

MANDATORY SERVICE BULLETIN**NUMBER:** SB 14-09**REVISION:** 01**DATE:** 12/11/2014**SUBJECT:** ELEVATOR DOUBLER INSTALLATION**EFFECTIVITY:**

Elevator Serial Numbers 0001 thru 0149

SUMMARY:

Quest Aircraft received one report of cracks forming in the trailing edge skin of the elevator on the lower inboard corner, near the leading edge skin and torque tube. QUEST® has determined that the area must be inspected on every aircraft as specified below, and doublers installed. The attached Field Service Instruction provides procedures for inspecting for cracking of the inboard upper and lower skins of the elevator and installation of doublers to repair existing cracking or prevent cracks from occurring.

COMPLIANCE:

This Service Bulletin must be complied with prior to the elevator Time In Service (TIS) reaching 1500 hours or within the next 25 hours TIS, whichever occurs later.
Elevator assemblies that have previously complied with revision 00 need not comply with revision 01 of this bulletin.

ATTACHED DOCUMENTS:

Document #:	Document Title:
FSI-106	Elevator Doubler Installation

FAA APPROVAL STATUS:

The resultant alteration to the affected aircraft described in the instructions attached has been shown to comply with the applicable Federal Aviation Regulations and is approved by the Federal Aviation Administration.


SPECIAL INSTRUCTIONS:

Any deviations from the Service Bulletin or the accompanying Field Service Instructions must be coordinated with Quest Aircraft and approved by the FAA. The FAA is considering issuing an Airworthiness Directive to address this issue.

CREDIT AND WARRANTY INFORMATION:

QUEST® will supply one Service Kit FSI-106 per aircraft at no cost to owner, and for aircraft under factory warranty, reimburse up to 4 hours of labor costs associated with FSI-106. Contact QUEST Customer Service to order Kit, and refer to the QUEST® website for information on submitting invoices for labor reimbursement.

Quest Customer Service**Service Bulletin SB14-09****Phone:** (208)263-1111 **Toll Free:** 1(866)263-1112**Email:** Customerservice@questaircraft.com

	<div> <div>FIELD SERVICE INSTRUCTION</div> <div> <div>TITLE: Elevator Doubler Installation</div> <div>SERIAL RANGE: Elevator Serial Numbers 0001 thru 0149</div> </div> <div>JASC CODE: 5522</div> </div>	<div> <div>PAGE: 1 of 18</div> <div>REPORT NO.: FSI-106</div> <div>REVISION: 02</div> </div>
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SUBJECT

▲ NOTE ▲

The serial range provided above is the elevator serial number, not the airplane serial number. The information can be found on the placard on the elevator itself. The placard is located on the front face of the spar at the trim actuator pass through hole.

This Field Service Instruction provides procedures for installation of a doubler at the inboard forward corner of each elevator trailing edge skin, top and bottom.

AFFECTED MANUALS AND PUBLICATIONS

None.

INDUSTRY REFERENCES

None.

WEIGHT AND BALANCE

The weight and balance changes to the elevator have been evaluated and found to be negligible; the elevator does not need to be weighed and balanced after complying with this Field Service Instruction. If the mechanic chooses to perform work outside of the scope and instructions provided within this document, the mechanic must reference the current revision of the AM902.0 *KODIAK® 100 Airplane Maintenance Manual*, for instructions on weighing and balancing the elevator control surface.

MANPOWER

The estimated man-hours and minimum number of persons required to perform this Field Service Instruction are listed below. The "Minimum Persons" refers only to maintenance personnel or installers, and unless otherwise specified within this instruction does not include additional personnel that may be needed solely to comply with safety requirements (for example, safety observers that are not performing tasks within this instruction). It is the responsibility of maintenance personnel to comply with safety requirements, including having a safety observer available as needed.

Estimated Man-hours: 1 to 4 hours

Minimum Persons: 1 person

If more than the minimum personnel perform this instruction, the actual man-hours required may be reduced due to increased efficiencies. As appropriate, Quest encourages the use of additional personnel; man-hour estimates are based on the minimum personnel required.

RECORD OF COMPLETION

- Update the appropriate maintenance log books
- Ensure the *KODIAK® 100 Pilot's Operating Handbook / Aircraft Flight Manual* is up-to-date with the current revision
- Ensure the *KODIAK® 100 Aircraft Maintenance Manual* is up-to-date with the current revision (Rev 16 or later)

Quest Aircraft Company, LLC
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Sandpoint, ID 83864

▲ DISCLAIMER ▲

The instructions / procedures presented herein are based upon the systems and components of the aircraft when it was delivered from the factory, or as modified by Quest Service Bulletins. Third-party modifications that have affected any component, system, or operating characteristic discussed by this document may invalidate the instructions / procedures provided. Before performing the instructions / procedures herein, examine all Supplemental Type Certificate (STC), Supplemental Type Authority (STA), or equivalently authorized modifications to verify that the instructions/procedures presented in this document can be properly completed. If an aircraft has an STC, STA, or equivalently authorized modification that affects any component, system, or operating characteristic also affected by this document, the operator is responsible for obtaining appropriate regulatory approval before performing the instructions / procedures herein. Quest Aircraft Company cannot be responsible for the quality of work performed in accomplishing the requirements of this document.

