# RV-14 PLANS CHANGES 04-15-13

#### **REVISION DESCRIPTION:**

Page: 01-01 REV 1: Section 40 "Emp Attachment" and Section 41 "Emp Fairings" were moved to the empennage kit and re-numbered "Section 11 Emp Attachment" and "Section 12 Emp Fairings".

All sections before Section 41 repaginated as required.

Added "Section 53 ACK ELT."

Page: 01-03 REV 1: Contents moved to a new Page 01-04.

Added a tail-dragger three view.

Page: 01-04 REV 1: "http://www.vansaircraft.com/public/builders-groups.htm" was "http://www.vansaircraft.com/public/buildgrp.htm"

Contents moved to Page 01-05.

Page: 01-05 REV 0: New Page. Added contents from Page 01-04.

Page: 01-06 REV 0: New Page.

Page: 02-01 REV 1: "RV-14 DESIGN OBJECTIVES" was "RV-12 DESIGN OBJECTIVES"

"the greatest success" was "greatest success"

"ever" was "every"

"RV-14's" was "RV-14s'

Page: 03-ALL REV 2: Changed entire section to add new tool list. Replaces RV-14 Section 3 and Common Section 3 with new universal Section 3.

Page: 04-ALL: Updated entire section to incorporate additions from RV-14 Empennage.

Page: 05-ALL: Entire section re-written.

ALL WING PLANS PAGES (11,12,13,14,15,16,17,18,19,20,21,22) MEMO All wing kit plans pages renumbered as two greater than their current number (for example all pages in Section 11 would become 13-XX).

Revision levels for pages with changes marked "MEMO" do not change.

Page 13-02 MEMO: Before Step 4, "CAUTION... Page 13-04, Figure 1." was "Page 11-04, Figure 1."

In Step 4, "Section 16" was. "Section 14".

In Step 5, "Section 20" was "Section 18".

Page 13-03 MEMO: "NOTE: Use Page 13-04, Figure 1" was "NOTE: Use Page 11-04, Figure 1"

In Step 1, "Except for holes already match-drilled on page 13-02, Step 4" was "Except for holes already match-drilled on page 11-02, Step 4".

In Step 2, "as shown on Page 13-05, Figure 1." was "as shown on Page 11-05 Figure 1."

In Step 2, "See Figure 1, Figure 2, and Page 13-04, Figure 1." was "See Figure 1, Figure 2, and Page 11-04, Figure 1."

"...at the root of the main spar assembly as shown on Page 13-05, Figure 1" was "...at the root of the main spar assembly as shown on Page 11-05, Figure 1."

Page 14-01 MEMO: In Figure, "MAIN SPAR ASSEMBLY (SEE SECTION 13)" was "MAIN SPAR ASSEMBLY (SEE SECTION 11)"

Page 14-03 MEMO: In Step 4, "See Page 14-08, Figure 1." was "See Page 12-08, Figure 1."

"...as shown in the isometric view on Page 14-01." was "as shown in the isometric view on Page 12-01."

"...Main Spar Assembly, see Page 14-08, Figure 1." was "...Main Spar Assembly, See Page 12-08, Figure 1."

Page 14-04 MEMO: In Figure 1, in the Lwr-Fwd Systems Hole call-out, "(SEE FIGURE 2 & PAGE 14-05, FIGURE 1)" was "(SEE FIGURE 2 & PAGE 12-05, FIGURE 1)",

In Figure 1, in the Lwr-Aft Systems Hole call-out, "(SEE FIGURE 2 & PAGE 14-05, FIGURE 1)" was "(SEE FIGURE 2 & PAGE 12-05, FIGURE 1)",

Page 14-05 MEMO: In Step 1, "...as shown on Page 14-04, Figure 1 in all but the three..." was "...as shown on Page 12-04, Figure 1 in all but the three..."

In Step 2, "...as shown on Page 14-04, Figure 1 in the three..." was "...as shown on Page 12-04, Figure 1 in the three...".

In Step 3: "...as shown on Page 14-04, Figure 1 in all..." was "...as shown on Page 12-04, Figure 1 in all...".

Page 14-07 MEMO: In Step 2, "...as shown on Page 14-08, Figure 1" was "...as shown on Page 12-08, Figure 1."

"...and washers as called out on Page 14-08, Figure 1." was "...and washers as called-out on Page 12-08, Figure 1."

In Step 3, "...washers as called out on Page 14-08, Figure 1." was "...washers as called out on Page 12-08, Figure 1."

Page 15-01 MEMO: In Figure, "MAIN SPAR AND RIB ASSEMBLY (SEE SECTION 14)" was "MAIN SPAR AND RIB ASSEMBLY (SEE SECTION 12)".

Page 15-02 MEMO: In the note prior to Step 1, "...refer to Pages 15-01 and 16-01" was "...refer to Pages 13-01 and 14-01".

Page 15-03 MEMO: In Step 3, "See the isometric view on Page 15-01." was "See the isometric view on Page 13-01."

Prior to Step 4, removed "NOTE: The right wing template is shown on the next page."

In Step 4, added "Cut out the Left Aileron Pushrod Hole Template shown on Page 15-05, Figure 1."

"Mark, center punch and pilot drill #30 the locations as shown in the Left Aileron Pushrod Hole Template." was "Using the template shown in Figure 4, mark center punch and pilot drill the locations shown.

"Final drill the pilot holes as shown in the template." was "Final drill the pilot holes as shown in Figure 4."

"Use a dremmel tool to enlarge the holes to the final shape shown in the template." was "Use a dremmel tool to enlarge the holes to the final shape shown in Figure 4."

Figure 4 moved to Page 15-07.

Figure 4 was Figure 5.

In Step 5, "as shown in Figure 4." was "as shown in Figure 5."

Page 15-04 MEMO: Figure 1 moved to Page 15-05.

Contents of Page 15-05 moved to Page 15-04.

In Figure 1, "MAIN SPAR AND RIB ASSEMBLY (SEE SECTION 14)" was "MAIN SPAR AND RIB ASSEMBLY (SEE SECTION 12)".

"In Step 7, "...flap gap fairings in Section 20." was "...flap gap fairings in Section 18."

Page 15-05 MEMO: Figure 1 and Figure 2 Added.

Page 15-07 MEMO In Figure 1, added "NOTE: CHECK PRINTED SCALE 1:1 BEFORE USING THE TEMPLATE!"

Page 16-02 MEMO: In Step 2, "see also Page 16-03, Figure 1." was "...also see Page 14-03, Figure 1."

In Step 7, "...as called out on Page 16-03, Figure 3." was "...as called-out on Page 14-03, Figure 3."

Page 16-04 MEMO: In Step 1, "See Page 16-03, Figure 3 for rivet call-outs" was "See Page 14-03, Figure 3 for rivet call-outs."

"See Page 16-03, Figures 2 and 3 for rivet call-outs." was "See Page 14-03, Figures 2 and 3 for rivet callouts."

In Step 2, "See Page 16-02, Figure 1." was "See Page 14-02, Figure 1."

Page 17-02 MEMO: In Step 4, "...see the isometric view on Page 17-01." was "...see isometric view on Page 15-01."

Page 17-03 MEMO: In Step 3, "See Page 17-06, Figure 1 to determine proper dimple orientation." was "See Page 15-06, Figure 1 to determine proper dimple orientation."

"See 'Final Drill' call-out on Page 17-06, Figure 1." was 'See 'Final Drill' call-out on page 15-06, Figure 1."

Page 17-04 MEMO: In Step 3, "See the isometric view on Page 17-01." was "See the isometric view on Page 15-01."

In the note prior to Step 8, "See Page 17-08, Figure 1." was "See Page 15-08, Figure 1."

Page 17-06 MEMO: In the note prior to Step 3, "Refer to Page 17-08, Figure 1" was "Refer to Page 15-07, Figure 1".

In Step 3, "See Figure 2 and Page 17-05, Figure 3." was "See Figure 2 and Page 15-05, Figure 3."

Page 17-08 MEMO: In Figure 1, "LEAVE OPEN LEFT WING ONLY FOR PITOT TUBE. (SEE SECTION 19)" was "LEAVE OPEN LEFT WING ONLY FOR PITOT TUBE (SEE SECTION 17)".

Page 18-02 MEMO: In Step 6, "See Page 18-04 Figure 3 for dimple direction." was "See Page 16-04 Figure 3 for Dimple Direction."

Page 18-03 MEMO: In Step 3, "See Page 17-04, Figure 1." was "See Page 15-04, Figure 1."

In Step 4, "See Page 18-01." was "See Page 16-01."

In Step 5, "See Page 18-08, Figure 1." was "See Page 16-08, Figure 1."

In Step 11, "as shown on Page 18-05, Figure 1." was "as shown on Page 16-05, Figure 1."

Page 18-04 MEMO: In Step 8, "See Page 18-06 Figure 1." was "See Page 16-06 Figure 1."

Page 18-05 MEMO: In Step 2, "See Page 18-03 Figure 3." was "See Page 16-03 Figure 3."

Page 18-06 MEMO: In Step 4, "...on Page 18-05, Figure 1." was "...on Page 16-05, Figure 1."

In Step 5, "See Page 18-05, Figure 1 for the nutplate attach rivets." was "See page 16-05, Figure 1 for the nutplate attach rivets."

In Figure 2, added the callout for "AN480AD4-5".

Page 18-07 MEMO: In Step 1, "...as shown on Page 18-10..." was "...as shown on Page 16-10..."

In the note prior to Step 3, "Page 18-08 Step 3..." was "Page 16-08, Step 3..."

Page 18-08 MEMO: In Step 4, "See Page 18-04, Figure 1 for rivet call-outs." was "See Page 16-04, Figure 1 for rivet call-outs."

Page 18-10 MEMO: In Figure 1, added "NOTE: CHECK PRINTED SCALE 1:1 BEFORE USING THE TEMPLATE!"

Page 19-02 MEMO: In Step 6, "See Page 19-06." was "See Page 17-06."

Page 19-04 MEMO: In Step 3, "...instructions on Page 17-08..." was "...instructions on Page 15-08..."

Page 19-05 MEMO: In Step 1, "(routed, coiled and stowed per Page 19-03, Step 2)" was "(routed, coiled and stowed per Page 17-03, Step 2."

Page 19-06 MEMO: In Step 1, "as shown on Page 19-05, Figure 1." was "as shown on Page 17-05, Figure 1."

In Step 3, "as shown on Page 19-05, Figure 2 and Detail B." was "as shown on Page 17-05, Figure 2 and Detail B."

In Step 4, "as shown on Page 19-05, Figure 2 and Detail C." was "as shown on Page 17-05, Figure 2 and Detail C."

In Step 6, "as shown on Page 19-02." was "as shown on Page 17-02."

Page 20-01 MEMO: In Figure 1, "OUTBOARD LEADING EDGE ASSEMBLY (SEE SECTION 17)" was "OUTBOARD LEADING EDGE ASSEMBLY (SEE SECTION 15)".

Page 20-03 MEMO: In Step 6, "See Page 20-05, Figure 1." was "See Page 18-05, Figure 1."

In Step 7, "as described on Page 16-02, Step 6." was "as described on Page 14-02, Step 6."

In the note prior to Step 8, "See Page 20-05, Figure 3." was "See Page 18-05, Figure 3."

In Step 8, "See Page 20-05, Figure 2 and Figure 3." was "See Page 18-05, Figure 2 and Figure 3."

In Step 11, "See Figure 3 and Page 20-05, Figure 2." was "See Figure 3 and Page 18-05, Figure 2."

Page 20-04 MEMO: In Step 4, "See Page 20-05, Figure 2..." was "See Page 18-05, Figure 2..."

In Step 5, "See Page 20-05, Figure 3 for rivet callouts." was "See Page 18-05, Figure 3 for rivet callouts."

In Step 6, "See Page 20-05, Figure 3" was "See Page 18-05, Figure 3."

**Page 20-05 MEMO:** In the Legend, "WING TIP ATTACH POINTS (SEE SECTION 22)" was "WING TIP ATTACH POINTS (SEE SECTION 20)".

Page 20-06 MEMO: In Step 1, "Page 20-05, Figure 1." was "Page 18-05, Figure 1."

In Step 2, "Page 20-05, Figure 1." was "Page 18-05, Figure 1."

