left until after the flaperon and the control horn assembly parts are painted. This will keep the nylon bearings from becoming fouled with paint.

7. Adjust the angle of the flaperon horns in relation to the chord line of the flaperon as depicted in Figure P-3. Be sure to observe the distances between the lower edge of the flaperon control horn bolt hole and the workbench surface. Note also that the left-hand flaperon control horn might contact the workbench before the desired measurement is achieved. If this occurs, notch the workbench or shim the flaperon fixtures off the bench slightly to allow the flaperon control horn to move into its correct position (allow for the shim height in your measurement if using that process). When the control horns are in the correct position, match drill four #30 holes, equally spaced, through each end rib torque tube, flaperon spar, shim, and control horn tube, and cleco in place. Also match drill three #30 holes, equally spaced, through the retention ring, flaperon spar, shim, and control horn tube. Mark the parts with a fine point marking pen for reassembly later. Disassemble the flaperon control horn assembly and deburr the rivet holes in all the parts. Reassemble the parts of the flaperon control horn assembly in their proper positions and rivet, as shown in Figure P-2.

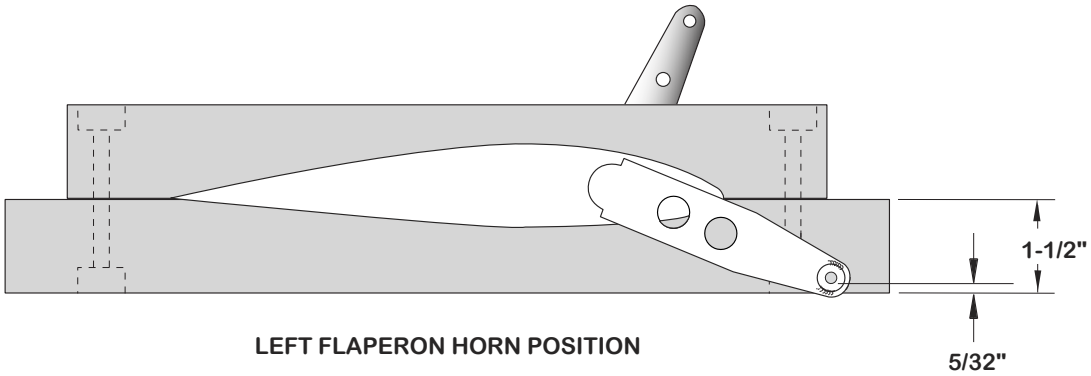
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RIGHT FLAPERON HORN POSITION



LEFT FLAPERON HORN POSITION

Figure P-3
Flaperon Control Horn Rigging

Section Q. Flaperon Hinge Bracket Installation

The flaperon brackets are composed of a left and right internal aluminum bracket bonded and riveted to the odd numbered ribs and a left and right external steel bracket riveted to the rib and internal bracket.

1. Drill the left side P/N: 12041.101 brackets to the approximate locations shown. Install the P/N: 12041.101 and P/N: 12041.102 rib reinforcing brackets onto ribs #1, #3, #5, #7, and #9 using the dimension shown in Figure Q-1. Use the left drilled brackets as drill guides to drill three #30 holes into the rib and right bracket. Attach these brackets to the rib using structural adhesive and P/N: 91348.000 $^1/_8$" x $^1/_2$" SS pop rivets. Make sure the brackets are up against the rib top capstrip.

2. Assemble four P/N: 12041.201 and P/N: 12041.202 flaperon brackets (two per wing) using the hardware shown in figure Q-1, however use P/N: 91147.000 AN960-10 washers in place of the flaperon at this time.

3. Measure the distance between the most inboard and most outboard hinges on each flaperon. This is the distance that the hinge brackets will need to be spaced between ribs #1 and #9 on the corresponding wing. It is important that the brackets be mounted parallel to one another to insure smooth operation of the flaperon. The two ribs are not necessarily parallel with one another, so you will need to determine the proper placement on each rib such that the bracket assemblies will be approximately centered on the top capstrip, parallel with each other, and the correct distance apart. Drill #30 holes and cleco the brackets to the ribs using the brackets as a drill guide. The aft hole in each bracket should be drilled all the way through the trailing edge structure.

