

**TOTAL PERFORMANCE**  
**VAN'S AIRCRAFT**

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## **SERVICE BULLETIN 16-03-28**

**Date Released:** May 6, 2016 (Initial release)  
March 7, 2018 (Replaced AN470AD4-11 with AN426AD4-11 in Figure 13, added corresponding machine countersinking instructions to Step 24.)

**Date Effective:** May 6, 2016

**Affected Models:** All RV-3, 4, 6/6A, 7/7A, 8/8A, 9/9A, 10, and 14/14A aircraft.

**Subject:** Cracking of wing aft spar web at the inboard aileron hinge bracket attach rivets. In addition, for RV-10 and RV-14/14A aircraft, there is a potential for cracking of the flange bends of the inboard aileron hinge brackets.

**Required Action:** For RV-3/3A/3B, 4, 7/7A, 8/8A, 9/9A aircraft: Inspect for cracks as described in this document. If cracks are present in the spar web, stop drill the cracks and install aileron attach doublers as described in this service bulletin.

For RV-10 and RV-14/14A aircraft: Inspect for cracks as described in this document. If cracks are found in the spar web or the inboard aileron brackets, stop drill the cracks in the spar web (if present), install aileron attach doublers, and replace the aileron hinge brackets with updated brackets.

It is unlikely that RV-6/6A wings will be affected. If cracks are present in RV-6/6A aircraft, email Van's Engineering Dept for instructions, with photos of the cracks, for a specific repair scheme.

Contact Van's Aircraft to obtain the parts needed to complete this modification for your specific model. See the SB kit part numbers at the end of this document.

**Time of Compliance:** Inspect before further flight.

- If no cracks are detected, re-inspect at every annual condition inspection or until the modifications required by this service bulletin have been completed.
- If cracks are detected, the modifications required by this service bulletin must be completed before further flight.

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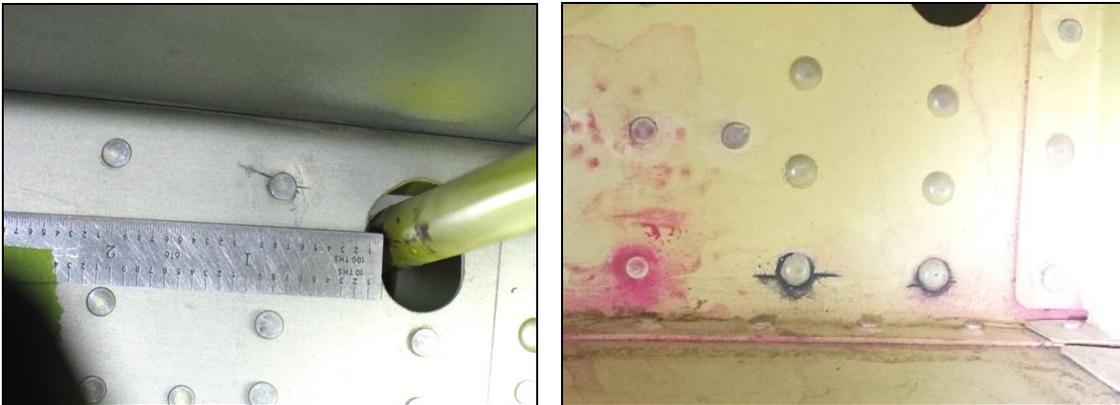
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**Synopsis:**

Cracks have been found radiating outward from the lower or upper most rivets that attach the inboard aileron hinge brackets to the webs of the wing rear spars. See Figure 1. On RV-10 or RV-14/14A aircraft, there is a potential for cracks in the flange bends of the inboard aileron hinge brackets (though there is no record of any at the time this S.B. was issued)



**FIGURE 1:** REAR SPAR WEB CRACKS

**Method of Compliance:**

**NOTE:** Completion of the modifications in this service bulletin as a preventative measure (prior to cracks being detected) on wings that have been fully assembled is not recommended.

**WARNING:** Due to the risk of irreversible spar damage, completion of the modifications in this service bulletin should **ONLY** be attempted by persons experienced in sheet metal repair and who, after thoroughly reading and understanding the instructions in this service bulletin, are confident that they can accomplish the steps as described in an airworthy manner.

**NOTE:** The parts are very similar for all of the aircraft covered by this service bulletin. Differences in detail, depending on which aircraft is being modified, will be noted.

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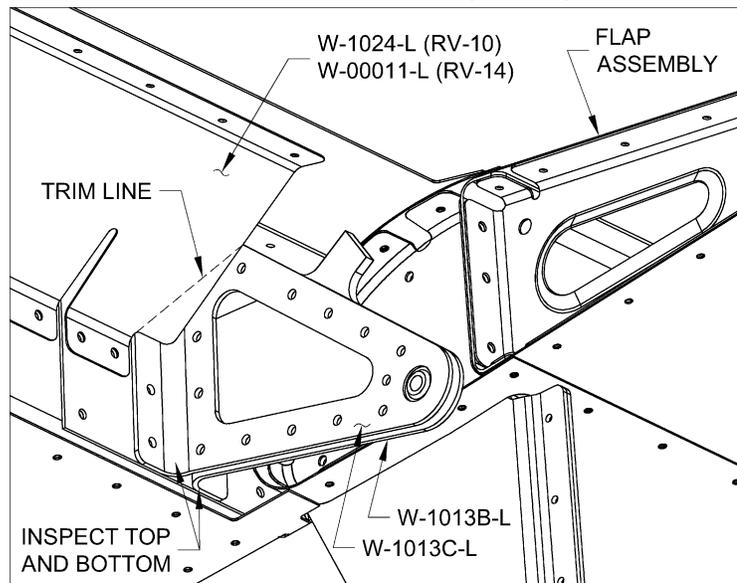
**Step 1:** Inspect the forward side of the wing rear spar web for cracking adjacent to all the rivets used to attach the inboard aileron hinge brackets. This area can be accessed by removing the outboard most inspection cover on the bottom of each wing.