In Step 3, "Page 20-05, Figure 1." was "Page 18-05, Figure 1."

In Step 4, in two places "Page 20-05, Figure 2." was "Page 18-05 Figure 2."

In Figure 1, "SEE PAGE 20-05, FIGURE 2 FOR NUTPLATE & RIVET CALL-OUTS" was "SEE PAGE 18-05, FIGURE 2 FOR NUTPLATE & RIVET CALL-OUTS".

Page 21-02 MEMO: In Figure 1, "USE MATERIAL SAVED FROM VB-11 CUTOUT. SEE PAGE 17-02 FIGURE 1" was "USE MATERIAL SAVED FROM VB-11 CUTOUT. SEE PAGE 15-02 FIG 1."

Page 21-05 MEMO: In Figure 2, "INBOARD END SEE PAGE 21-11" was "INBOARD END SEE PAGE 19-11".

Page 21-06 MEMO: In Step 5, "Page 21-12, Figure 2." was "Page 19-12, Figure 2."

In Step 5, "Page 21-12, Figure 1 to fill the gap between the brackets." was "Page 19-12, Figure 1 to fill the gap between the brackets."

In the note prior to Step 12, "See Page 21-11, Figures 1 and 3 for their locations." was "See Page 19-11, Figures 1 and 3 for their locations."

Page 21-07 MEMO: In Step 6, "Page 21-12, Figure 1" was "Page 19-12, Figure 1".

Page 21-08 MEMO: In Figure 1, "ALSO SEE PAGE 21-04, FIGURE 1." was "ALSO SEE PAGE 19-04, FIGURE 1."

Page 21-09 MEMO: In the note prior to Step 1, "Refer to Page 21-11 for all..." was "Refer to Page 19-11".

Page 21-10 MEMO: In Step 3, "Page 21-11 Figure 3." was "page 19-11 Figure 3."

In Step 4, in two places, "See Page 21-11 Figure 1." was "See Page 19-11 Figure 1."

In Step 5, "Page 21-11, Figure 1." was "Page 19-11, Figure 1."

In the note prior to Step 8, "Page 21-11, Figure 3" was "page 19-11, Figure 3".

Page 22-04 MEMO In the note prior to Step 1, "on Page 21-02" was "on Page 19-02."

Page 22-05 MEMO In Step 3, "Page 22-04, Figure 2" was "Page 20-04, Figure 2".

In Step 8, "Page 22-09, Figures 4 and 5 for rivet call-outs." was "Page 20-09, Figures 4 and 5 for rivet call outs."

Page 22-08 MEMO In Step 2, "Page 22-09, Figure 2." was "Page 20-09, Figure 2."

In Step 4, "(see Page 22-09, Figure 2 for all A-1001-1L Nose Skin Rivets)." was "(see Page 20-09, Figure 2 for all A-1001-1L Nose Skin Rivets)."

Page 23-02 MEMO: In Step 1, "Page 17-02" was "Page 15-02".

Page 23-03 MEMO: In Step 2, "Page 23-11" was "Page 21-11".

Page 23-06 MEMO: In Step 4, "...as shown on page 24-06, Figures 3 and 4" was "...as shown on Page 22-06, Figures 3 and 4."

Page 23-07 MEMO: In Step 2, "Page 23-08, Figure 1" was "Page 21-07, Figure 1".

Page 23-09 MEMO: In Step 3, "Page 23-08, Figure 2" was "Page 21-08, Figure 2".

In Figure 1, "PAGE 23-08 FIGURE 2" was "PAGE 21-08 FIGURE 2".

Page 23-11 MEMO: In Figure 1, added "NOTE: CHECK PRINTED SCALE 1:1 BEFORE USING THE TEMPLATE!"

Page 24-02 MEMO: In Step 2, "Page 23-10, Figure 2" was "Page 21-10, Figure 2".



# SECTION 13: MAIN SPAR

W-00006-L MAIN SPAR ASSEMBLY

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Step 1: Except for holes already match-drilled on Page 13-02, Step 4, final-drill #40 all the .094 (2.4 mm) holes in the flanges of the W-00006-L Main Spar Assembly.

Final-Drill #40 the .094 (2.4 mm) nutplate attach rivet holes near the tip of the main spar assembly as shown in Figure 2 and at the root of the main spar assembly as shown on Page 13-05, Figure 1.

NOTE: Countersink just deep enough to fit the head of an AN426AD3 rivet. Read Section 5.5 for more information on countersinking and dimpling.

Step 2: Machine countersink the nutplate attach rivet holes in the flanges of the W-00006-L Main Spar Assembly. See Figure 1, Figure 2, and Page 13-04, Figure 1.

Machine countersink the nutplate attach rivet holes near the tip of the main spar assembly as shown in Figure 2 and at the root of the main spar assembly as shown on Page 13-05, Figure 1.

> AN426AD3-3.5 116 PLACES

#### NOTE: Machine countersink in all rib locations.

MS21053-L08

Step 3: Machine countersink the #40 holes indicated in Figure 2.



FIGURE 1: FUEL TANK ATTACH NUTPLATE INSTALLATION

**INBOARD** 

NOTE: Use a temporary screw in the nutplates to ensure proper alignment.

MS21053-L08

Step 4: Rivet the fuel tank skin attach nutplates to the W-00006-L Main Spar Assembly as shown in Figure 1.

Step 5: Machine countersink the fuel tank attach screw holes. See Figure 3 for details of the countersunk hole. Use a #30 pilot countersink cutter in a microstop countersink cage to countersink the screw holes in the spar. The #30 pilot will center in the nutplate well enough to keep the countersink round and concentric.

Step 6: Rivet the wing access plate attach nutplates to the W-00006-L Main Spar Assembly as shown in Figure 2.

Use a #40 pilot countersink cutter in a microstop countersink cage to countersink the screw holes in the spar. The #40 pilot will center in the nutplate well enough to keep the countersink round and concentric.

## FIGURE 3: FUEL TANK ATTACH





Spar Assembly as shown in Figure 2.



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in the lower flanges of all wing ribs and flap hinge ribs. This includes the single hole in each rib's lower aft tab.

NOTE: Label the W-1029C Angles and W-1029D Spacers before separating.

Step 4: Separate the W-1029C Angles and W-1029D Spacers as shown in Figure 2.



Step 5: Final-Drill #40 the single .094 [2.4mm] hole in the bottom tab of each W-1029A-L and W-1029B-L Torque Tube Support Bracket. See call-out in Figure 3. Deburr the #40 holes and dimple.

Cleco the torque tube support brackets, W-1029C-L Angle, W-1029D-L Spacer and VA-146 Flange Bearing together as shown in Figure 3. Final-Drill #30 all common holes.

File a radius on the upper and lower edges of both torque tube support brackets. See call-out in Figure 3. This will allow them to "nest" inside the flanges of the W-1010-R Inboard Wing Rib as shown in Figure 4.



DO NOT DIMPLE **FIGURE 5:** 

**GENERIC WING RIB** 

Step 6: Cleco the Torque Tube Support Assembly to the upper and lower flanges of the W-1010-R Inboard Wing Rib as shown in Figure 4. The support brackets cleco into the fourth and fifth holes back from the front of the main flange (not counting the tab). Final-Drill #30 the W-1029C-L Angle to the inboard wing rib.



Step 1: Straighten the W-1025A Flap Hinge Brackets until they are flat. Use a straight edge for reference.

Step 2: Cleco the W-1025B-R Flap Hinge Rib and W-1025A Flap Hinge Bracket to the two alignment holes in the W-1011-L Inboard Wing Rib as shown in Figure 1.

Cleco the W-1025B-L Flap Hinge Rib and W-1025A Flap Hinge Bracket to the two alignment holes in the W-1011-R Inboard Wing Rib as shown in Figure 1.

Match-Drill #30 the inboard wing ribs using the holes in the flap hinge ribs and brackets as a drill guide. Final-Drill #30 the two alignment holes in each inboard wing rib. See Figure 1.



FLAP HINGE ASSEMBLIES

Step 3: Remove the aft flange but not the flange radius from one W-1012-R Outboard Wing Rib as shown in Figure 2.



Step 4: Remove bolts, nuts, and washers from the Main Spar Assembly and set aside for subsequent re-installation. See Page 14-08, Figure 1.

Cleco the W-1010-R Inboard Wing Rib, W-1011-L & -R Inboard Wing Ribs and W-1012-L & -R Outboard Wing Ribs to the Main Spar Assembly as shown in the isometric view on Page 14-01.

Match-Drill #12 the upper and lower attach points on the W-1010-R Inboard Wing Rib and all the W-1011-L & R Inboard Wing Ribs that will be attached with bolts to the Main Spar Assembly, see Page 14-08, Figure 1. Use the holes in the Main Spar Assembly as a drill guide. Use a wood block to support the forward flange of each rib while drilling.

Final-Drill #30 all the remaining common attach holes in the forward flange of the ribs and web of the Main Spar Assembly.

Final-Drill #40 all the common attach holes in the upper and lower rib tabs and the flanges of the Main Spar Assembly.

Mark the wing ribs for location on the Main Spar Assembly and remove. Deburr all freshly drilled holes.



#### FIGURE 2: **REMOVING THE AFT FLANGE** OF THE OUTBOARD-MOST WING RIB

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Step 1: Mark the W-1025A Flap Hinge Brackets, W-1025B-L & -R Flap Hinge Ribs, and W-1011-L & -R Inboard Wing Ribs so they can be re-assembled exactly as when they were drilled.

Disassemble the flap hinge brackets and flap hinge ribs from the inboard wing ribs.

Remove the Torque Tube Support Assembly from the W-1010-R Inboard Wing Rib then disassemble the Torque Tube Support Assembly.

Deburr the edges of the W-1025A Flap Hinge Brackets.

Deburr all holes in all parts. Prime all parts if/as desired.

Step 2: Cleco the W-1025B-R Flap Hinge Rib and W-1025A Flap Hinge Bracket to the W-1011-L Inboard Wing Rib.

Cleco the W-1025B-L Flap Hinge Rib and W-1025A Flap Hinge Bracket to the W-1011-R Inboard Wing Rib.

Rivet the flap hinge ribs and flap hinge brackets to the inboard wing ribs as shown in Figure 1.



Angle, and W-1029D-L Spacer together as shown in Figure 2.

as shown in Figure 2.











NOTE: Before working on assembling the aileron hinge bracket assemblies, refer to Pages 15-01 and 16-01 to become familiar with the brackets' orientation as installed on the aircraft.

<u>Step 1:</u> The manufacturing process leaves the W-1013A Aileron Hinge Bracket Spacers slightly warped or bowed. Straighten the hinge bracket spacers as much as possible by clamping the part in a bench vise and applying firm hand pressure. Sight along the edges of the part to verify straightness and re-adjust as required.

Step 2: Of the four W-1013A Aileron Hinge Bracket Spacers supplied in the kit, two will be used in the W-1014-L & -R Aileron Hinge Bracket Assemblies and will need the aileron stop tab trimmed off as shown in Figure 1.

Step 4: Cleco the W-1013A TRIMMED Aileron Hinge Bracket Spacer, W-1013C-LX and W-1013C-R Aileron Hinge Bracket Sides together as shown in Figure 3.

Final-Drill #30 all common attach holes. Machine countersink the aft holes (as indicated in Figure 3) on the **inboard** face of the W-1013C-R Aileron Hinge Bracket Side for the head of an AN426AD4 rivet.

Repeat this process for the Right Outboard Aileron Bracket Assembly.



# **FIGURE 1:** HINGE BRACKET SPACER TRIM FOR OUTBOARD AILERON HINGE BRACKET ASSEMBLIES



### FIGURE 3: OUTBOARD AILERON BRACKET ASSEMBLY

<u>Step 3:</u> Cleco the W-1013A Aileron Hinge Bracket Spacer, W-1013B-L and W-1013C-L Aileron Hinge Bracket Sides together as shown in Figure 2.

Final-Drill #30 all common attach holes. Machine countersink the aft holes as indicated in Figure 2 on the **outboard** face of the W-1013C-L Aileron Hinge Bracket Side for the head of an AN426AD4 rivet. See Section 5.5 for more information on countersinking.

Repeat this process for the Right Inboard Aileron Bracket Assembly.



Step 5: Disassemble all parts. Thoroughly deburr the edges and holes in all parts. Prime all parts if/as required.