If you have any questions as to the applicability of this document to your specific aircraft, contact Quest Customer Service by telephone at (208) 263-1111, toll-free at (866) 263-1112, or via email at CustomerService@QuestAircraft.com



FIELD SERVICE INSTRUCTION

TITLE:

Elevator Doubler Installation

SERIAL RANGE:

Elevator Serial Numbers 0001 thru 0149

JASC CODE:

5522

PAGE:

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REPORT NO.:

FSI-106

REVISION:


02

REVISION RECORD

REV	PAGE	CHANGE DESCRIPTION
00	All	Initial Release
REV	PAGE	CHANGE DESCRIPTION
01	1	Updated note to describe location of placard.
	1	Weight and Balance Section has been reworded and clarifying details added
	4	Table 2-1: Remove * and * text referring to attached print. (Print removed from FSI)
	5	Note Box added in general section regarding standard tolerance on dimensions within document
	5-6	Added procedure for inspecting for cracks.
	10	Table 5-1: Column 1 Header, Was: Typical Rivet Callout. Column 2 Header, Was: Nominal Size
		Updated photo in figure 5-4
	12-13	Step 3: Added procedure for inspecting for cracks. Remaining pages are renumbered by 1 page.
	14	Filler in image 5-7 text callout updated "Drill Size" and "To existing holes" text is added.
	16	Table 5-2: Column 1 Header, Was: Typical Rivet Callout. Column 2 Header, Was: Nominal Size
	17	Section 5.3, Step 2. Step re-worded to clarify the use of the tygon tubing
02		Section 5.3, Step 3 added. "Use a borescope..." The following steps renumbered.
	A1	Attachment A1 is removed.
REV	PAGE	CHANGE DESCRIPTION
02	4	Table 2-1 is updated to include MS20470AD5-5.5, MS20470AD5-4 and MS20470AD5-5 rivets
	10	Step 7 is updated to clarify that the mechanic must choose the correct length rivet and optional rivet lengths are provided
	10	Figure 5-4 is updated to agree with step 7, same page.
	16	Step 13 is updated to clarify that the mechanic must choose the correct length rivet and optional rivet lengths are provided
	17	Figure 5-9 is updated to agree with step 13, previous page.

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1. Special Safety Instructions

1.1 Warnings

Failure to comply with “Warnings” contained in this instruction may result in financial loss, significant delay in the completion time, and/or serious injury to personnel.

1.2 Cautions

Failure to comply with “Cautions” contained in this instruction may result in the destruction of components, unnecessary complications, the need to reverse completed work, and/or delays in the completion time.

1.3 Notes

“Notes” are provided when additional information may lead to an increase in efficiency.

2. Parts, Tools, and Equipment

The following tables describe the parts, tools, and equipment necessary to successfully complete this instruction. Where applicable, reference to drawings provided with this instruction is provided.

Table 2-1: Parts and Tools Included in the Service Kit

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-1-1	100-534-2102	4	Elevator Doubler	N/A	N/A
2-1-2	CR3213-4-01	12	Rivet, Cherry	N/A	N/A
2-1-3	CR3213-4-02	30	Rivet, Cherry	N/A	N/A
2-1-4	CR3243-4-02	30	Rivet, Cherry, Oversized	N/A	N/A
2-1-5	MS20470AD5-5.5	10	Rivet, Universal	N/A	N/A
2-1-6	NAS1242AD5-5.5	4	Rivet, Universal, Oversized	N/A	N/A
2-1-7	AAG00017	1 ft	Tygon Tubing	N/A	N/A
2-1-8	MS20470AD5-4	10	Rivet, Universal	N/A	N/A
2-1-9	MS20470AD5-5	10	Rivet, Universal	N/A	N/A

Table 2-2: Consumables Included in the Service Kit

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-2-1	N/A	--	N/A	N/A	N/A

Table 2-3: Serial-Number-Specific Parts Included in the Service Kit

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-3-1	N/A	--	N/A	N/A	N/A

Table 2-4: Parts and Tools NOT Included in the Service Kit

Item #	Part No.	Qty	Description	Drawing No.	Dwg Item #
2-4-1	N/A	AR	Drill Bits #16, #21, #27, #30, #31, #40	N/A	N/A
2-4-2	N/A	AR	Drill Stop	N/A	N/A
2-4-3	N/A	AR	Airplane Touch-up Paint	N/A	N/A

3. General

This Field Service Instruction provides procedures for inspecting for cracking of the inboard upper and lower skins of the elevator and installation of doublers to repair existing cracking or prevent cracks from occurring.

NOTE

Inspect a total of four locations on the airplane and perform repairs/install doublers at each in accordance with the instructions in Section 4.0 and Section 5.0.

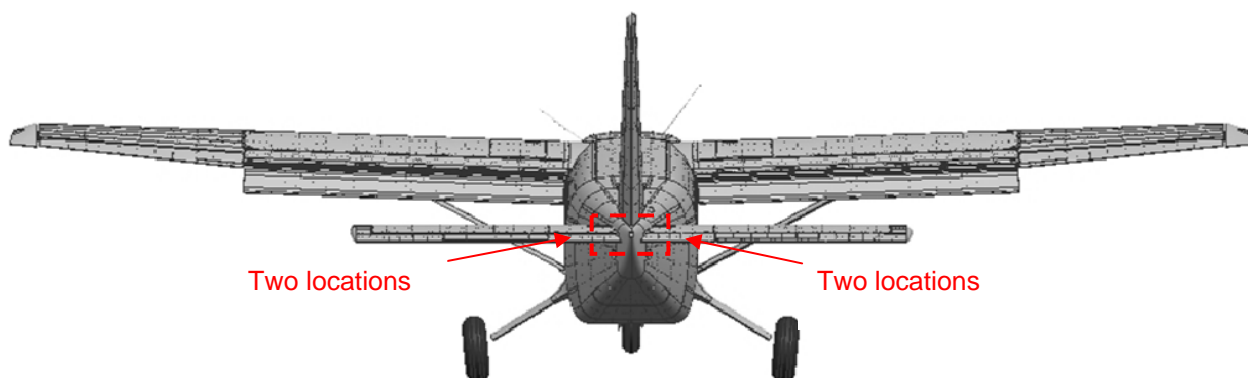


Figure 3-1: Overview

NOTE

All dimensions throughout this document are in inches. Unless otherwise noted, dimensions with one decimal place, X.X, are ± 0.100 and those with two decimal places, X.XX, are ± 0.030 .