- If web cracks are detected, skip to Step 3 and complete the remaining steps in this service bulletin before further flight. Contact Van's Aircraft to obtain the parts needed to complete this modification for your specific model. (RV-10 and RV-14/14A aircraft: Since there is cracking of the web and the inboard aileron brackets will have to be removed to address this, even if the brackets themselves do not show evidence of cracking they should be replaced now with updated brackets to prevent having to repeat this process in the future.)
- If web cracks are not detected, make a log entry indicating that recurrent inspection is due at the next condition inspection. (RV-10 & RV-14/14A continue to Step 2 to inspect for aileron bracket cracks.)

**Step 2 (RV-10 & 14 only):** To gain access for inspecting the top of the W-1013C Aileron Hinge Bracket Sides, remove the ailerons from the wings as instructed in Step 3 and 4, then trim off the corner from the W-1024 / W-00011 Aileron Gap Fairings along the "TRIM LINE" shown in Figure 2.

Inspect for cracks in the flange bends at the top and bottom of the W-1013C & B Aileron Hinge Bracket Sides.

- If cracks are detected, continue with the remaining steps in this service bulletin before further flight.
- If cracks are not detected, reattach the ailerons and make a log entry indicating that recurrent inspection is due at the next condition inspection.



**FIGURE 2:** INSPECT AILERON HINGE BRACKET

**Step 3:** Disconnect the aileron to bellcrank pushrod at the bellcrank.

**NOTE:** To save reassembly time, take close up photos of each fastener location to help with properly positioning spacers and washers during re-assembly.

**Step 4:** Remove the hardware that attaches the aileron to each hinge bracket, and remove the aileron with the pushrod still attached.

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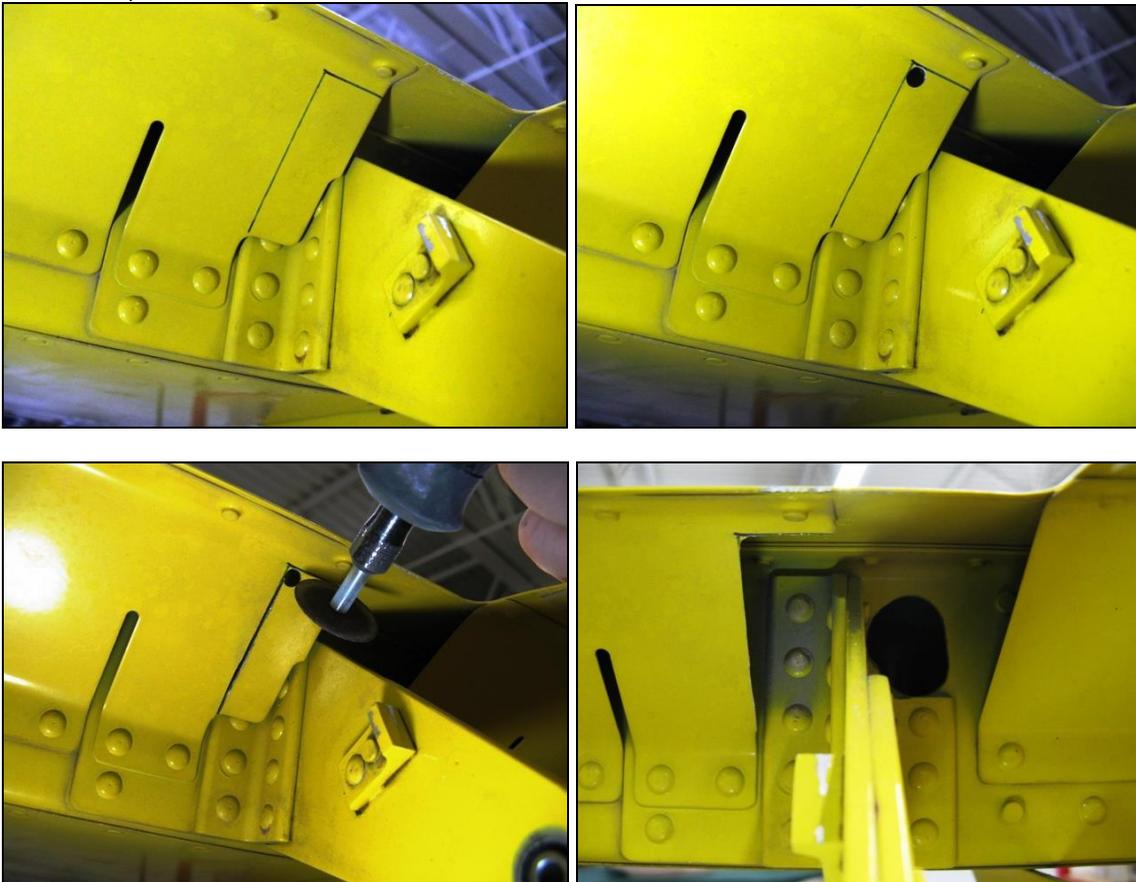
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Step 5 (RV-3, 4, 7, 8, & 9): Remove the side cover from the inside of the fuselage, then disconnect the flap pushrod from the flap actuator weldment and allow the flap to swing downward. For the RV-9, skip Step 6; the flap can be left attached and hanging upside-down from the hinge brackets while completing the service bulletin.