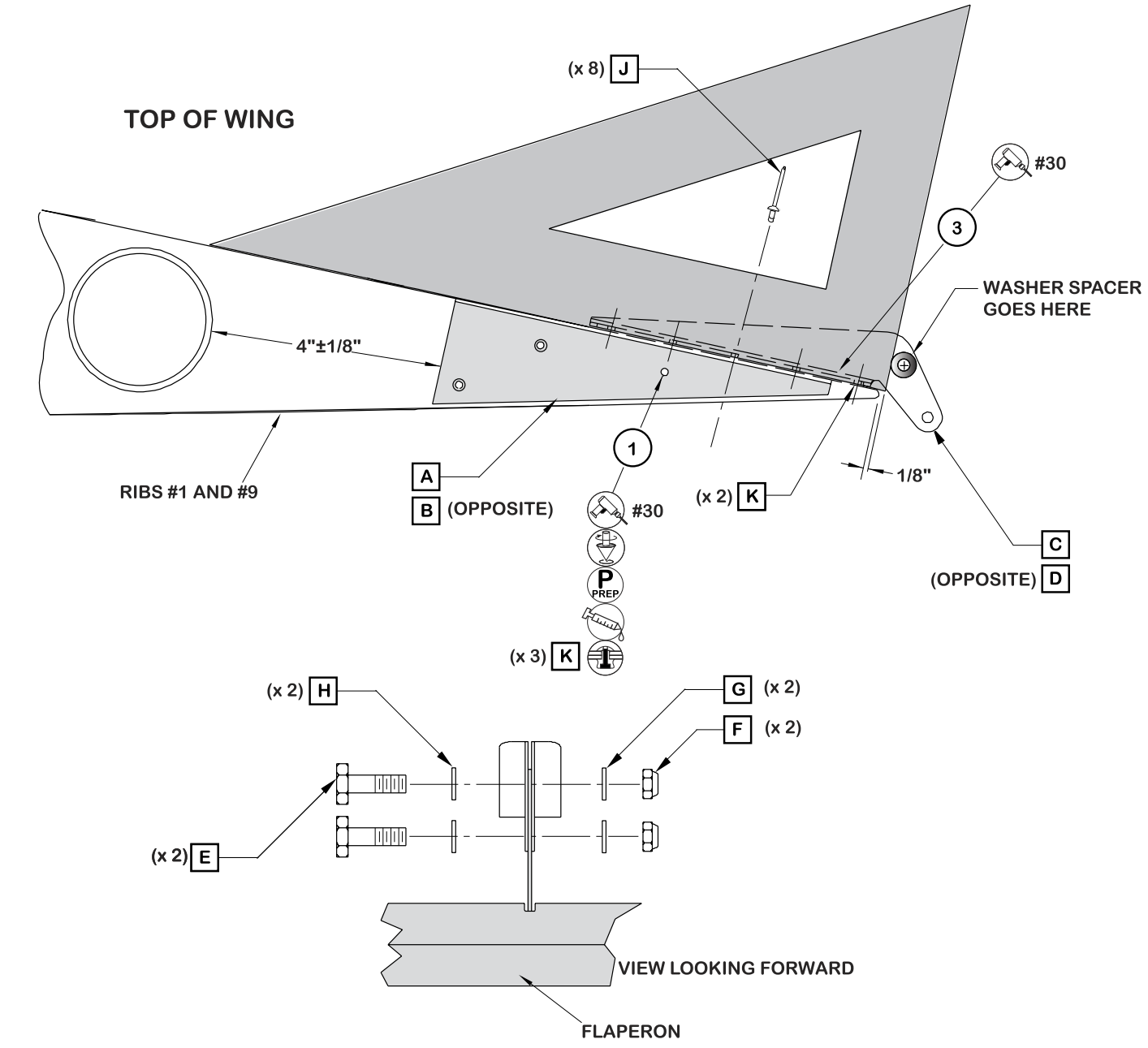
4. To determine the flaperon bracket positions for ribs #3, #5, and #7, attach the flaperon to the brackets clecoed to ribs #1 and #9. Attach the left and right flaperon brackets to the flaperon hinges. Place the brackets onto the ribs, keeping the brackets centered on the ribs. With the flaperon approximately level, drill and cleco the brackets to the ribs.