4. Preparation

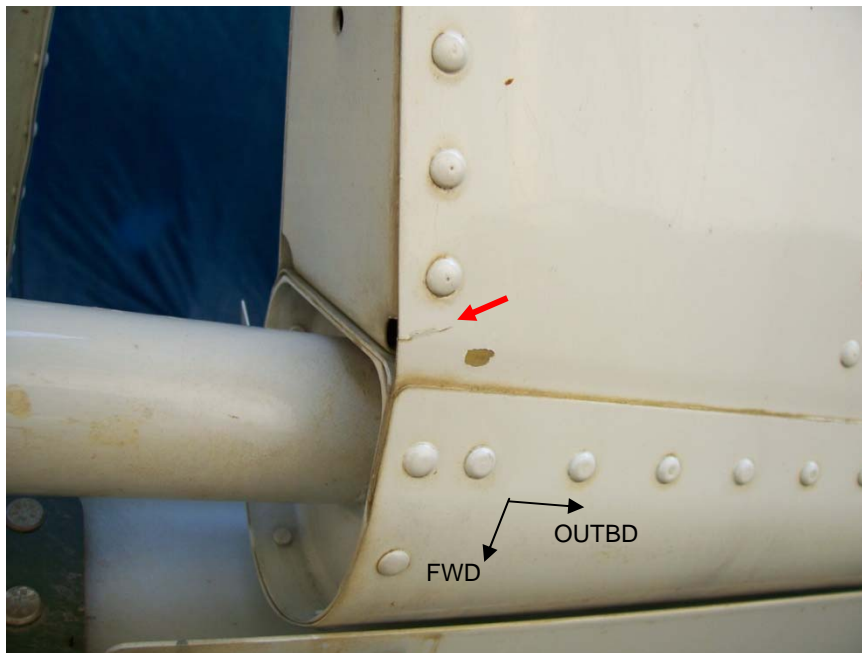
1. Remove the tailcone in accordance with AM902.0, *KODIAK 100 Airplane Maintenance Manual*, Chapter 53, Fuselage.

NOTE

The elevator may be removed to provide better access to the inspection and repair area.


2. Inspect the elevator, both top and bottom, for signs of cracking in the forward inboard end of the trailing edge skin, aft of the spar (**Figure 4-1**) by using the following procedure based on AC43.13-1B, Section 2:
 - a. Provide adequate lighting to illuminate the edges of the elevator trailing edge skin.
 - b. Clean the areas to be inspected. Remove any contaminants that might hinder the discovery of existing surface indications. Do not remove the protective finish from the part or area prior to inspection.

- c. Carefully inspect the area for discontinuities, using optical aids as required. An inspector should have available, at minimum, a flashlight and a mirror.
 - d. Determine the extent of any cracks found by directing the light beam at right angles to the crack and tracing its length. Use a 10-power magnifying glass to confirm the existence of a suspected crack.
3. **For locations where no cracking is found:** proceed to **Section 5.1**, Uncracked Elevator Skins — Install Doubler.
 4. **For locations where cracking is found:** proceed to **Section 5.2**, Cracked Elevator Skins — Repair Cracking and Install Doubler.



Bottom side of right elevator shown

Figure 4-1: Example of Cracking

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5. Instructions

5.1 Uncracked Elevator Skins — Install Doubler

1. Remove eight (8) rivets from the locations shown in **Figure 5-1**.

⚠ CAUTION ⚠

Use a drill stop to prevent damage to the elevator torque tube while drilling.