Step 5 (RV-10 & 14): Remove the top aft wing root fairing. Disconnect the flap pushrod from the flap torque tube arm and allow the flap to swing downward. Skip Step 6; the flap can be left attached and hanging upside-down from the hinge brackets while completing the service bulletin.

Step 6 (RV-3, 4, 7, & 8 only): Remove the flap by removing the hardware that attaches the flap to the wing.

Step 7: Remove a portion of the aileron gap fairing if it interferes with access to the rivets attaching the aileron hinge bracket to the rear spar as shown in Figure 3. Drill a 3/16 corner hole and then use a cutting disk in a die grinder or Dremel™ type tool to remove a small section of the gap fairing. (RV-10 & 14 only: When upgrading to the W-1013D, W-1013E, and W-1013FG Aileron Hinge Bracket parts, it will be necessary to remove the two bottom rivets in the tabbed portion of the aileron gap fairing. This will allow for slight trimming of the fairing adjacent to the tab to clear the wider aileron hinge bracket. Maintain a .188 in. [4.8mm] minimum edge distance between the trimmed edge and tab rivet hole.)



**FIGURE 3:** TRIMMING THE AILERON GAP FAIRING

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**CAUTION:** Refer to Appendix 1 at the end of this service bulletin and to Section 5.4 of the construction manual (available at [www.vansaircraft.com](http://www.vansaircraft.com)) for tips on removing rivets. Extra care will be needed while removing the rivets if the shop heads are on the aft (aileron hinge bracket) side of the spar.

Step 8: Remove the rivets that attach the Aileron Hinge Bracket to the web of the rear spar. To prevent pucker/distortion of the spar web while driving out rivets, back up the spar web on the forward side with a large bucking bar adjacent to each rivet.

Step 9: Make a drill guide from .032-.040 aluminum sheet using the removed hinge bracket as a pattern. Make the drill guide .125 in. [3.2mm] larger along the inboard and outboard edges of the bracket as shown in Figure 4. Match-Drill #30 all of the aileron hinge bracket rivet holes into the drill guide (cleco each hole as you drill). Remove the clecos and deburr the holes.



**FIGURE 4:** FABRICATING THE DRILL GUIDE

**NOTE:** The drill guide will be used to locate any required stop-drill holes. Typically, a crack in aluminum aircraft structure extends beyond the point where it is visible with the naked eye. Stop-drilling at the apparent endpoint could miss the end of the crack allowing it to continue to propagate. Therefore, when stop-drilling a crack, the center point of the stop-drill hole should be positioned slightly beyond the apparent end of the crack. This way, if the crack continues to propagate, it will do so toward the hole and then stop.

Step 10: Use a piece of tubing to make an extension handle for a fine point marking pen (a 5/8 inch diameter aluminum or steel tube works well), then, in a color that is easily visible, mark the optimal stop-drill hole center locations on the forward side of the rear spar. See Figure 5. To make the pen easier to control, you can rest it on a small piece of wood that has been cut to the approximate height of the hole location being marked.

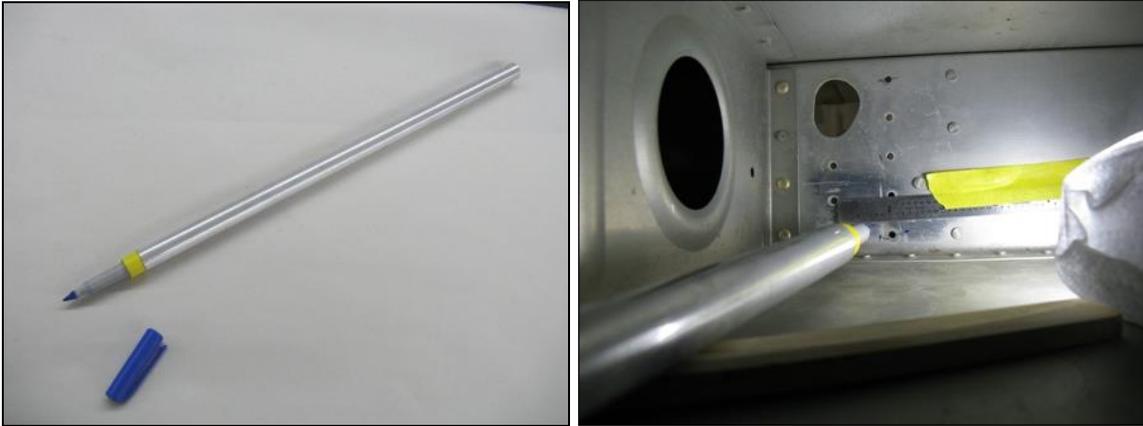
**NOTE:** A piece of heavy tape placed over the nutplates along the aft edge of the wing access hole will help prevent injury to your arm.

