SERVICE BULLETIN

Fuselage Tail Cone Damage

It has come to our attention that a number of Sportsman tailwheel installations have resulted in crushed and/or delaminated fuselage laminates near the aft tailwheel bracket. This is due to occasional shock loads transmitted through the small wedge shaped aluminum block above the tailwheel leaf springs. In several extreme cases, partial dis-bonding of the aft most fuselage bulkhead flange (Bulkhead “E”) to the fuselage may have occurred.

Some of the dis-bonds are easily visible, while others may appear to be superficial. In most cases, sanding off the interior fuselage laminates on the lower third of the flanges of bulkhead “E” and along the fuselage seam above the tailwheel leaf spring assembly exposes deeper cracks, voids, and delamination.

This service bulletin covers the removal of the tailwheel assembly, inspection of the aft fuselage between bulkheads “D” and “E,” reinforcement of this area, and the optional, but recommended replacement of the aft tailwheel attachment.

Through the investigation of this problem we became aware of a small likelihood of occurrence of failed laminates attaching bulkhead “E” to the fuselage shell. Out of an abundance of caution we request that all fuselages Serial No: 7300 – 7450 perform the bulkhead flange inspection.
There are currently two variations of the tailwheel spring attachment to the fuselage at bulkhead “E.”

The “Variation One” attachment method consists of strong steel brackets and incorporates solid attachment to the fuselage shell. The AN4 cross bolt contains the leaf spring set, but allows too much torsional movement of the leaf springs.

The “Variation Two” attachment method utilizes strong vertical clamping of the leaf springs, preventing the springs from shifting relative to the clamp.

Both methods have seen failures. The root cause is the transferring of too much force into the fuselage over the small area of the wedge-shaped aluminum block, particularly into foam cored laminates.
A full redesign has incorporated the secure fuselage mounting of “Variation One,” the spring clamping design of “Variation Two,” and removed the point loading aluminum block in favor of a steel cross member. Further improvements include fuselage reinforcement and shifting the aft tailwheel attachment aft, into and near the bulkhead “E” flange reinforcement laminates.

Variation Three Tailwheel Attachment. P/N:401-09010-101 and 401-09011-101
INSTRUCTIONS

1. Description of Corrective Action:
   a. Inspection of two aft most fuselage bulkheads (Bulkhead “D” and “E”) and area around tailwheel attach brackets.
   b. Repair and reinforcement of fuselage seam, mandatory for taildragger configuration.
   c. Optional replacement of aft tailwheel mount.

2. When Corrective Action Must Take Place:
   a. Within 10 hours of flight time for inspection.

3. Effectivity:
   a. Sportsman in taildragger configuration Kit Serial No 7000 - 7450.
   b. Sportsman aircraft other configurations Kit Serial No 7300 - 7450

4. Level of Certification Required:
   a. Repairman’s Certificate or licensed A&P Mechanic.
5. **Tools Required:**

   a. General hand tools
   b. Assorted disposable volume measuring and mixing tools
   c. Power drill and drill bits
   d. Handheld rotary cutoff wheel tool (Dremel tool)
   e. Sand paper of various grit levels
   f. Sanding block
   g. Torque wrench
   h. Shop vacuum cleaner
   i. Masking tape
   j. Torque seal
   k. Level
   l. Appropriate personal protective equipment
6. **Parts Needed:**
   
   Repair Kit P/N: 027-00005-05 SB74 Kit - Tailwheel bracket replacement
   
   Repair Kit P/N: 027-00005-06 SB74 Kit - Tailwheel reinforcement only

7. **Where to Purchase Parts:**
   
   a. Glasair Aviation.
      
      parts@glasairaviation.com
      
      (360) 435-8533 x232
      
      18530 59th Drive NE, Arlington, WA, 98223
8. **Detailed Steps:**

**INSPECTION**

a. **Lift and support fuselage tail**
   1. Taildragger only; tricycle gear aircraft continue to next step.
   2. Lift the fuselage of the aircraft onto a stable and well-padded sawhorse, just ahead of the tailwheel spring assembly.

b. **Remove fairings**
   1. Photograph parts and fasteners to aid in later re-assembly.
   2. Remove the Philips head screws holding the tail cone fairing to the fuselage.
   3. Remove the Philips head screws holding the rudder base fairing to the fuselage.
   4. Store fasteners in a labeled plastic bag for later re-assembly.