Figure 5-1: Drill Out Eight Rivets

2. Line up the doubler in the corner and cleco in place using the forward, inboard pilot hole (**Figure 5-2**).

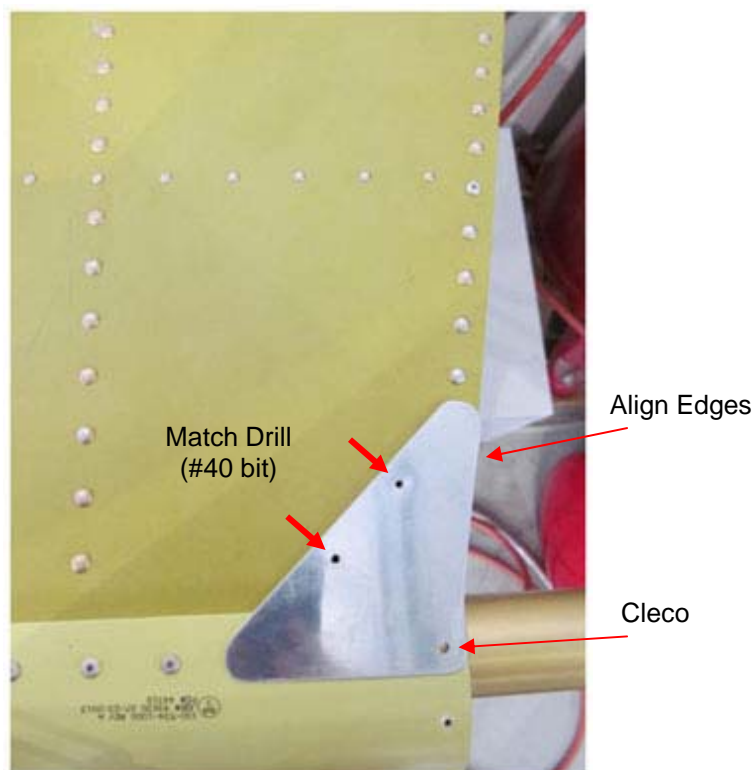


Figure 5-2: Fit Doubler to Corner and Match Drill

3. Match-drill the two (2) pre-drilled holes into the airplane skin using a #40 drill bit.

4. Slide the doubler under the skin, matching up the holes. Cleco in place.

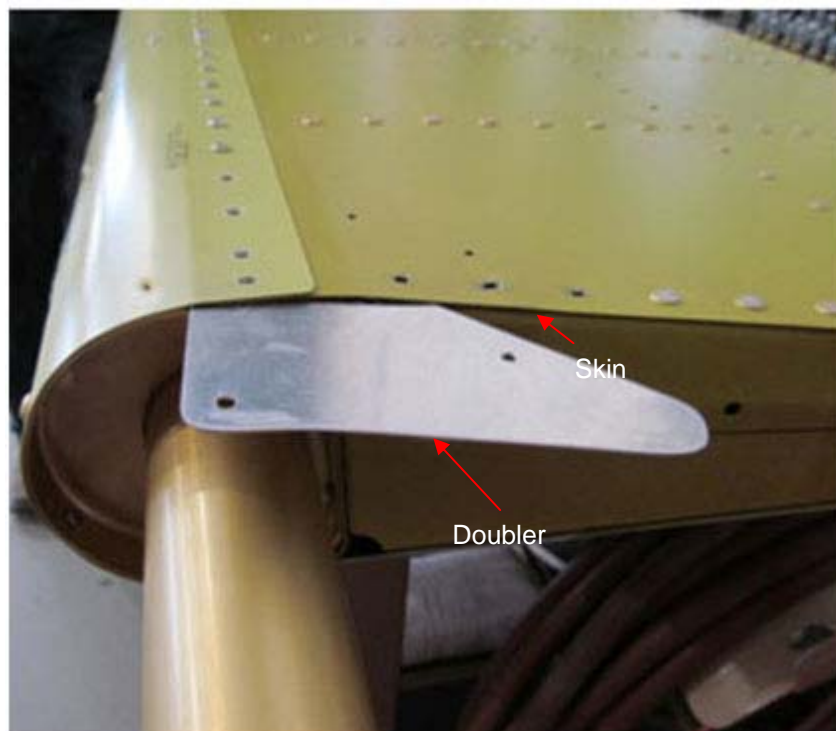


Figure 5-3: Slide Doubler Under Skin

5. Match drill the remaining six (6) holes for the doubler with a #30 drill bit, inserting clecos as appropriate.

⚠ CAUTION ⚠

Use a drill stop to prevent damage to the elevator torque tube while drilling.

6. Upsize the two (2) holes from Step 3 with a #30 drill bit. Deburr as needed.

⚠ NOTE ⚠

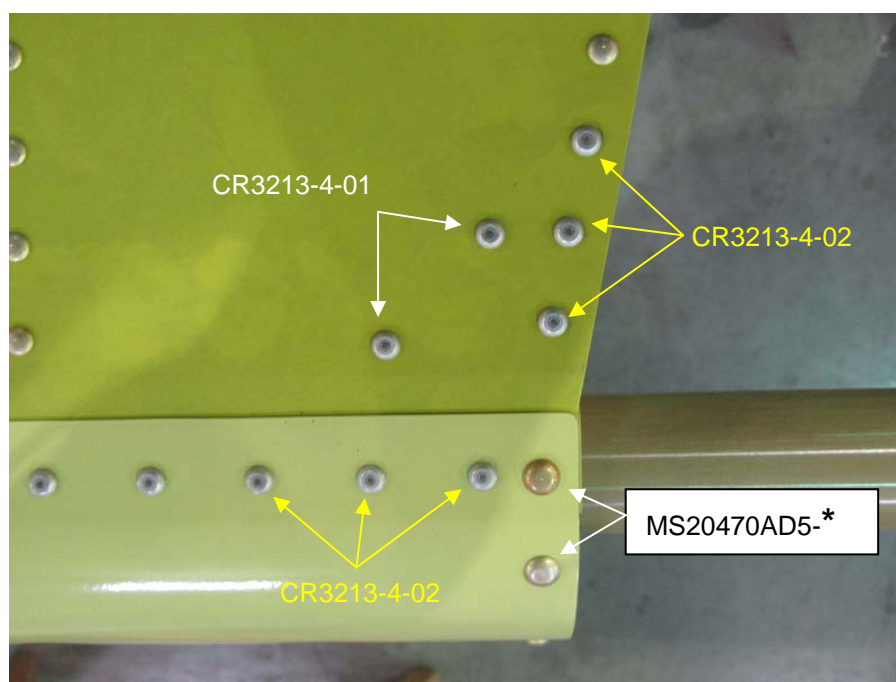
Standard sized rivets and hole dimensions are used throughout this document. It is permissible to use the standard oversized fastener in all locations where fasteners are replaced in this document. All fasteners shall be installed in accordance with **Table 5-1**; refer to **Table 5-1** for edge distance, fastener part numbers, and other pertinent information. Solid fasteners may not be replaced with pulled fasteners. Pulled fasteners may always be replaced with solid fasteners if desired.