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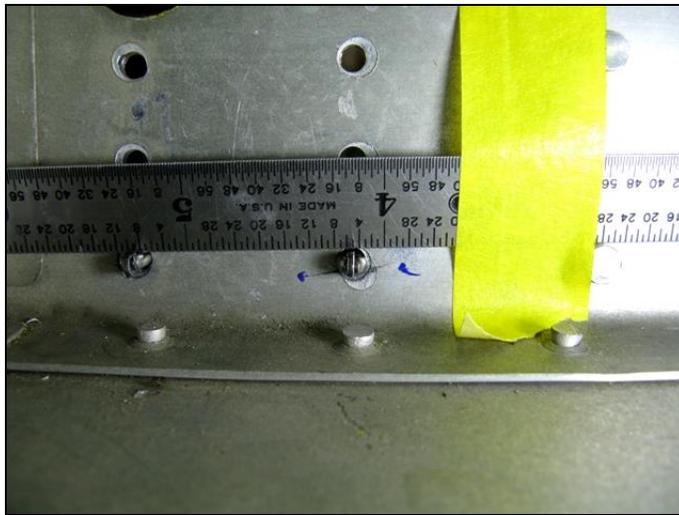
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**FIGURE 5:** MARKING THE STOP-DRILL CENTER POINTS ON THE SPAR.

**Step 11:** Tape a small scale/ruler adjacent to any rivet holes that have associated cracks (clecos in two holes can be used to help brace and align the ruler), then, using a digital camera, shoot a close-up photo of the cracks and the ruler. See Figure 6.

**Photo tip:** Turn off the flash on the camera. Set the camera to macro mode. Use a bright flashlight with a piece of plain white paper over the end as a diffused light source to aid in providing balanced lighting. Take all photos as close as possible.



**FIGURE 6:** PHOTOGRAPHING THE STOP-DRILL CENTER POINTS.

**Step 12:** Use the photo(s), magnified on a computer screen, as a measuring guide to transfer the locations of the stop-drill holes onto the forward face of the drill guide. Use the same ruler that was used to take the photos, and position the ruler on the drill guide and against the clecos in exactly the same way as originally positioned on the spar.

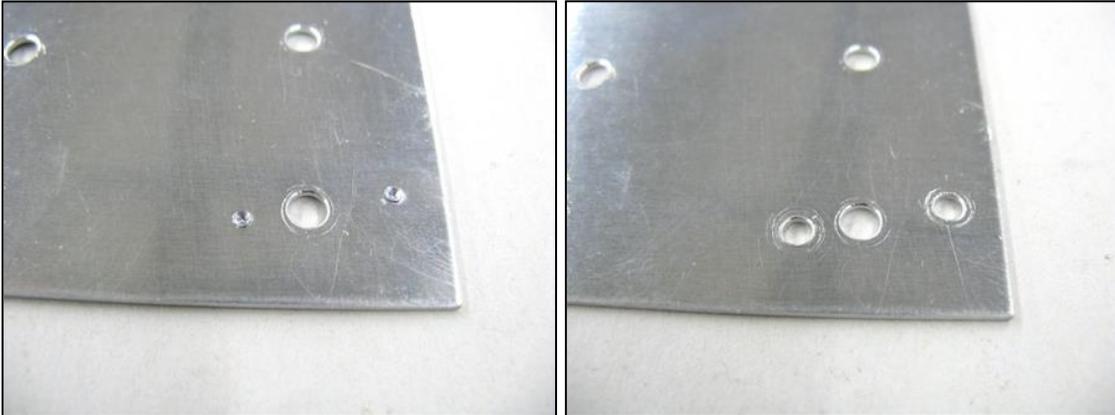
Center-punch the marks, then drill #40 the stop-drill guide holes into the drill guide as shown in Figure 7. Do not drill a stop-drill hole any closer than .098 in. [2.5mm] from the edge of a rivet hole.

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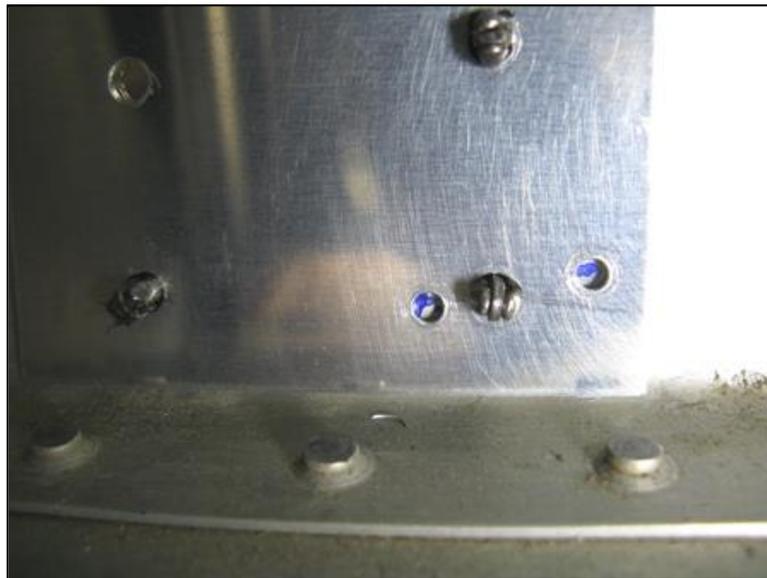
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**FIGURE 7:** DRILLING THE DRILL GUIDE

**Step 13:** Cleco the drill guide into place on the rear spar. Check that the marked locations on the spar are visible in the stop-drill guide holes as shown in Figure 8. If the holes are not properly aligned, remove the drill guide and use it as a template to make a replacement drill guide with repositioned stop-drill guide holes.