<u>Step 6:</u> Press a BEARING-COM-3-5 into all W-1013A and W-1013A TRIMMED Aileron Hinge Bracket Spacers as shown in Figure 2 and Figure 3. Use a 3/8 drive 7/16 (or 11 mm) socket to push the bearing and a 3/8 drive 9/16 (or 14 mm) socket to support the aileron hinge bracket spacers. Squeeze with a vise or c-clamp.

<u>Step 7:</u> Cleco the Aileron Bracket Assemblies back together per Step 3 and Step 4. Press the aft ends of the assemblies together to insure that the BEARING-COM-3-5 bearings are seated into the recesses on the aileron hinge bracket sides and are not spreading the aft ends of the assemblies apart.

Step 8: Rivet the Aileron Bracket Assemblies together using the rivet callouts shown in Figure 2 and Figure 3. Set the rivets in a random pattern to inhibit warping in the final assemblies.

The Inboard Aileron Bracket Assemblies will now be referred to as W-1013-L & -R. The Outboard Aileron Bracket Assemblies will now be referred to as W-1014-L & -R.

Set W-1014-L and W-1014-R aside, to be installed after the W-00002 Top Inboard Wing Skin and W-00003 Top Outboard Wing Skin are riveted in place. This will allow access to buck the outboard-most rivet on the upper flange of the W-00007A-L Rear Spar Web.

#### FIGURE 2: INBOARD AILERON BRACKET ASSEMBLY



Step 1: With the W-1007D Rear Spar Doubler Plate oriented as shown in Figure 1, draw a line parallel with the edge of the rear spar doubler plate per the dimensions given in Figure 1.

Repeat this process on the remaining three rear spar doubler plates.

Step 2: Align the W-1007E Rear Spar Doubler Plate by nesting the upper flange underneath the upper flange of the W-00007A-L Rear Spar Web and aligning the doubler plate's outboard edge with outboard edge of the rear spar web and clamp in position. See Figure 2.

Match-Drill #30 then cleco all holes used to attach the doubler plate to the rear spar web using the rear spar web as a drill guide.

Match-Drill #40 all common attach holes in the upper flange of the rear spar and the rear spar doubler plate using the rear spar as a drill guide. This will create W-1007E-L.

#### NOTE: The right wing template is shown on the next page.

Step 4: Cut out the Left Aileron Pushrod Hole Template shown on Page 15-05, Figure 1.

Mark, center punch and pilot drill #30 the locations as shown in the left aileron pushrod hole template.

Final drill the pilot holes as shown in the template.

Use a dremmel tool to enlarge the holes to the final shape shown in the template.

Smooth the edges of the aileron pushrod holes as required.

Step 5: Final-Drill 11/32 the rear spar attach hole in each W-1007C Rear Spar Doubler Plate as shown in Figure 4.



#### W-1007C 0 0 0 $\cap$ 0 0 0 Ο 0 0 0 0 0 Ο 0 0 0 0 0 0 0

### FIGURE 4: FINAL-DRILL REAR SPAR DOUBLER PLATE

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Step 3: Disassemble all parts. Deburr the holes and edges of all parts.

Step 4: Dimple all non-machine countersunk holes in the flanges

| ng per the rivet call-outs shown in<br>have rivet callouts and will be<br>gap fairings in Section 20. | REAM<br>Ø3/8 [9.5 mm] |
|---|-----------------------|
| rarily to prevent accidentally  | W-1007C               |
| MACHINE COUNT   | ERSINK FOR            |
| A DIMPLED 0.020   | ) [.5 mm] SKIN 7      |
|   |                       |
| ·····································   |                       |
| ·<br>资 资 资 资 资 资 资 资 资 资 资 资 资 资 资 资 资 资 资  |                       |
| 00007B MACHINE COUNTERS<br>THE HEAD ON AN AN426   | SINK TO FIT           |
|   |                       |





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NOTE: Except where separate instructions and/or figures exist for both left and right sides of the aircraft, only the left side parts, assemblies, or installations will be shown.

It is the builder's choice as to whether to complete all steps for the left side before repeating those steps for the right side or to complete each step for both left and right sides before moving to the next step.

Step 1: Cleco the W-00002 Top Inbd Wing Skin and the W-1027A and W-1027B Wing Walk Doublers to the main spar, rear spar and wing ribs.

NOTE: Ignore the two holes in the W-1027B Wing Walk Doubler shown in Figure 1. These holes remain unused in the **RV-14** 

Step 2: Match-Drill #40 the rivet holes for the nutplates that will be installed along the inboard edge of the W-00002 Top Inbd Wing Skin, W-1027A Wing Walk Doubler - Fwd and W-1027B Wing Walk Doubler - Aft to the W-1010-R Inbd Wing Rib. See Figure 1, also see Page 16-03, Figure 1.

Final-Drill #40 all holes common to the top inbd wing skin, wing walk doubler - fwd and wing walk doubler - aft.

Step 3: Final-Drill #19 the screw holes for the nutplates that will be installed along the inboard edge of the W-00002 Top Inbd Wing Skin as shown in Figure 1. Use caution when enlarging the hole for the middle nutplate. Be sure you drill the correct hole for later installation of a single leg nutplate.

#### CAUTION!: Holes dimpled for a #8 screw have a tendency to crack if not deburred carefully! First check that the hole has been drilled to final size. Before dimpling, thoroughly deburr the holes.

Step 4: Deburr then dimple the aft most screw hole for a #8 flush head screw (see Figure 1).



simulate the tank skin thickness for reference.





Doublers.

Step 1: Place the wing with the forward face of the Wing Spar Assembly flat against a table. Block up the spar as required. Clamp the spar firmly to the table at both ends. Protect the spar from the clamp face with wood blocks as shown in Figure 1. Do not distort (bow or twist) the spar with the clamps.

Step 2: Cleco the W-00002 Top Inbd Wing Skin, W-00003 Top Outbd Wing Skin, W-1027A and W-1027B Wing Walk Doublers to the spars and ribs.

Step 3: Check that the W-00003 Top Outbd Wing Skin is on top of the W-00002 Top Inbd Wing Skin. Rivet the top inbd wing skin and top outbd wing skin to the ribs, rear spar and main spar. See Figure 2 and Figure 3 for the rivet call-outs.

When riveting the inboard most row of rivets, install the nutplates as indicated in Figure 1 to the W-1010-R Inbd Wing Rib, W-1027A and W-1027B Wing Walk Doublers and top inbd wing skin.

To assure maximum skin tightness, rivet from the center of each skin outwards towards the root and tip. Do this on both skins, saving the double row of rivets at the lap joint until last. For a higher quality skin finish, back rivet the skins in place. This will require a large bucking bar, covered with plastic packaging tape, laid over the manufactured head of the rivet on the outside face of the skin and an extended back rivet set.





#### FIGURE 2: W-00002 TOP INBD WING SKIN RIVET CALL-OUT

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FIGURE 3: W-00003 TOP OUTBD WING SKIN RIVET CALL-OUT



#### ☆ WING TIP ATTACH POINTS (DO NOT DIMPLE)



Step 1: Lay the W-00009A Wing Box J-Stiffener - Long into the J-stiffener notches in the wing ribs and cleco to the W-00003 Top Outbd Wing Skin. Rivet the wing box J-stiffener - long to the top outbd wing skin leaving the three inboard rivet holes open. See Page 16-03, Figure 3 for rivet call-outs.

Lay the W-00009B Wing Box J-Stiffener - Short into the J-stiffener notches in the wing ribs and cleco to the W-00002 Top Inbd Wing Skin. Place the wing box J-stiffener - long on top of the J-stiffener - short. Rivet the wing box J-stiffener - short to the top wing skins and wing box J-stiffener - long. See Page 16-03, Figures 2 and 3 for rivet call-outs.

Step 2: Machine countersink the non-dimpled #19 screw holes at the inboard edge of the wing to fit a #8 flush head screw dimple. See Section 5.5. See Page 16-02, Figure 1.

Step 3: Cleco the W-1014-L Outboard Aileron Hinge Bracket Assembly to the W-1012-R TRIMMED Outboard Wing Rib, two places as shown in Figure 1. Cleco the outboard aileron hinge bracket assembly to the W-00007A-L Rear Spar Web and W-1007E-L Rear Spar Doubler Plate as shown in Figure 1.

Step 4: Match-Drill #30 and cleco the outboard aileron hinge bracket assembly to the W-1012-R TRIMMED Outboard Wing Rib using the W-1014-L Outboard Aileron Hinge Bracket Assembly as a drill guide. Remove the two clecoes holding the hinge bracket to the outboard wing rib and final-drill #30 the holes in the hinge bracket and outboard wing rib. Using an extended #30 bit, final-drill the Outboard Aileron Hinge Bracket Assembly to the W-00007-L Rear Spar Assembly.

Step 5: Un-cleco the W-1014-L Outboard Aileron Hinge Bracket from the wing assembly.

Deburr all parts Per Section 5.2.

Step 6: Cleco the W-1014-L Outboard Aileron Hinge Bracket Assembly to the wing assembly per Step 1.

Rivet the outboard hinge bracket assembly to the W-1012-R TRIMMED Outboard Wing Rib then to the W-00007A-L Rear Spar Web and W-1007E-L Rear Spar Doubler Plate as shown in Figure 1.







Step 1: Create a cradle to hold both the leading edge and tank assemblies during assembly.

Remove the material indicated by the hatched area in Figure 1 from the VB-11 Wing Leading Edge Vee Blocks. Save the removed material, it will be used later to create the flap cradle.

Make clamp blocks 12 inches [304.8 mm] long from 2 X 2 wood blocks (U.S. wood dimensions being what they are, the nominal dimensions of these blocks should be approximately 1 3/4 inches [44.5 mm] x 1 3/4 inches [44.5 mm]) and screw them to the vee blocks as shown in Figure 2.

Pad the inside face of the vee blocks with duct tape or weather strip as shown in Figure 2.

Clamp the vee blocks to the edge of your work table as shown in Figure 2. It may be necessary to reposition the clamps during later steps.

Step 2: Adjust all flange angles, flute, and straighten all the W-1008 Splice Ribs and W-1009 Leading Edge Ribs per Section 5.13.

Step 3: Final-Drill #40 all .094 [2.4 mm] diameter holes in all the W-1008-L & -R Splice Ribs and W-1009-L & -R Leading Edge Ribs.

Final-Drill #30 all .125 [3.2 mm] diameter holes in all the splice ribs and leading edge ribs.

Step 4: Modify two W-1009-L for the left wing assembly and two W-1009-R Leading Edge Ribs for the right wing assembly per the dimensions given in Table 1 and as shown in Figure 3. This will create W-1009-1L, W-1009-2L, W-1009-1R and W-1009-2R. The ribs must be notched to fit around the spar bars and rivet heads on the main spar assembly. Because the main spar bars are stepped (spanwise thickness changes) two different modified ribs will be required, see the isometric view on Page 17-01.









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Step 1: Dimple the .098 [2.5 mm] diameter holes in all four W-00018 Backing Plates. See Figure 1.

Dimple the .098 [2.5 mm] diameter holes in both W-00017 Mount Brackets. See Figure 2.

Step 2: Prime all parts if/as desired. For those builders preferring a finish such as matte black or gloss white inside the landing light coves, now is the recommended time to apply finish paint to the following parts/locations:

Outboard rib bays of W-00001-L & -R Leading Edge Skins.

Inboard sides of outboard W-1009-L & -R Leading Edge Ribs.

Outboard sides of second leading edge rib.

Forward sides of W-00017 Mount Brackets.

W-00018 Backing Plates.

Step 3: The nutplates called out in Figures 1 through 3 must have their attach holes dimpled before installation. Dimple one full shipset of all the nutplates called out in Figures 1 through 3. See Section 5.16 for more information on dimpling nutplates.

Step 4: Install nutplates to all four W-00018 Backing plates as shown in Figure 1.

Install nutplates to both W-00017 Mount Brackets as shown in Figure 2.

Install nutplates to the VA-195C Access Hatch Doubler as shown in Figure 3.

Install nutplates to the W-1019-L and W-1019-R Splice Strips as shown in Figure 4.







Step 1: Install nutplates to the W-1008-R Splice Rib as shown in Figure 1.