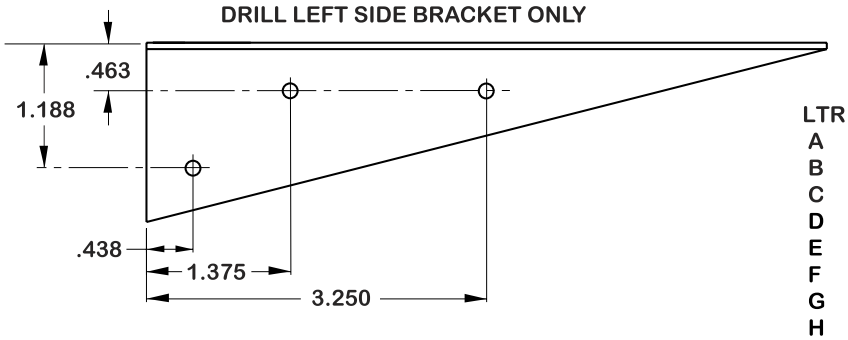
Completion Date

_____

5. The riveting of the brackets should be done **AFTER** the wing has been fabric covered using P/N: 95005.000 $^1/_8$" x $^3/_8$" SS rivets. The aft holes that go through the trailing edge will use P/N: 91348.000 $^1/_8$" x $^1/_2$" SS rivets.

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LTR	DESCRIPTION	PART NO	QTY
A	REINFORCING BRKT, LT	12041.101	10
B	REINFORCING BRKT, RT	12041.102	10
C	FLAPERON BRKT, LT	12041.201	10
D	FLAPERON BRKT, RT	12041.202	10
E	BOLT, AN3-4A	91030.000	20
F	NUT, AN364-1032	91064.000	20
G	WASHER, AN960-10	91147.000	10
H	WASHER, AN960-10L	91148.000	10
J	RIVET, 1/8" x 3/8" SS	95005.000	80
K	RIVET, 1/8" x 1/2" SS	91348.000	50

Figure Q-1
Flaperon Bracket Installation

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Section R. Final Wing Review

Swinging the Wings

With the wings and flaperons installed on the fuselage, swing the wings slowly aft. Be careful to rotate the flaperons so they clear the turtledeck tabs on the fuselage. When the flaperon approaches the vertical stabilizer, rotate the flaperon up 90°. **Do not** force the wing as it pivots aft. When the wing comes to rest (it will contact the fuselage where the root rib contacts the rear fuselage carry-through tube) mark the contact location of the carry-through tube on the root rib top capstrip. This area will need to be trimmed to allow the wing to pivot all the way back.

To lock the wings in place, Kitfox offers a wing lock-back brace that will connect the rear lift strut attach brackets to the fuselage.

Varnishing Parts

With the wings complete, varnish the wood parts using an epoxy varnish (recommended by Poly-Fiber). Use the directions in the Poly-Fiber manual supplied in your Cover and Finish Kit.

Protecting the Spars

If you are going to be using the aircraft in an environment that is corrosive or you would just like to have added protection, you can paint both the interior and exterior of the spars with an epoxy primer (recommended by Poly-Fiber). The interior of the spars should be degreased using denatured alcohol by plugging one end (a tennis ball works well as a plug), filling the spars with about a quart of alcohol, and then plugging the other end. With the help of an assistant, slosh the wing and drain. The epoxy can be applied the same way. The outside surfaces can be painted in a normal manner.

Storage

Storing the wings is best done by placing them vertically and hanging them on a wall using the REAR spar for support. Angle the wing slightly so any moisture (condensation) that might collect in the wing spars is allowed to run out and not pool. Try to keep direct sunlight from contacting the wings until they are covered.

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