**FIGURE 8:** CHECK MARKS THROUGH GUIDE HOLES

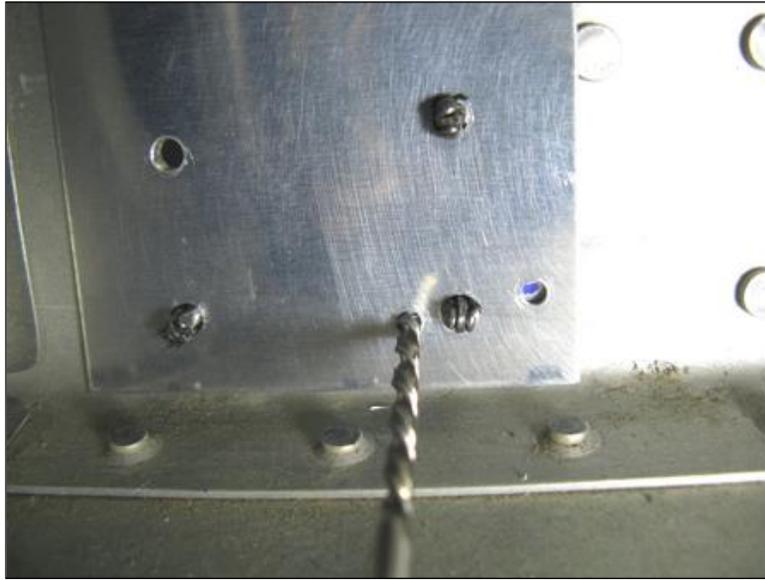
**Step 14:** Once you have a drill guide with properly located guide holes, cleco it in place. Match-Drill #40 through the spar web and the spar web doubler at each guide hole using a 12 in. [304.8mm] extension drill as shown in Figure 9. Remove the drill guide and deburr the stop-drill holes on both sides of the spar.

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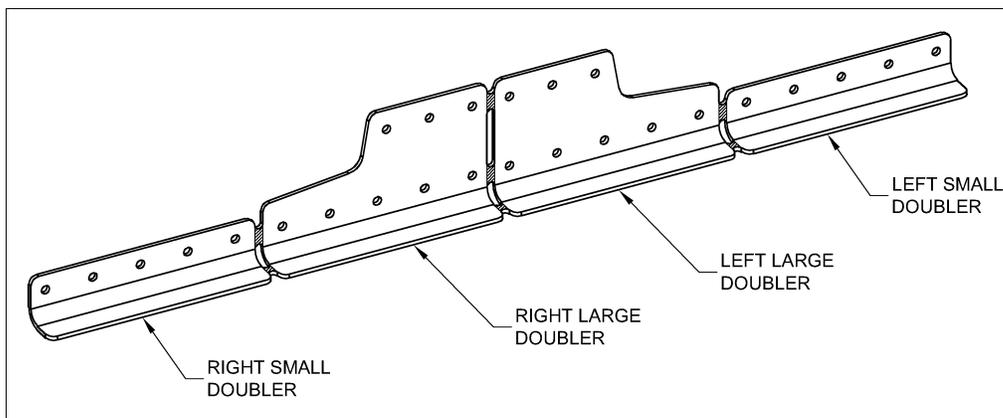


**FIGURE 9:** DRILLING THE SPAR

**Step 15:** Label, then separate the Aileron Attach Doubler into individual parts by removing the shaded areas shown in Figure 10.

RV-10 & 14 skip to Step 20.

RV-7,8, & 9 skip to Step 26.



**FIGURE 10:** SEPARATE THE AILERON ATTACH DOUBLER  
(RV-3 & 4 DOUBLERS HAVE NO HOLES)

**Step 16 (RV-3 & 4 only):** The small doubler has a .750 in. [19.1mm] flange and a .625 in. [15.9] flange; draw a vertical line on the .750 in. [19.1mm] flange .250 in. [6.4mm] from the edge as shown in Figure 11.

Using a square for measurement, draw a vertical line on the large doubler .500 in. [12.7mm] from the flange, then make a horizontal mark on this line .250 in. [6.4mm] from the bottom as shown in the figure.