Step 2: Insert the W-00001-L Leading Edge Skin into the cradle.

NOTE: Refer to Page 17-08, Figure 1 for rivet call-outs.

<u>Step 3:</u> Cleco the VA-195C Access Hatch Doubler to the W-00001-L Leading Edge Skin and back rivet. The access hatch doubler must be oriented such that there are two nutplates on the forward and aft edges and three nutplates on its inboard and outboard edges. See Figure 2 and Page 17-05, Figure 3.

Step 4: Cleco all the W-1009 Leading Edge Ribs, the W-1019-L Splice Strip, and the W-1008-R Splice Rib to the W-00001-L Leading Edge Skin as shown in Figure 2.

Rivet the aft most two holes in the leading edge ribs and splice rib, top and bottom, then rivet all parts together progressively working towards the leading edge.

Step 5: Cleco then rivet the W-00017 Mount Bracket to the W-00001-L Leading Edge Skin. See Figure 2.

Step 6: Cleco then rivet the W-00008-L Leading Edge J-Stiffener to the W-00001-L Leading Edge Skin. See Figure 2.

Repeat steps 2, 4, 5, and 6 on this page for the right side leading edge skin, ribs, splice strip, mount bracket, and J-stiffener.





screw on which the VA-196 Stall Warning Vane pivots. Machine countersink this hole on the inboard face of the mount plate to fit the head of a #8 screw. See Figure 1.



|--|


#### NOTE: See Section 5.19 for tips on working with Plexiglass.

#### Be aware of "curled" edges on the lens.

<u>Step 1:</u> Place the W-00014 Lens over the outside of the wing as shown in Figure 1. Trace a line approximately 3/4 [19.0 mm] from the edge of the landing light cutout. Place the least "curled" part of the lens over the opening in the W-1001-L Leading Edge Skin.

Remove the lens from the wing and trim to the line just marked as shown in Figure 1.

Step 2: Cover the W-00014 Lens with masking tape to protect it. Attach additional pieces of tape around the lens as shown in Figure 1.

Step 3: Insert the W-00014 Lens into the opening in the W-1001-L Leading Edge Skin. Place the outboard edge against the outboard most rib flange. Pull on the tape to keep the lens snug against the inside leading edge of the wing.

Use a sharpie pen to trace the shape of the landing light cutout onto the lens.



Step 4: Remove the W-00014 Lens from the wing.

Clamp the W-0018 Backing Plates onto the W-00014 Lens as shown in Figure 3.

Mark a line 1/4 [6.3 mm] from the aft edges of the backing plates, and 1/4 [6.3 mm] from the width of the landing light cutout line. See Figure 3.

Unclamp the backing plates.



<u>Step 5:</u> Reinstall the W-00014 Lens into the W-1001-L Leading Edge Skin. Pull on the tape to keep the lens snug against the inside leading edge of the wing.

Match-drill #30 using a plexi-bit then cleco the lens to the leading edge skin as shown in Figure 4.

Step 6: Remove the W-00014 Lens from the wing.

Final-Drill #27, deburr, then dimple the eight holes surrounding the landing light cutout in the W-1001-L Leading Edge Skin to fit the head of a #6 screw.

<u>Step 7:</u> Match-Drill #27 the screw holes in the W-00014 Lens with a plexi-bit.

Machine countersink the screw holes in the lens for the corresponding dimples in the W-1001-L Leading Edge Skin.

Carefully deburr the interior edges of the screw holes as the sharp edges which result from countersinking are particularly susceptible to cracking.

Step 8: Radius any sharp edges of the W-00014 Lens as shown in Figure 5.

Smooth all trim marks with 220 grit sandpaper.

<u>Step 9:</u> Use double sided tape or equivalent adhesive to secure the W-00018 Backing Strips to the inside face of the W-00014 Lens as shown in Figure 5.

Step 10: Install the W-00014 Lens as shown in Figure 6.

Reach through the lightening hole in the W-1019-R Leading Edge Rib and push to provide leverage as the screws are tightened.

Someone with small hands works well here. Tips for acquiring spouses or children for this purpose are not covered within the scope of these documents.

Use rubber gloves to avoid getting human skin oils on the clean lens for final installation.



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NOTE: Except where separate instructions and/or figures exist for both left and right sides of the aircraft, only the left side parts, assemblies, or installations will be shown.

It is the builder's choice as to whether to complete all steps for the left side before repeating those steps for the right side or to complete each step for both left and right sides before moving to the next step.

Step 1: Check that flanges of all ribs used in the tank assembles are perpendicular to the rib webs. Flute the ribs as needed. See Section 5.13.

Step 2: Final-Drill #40 all .094 [2.4mm] holes and final-drill #30 all .125 [3.2mm] diameter holes ribs used in the tank assembles.

Step 3: Use a step drill to make a 3/4 [19.05mm] hole in the T-1003B-L & -R Tank Inboard Ribs - Aft as shown in Figure 1. See Section 5.24 for more information on using step drills.

Center the VA-141 Finger Strainer Flange over the step drilled hole making sure that no part of the finger strainer flange protrudes beyond the profile of the rib.

Match-Drill #30 the finger strainer flange to the tank inboard ribs - aft.

Final-Drill #30 the .125 [3.2mm] holes in the two remaining finger strainer flanges that will attach to the lower region of the rib.



Step 4: Deburr all holes and edges of all the ribs used in the tank asemblies.

Step 5: The flanges of the T-1003 Tank Outboard Ribs, T-1003C Tank Inboard Ribs-Fwd, and T-1004 Tank Interior Ribs are notched where they form around the tight curvature of the leading edge. Despite the notching, the flanges still do not form perfectly but turn-out slightly faceted.

Buff the edges of the ribs at the nose area of all tank rib flanges on an abrasive wheel in order to minimize the tendency for them to appear faceted instead of curved.

Therefore a pop rivet dimple tool is needed.

18-04 Figure 3 for dimple direction.



AN426AD3 rivet. See Page 18-03, Figure 1.

T-1012 Tank Attach Zee Brackets.

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#### NOTE: The inboard most tank attach zee does not have nutplates.



Step 2: Fabricate the T-00003 Tank J-Stiffener for both left and right tank assemblies by cutting two pieces of J-channel to the length shown in Figure 2.

Draw a centerline on the flange of each J-stiffener as shown.

Drill #40 a hole in each J-stiffener as shown.



NOTE: Read Section 5.5 for more information on countersinking and dimpling. The tank baffle must be in place during these steps to provide a good pilot for the countersink.

To assure proper part alignment upon reassembly, leave every 10th hole on the T-00001-L Fuel Tank initial batch of sealant has cured.

Countersinks that are up to .005 too shallow are acceptable and preferable to countersinks that are too deep.

Step 6: Machine countersink the row of holes in the T-00001-L Fuel Tank Skin that attach the skin to the T-00002 Tank Baffle to fit the head of an AN426AD3 rivet.

Step 7: Remove the T-00003 Tank J-Stiffener from the T-00001-L Fuel Tank Skin.

Deburr then dimple the holes in the tank J-stiffener. It is normal for the J-stiffener to bow slightly as it is dimpled.

Step 8: Final-Drill #19 then deburr all .161 [4.1mm] diameter holes in the T-00001-L Fuel Tank Skin.

Step 9: As described in Section 5.10, form a slight bend or "crimp" in the aft edges of the T-00001-L Fuel Tank Skin.

Step 10: Remove the T-00001-L Fuel Tank Skin from the Leading Edge Assembly Cradle.

rivet squeezer. This will result in "crisper", better looking skin dimples.

Step 11: Dimple the T-00001-L Fuel Tank Skin as shown on Page 18-05, Figure 1.

Step 12: Machine countersink the T-00007B Fuel Cap Flanges as shown in Figure 2 to accept the dimples in the T-00001-L Fuel Tank Skin.



Step 3: Remove the protective vinyl coating from the inside surface of the T-00001-L Tank Skin. Place the T-00001-L Fuel Tank Skin in the assembly cradle. See Page 17-04, Figure 1.

Step 4: Insert a cleco through the outboard most J-stiffener rivet hole in the T-00001-L Fuel Tank Skin and the single hole in the T-00003 Tank J-Stiffener. See Page 18-01.

Align the centerline drawn on the flange of the tank J-stiffener with the holes in the fuel tank skin, then match-drill #40 and cleco the tank J-stiffener to the skin. Work away from the clecoed hole.

Step 5: Cleco the T-00002 Tank Baffle to the T-00001-L Fuel Tank Skin. See Page 18-01. Proper orientation of the tank baffle places the flange with the "extra" hole on the bottom. See Page 18-08, Figure 1.

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## Skin un-countersunk. Go back and countersink these holes and install rivets after the tank has been assembled and the

# NOTE: Dimple the screw holes in the fuel tank skins using the C-frame tool and a hammer rather than forming them with a

### FIGURE 3: FUEL CAP FLANGE ORIENTATION

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Step 1: Separate & deburr the T-1005BC Shims and trim as shown in Figure 1.

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FIGURE 1: SEPARATE T-1005BC

Cleco the shims to the T-00006-L Tank Attach Bracket as shown in Figure 2. Trim the inboard ends of the shims to be flush with the inboard ends of the tank attach brackets.

Remove the shims from the tank attach brackets.

Step 2: Final-Drill & deburr #40 & #19 all holes in the T-1005B and T-1005C Shims.

CAUTION: Holes dimpled for a #8 screw have a tendency to crack if not deburred carefully! First check that the hole has been drilled to final size. Thoroughly deburr the holes before dimpling.

Remember to dimple the opposite direction on the T-1005C & T-1005B shims for the right side of the aircraft.

Step 3: Dimple the two #19 holes in the T-1005B Shim which will have the K1100-08D Nutplates attached. See Figure 2. Dimple all #40 holes in the shim.

Step 4: Final-Drill #19 all .161 [4.1 mm] diameter holes in the T-00006-L & -R Tank Attach Brackets. Deburr the #19 holes. See Figure 2.

Machine countersink the #40 holes in the tank attach brackets to accept the dimples in the T-00001-L & -R Fuel Tank Skin or T-1005B and T-1005C Shims.

Step 5: Final-Drill #30 and attach the VA-146 Flange Bearing, K1000-08, nutplates, T-1005B & T-1005C Shims to the T-00006-L Tank Attach Bracket as shown in Figure 2.

#### NOTE: Do not prime any areas that will be in the inside of the tank.

Step 6: If desired, prime the T-1005B and T-1005C Shims, T-1012 Tank Attach Zees, and the external portion of the T-00006-L Tank Attach Brackets.



NOTE: Assembly steps from this point on require that sealant be installed between mating parts. Read section 5.16 for more information on fuel tank sealant.

The tank is riveted together just like any other structure with one very important difference: Apply sealant between the parts comprising a seam through which fuel could conceivably leak. This includes every rivet.

T-1005C,

T-1005B.

2 PL

2 PL

Step 7: The T-1003C-L & -R Tank Inboard Ribs-Fwd, T-1003B-R & -L Tank Inboard Ribs-Aft, and T-1003-L & -R Tank Outboard Ribs each have two .188 [4.8 mm] diameter holes. These holes are used to hold the ribs in proper alignment with the tool during hydropress forming of the ribs.

Install AN470AD6-5 rivets in the .188 [4.8 mm] rib holes. Use a C-Frame tool and a heavy hammer to set the rivets only enough for them to be retained in the tooling holes.

Step 8: Attach the VA-141 Fuel Flanges, T-1010 Anti-Rotation Plate and nutplates to the T-1003B-R Tank Inboard Rib - Aft as shown in Figure 3.

Clean excess sealant from inside of the hex area of the anti-rotation plate to allow for a flush fit of a bulkhead union fitting later on. See Page 18-06 Figure 1.





Step 1: Final-Drill #40 the VA-112 Drain Flange.

Rivet the T-00004 Tank Stiffeners, T-00005A Tank Stiffener, and VA-112 Drain Flange to the fuel tank skin as shown in Figure 1 & Figure 2 for rivet call outs.

Step 2: Rivet the T-00007B Fuel Cap Flange and T-00005B-L Vent Line Clip to the T-00001-L Fuel Tank Skin as shown in Figure 1 & Figure 2 for rivet call-outs. Make sure the thin part of the fuel cap flange is facing the aft and fwd direction See Page 18-03 Figure 3.