Table 5-1: Rivet Specifications

RIVET CALLOUT	SIZE	PREPARED HOLE DIAMETER (in)		STANDARD DRILL	MINIMUM EDGE DISTANCE (in)
		Min	Max		
MS20470AD4	4	0.128	0.134	30	0.25
NAS1242AD4	4 oversized	0.143	0.149	27	0.27
CR3213-4	4	0.129	0.132	30	0.25
CR3243-4	4 oversized	0.143	0.146	27	0.27
MS20470AD5	5	0.159	0.164	21	0.31
NAS1242AD5	5 oversized	0.175	0.180	16	0.34

7. Install ten (10) rivets at the location shown in **Figure 5-4**. The rivet lengths shown are provided in the service kit, but the mechanic may adjust the length as necessary to ensure a properly installed fastener in accordance with *AC-43.13-1B Section 4-57*.


- Two (2) cherry rivets (P/N CR3213-4-01)
- Six (6) cherry rivets (P/N CR3213-4-02)
- Two (2) fastener (MS20470AD5-*).



*MS20470AD5-4, MS20470AD5-5, and MS20470AD5-5.5 are provided in the kit. Select the appropriate length as needed.

Figure 5-4: Install Ten Rivets

8. Proceed to **Section 5.3**, Repeat and Clean Up.

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5.2 Cracked Elevator Skins — Repair Cracking and Install Doubler

1. Remove eight (8) rivets from the locations shown in **Figure 5-5**.

⚠ CAUTION ⚠

Use a drill stop to prevent damage to the elevator torque tube while drilling.



Figure 5-5: Drill Out Eight Rivets

2. Fully remove the cracked skin by trimming away the trailing edge skin to the dimensions shown in **Figure 5-6**. Remove additional fasteners in the leading edge skin as necessary to access the area.

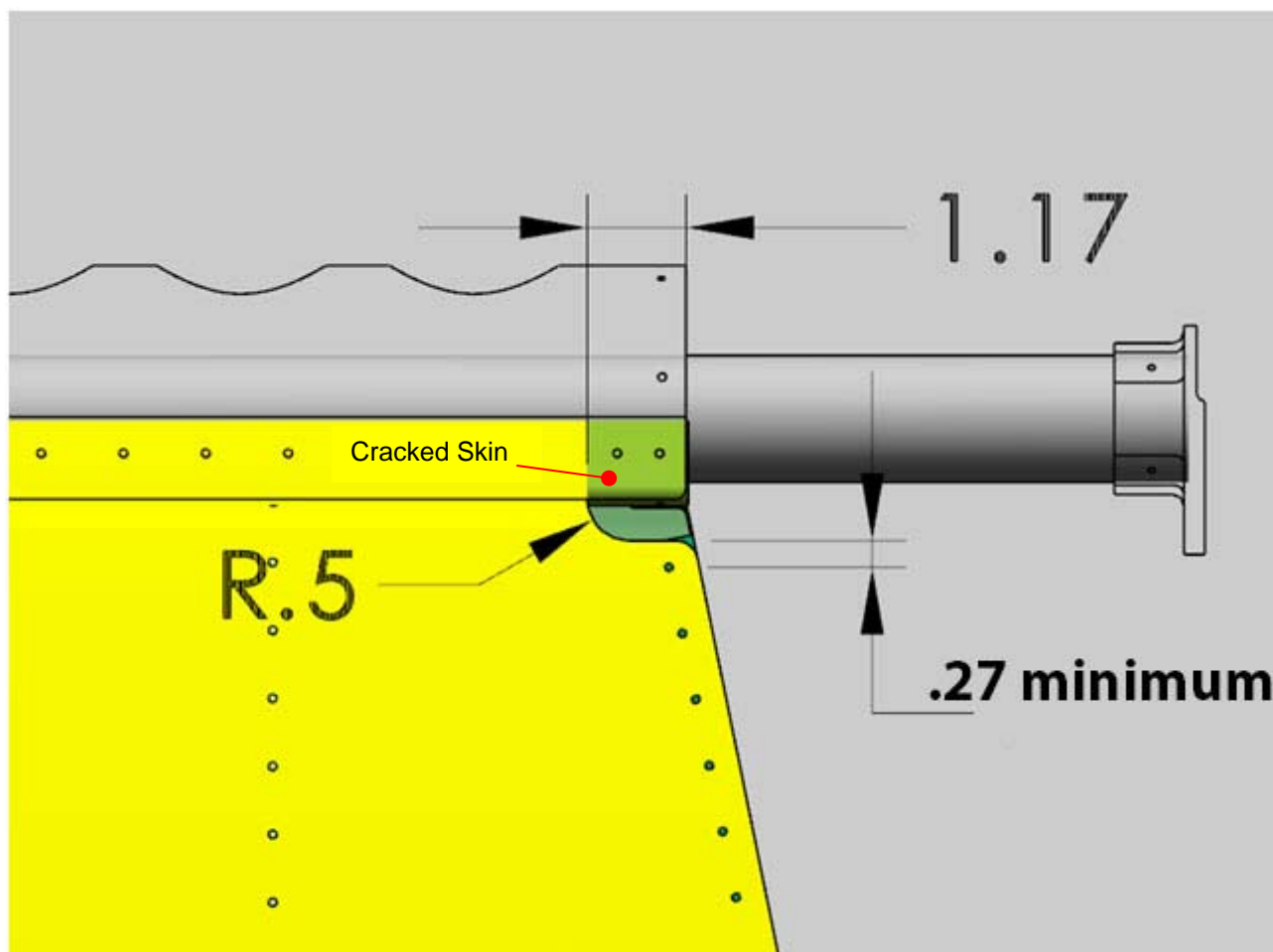



Figure 5-6: Trim Away Cracked Skin

3. Inspect and verify that all of the cracked material has been removed by using the following procedure based on AC43.13-1B, Section 2:
 - a. Provide adequate lighting to illuminate the edges of the trimmed skin.
 - b. Clean the areas to be inspected. Remove any contaminants that might hinder the discovery of existing surface indications. Do not remove the protective finish from the part or area prior to inspection.
 - c. Carefully inspect the area for discontinuities, using optical aids as required. An inspector should have available, at minimum, a flashlight and a mirror.