*Figure 1: Tail Cone Fairing*  
*Figure 2: Rudder Base Fairing*
c. **Disconnect elevator from controls**

   1. Photograph parts and fasteners to aid in later re-assembly.

   ![Disconnect Elevator from controls, keep note of hardware order for later reassembly. Disconnect Elevator Trim Connector](image)

   Figure 3: Disconnect Elevator Control Tube

   2. Store fasteners in a labeled plastic bag for later re-assembly.
d. **Remove horizontal stabilizer and elevator**

   1. Photograph parts and fasteners to aid in later re-assembly.
   2. Remove horizontal stabilizer and elevator as one assembly by removing the 4 bolts located on the furthest aft bulkhead (Bulkhead “E”).

   ![Figure 4: Remove Horizontal Stabilizer and Elevator](image)

   Remove four bolts fastening Horizontal Stabilizer to bulkhead

   3. Store fasteners in a labeled plastic bag for later re-assembly.
e. Remove aft shear web P/N: 101-00030-010

1. Photograph parts and fasteners to aid in later re-assembly.
2. Remove aft shear web by removing the 12 bolts and washers.

3. Store fasteners in a labeled plastic bag for later re-assembly.
f. **Inspect forward and aft bonding flanges of two aft most bulkheads (Bulkhead “E” and “D”)**

1. Inspect the laminates that bond the bulkhead flanges for signs of damage, or light/white discolorations that could be an indication of delamination or trapped air or voids in the laminate.

**Note:** Bulkheads have one molded flange and one built up with laminates during fuselage construction. Both forward and aft faces should be well laminated into the fuselage shell.
2. Inspect the tailwheel spring block location for any indication that the tailwheel spring block has, or has the possibility to load a foam cored laminate. The Fuselage Structure is designed to taper the foam to solid composite material, applying the load to the solid composite laminates. Manufacturing variability may have led to loading in a cored laminate, which will lead to subsequent foam core failure and a significant loss of rigidity in that immediate area. See Figure 8 and Figure 9.

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Limitations for completion of any required corrective action: n/a
3. If inspection reveals the risk of, or existence of damage continue to the next step, otherwise continue to step o.
REPAIR

g. Disconnect forward end of elevator push rod

1. Photograph parts and fasteners to aid in later re-assembly.
2. Remove inspection cover on the bottom of the fuselage, just forward of bulkhead “D.”
3. Disconnect elevator push rod from bellcrank by removing the cotter pin, castle nut, and bolt.
4. Remove the push rod from the tail section.

![Figure 10: Disconnect Elevator Control Tube](image)
h. Remove tailwheel assembly

1. Photograph parts and fasteners to aid in later re-assembly.
2. Use masking tape to create a line on the fuselage from each side of the springs to aid in tailwheel re-alignment during assembly.
3. Disconnect the chains on the steerable tailwheel where they connect to the cables exiting the fuselage.
4. Remove the three bolts and nuts fastening the tailwheel assembly to bulkheads “D” and “E.” The forward mount is one AN6 (3/8”) bolt, aft mount is two AN5 bolts (5/16”), See Figure 11

5. Store fasteners in a labeled plastic bag for later re-assembly.
### i. Remove inside tailwheel upper clamp half

1. From the outside of the fuselage, remove the screw that bolts the aft tailwheel block to the upper clamp-half (P/N: 401-09102-01).

2. Thread bolt from the inside of the bracket and tap it free of the adhesive with a hammer. Tap the left and right side independently to break the adhesive.