Step 3: Rivet the T-1003C-R Tank Inboard Rib - Fwd, T-1004-L Tank Interior Ribs, and T-1003-L Tank Outboard Rib, to the T-00001-L Tank Skin as shown in Figure 3. See Figure 1 for rivet call-outs. Keep the T-00003-L & -R Tank J-Stiffener area clean of sealant for later installation of the J-stiffener.

Begin with the tank inboard rib - forward and progress from inboard to outboard, finishing with the tank outboard rib. After the inboard and outboard ribs have been riveted form a generous fillet of sealant approximately 3/8 [9.5 mm] radius at the interior corner of the rib and along the nose area where the flange notches are located.



T-00001-L T-00007B T-00004 T-00004 T-00005B-L T-00004 T-00004 T-00004



tank ribs to minimize mess.

Step 4: Rivet the T-00003 Tank J-Stiffener to the T-00001-L Fuel Tank Skin as shown in Figure 1 & Figure 4.

#### NOTE: Verify that the drain back hole is not blocked with sealant.

Step 5: Rivet the T-00006-L Tank Attach Bracket Subassembly to the T-00001-L Fuel Tank Skin as shown in Figure 1 & Figure 4.

Cleco, but do not rivet the tank attach bracket to the T-1003C-R Tank Inboard Rib-Fwd.







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Step 1: Bend the IE-F385B Fuel Level Sender float wire to fit the fuel tank as shown on Page 18-10 and the Float Wire Bending Diagram supplied with the fuel level sender. Install the bent wire to the sender as shown in Figure 3. Make sure the float wire snaps into the prongs on the fuel level sender wiper arm.

#### NOTE: Do not use tank sealant for this initial installation.

Step 2: Temporarily install the IE F-385B Fuel Level Sender as shown in Figure 1 & Figure 2. Bend the float wire and/or T-00010 Fuel Tank Vent Line so that the float clears the fuel tank vent line. The float should not contact either the top or bottom tank skin but leave a gap of approximately 1/16 [1.6mm] when the sender reaches its travel limits.



NOTE: Step 3 can be delayed after Page 18-08 Step 3 for better bucking bar access to the inboard attach zee rivets.

#### Use tank sealant for this final installation.

Step 3: Final install the IE F-385B Fuel Level Sender as shown in Figure 1 & Figure 2.

Discard the gasket supplied with the fuel level sender.

Apply a 1/16 [1.6 mm] thick layer of sealant to the area of the rib where the fuel level sender will be installed.

Place the fuel level sender in its position on the rib but do not push it down into it's "bed" of sealant.

Start a screw into each hole in the fuel level sender. Note that a lock washer is installed under the head of one of the screws. This should be free of sealant as much as possible for a good electrical ground connection.

Evenly and progressively tighten the screws just enough to cause sealant to bulge evenly from underneath the perimeter of the sender plate.

When finished, there should be a minimum 1/32 [0.7mm] layer of sealant between the rib and the sender.

Leaving a thickness of sealant is important; should the sender ever need to be removed, it allows sufficient gap for a blade to be inserted between the sender and the rib to cut the bond.

Check for continuity between the ground plate on the Fuel Level Sender the T-00001 Fuel Tank Skin using a multimeter.



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NOTE: During the following steps, orient the Fuel Tank Assembly using the Leading Edge Assembly Cradle as best allows for the easy application of fuel tank sealant. After sitting for a minute or so, tank sealant should remain attached even if it is necessary to turn the tank upside down.

Step 1: Apply a bead of fuel tank sealant to the T-00001-L Fuel Tank Skin from the tank baffle rivet holes forward. Upon installation, the T-00002 Tank Baffle acts as a squeegee and the bead of sealant will be pushed ahead as the baffle is moved forward. Use a bead of sealant not larger than 3/16 [4.8 mm] Too much sealant will result in thickness buildup, making the tank difficult to install on the wing.

Put a bead of sealant along the inside edge of the flange on each end rib. Put a heavy glob of sealant where each corner of the baffle will meet the end ribs (this is one of the most common locations for leaks).

Put a thin smear of sealant around each of the rib flange rivet holes.

Proper orientation of the T-00002 Tank Baffle places the flange with the "extra" hole on the bottom. See Figure 1. Install the tank baffle by dropping it straight down onto the rib flanges as shown in Figure 1.

Put a cleco in every hole of the tank skin to baffle joint. After clecoing, inspect the skin to see if it is pillowed-out between the clecos. The contact surface of the tank baffle flange may require pressure to force out excess sealant. The easiest method to squeeze-out the excess is to apply a c-clamp or strong spring clamp between each set of rivets. If you are unsure, clamp the flange in a couple of spots and see if it makes a difference.

Step 2: Install the rivets attaching the T-00002 Tank Baffle to the T-1003-L, T-1003B-R and T-1004-L Fuel Tank Rib flanges as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

Step 3: Apply a thin smear of sealant over each hole for mounting the T-1012 Tank Attach Zees. Cleco the tank attach zees in place. Check for proper tank attach zee orientation as shown in Figure 1.

Install the tank attach zee to tank baffle to rib flange rivets as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

Step 4: Install rivets attaching the T-00001-L Fuel Tank Skin to T-00002 Tank Baffle in all skin holes that have been countersunk. See Page 18-04, Figure 1 for rivet call-outs. After sealant has cured, machine countersink the remaining skin holes and install rivets.

Machine countersink the 5 screw holes in the T-00006-L Attach Bracket to fit a piece of aluminum that has been dimpled for a #8 flush head screw.

Step 5: Install the T-00007A Fuel Cap and CAV-110 Drain Fitting as shown in Figure 1. Seal the Drain Fitting with a fuel compatible thread sealant. (Fuse Lube, Loctite, etc...).



CAUTION: The tank sealant must be fully cured before leak testing the Fuel Tank Assembly. Use less than 1 psi. DO NOT over pressurize the Fuel Tank Assembly.

Step 1: Install the VA-261 Fuel Strainer to the T-1003B-R Tank Inboard Rib - Aft and place a balloon over the fuel strainer as shown in Figure 2. Seal the strainer with a fuel compatible thread sealant. (Fuse Lube, Loctite, etc...).

Install the AN913-3D plug fitting as shown in Figure 2.

Connect the EA HOSE H177 X 3 to the AN832-4D Bulkhead Union then connect the Fuel Air Tank Valve to the hose.

Follow the instructions provided with the Fuel Tank Test Kit to test the Fuel Tank Assembly for any leaks. Repair any leaks and re-test until no leaks are detected.

After removing the hose and air valve from the bulkhead union, it is recommended to place a balloon or similar cover over the open end of the vent line. This is to keep debris and/or nesting insects and/or honey badgers from blocking the vent line.

Step 2: Install the Fuel Tank Assembly to the Wing Spar and Leading Edge Subassembly as shown in Figure 1.

The edges of the T-00001 Fuel Tank Skin must have a zero to 1/64 [0.4 mm] gap between the adjacent wing skin edges. A larger gap may be desireable if the aircraft is to be painted, while zero gap may be desireable if the aircraft is to be left in natural aluminum. Check the fit of the fuel tank skin and file the edges as required before installing all fuel tank attach fasteners.







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maximum of dis-enslackenment. It may be desirable, in certain cases, to route one wire at a time. Use tie wraps

Step 1: Label the WH-00011 Wing Tip Lighting Harnesses as shown in Figure 1.

Install the C400P into the lower opening in the W-1029D-L Spacer as shown in Detail A.

Step 2: Route the Q427 (WHT) wire from the WH-00011 Wing Tip Lighting Harness through the snap bushing located on the Main Spar Assembly as shown in Detail A.

Connect the Q427 (WHT) wire to the IE-F385 Fuel Level Sender on the Fuel Tank Assembly as shown in Detail A.

in the wing ribs as shown in Figure 2.

Insert these wires into the C401J as shown in Figure 1.

Connect the L422 (BLK) wire to the outboard face of the W-1009-R Leading Edge Rib as shown in Detail B.

through the snap bushings on the W-00006-L Main Spar Assembly as shown in Figure 2.

See Page 19-06.





NOTE: A stainless steel pitot tube with cover (VENT P-100) is available from the VAN'S ACCESSORIES CATALOG. If installing a mast mounted pitot head follow installation instructions provided with mast and pitot head. See Section 5.14 for more information on aluminum tubing. The lower aft snap bushings in the ribs are provided for the option to route an AOA line.

Step 1: Make the Pitot Tube by cutting a piece of AT0-035X1/4 Tube to at least 8 [203.2 mm] long.

Bend the tube and then trim to match the dimensions shown in Figure 1.

Step 2: Place a nut and sleeve on to the long leg of the Pitot Tube as shown in Detail A.

Flare the end of the pitot tube called out in Figure 1 as described in Section 5.14 to retain the sleeve and nut.



### FIGURE 1: PITOT TUBE

Step 3: Final Drill 7/16 [11.1 mm] the single hole in the bottom aft row of rivet holes left open from the instructions on Page 17-08 in the W-00001-L Leading Edge Skin and W-00006-L Main Spar Assembly.

Deburr the hole in the leading edge skin and Main Spar Assembly.

NOTE: The Pitot Tube can be final installed later to avoid damage during wing storage.

Step 4: Install the VA-170A Adapter Fitting, nut and FLF-00005 1/4 Dia Instant Connect Fitting into the W-00001-L Leading Edge Skin and W-00006-L Main Spar Assembly as shown in Detail A.

NOTE: The length of the W-00027 Pitot Line (PT 1/4 OD Plastic Tube) is dependent on your choice in avionics.

Step 5: Insert the outboard end of the W-00027 Pitot line into the FLF-00005 1/4 Dia. Instant Connect Fitting.

Route the inboard end of the pitot line through the snap bushings in the wing ribs to the location as shown in Figure 2.

Coil and stow excess pitot line for later use.







NOTE: Additional wing systems are covered under separate sections, or by builder specific design.

Use the string to route the wing systems subsequent to bottom wing skin installation.

Step 1: Cut two 12 foot lengths of string or fishing line (not supplied in kit).

<u>Step 2:</u> Starting from the outboard most Wing Rib, route a length of string or fishing line inboard through any unused snap bushings.

Tape the ends of the string or fishing line on the outboard most and inboard most rib. See Figure 1.



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Step 1: Cleco the W-00009B Wing Box J-Stiffener - Short to the W-00004-L Bottom Inbd Wing Skin as shown in Figure 1.

Cleco the ADAHRS Mounting Zee to the W-00012A ADAHRS Mounting Plate as shown in Figure 3.

Cleco the ADAHRS mounting zee and ADAHRS mounting plate to the bottom inbd wing skin as shown in Figure 1.

Step 2: Match-Drill #30 the W-00012A ADAHRS Mounting Plate to the W-00009B Wing Box J-Stiffener - Short as shown in Figure 1. Insert a cleco in an adjacent hole before match-drilling the next hole.

Step 3: Remove the W-00012A ADAHRS Mounting Plate from the W-00012E ADAHRS Mounting Zee.



Step 4: Deburr all holes in the W-00012A ADAHRS Mounting Plate, W-00009A Wing Box J-Stiffener - Long and W-00009B Wing Box J-Stiffener - Short.

Dimple all #40 holes in all wing box J-stiffeners.

Step 5: Cleco the W-00004-L Bottom Inbd Wing Skin to the left wing. See Page 20-04, Figure 2.

Match-Drill #40 the W-1010-R Inbd Wing Rib at all nutplate rivet hole locations in the bottom inbd wing skin.

Final-Drill #19 the bottom inbd wing skin and inbd wing rib at all nutplate screw hole locations in the bottom inbd wing skin. See K1100-08D call-outs on Page 20-05, Figure 2.

Final-Drill #19 the aft most screw hole in the bottom inbd wing skin. See MS21053-L08 call-out on Page 20-05, Figure 2.

Final-Drill #19 the screw holes in the access plate attach locations. See Page 20-05, Figure 1.

Remove the bottom inbd wing skin from the left wing.

Step 6: Final-Drill #19 the screw holes in the access plate attach locations in the W-00005-L & -R Bottom Outbd Wing Skins. See Page 20-05, Figure 1.

Deburr all #40 and #19 holes in the bottom outbd wing skins and in the W-00004-L & -R Bottom Inbd Wing Skins.