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- d. Determine the extent of any cracks found by directing the light beam at right angles to the crack and tracing its length. Use a 10-power magnifying glass to confirm the existence of a suspected crack.
- e. If unable to remove all of the cracked material while maintaining the 0.27 inch minimum and other dimensions shown in **Figure 5-6**, contact Quest Aircraft.
- f. If it is verified that all the cracked material has been removed, proceed to the next step in this procedure.

4. Manufacture a filler (from the removed piece or other 2024-T3 clad sheet measuring 0.020 inch thick) as shown in **Figure 5-7**.

▲ NOTE ▲

If the filler is manufactured from clad sheet, etch, alodine, and prime.

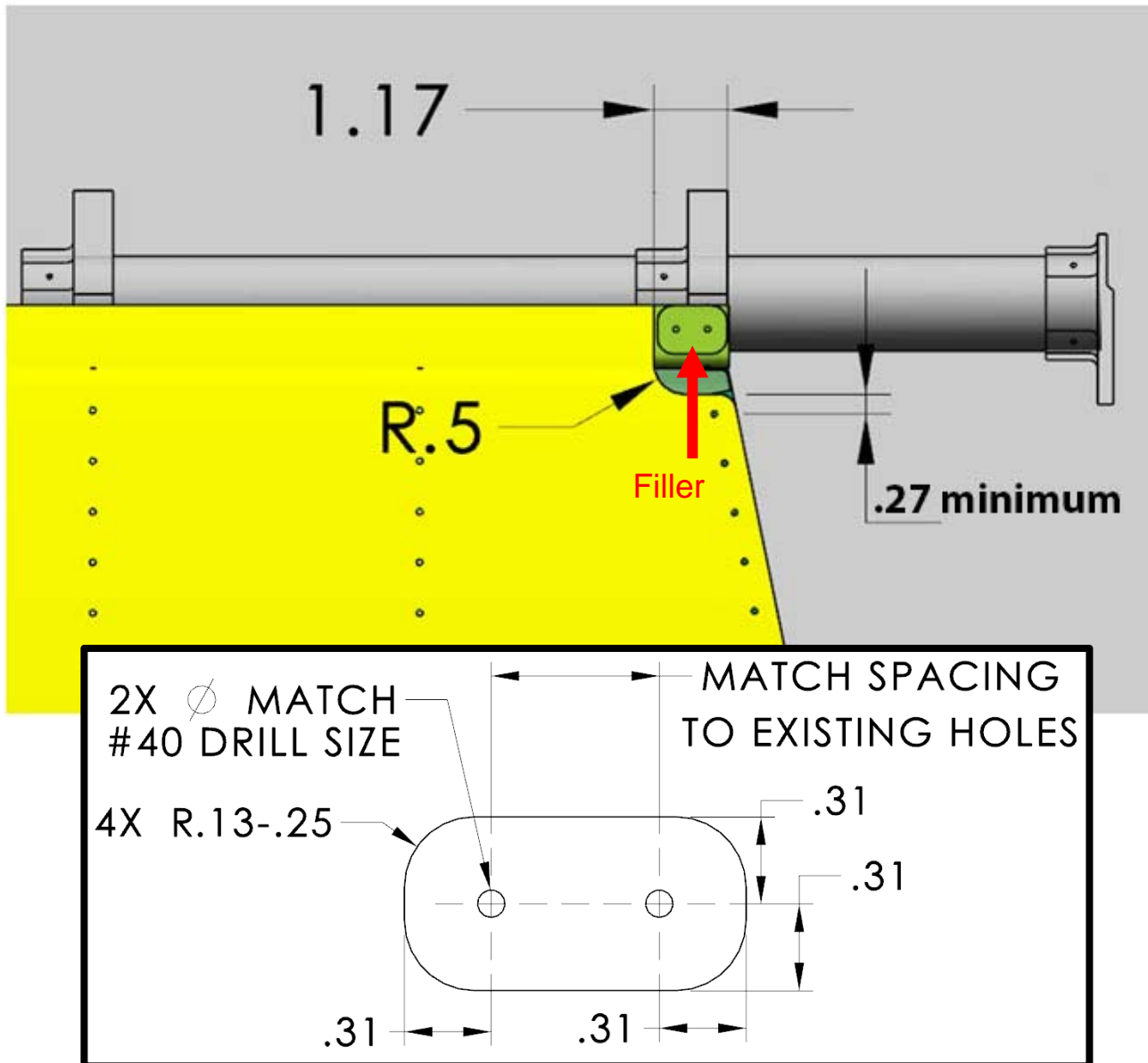


Figure 5-7: Manufacture a Filler

5. On top of the elevator skin, line up the doubler and the filler in the corner, with the filler beneath the doubler, and cleco in place (**Figure 5-8**).