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*Figure 12: Insert Bolt from Inside*
3. Evaluate the surrounding areas of the tailwheel upper clamp half. Any old adhesive, damaged or delaminated laminates need to be sanded away. See Figure 14 and Figure 18.
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Figure 14: Damaged Laminates around Tailwheel Upper Clamp Half Location

Damaged laminate surrounding the Tailwheel Upper Clamp Half Location
j. Remove tail strike wheel (Tricycle gear aircraft)

1. Photograph parts and fasteners to aid in later re-assembly.

2. Remove the four AN4 bolts holding the strike wheel in place.

![Figure 15: Tail Strike Wheel](image-url)
k. Remove damaged foam core

*Note:* Use caution to not damage the fuselage exterior laminate.

1. Use the rotary cutter to cut away the laminate immediately over and ¾ inches around suspect foam.

![Figure 16: Remove Damaged Laminates and Foam Core](image1)

2. Sand away damaged foam core, taper the edges of the core and laminate for later repair.

![Figure 17: Taper Foam Core and Laminates for Later Repair](image2)

![Figure 18: Taper Sand away Damaged Foam Core](image3)
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1. If bulkhead “E” flange damage or delamination is found, remove damaged material

   **Note:** Use caution to not damage the fuselage shell structure.

   **Note:** Because the quality of the bond between the fuselage shell and the bulkhead may be suspect, the flange must be sanded away and replaced. There is no other way to guarantee a quality bond.

   1. Sand through the damaged flange and old adhesive, this is roughly ¼ inch of material thickness on most aircraft.
   2. Vacuum out debris

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**Figure 19: Top View of Fuselage Shell and Bulkhead "E"**
m. Re-laminating aft structures

1. Thoroughly clean away any dirt, water, or oil with acetone.

2. If it was necessary to grind the bulkhead “E” flange away, build a ~1/8 inch radius of a Cab-O-Sil and resin mixture in the corners between the bulkhead and fuselage shell to aid the process of re-laminating the bulkhead to the fuselage. Remove any excess and allow the resin to cure.

![Figure 20: Fillet Radius of Thick Mixture of Cab-O-Sil and Resin](image)

3. Cut 4 pieces of 7781 fiberglass cloth to cover all of the previously sanded area of the fuselage seam, with a one inch overlap onto adjacent good laminate, and up the face of bulkhead “E” at least two inches as shown in Figure 21. Each ply should get progressively larger all around at roughly ½ inch per layer.

![Figure 21: Cut Fabric to Fit, with Increasing Dimensions](image)
Note: Be sure to remain clear of the Forward Tailwheel Spring Attach Angle (P/N: 401-09002-03) on bulkhead “D,” as shown in Figure 23.

4. Cut a piece of peel ply large enough to cover the fabric cut in the previous step.

5. Mix a batch of Vinyl Ester resin equal in weight to the fiberglass fabric previously cut.

6. Use a clean, varnish brush to apply resin to the cloth one layer at a time. Each layer needs enough resin that the white color of the cloth becomes a clear/uniform saturated color free of air bubbles. (Light green for fiberglass fuselages, black for carbon fiber fuselages).

7. Apply the peel ply over the fiberglass cloth without applying any additional resin. Work the peel ply down into the wet plies until it becomes fully saturated.

Note: Be sure to leave a corner or edge dry to aid in removing the peel ply.

8. Allow the resin to cure. The amount of time will vary by how the resin was promoted and the outside temperature. Pull away the peel ply once the laminate is fully cured. This will leave a uniform surface similar to the rest of the fuselage shell interior.
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**Figure 22:** Replacement Plies from Damaged Core Removal: Bulkhead “E”

**Figure 23:** Replacement Plies from Damaged Core Removal: Bulkhead “D”

**Figure 24:** Cross Section of Replacement Plies over Sanded Area from Figure 17.
9. If any of bulkhead “E” flange has been sanded off, re-laminate the bulkhead to the fuselage shell. Laminate the bulkhead with six layers of 7781 fiberglass, as large as you can without causing interference with the tailwheel cables or shear webs. Follow Step 4 through Step 8 to laminate the flanges.

See Figure 25. Ideally this laminate will overlap the fiberglass material added in Step 3.