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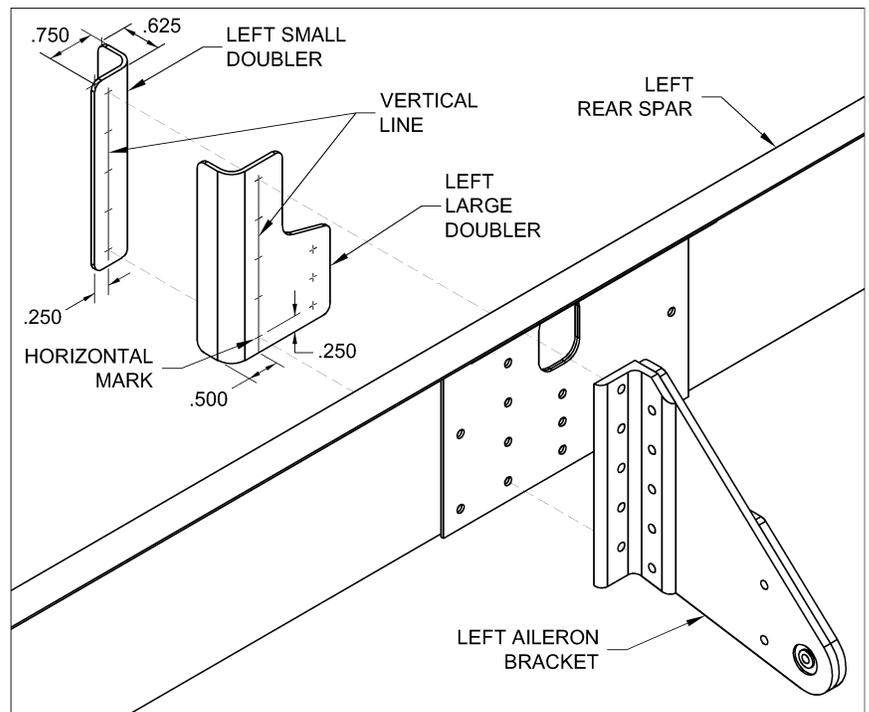
**Step 17 (RV-3 & 4 only):** Place the large doubler on the forward side of the rear spar. Adjust the doubler so that the vertical line drawn on the large doubler is visible through and centered on the Aileron Hinge Bracket attach holes in the rear spar. Center the horizontal mark at the bottom of the doubler with the bottom hole in the spar.

Mark the large doubler through the top hole in the spar. Remove the doubler and verify that there is at least .188 in. [4.8mm] from the new mark to the top of the doubler. The doubler may be adjusted vertically if necessary, but .188 in. [4.8mm] must be maintained from the marks and the top and bottom edges of the doubler. If necessary, the bottom, aft edge of the doubler may be rounded with a file to fit the bottom radius of the rear spar.

**Step 18 (RV-3 & 4 only):** Drill a #30 hole in the large doubler at the intersection of the vertical line and bottom mark, then cleco the doubler to the rear spar. Center the vertical line in the holes of the rear spar, then match-drill #30 all of the holes used for attaching both angles of the aileron bracket into the doubler. Cleco while drilling. Remove the doubler.

**Step 19 (RV-3 & 4 only):** Place the small doubler on the forward side of the large doubler, as shown in Figure 11, and flush the top and bottom edges. Center the vertical line on the small doubler in the holes of the large doubler, clamp the parts together, then match-drill #30 the holes of the large doubler into the small doubler. Deburr the holes of both doublers.

RV-3 & 4 skip to Step 26.



**FIGURE 11:** MATCH-DRILLING THE AILERON ATTACH DOUBLER

**Step 20 (RV-10 & 14 only):** First label (see note below), then separate the W-1013FG Aileron Angle Bracket into individual parts as shown in Figure 12. Separate the part at the three holes that are offset to the edge of one of the flanges. Cut perpendicular to the part, and trim away material the width of the hole across the entire part (file/sand if necessary).

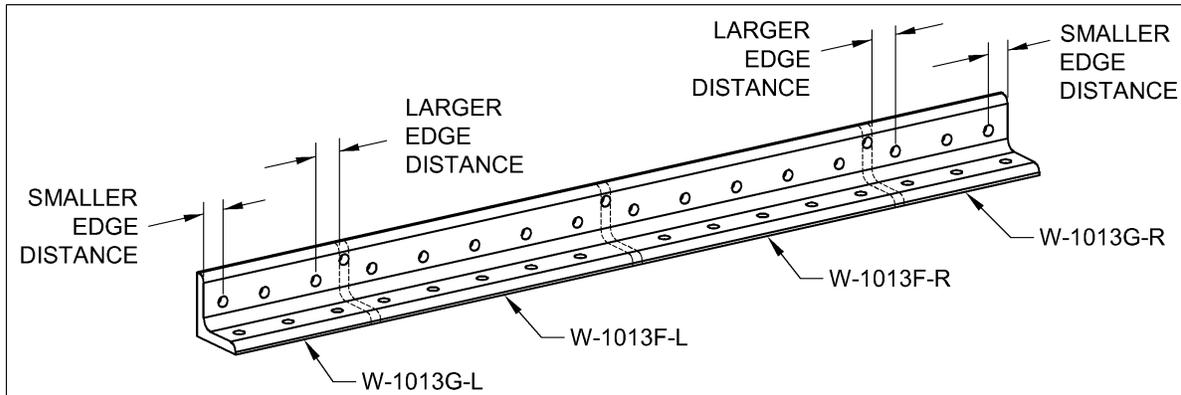
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**NOTE:** As shown in the figure, there is a slightly larger edge distance for the hole at one end of the W-1013G-L & -R Angle Brackets than at the other end. When orienting the parts in later steps, the hole with the larger edge distance is placed on the bottom, and the flange with this hole attaches to the spar web.