Step 7: Modify the lap joint between the W-00004-L Bottom Inbd Wing Skins and W-00005-L Bottom Outbd Wing Skins in a similar way as described on Page 16-02, Step 6.

| NOTE: Do not dimple the outboard mos<br>row of holes in the bottom outbd wing<br>skins (used later for wing tip<br>attachment). See Page 20-05, Figure 3.   | st                           |                   |
|---|------------------------------|-------------------|
| <u>Step 8:</u> Dimple all the #19 and #40 holes i<br>the W-00004-L & -R Bottom Inbd Wing<br>Skins and W-1005-L & -R Bottom Outbd<br>Wing Skins. Start with the #19 holes, then<br>dimple the #40 holes. See Page 20-05,<br>Figure 2 and Figure 3. | n<br>FILE<br>EDGES<br>SMOOTH |                   |
| Step 9: Cut apart the W-00012B ADAHRS<br>Mounting Spacer and W-00012C ADAHRS<br>Retainer as shown in Figure 2.  | 5                            |                   |
| Machine-countersink the ADAHRS retainer to fit the head of an AN426AD4-7 Rivet.   | ٢                            | 0                 |
| Flute the edges of the W-00012C<br>ADAHRS Retainer as shown in Figure 2.  |                              | AD                |
| Flute in the same direction, bowing the<br>ADAHRS retainer towards the W-00012A<br>ADAHRS Mounting Plate as installed. See<br>Figure 3.   | 9                            |                   |
| Step 10: File the edges of the W-00012B<br>ADAHRS Mounting Spacer as called-out i<br>Figure 2. File until all shearing marks are  | n                            | (                 |
|   | AN426AD                      | 4-4, <sup>1</sup> |
| Step 11:Dimple the holes in theW-00012A ADAHRS MountingPlate and W-00012E ADAHRSMounting Zee, See Figure 3 and Page20-05, Figure 2.   | 170AD4-4, _<br>3 PL          |                   |
| Step 12: Prime all W-00012 ADAHRS<br>Mount Assembly parts, W-00004-L & -R<br>Bottom Inbd Wing Skins, W-00005-L & -R<br>Bottom Outbd Wing Skins and W-00009A<br>& W-00009B Wing Box J-Stiffeners<br>if/as desired.                                 | W-00012E                     |                   |
| Step 13: Rivet the W-00012A ADAHRS<br>Mounting Plate, W-00012B ADAHRS<br>Mounting Spacer, W-00012C ADAHRS<br>Retainer, W-00012D ADAHRS Latch,<br>and W-00012E ADAHRS Mounting<br>Zee as shown in Figure 3.  | (e)                          | •                 |
|   |                              | DIMPLE<br>6 PL    |
|   |                              |                   |



Step 1: Deburr the #40 nutplate attach rivet holes and #19 screw holes in the flange of the W-1010-R Inbd Wing Rib.

R

5 PL

Dimple the #40 holes and #19 holes in the inbd wing rib.

Repeat this step for the right wing.

Step 2: Rivet the W-00012 ADAHRS Mount Assembly to the W-00009B Wing Box J-Stiffener - Short as shown in Figure 1.

Step 3: Insert the W-00009B Wing Box J-Stiffener - Short (with ADAHRS mount bracket attached) into the cutout in the wing ribs.

Cleco the W-00004-L Bottom Inboard Wing Skin to the bottom flange of the rear spar, to the aft half of the wing ribs, and to the wing box J-stiffener - short. See Figure 2.

Check for clearance between the flap bracket and the aft edge of the bottom inboard wing skin. File away the bottom inboard wing skin until the skin just clears the flap bracket.

#### NOTE: Do not rivet the outboard double row of rivets that will adjoin the W-00005-L Bottom Outbd Wing Skin at this time.

Step 4: Carefully, so as not to form a kink, pull the unclecoed forward portion of the W-00004-L Bottom Inboard Wing Skin back to gain access to the rear spar with a bucking bar.

Begin riveting at the rear spar in the center of the skin and work forward and outward toward the forward corners. As riveting proceeds forward, gain access for bucking the rivets through the larger lightening holes in the wing ribs and the access hole in the skin. See Page 20-05, Figure 2 for rivet callouts.

#### NOTE: Rivet only as far forward as the row of rib flange holes indicated in Figure 2 at this time.

Step 5: Cleco the W-00005-L Bottom Outbd Wing Skin to the bottom flange of the rear spar and to the aft half of the wing ribs. See Figure 2.

Begin riveting per the callout in Figure 2 and work forward, inboard and outboard. See Page 20-05, Figure 3 for rivet callouts.

Step 6: Place the W-00009A Wing Box J-Stiffener -Long in the cut-out in the ribs and cleco to the W-00005-L Bottom Inbd Wing Skin.

Pay particular attention where the wing box Jstiffeners overlap. The inboard end of the wing box J-stiffener - long nests between the outboard S end of the W-00009B Wing Box J-Stiffener -Short and the W-00005-L Bottom Outbd Wing Skin.

Rivet the wing box J-stiffener - long to the bottom outbd wing skin.

Rivet the bottom outbd wing skin first to the ribs forward of the J-stiffener, then to the spar flange.

Rivet the overlap joint between the bottom outbd wing skin and bottom inbd wing skin. See Page 20-05, Figure 3.







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Step 1: Deburr the holes and edges of all six W-822PP Wing Access Plates.

Dimple the forward row of attach holes in all six wing access plates for a #6 screw. See Page 20-05, Figure 1.

Dimple the remaining holes in all six wing access plates for a #8 screw.

Prime the access plates if/as desired.

Step 2: Rivet the nutplates that will attach the W-822PP Wing Access Plates to the W-00005-L & -R Bottom Outbd Wing Skins and W-00004-L & -R Bottom Inbd Wing Skins as shown on Page 20-05, Figure 1.

Step 3: Install the W-822PP Wing Access Plates to the two inboard locations on the bottom of each wing as shown on Page 20-05, Figure 1.

Install the outboard wing access plate temporarily with two or three fasteners, finger tight. These will be removed later to provide access for installing the aileron control system.

<u>Step 4:</u> Dimple the rivet holes on two (one for each wing) "MS" one-lug nutplates that are called-out on Page 20-05, Figure 2.

Attach the nutplates called-out on Page 20-05, Figure 2 to both left and right wings as shown in Figure 1.





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NOTE: This manual provides building instruction for the left flap only. The right flap is simply the mirror of the left. Unless otherwise specified instructions given for the left flap apply to the right as well. To help prevent mistakes and speed up the construction process assemble both flaps at the same time. A flat work surface is required for constructing a true flap. Two cradles will be needed to hold the flap upright while riveting. Fabricate cradles from the same material supplied for the wing leading edge and tank cradles.

Step 1: Trace the outline of an FL-1004 Nose Rib onto the wood as shown in Figure 1.

Step 2: Cut the cradle out. Cut the nose rib contour slightly oversize to allow for the addition of padding (such as duct tape) to protect the skin's surface. The aft flange of the FL-1004 Nose Rib and the base of the cradle must be parallel as shown.

Step 3: Attach the cradle to a block of wood so that it may be clamped to a table. See Figure 2.



FIGURE 1: CUT CRADLE MATERIAL

# WOOD BLOCK (NOT SUPPLIED PAD IN KIT) WITH TAPE

FIGURE 2: BUILD CRADLES

NOTE: Do not drill the joggled portion of the FL-1007-R Hinge Brackets at this time.

Step 4: Adjust the flange of the FL-1007-L and -R Hinge Brackets to be parallel with the part body if/as required. See Figure 3.

Lay-out the four hole pattern on the joggled portion of one FL-1007-L Hinge Bracket as shown in Fig. 3.

Step 5: Drill #40 the four hole pattern from the previous step.

Deburr these holes.

Step 6: Cleco a second FL-1007-L Hinge Bracket to the one just drilled.

Align and clamp the trailing edges.

Match-Drill #40 the second hinge bracket using the drilled hinge bracket as a guide.

Match-Drill #40 the remaining hinge brackets using the drilled hinge bracket as a guide.

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Disassemble and deburr.

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FIGURE 3: DRILL LEFT HINGE BRACKET FLANGES

Step 7: Buff the edges of the FL-1004-L & -R Nose Rib flanges on an abrasive wheel in order to minimize the tendency for them to appear faceted instead of curved. See Figure 4.

Buff the flange faces adjacent to the edges at the flanges nearest the leading edge as indicated by the dashed arrows and the shaded region in the detail.



Step 8: Flute and straighten as required the called out flange of the FL-1004-L & -R Nose Ribs. See Figure 5.

Step 9: Deburr all FL-1004-L & -R Nose Ribs.

Step 10: Assemble the Outboard Rod End Rib Subassembly by clecoing the FL-1006 Doublers to the FL-1004-L & -R Nose Ribs. See Figure 6.

Step 11: Match-Drill #40 the two .094 [2.4 mm] doubler holes into the nose rib using the doubler as guide.



Step 12: Final-Drill the 1/4 [6.4 mm] hole in the FL-1006 Doublers and the corresponding #30 hole in the VL-1004-L & -R Ribs. See Figure 6.

Step 13: Machine countersink the #40 holes in the Outboard Rod End Rib Subassemblies. See Figure 6.

Step 14: Disassemble, deburr, clear away chips and cleco together the FL-1006 Doublers and VL-1004-L & -R Ribs. Install the clecos from the rib side.



### FIGURE 6: MATCH & FINAL-DRILL OUTBOARD ROD END RIB SUBASSEMBLY

Step 1: Assemble the Inboard Rod End Rib Subassembly by clecoing the FL-1006 Doublers to the FL-1004-L & -R Nose Ribs. See Figure 1.

Step 2: Final-Drill the .250 [6.4 mm] hole but ignore the two .094 [2.4 mm] holes shown in Figure 1.



NOTE: Do not drill the joggled portion of the FL-1007-R Hinge Brackets at this time.

Step 6: Assemble the Left Hinge Pair Rib Subassembly by clecoing together the FL-1004-L Nose Rib and FL-1007-L Hinge Brackets as shown in Figure 4. Install clecos from rib side.

Final-Drill #30 the holes common to both parts and the holes in the spar attach flanges of the FL-1004-L Nose Ribs. See Figure 4.

Step 7: Repeat Step 6 for the remaining Left Hinge Pair Rib Subassembly as shown in Figure 4.

Repeat Step 6 for two sets of Right Hinge Pair Rib Subassemblies as Shown in Figure 5.

DRILL #30 FL-1007-L

12X FINAL-

### NOTE: Remaining steps refer to the left flap. As noted earlier the right is a mirror of the left.

the notch.

Step 9: Final-Drill #40 all main ribs per the callouts in Figure 6.

FL-1005-L

Final-Drill #30 all main ribs per the callouts in Figure 6.



<u>Step 3:</u> Disassemble, deburr, clear away chips and cleco

together the FL-1006 Doublers and FL-1004-L & -R Nose

Ribs. Install clecos from the rib side.

FIGURE 3: FINAL-DRILL NOSE RIBS AND ROD END RIB SUBASSEMBLIES - RIGHT FLAP



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|----------------------------|-------|------------|





NOTE: For more information regarding riveted trailing edge construction see Section 5.8. Unless otherwise noted see Figure 1 for details.

<u>Step 1:</u> Cleco the FL-00002B Bottom Skin, FL-00002A Top Skin, and FL-00001-L Nose Skin in place in this order.

<u>Step 2:</u> Cleco the FL-00008A-L Inboard Trailing Edge and the FL-00008B-L Outboard Trailing Edge to the bottom skin and top skin.

Step 3: Match-Drill #40 the FL-1004-L & -R Nose Ribs using the FL-00001-L Nose Skin as a guide.

NOTE: When drilling the trailing edge, drill perpendicular (90°) to the centerline of the trailing edge extrusion, not perpendicular to the surface of the top skin. See Figure 2.

<u>Step 4:</u> Final-Drill #40 the trailing edge per Figure 2 detail callout.

Step 5: Install hardware into the FL-1007-L & -R Hinge Brackets as shown on Page 21-12, Figure 2. Use additional washers or the bushing called out on Page 21-12 Figure 1 to fill the gap between the brackets.

<u>Step 6:</u> Match-Drill #40 all FL-1007-R Hinge Bracket flanges using the holes in the FL-1007-L Hinge Bracket flanges as drill guides.