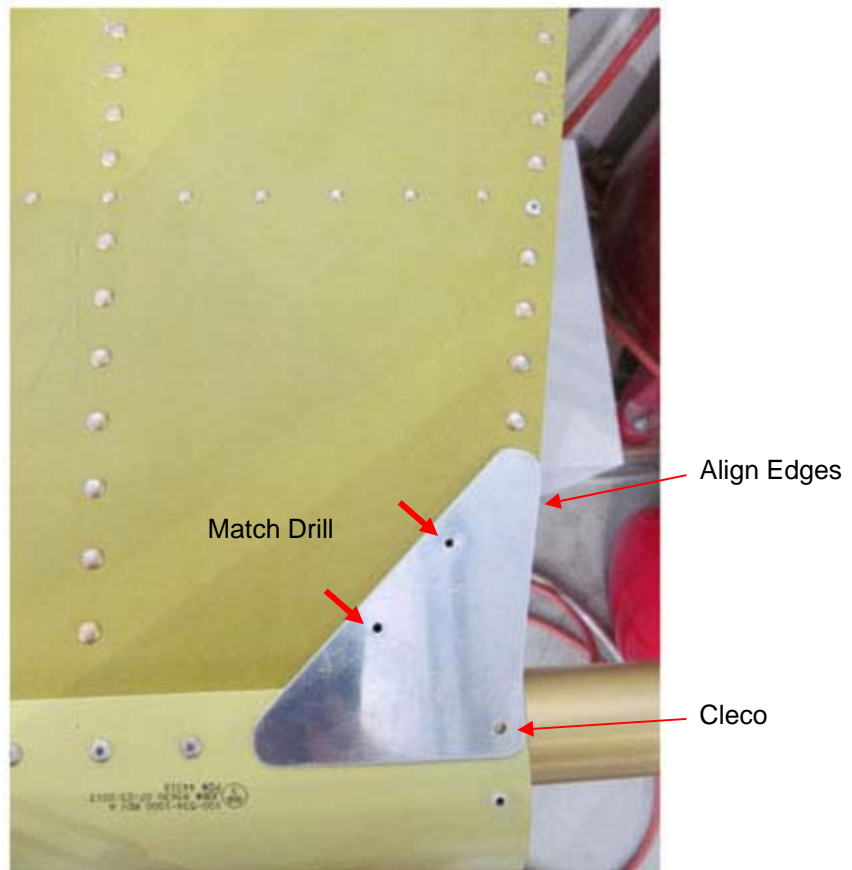


Figure 5-8: Fit Doubler to Corner and Match Drill

6. Match-drill the two (2) pre-drilled holes into the airplane skin using a #40 drill bit.
7. Slide the doubler under the skin, matching up the holes and aligning the filler. Cleco in place.
8. Match drill all eight (8) holes in the doubler with a #30 drill bit, inserting clecos as appropriate.

⚠ CAUTION ⚠

Use a drill stop to prevent damage to the elevator torque tube while drilling.

9. Remove the clecos, and remove the doubler from under the skin.
10. Deburr as needed.
11. On top of the elevator skin, line up the doubler and the filler in the corner, with the filler beneath the doubler, and cleco in place.
12. If needed, upsize rivet holes in accordance with **Table 5-2**.

⚠ CAUTION ⚠

Use a drill stop to prevent damage to the elevator torque tube while drilling.