**FIGURE 12:** SEPARATING THE W-1013FG AILERON ANGLE BRACKET

**Step 21 (RV-10 &14 only):** If necessary, straighten the W-1013D & E Aileron Hinge Side Brackets (see Figure 13) as much as possible by clamping the parts in a bench vise and applying firm hand pressure. Sight along the edges to verify straightness and re-adjust as required.

**Step 22 (RV-10 &14 only):** Remove the COM-3-5 bearings from the old aileron hinge brackets. Drill out the three rivets adjacent to the bearing, then use a band saw or hack saw to cut off the bearing end of the hinge bracket from the rest.

**Step 23 (RV-10 &14 only):** Cleco together all of the parts shown in Figure 13 for the Left and Right Aileron Hinge Brackets (with the COM-3-5 bearings in place). Be sure to orient the W-1013F Aileron Angle Brackets to place the hole with the larger edge distance at the top, and, as previously noted, orient the W-1013G Aileron Angle Brackets to place the hole with the larger edge distance on the bottom.

Final-Drill #30 all of the common holes.

**Step 24 (RV-10 &14 only):** Draw a line on the flange of the W-1013F Angle Brackets that matches the sloped edge of the W-1013D Side Brackets. Disassemble the parts, trim the flange along the line, then deburr the edge.

As called out, machine countersink the three holes in the W-1013D-L & -R Side Brackets flush on the outboard side. Machine countersink the three lower holes in the W-1013F-L & -R for the flush rivets common to the W-1013G-L & -R. Deburr the drilled holes in all parts.

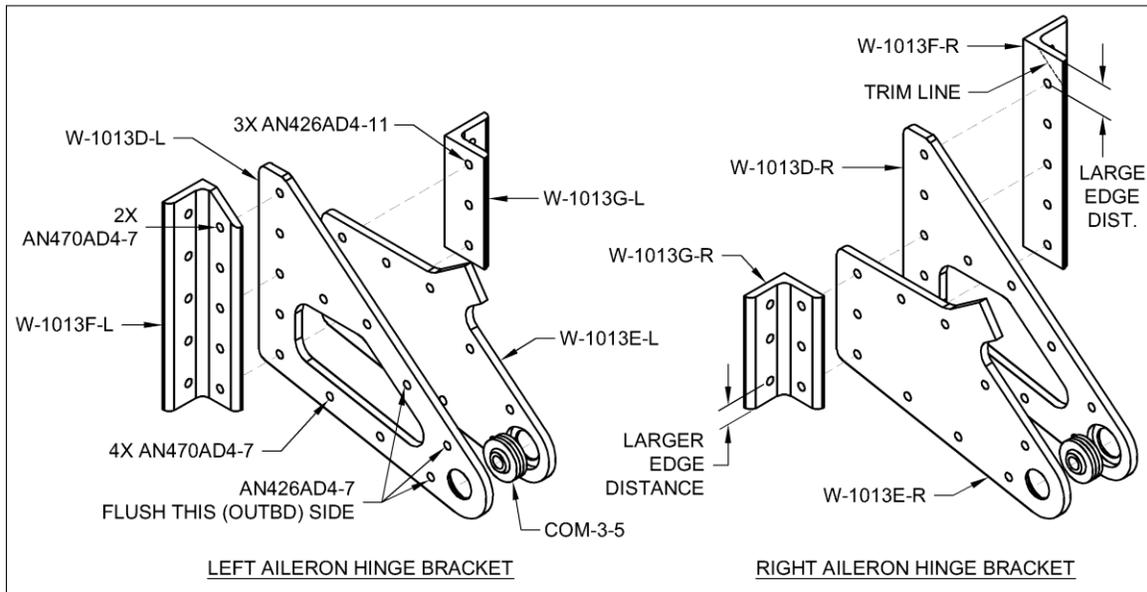
**Step 25 (RV-10 &14 only):** Prime all parts, then cleco the Left and Right Aileron Hinge Brackets back together and rivet them as called out in Figure 13. Set the rivets in a random pattern to inhibit warping.

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**FIGURE 13:** AILERON HINGE BRACKETS

**Step 26:** Cleco, then rivet the small and large doublers and the Aileron Hinge Brackets to the rear spars using the rivets called out in Figure 14. Final-Drill #30 any hole into which a rivet cannot be inserted. Note that for the RV-7 & 8, the bottom hole in the outboard angle bracket uses a flush rivet.