Hereafter refer to these as the Hinge Pair Subassemblies.

Remove the hardware from the hinge brackets when drilling is complete.

<u>Step 7:</u> Mark the Hinge Bracket Pairs for their location on the spar.

Step 8: Disassemble the flap.

Step 9: Machine countersink the holes on both sides of the FL-00008A-L & B-L Trailing Edges for setting rivets double flush. Step 10: Fabricate the FL-00009 Drill Jig from 3/4X3/4X1/8 [19.1X19.1X3.2 mm] angle extrusion to allow use of a countersink cage when countersinking the hinge brackets. See Figures 3 and 4.

Machine countersink the four holes on the non-mating side of the joggled flanges of each FL-1007-L and FL-1007-R Hinge Bracket for double flush riveting.

Deburr holes in mating surface of the hinge brackets.

Step 11: Deburr the two match-drilled #40 holes in the upper flange of the FL-1004-L & -R Nose Ribs.

NOTE: Holes in skins that will receive MK-319-BS blind rivets will be final-drilled #33 in assembly later, but for now dimple them just as you would to receive AN426AD3 rivets. See Page 21-11, Figures 1 and 3 for their locations.

When dimpled the spar will develop a harmless lengthwise bow.

CAUTION: Be sure to dimple the correct side of the skins.

<u>Step 12:</u> Dimple all holes common to the skins, spar and rib flanges. Use a reduced diameter female die on the curved portion of the nose skin and on the spar flanges.

Step 13: Prime the parts if/as desired.

Mask off the area on the skins where they will contact the FL-00008A-L and B-L Trailing Edges where adhesive will be applied. For this reason, do not prime the trailing edges.

Hereafter refer to the skins as FL-00002A-L Top Skin and FL-00002B-L Bottom Skin.



Step 1: Rivet the FL-1004-L Nose Rib and nutplate to the FL-1006 Doubler using the rivets called out in Figure 1.

Step 3: Rivet together the FL-1004-L Nose Rib and the FL-1007-L Hinge Bracket using the rivets called out in Figure 3.



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Step 1: Reposition the cradles on the bench as shown in Figure 1

Step 2: Place the flap back into the cradles.

Step 3: Remove clecos from the bottom flange of the FL-00003-L Spar.

Insert the FL-00002B-L Bottom Skin between the FL-00001-L Nose Skin and the spar's lower flange.

Cleco the bottom skin and nose skins to the spar only.

Check for unwanted twist by measuring the angle of each Hinge Pair Subassembly using a digital level. See Figure 1. If necessary twist the flap to match the angles. When the angles match the flap is true.

Rivet the bottom and nose skins only to the spar using rivets called out on Page 21-11 Figure 3.

### NOTE: In order to clear the hinge brackets when drilling #33 a six inch long drill bit is required.

Step 4: Final-Drill #33 the underside of the FL-00001-L Nose Skin to FL-1004-L and -R Nose Rib holes only at the blind rivet locations. See Page 21-11 Figure 1.

FL-00002B-L

### Step 4: (continued)

Blind rivet the underside of the nose skin to the nose ribs using the rivets called out on Page 21-11, Figure 1.

Squeeze solid rivets on the underside of the nose skin at the inboard and outboard ends.

Remove the flap from the cradles.

Step 5: Final-Drill #33 the top side of the FL-00001-L Nose Skin to FL-1004-L and -R Nose Rib holes.

Blind rivet the top side of the nose skin to the nose ribs using the rivets called out on Page 21-11, Figure 1.

Squeeze solid rivets on the top side of the nose skin at the inboard and outboard ends.

Step 6: Lay the flap top side down on a very flat surface as shown in Figure 2.

NOTE: Parts which form the trailing edge need to be cleaned in preparation for applying adhesive which will bond the trailing edge together before riveting to help produce a straighter trailing edge after riveting.

Step 7: Clean FL-00008A Inboard and FL-00008B Outboard Trailing Edges as well as FL-00002A-L Top Skin and FL-00002B-L Bottom Skin trailing edge contact area. See directions for cleaning fuel tank components in Section 5.17.

Refer to Section 5.8 for instruction/technique on how to complete riveted trailing edges.

Apply adhesive to both surfaces of the inboard and outboard trailing edges.

CAUTION: Do not cleco the aft most main rib hole in order to avoid denting the top skin since the cleco tip is longer than the trailing edge is deep.

Cleco the trailing edges to the top skin and the bottom skin as shown in Figure 2.

Cleco the bottom skin to the FL-1005-L Main Ribs and the FL-1005-R Modified Main Rib.

Weight the flap down to a FLAT work table to keep it flat until the adhesive has cured.





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### NOTE: Refer to Page 21-11, Figure 3 for the remaining rivet callouts.

Step 8: Final-Drill #33 the FL-00002B Bottom Skin to the FL-1005-L Main Ribs and -R Modified Main Rib.

Blind rivet the bottom skin to the main ribs.

Squeeze solid rivets to attach the main and modified main ribs at the ends of the flap.









Install the nutplates as shown in Figure 4.







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Step 1: Match Drill #40 the holes in the lower tab of the A-10004-1R Nose Ribs into the A-1009 Counterbalance as shown in Figure 1. Cleco the A-1009 Counterbalance to the A-1004-1R Nose Ribs. Remove the A-1001A-1L Nose Skin. EXTENDED MATCH DRILL, #40 DRILL BIT shown in Figure 3. A-1004-1R 4 PL back-riveting method described in Section 5.6. A-1004-1R COUNTERBALANCE A-1005A-1L (INBOARD) DON'T RIVET THIS HOLE LOCATION FIGURE 1: INBOARD DRILL COUNTERBALANCE EDGE AN526C632R8 4X A-1001A-1L AN365-632A A-1005B-1R (OUTBOARD) Step 2: Use an extended #40 drill bit to mark the A-1009 Counterbalance to A-1004-1R Nose Rib attach holes on the spar by leaning the drill in alongside the rib as shown in Figure 1. Remove the counterbalance. Final-Drill #27 the marked holes and the two #40 holes in the DO NOT RIVET counterbalance. Final-Drill #27 the four corresponding holes in the nose ribs. Attach the counterbalance to the nose ribs using the hardware called out in Figure 1. If you have difficulty getting a screwdriver on the head of the screw use an offset screwdriver or a Phillips bit tip held in Vise-Grip pliers at 90°. Step 3: Cleco the A-1001A-1L Nose Skin and A-1003-1L Spar to the A-1004-1R Nose Ribs, A-1015-1L Inboard Nose Rib, and A-1003-1L Spar. Match-Drill #40 into the counterbalance along its length using the holes in the leading edge of the nose skin as drill guides. Start drilling at one end. Insert a cleco after each hole is drilled to prevent the counterbalance from being pushed away from the skin. Final-drill #30 these holes. See Page 22-04, Figure 2 for hole locations. Step 4: Remove the A-1001A-1L Nose Skin. Remove the A-1004-1R Nose Ribs and A-1015-1L Inboard Nose Rib from the spar.



Step 5: Final-Drill #40 all the .094 [2.4 mm] holes in the A-710 Stiffeners. Cut the stiffeners from the angle strip provided and trim as shown in Figure 2. The angle strip is shown unbent for clarity.

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Step 1: Cleco the Top Skin Assembly and the A-1001A-1L Nose Skin to the top flange of the A-1003-1L Spar at every other hole. Cleco the nose skin to the A-1004-1R Nose Ribs, and A-1015-1L Inboard Nose Rib.

Cleco the A-1005-1A-L and A-1005-1A-R Main Ribs to the spar.

Cleco the Bottom Skin Assembly to the Spar Assembly and cleco the A-1005-1B-L and A-1005-1B-R Main Ribs to the top skin and Spar Assembly.





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Step 1: Fabricate two CS-00012 Torque Tube to Bellcrank Pushrods by cutting two pieces of AT6-035 X 1 1/8 to the length shown in Figure 1.

A hacksaw with a fine tooth blade or die grinder with an abrasive cutting disc works well here.



Step 2: Cut-out Page 23-11, Figure 1 and use it as a wrap-around template for locating the rivet holes in both ends of both CS-00012 Torque Tube to Bellcrank Pushrods.

Use clear tape to make the template into a ring and align it with the end of the pushrod.

Center-punch the "cross hairs" in the wrap-around template. Remove the template.

Drill #40 the six pilot holes in each end of both torque tube to bellcrank pushrods using the center-punch marks as drill guides.

Deburr the holes in the torque tube to bellcrank pushrods.

Step 3: Sand the outer diameter of a VA-111 Threaded Rod End as required to allow a tight slip fit into the end of one of the CS-00012 Torque Tube to Bellcrank Pushrods.

Proper engagement of the threaded rod end in the torque tube to bellcrank pushrod is when the end of the tube coincides with the edge of the taper in the threaded rod end. See Figure 2.

Match-Drill #30 the threaded rod end using the pilot holes in the torque tube to bellcrank pushrod as drill guides. Insert clecos in the holes as match-drilling progresses around the circumference of the torque tube to bellcrank pushrod.

Repeat until the threaded rod ends have been match-drilled to both ends of the torque tube to bellcrank pushrods.

Mark the threaded rod ends so that they can be re-installed in the same position as when they were match-drilled.

Remove the threaded rod ends from the torque tube to bellcrank pushrods and deburr the holes.

Prime the interior, exterior and tube ends of the threaded rod ends and torque tube to bellcrank pushrods.

Permanently install the threaded rod ends to the torque tube to bellcrank pushrods using the rivets called-out in Figure 2.



CS-00012

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Step 4: Install rod end bearings and jam nuts into the VA-111 Threaded Rod Ends as shown in Figure 3.

The correct engagement of the rod end bearings yields a bearing center-to-bearing center length of 67 7/16 [1712.9 mm].

The rod end bearing engagement may be adjusted during installation of the CS-00012 Torque Tube to Bellcrank Pushrod.





Step 1: Cleco a nutplate to the W-421-R Aileron Bellcrank through the screw hole. This nutplate allows for attachment of an autopilot servo pushrod and is installed on the right aileron bellcrank only.

Final-Drill #40 the nutplate rivet holes in the right aileron bellcrank.

Rivet a nutplate to the Aileron Bellcrank as shown in Figure 1.

Final-Drill #12 the .188 [4.8 mm] holes in both aileron bellcranks.

Step 2: Check that the length of both of the BUSH BS-.245 X.375 X 2.781 Aileron Bellcrank Bushings are between 2 3/4 inches [69.9 mm] and 2 25/32 inches [70.6 mm]. Trim if/as required.

Check that an AN4 bolt will fit the inside diameter of the aileron bellcrank bushings. If required, enlarge the inside diameter of the bushings using a 1/4 [6.4 mm] drill or reamer.

Deburr the ends of the aileron bellcrank bushings and the inside edge and ends of the pivot tubes in the aileron bellcrank so that they slide easily inside the WD-421 Aileron Bellcranks as shown in Figure 2.

The pivot tube of the aileron bellcrank must be 1/32 [0.8 mm] to 1/16 [1.6 mm] shorter than the aileron bellcrank bushing. File the ends of the aileron bellcrank pivot tubes if/as required to achieve the correct length.

Insert an aileron bellcrank bushing into each aileron bellcrank as shown in Figure 2.



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FINAL-DRILL #12,

WD-421-R K1000-3 AN426AD3-3.5

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FIGURE 1: AILERON BELLCRANK NUTPLATE INSTALLATION



Step 3: Install the WD-421-L Aileron Bellcrank and BUSH BS-.245 X .375 X 2.781 Aileron Bellcrank Bushing subassembly into the left wing as shown in Figure 2.

Install the WD-421-R Aileron Bellcrank and BUSH BS-.245 X .375 X 2.781 Aileron Bellcrank Bushing subassembly into the right wing.

When the nuts are torqued to the value called-out in Section 5.20, the aileron bellcranks must rotate freely on their aileron bellcrank bushings.



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Step 1: Insert a VA-162 Pushrod End in the "long" end of each CS-00009 Aileron Torque Tube until the step on the pushrod end rests on the end of the aileron torque tube. See Figure 1.

Match-Drill #30 the pushrod ends, using the holes in the aileron torque tubes as drill guides. See Figure 1. Insert clecos in the holes as match-drilling progresses.