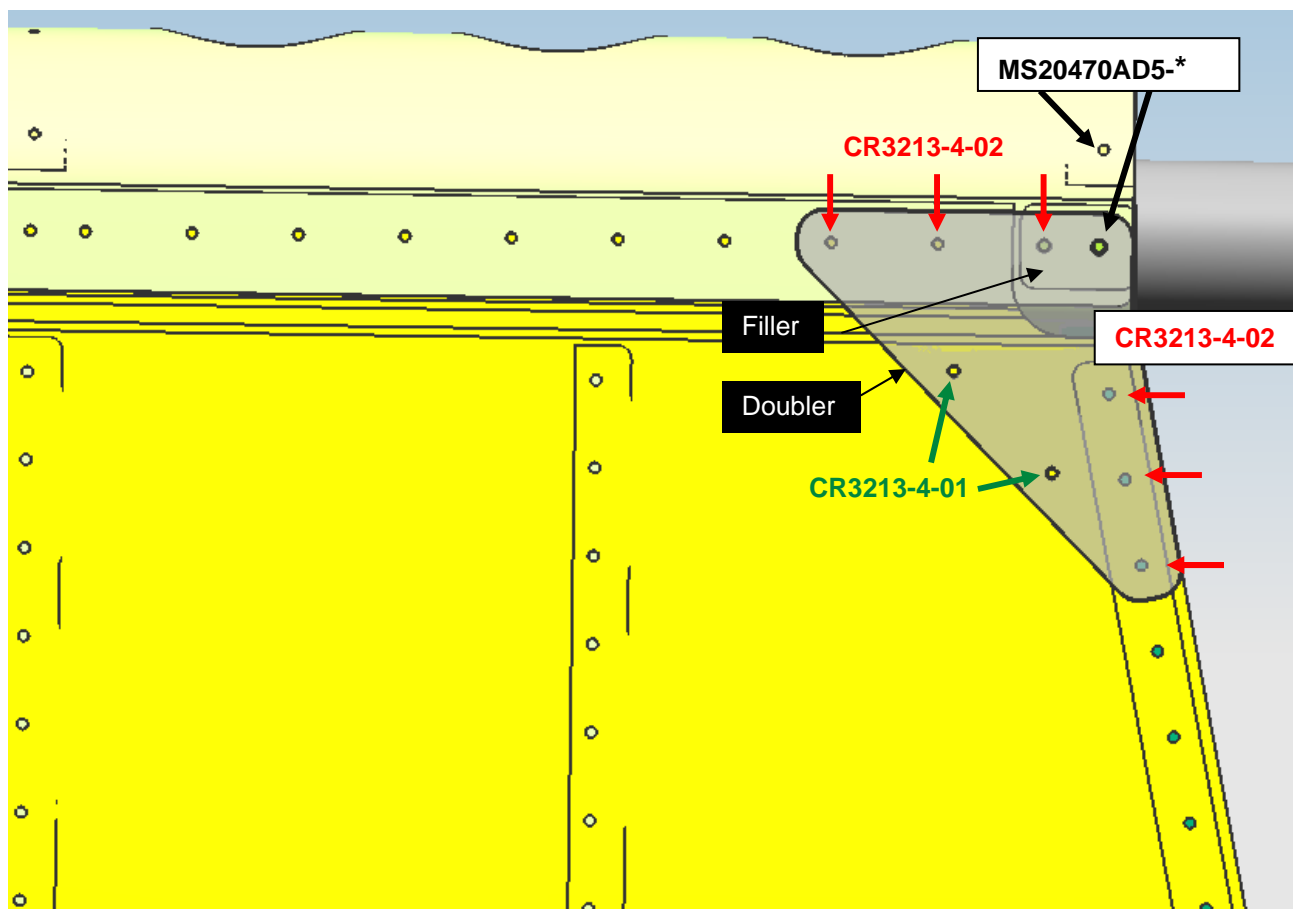
⚠ NOTE ⚠

Standard sized rivets and hole dimensions are used throughout this document. It is permissible to use the standard oversized fastener in all locations where fasteners are replaced in this document. All fasteners shall be installed in accordance with **Table 5-2**; refer to **Table 5-2** for edge distance, fastener part numbers, and other pertinent information. Solid fasteners may not be replaced with pulled fasteners. Pulled fasteners may always be replaced with solid fasteners if desired.

Table 5-2: Rivet Specifications

RIVET CALLOUT	SIZE	PREPARED HOLE DIAMETER (in)		STANDARD DRILL	MINIMUM EDGE DISTANCE (in)
		Min	Max		
MS20470AD4	4	0.128	0.134	30	0.25
NAS1242AD4	4 oversized	0.143	0.149	27	0.27
CR3213-4	4	0.129	0.132	30	0.25
CR3243-4	4 oversized	0.143	0.146	27	0.27
MS20470AD5	5	0.159	0.164	21	0.31
NAS1242AD5	5 oversized	0.175	0.180	16	0.34

13. Install ten (10) rivets at the locations shown in **Figure 5-9**. The rivet lengths shown are provided in the service kit, but the mechanic may adjust the length as necessary to ensure a properly installed fastener in accordance with *AC-43.13-1B Section 4-57*.
 - Two (2) cherry rivets (P/N CR3213-4-01)
 - Six (6) cherry rivets (P/N CR3213-4-02)
 - Two (2) rivet (MS20470AD5-*).
14. Replace any rivets that were removed to access the inspection and work area.



*MS20470AD5-4, MS20470AD5-5, and MS20470AD5-5.5 are provided in the kit. Select the appropriate length as needed.

Figure 5-9: Install Ten Rivets

5.3 Repeat and Clean Up

1. Repeat **Section 5.1** or **Section 5.2** as appropriate to install a total of 4 doublers (one on top, one on bottom, on both the left and right elevators).
2. Remove rivet tails and foreign object debris from inside the elevator using a vacuum system. If the elevator was removed from the airplane, connect the included piece of Tygon tubing to the vacuum system and insert between the trailing edge skin and the inside rib to aid in removing foreign object debris. See Figure 5-10.
3. Use a borescope (if available) to verify all foreign object debris has been removed.

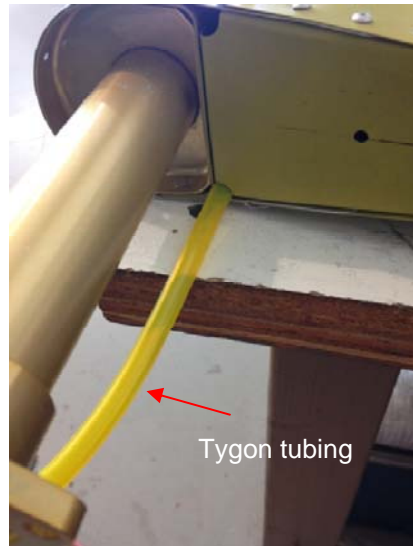


Figure 5-10: Remove Debris

4. If doubler(s) were installed on the outside of the elevator (in accordance with **Section 5.2**), paint the doubler(s) and exposed rivet heads to match in accordance with AM902.0, *KODIAK® 100 Airplane Maintenance Manual*, Chapter 6, Standard Practices. If the doublers were installed on the inside of the elevator (in accordance with **Section 5.1**), touch up the paint on the exposed rivet heads to match.

6. Completion

1. If the elevator was removed from the airplane, reinstall in accordance with AM902.0, *KODIAK® 100 Airplane Maintenance Manual*, Chapter 53, Fuselage.
2. Reinstall the tailcone in accordance with AM902.0, *KODIAK® 100 Airplane Maintenance Manual*, Chapter 53, Fuselage.
3. Record the work performed in the appropriate maintenance records.

---END---