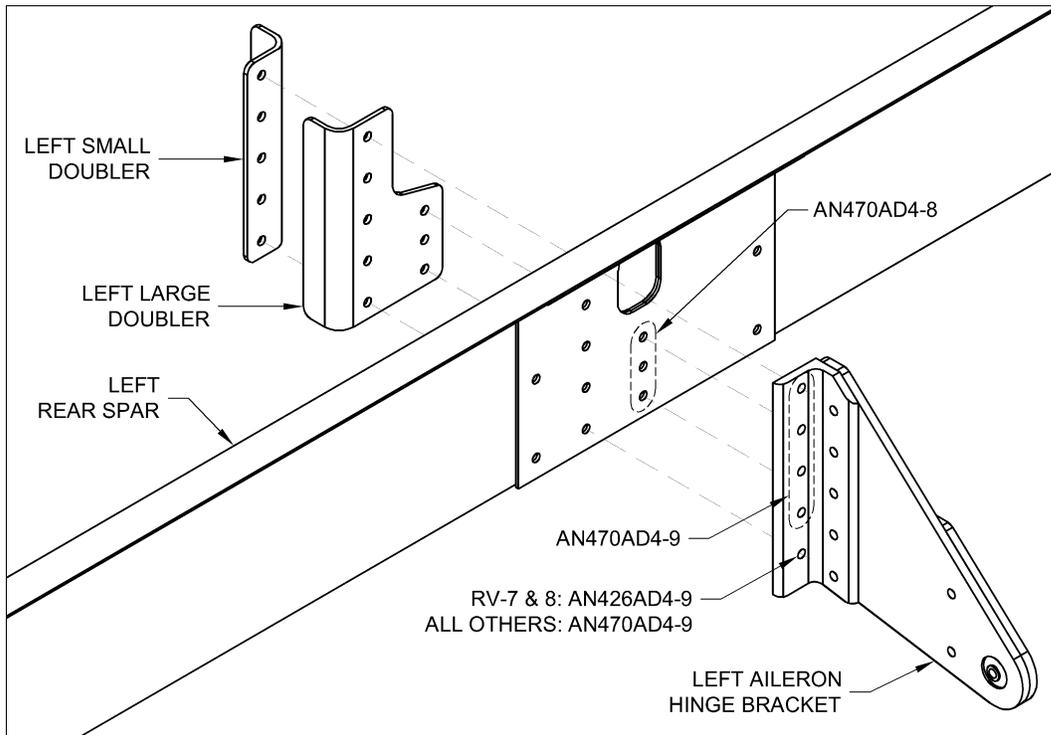
The special bucking bar (see Figure 15) recommended for RV-10 and -14 elevator riveting works well if you have one or can borrow one. Otherwise, a steel bar approximately .750 in. [19.1mm] X 1 in. [25.4mm] X 12 in. [304.8mm] with the end polished on a Scotchbrite™ wheel can be used.

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**FIGURE 14:** AILERON HINGE BRACKET RIVETS



**FIGURE 15:** BUCKING BAR

**Step 27 (RV-10 & 14 only):** Rivet the two rivets in the tabbed portion of the aileron gap fairing with AN470AD4-5 rivets.

**Step 28:** Re-install / re-connect the flap and aileron in the reverse order in which they were removed / disconnected. Re-install any removed access panels or covers. Make an appropriate log book entry to show that S.B. 16-03-28 has been complied with.

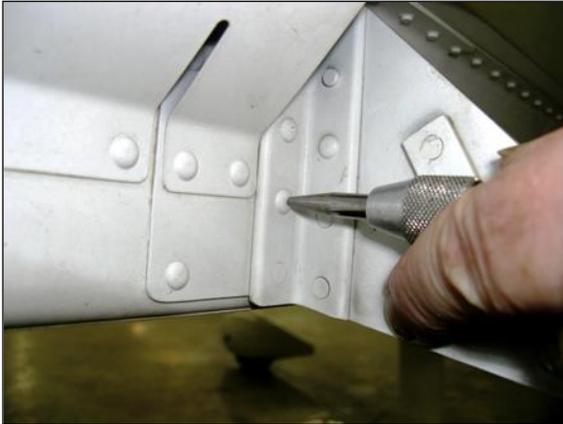
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## Appendix 1: Rivet Removal



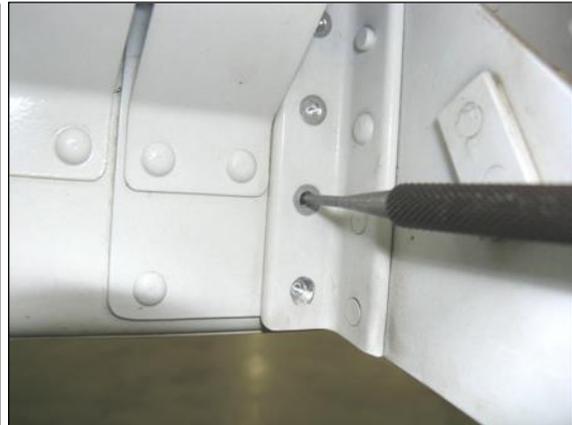
1. Center punch each rivet head.



2. Drill #30 to the depth of the rivet head. Drill #40 to the depth of the hinge bracket angle.



3. Snap off the rivet heads using a 1/8 in. pin punch or the aft end of a #30 drill bit.



4. Drive out the rivets with a 3/32 in. pin punch while backing-up the spar web on the opposite side with a heavy bucking bar adjacent to the rivet.

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**These kits contain the parts and hardware necessary for individual RV models to perform this SB. Order the kit for your RV. There is a nominal charge for these kits to cover the cost of materials.**

| <b>RV Model</b> | <b>PART NUMBER</b> |
|-----------------|--------------------|
| RV-3/3A/3B      | SB 16-03-28-3      |
| RV-4/6/6A       | SB 16-03-28-46     |
| RV-7/7A/8/8A    | SB 16-03-28-78     |
| RV-9/9A         | SB 16-03-28-9      |
| RV-10/14/14A    | SB 16-03-28-1014   |