Mark the pushrod ends and aileron torque tubes so that the pushrod ends can be re-installed in the same orientation as when they were match-drilled.

Remove the pushrod ends from the aileron torque tubes and deburr the holes.



Step 3: Fabricate two CS-00009B Torque Tube Collars by cutting WD-1014PC into two 7 5/16 inches [185.7 mm] long pieces.

Measure 1 1/2 inches [38.1 mm] from one end of each torque tube collar and draw a line around the circumference.

Insert the CS-00009B Torque Tube Collars in to the open ends of the CS-00009 Torque Tube Subassemblies as shown in Figure 3.

Match-Drill #30 the torque tube collar using the holes in the Torque Tube Subassemblies as drill guides. See Figure 3. Insert clecos in the holes as match-drilling progresses.

Final-Drill #12 through both sides of the Torque Tube Subassembly and torque tube collar.

Install a bolt, washer, and nut as shown in Figure 4 to hold alignment then final-drill #12 the remaining bolt hole.



**FINAL-DRILL** 

#12

Step 2: Insert a VA-162 Pushrod End in the "short" end of each WD-1014 Aileron Torque Tube until the step on the pushrod end rests on the end of the aileron torque tube. See Figure 2.

Match-Drill #30 the pushrod ends using the holes in the aileron torque tubes as drill guides. See Figure 2. Insert clecos in the holes as match-drilling progresses.

Final-Drill #30 the two unused holes in the aft torque tube. See Figure 2.

Mark the pushrod ends and aileron torque tubes so that the pushrod ends can be re-installed in the same orientation as when they were match-drilled.

Remove the pushrod ends from the aileron torque tubes and deburr the holes.

Rivet the pushrod ends to the torque tubes as shown in Figure 2.

Install rivets in the unused holes in the aft torque tubes as shown in Figure 2.

The aileron torque tube subassemblies created in this step will subsequently be referred to as the WD-1014 Torque Tube Subassemblies.



Step 4: Mark the CS-00009 Torque Tube Subassemblies and CS-00009B Torque Tube Collars so that they can be re-installed in the same orientation as when they were match-drilled.

that were installed during Step 3. Remove the torque tube collars from the forward torque tube subassemblies and deburr the holes. Prime the torque tube collars both inside and out; prime the inside of the all torque tube subassemblies. Attach the forward torque tube subassemblies to the torque tube collars as shown in Figure 4. Apply a thin coating of grease to the torque tube collars to minimize the chance of binding as well as to prevent rust. Install bolts such that the two torque tube subassemblies are mirrors of each other as shown on Page 24-06, Figures 3 and 4. FIGURE 4:

Final-Drill #12 the .188 [4.8 mm] holes in the arm of each torque tube subassembly. TORQUE TUBE COLLAR See Figures 2 and 4. **BOLT INSTALLATION** 



Step 1: Assemble the Left Side Torque Tube Assembly by inserting the aft end of one of the CS-00009B Torque Tube Collars



Step 1: Insert CS-00009B Torque Tube Collar through the forward side of the 1 1/8 inch [28.6 mm] diameter hole in the spar web. See Figure 1.

<u>Step 2</u>: Angle the CS-00009B Torque Tube Collar down as it extends aft through the hole in the spar web and slip the WD-1014 Aft Torque Tube Subassembly over the torque tube collar. Engage the WD-1014 Aft Torque Tube Subassembly and the torque tube collar far enough to allow the threaded ends of the torque tube subassemblies to be inserted into the flanged bearings riveted into the wing structure. Disengage the aft torque tube subassembly and torque tube collar slightly as the threaded ends of the torque tube subassembly and torque tube collar slightly as the threaded ends of the torque tube subassemblies are inserted into the bearings. See Figure 1.

Step 3: Install washers and nuts on the pushrod ends of the CS-00009 and WD-1014 Torque Tube Subassemblies as shown in Figure 1.

Step 4: Check to see if the bolt holes in the WD-1014 Aft Torque Tube Subassembly and CS-00009B Torque Tube Collar line-up properly.

If the bolt holes in the aft torque tube subassembly and torque tube collar misalign in the forward/aft direction then NAS1149F0463 or NAS1149F0432 washers should be installed between the torque tube subassemblies and the flanged bearings as required to eliminate the forward/aft hole misalignment. There should be little or no pre-load on the wing structure when the aileron torque tube installation is complete.

Install bolts, washers, and nuts as shown in Figure 1 to attach the aft torque tube subassembly to the torque tube collar.

CS-00009 SEE **FIGURE 2** AN3-13A 2 PLACES WD-1014 O NAS1149F0432P. 2 PLACES MS21042-4, SEE 2 PLACES FIGURE 2 NAS1149F0332P, 3 PLACES MS21042-3, 2 PLACES FIGURE 1: TORQUE TUBE INSTALLATION PAGE 23-08 RV-14 REVISION: 0 DATE: 04/15/13

<u>Step 5:</u> Figure 2 shows the "neutral position" of the CS-00009 Forward Torque Tube Subassembly. The correct rigging of the aileron actuation system is defined by the forward torque tube subassembly, WD-421 Aileron Bellcrank, and Aileron all being in their neutral positions at the same time.



FIGURE 2: FORWARD TORQUE TUBE SUBASSEMBLY NEUTRAL POSITION



### NOTE: Use blue Loctite to install the AN509-10R25 screw.

Step 1: Insert the CS-00013 Bellcrank to Aileron Pushrod into the wing through the hole in the Rear Spar Assembly.

Attach the bellcrank to aileron pushrod to the WD-421-L Aileron Bellcrank as shown in Figure 1.

Step 2: Loosely attach the W-00026 Alignment Template to the aft tooling hole in the W-1012-R Outbd Wing Rib as shown in Figure 2.

<u>Step 3:</u> Align the upper and lower surfaces of the Aileron with the upper and lower edges of the W-00026 Alignment Template as shown in Figure 2. This establishes the neutral position of the Aileron.

Use a strip of duct tape running outboard from the upper surface of the Aileron, then down over the alignment template, then finally inboard onto the lower surface of the Aileron. This will hold the Aileron in the neutral position.

Use the W-730 Bellcrank Jig to verify that when the Aileron is in its neutral position, the WD-421-L Aileron Bellcrank is also in its neutral position.

<u>Step 4:</u> Adjust the engagement of the CS-00013 Bellcrank to Aileron Pushrod rod end bearings and jam nuts if/as required.

Attach the aileron pushrod to the aileron as shown in Figure 1.

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Remove the W-730 Bellcrank Jig and W-00026 Alignment Template.

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<u>Step 5:</u> Double-check that all nuts are tight and properly torqued. All bearings and bushings must rotate freely and without binding.

EDGES OF W-00026 PARALLEL TO SURFACES OF AILERON W-1012 AFT TOOLING HOLE (USE AN3 BOLT) W-00026 Ba ALLERON HINGE BOLT HINGE BOLT FIGURE 2: AILERON NEUTRAL POSITION

WD-421-L

CS-00013







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Step 1: Square the inside edge and corner of the lens recess in the W-1015-L Wing Tip with a file and/or a razor blade to allow the lens to lay flush with the wing tip.

Step 2: Cut the VA-193 Wing Tip Light Lens in half as shown in Figure 1. Determine the right and left lenses by placing them on their respective wing tips, then set the VA-193-R Right Lens aside.



7/16

[11.1 mm]

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NOTE: Final trim from the forward and outboard extents of the landing light first to allow the lens to fully nest in place. Then mark/trim the remaining areas. See Figure 2.

Step 3: Position the VA-193-L Left Lens on the W-1015-L Wing Tip and mark a trim line for the recess onto the left lens. Remove the left lens from the wing tip and roughly trim to within 1/8 [3.2 mm] of the trim line. Carefully trim the lens a little at a time to fit the recess until satisfied with the final trim, then tape the left lens in place on the W-1015-L Wing Tip.

Step 4: Drill #40 the VA-193-L Left Lens into the W-1015-L Wing Tip at the upper and lower corners using the dimensions given in Detail A. After drilling, cleco each hole. Remove the tape and check the fit.

Final-Drill #28 both holes in the wing tip and the left lens.

Step 5: Match-Drill #40 the nutplate attach pattern into the W-1015-L Wing Tip, orient the nutplate approximately as shown in Figure 2.

Machine countersink the VA-193-L Left Lens to fit the head of a #6 screw.

Machine countersink the nutplate rivet holes in the wing tip for the head of an AN426AD3 rivet. See Figure 2.

NOTE: When setting solid rivets in fiberglass composites, use soft rivets or leave normal rivets with a longer shop head (approximately 1.2 X the hole diameter).

Step 6: Install the VA-193-L Left Lens as shown in Figure 2.



Step 7: Insert the W-1015-L Wing Tip into the Wing Assembly and tape into place. Use a ratchet strap to pull the wing tip tightly toward the leading edge for the best fit.

the Aileron in both span and elevation.

Step 8: Match-Drill #40 and cleco the W-1015-L Wing Tip, using the .098 [2.5 mm] holes in the W-00001-L Leading Edge Skin, W-00003-L Top Outbd Wing Skin, W-00005-L Bottom Outbd Skin as guides. Drill from fwd to aft, alternating between the top and bottom holes.

Remove the wing tip from the Wing.

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Step 9: Final-Drill #27 all wing tip attach holes in the W-00001-L Leading Edge Skin, W-00003-L Top Outboard Wing Skin and W-00005-L Bottom Outboard Wing Skin, then deburr and dimple these holes for a #6 screw.

Step 10: Use temporary screws to locate the nutplates on the W-1015-L Wing Tip.

Match-Drill #40 then cleco the nutplate rivet holes in the wing tip.

Machine countersink the nutplate rivet holes in the wing tip to fit the head of an AN426AD3 rivet. See Figure 4.

Final-Drill to #27 the screw attach holes in the wing tip.

Machine countersink the #27 holes to fit the dimples in the W-00001-L Leading Edge Skin, W-00003-L Top Outboard Wing Skin and W-00005-L Bottom Outboard Wing Skin.

Rivet the nutplates to the wing tip as shown in Figure 4.



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### NOTE: Before drilling use a straight edge to ensure that the top edge of the W-1015-L Wing Tip aligns with the top edge of

NOTE: Pay attention to the location of the notches in the flanges when laying out the hole pattern.

Step 1: Attach the W-1015-L Wing Tip to the Wing and insert the W-1016-L Wing Tip Rib into the aft edge of the wing tip. Position the wing tip rib to fit snugly into the wing tip without distorting the wing tip or rib web. The wing tip rib should be flush with the inboard edges of the wing tip.

With the wing tip rib positioned as shown in Figure 1, mark the forward and aft ends of the flanges onto the bottom and top sides of the wing tip.

Using an edge distance of 5/16 [7.9 mm] from the inboard edge, lay out a rivet pattern on the bottom and top of the wing tip using the spacing between rivets and the forward and aft edges of the wing tip rib as shown in Figure 1.

Step 2: Drill #40 the forward and aft most holes in the pattern created in Step 1 into the W-1015-L Wing Tip as shown in Figure 1.

Draw a centerline on the flanges of the W-1016-L Wing Tip Rib and mark the forward most rivet location 5/16 [7.9 mm] from the forward edge of the forward upper flange. Insert the wing tip rib back into the wing tip. Use the marks visible through the holes in the wing tip for alignment. Tape the wing tip rib into place.

Match-Drill #40 and cleco the wing tip rib using the guide holes in the wing tip as reference. Drill moving aft from the first hole, alternating top to bottom.

Final Drill #33 the holes for the MK-319 Rivets as shown in Figure 1.

Step 3: Machine countersink the W-1016-L Wing Tip Rib attach holes in the W-1015-L Wing Tip to fit the head of an either an AN426AD3 or MK-319 rivet. See Figure 1.

Remove the wing tip rib from the Wing and deburr.

Prime the wing tip rib if/as desired.

Rivet the wing tip rib to the wing tip as shown in Figure 1.

Step 4: Use a straight edge to mark the tip trailing edge of the W-1015-L Wing Tip for final trimming.

Use a sanding block to remove excess material from the trailing edge of the wing tip.

Step 5: Install the wing tip to the the Left Wing Assembly.



# FIGURE 1: WING TIP RIB INSTALLATION