![Figure 25: Flange Replacement and Reinforcement Laminates](image-url)
10. Cut six reinforcement plies of 7781 fiberglass starting four inches wide, from two inch up bulkhead “E”, to three inches forward of the bulkhead. Cut each ply larger than the previous as shown in Figure 21 and Figure 23. If the old tailwheel assembly is going to be used, extend these layers forward over the tailwheel block location.

11. Follow Step 4 through Step 8 to laminate the six plies of material cut in the previous step.
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*Figure 27: Finished Laminate Repair, Ready for Tailwheel Mount holes to be drilled.*
n. If using the new aft tailwheel mount, remove and discard aft spring block

**Note:** Tricycle Gear Aircraft continue to Step v

1. Lightly tap the block free with a hammer, this part is only bonded with adhesive and should give way relatively easy.

2. Mask the surrounding area and sand away the old adhesive.

**Note:** Use care to avoid damaging the fuselage shell.

![Figure 28: Remove Aft Tailwheel Block P/N: 075-01500-01](image-url)
**o. Position Tailwheel Assembly**

1. Bolt forward tailwheel attachment. See Figure 29

2. Reinstall the AN6 bolt

3. Replace nut with new AN365-624A

*Note:* Do not final torque to allow further adjustments in assembly position.

*Figure 29: Fasten Forward Tailwheel Attachment*
4. Clamp to aft flange of bulkhead “E”

*Note:* Align tailwheel springs to the masking tape line created in Step h.

![Figure 30: Clamp the Tailwheel Spring Assembly to the Aft Fuselage Flange](image-url)
5. **Level Tailwheel Assembly**

1. Level the tailwheel assembly relative to the horizontal stabilizer

   ![Figure 31: Level the Tailwheel Spring Assembly](image-url)
p. Position and drill new aft tailwheel mount assembly

*Note:* If using the old Aft Tailwheel Mount Assembly continue to Step r.

1. Position new P/N: 401-09010-101 Aft Tailwheel Mount Assembly ¾” forward of the tail cone joggle. See Figure 33

2. Match drill upper four holes of the new Aft Tailwheel Mount Assembly to the fuselage. Inserting an AN-4 bolt with a AN970-4 washer after each hole is drilled to maintain alignment of the hole pattern.

*Note:* the AN970-4 washers may require grinding to allow them to sit flat against the fuselage. See Figure 32

*Note:* Use a new, ¼ inch drill bit with minimal pressure to prevent delamination.
q. Torque new tailwheel assembly

1. Torque the four aft fuselage AN4 bolts to 50 in-lbs

*Note:* The required length of the four bolts that pass through the fuselage depend on the thickness of the repair, these bolts must have two threads visible past the nut on the fuselage bracket.

2. Torque the single forward fuselage AN6 Bolt to 170 in-lbs

3. Assemble clamp portion of the assembly as shown with AN365-428A nuts, AN960-416L washers, and AN4-6 bolts. Torque the two AN4-6 clamp bolts to 30 in-lbs

4. Minor variations in the leaf spring width may cause minor interference or minor play in the bracket, these springs can be lightly sanded and repainted or shimmed with a .016” thick stainless steel shim as seen in the figure below.

*Note:* Apply Torque Seal after setting the torque on each bolt.
r. Position and drill old tailwheel mount assembly

1. Drill two holes through the repair material using the old mounting holes as a guide.

   **Note**: Use a new, 5/16” inch drill bit with minimal pressure to prevent delamination.

   ![Drill Holes through Repair Laminates](image)

2. Lightly wax the two AN5 bolts for the aft tailwheel assembly, they will be used to aid alignment and bonding of the inside bracket.

3. Insert AN5 bolts through the tailwheel bracket assembly, over the tailwheel spring assembly, and through the newly drilled holes in the fuselage.

4. Thread the two bolts into the inside bracket to verify fitment and bolt length, after the repair longer bolts will be necessary. A minimum of two threads must show beyond the inside bracket when fully assembled.

5. Remove the inside bracket and sand away any old adhesive from the bracket.

6. Mix a thick mixture of resin and Cab-O-Sil to use as an adhesive.

7. Apply a thick layer of adhesive to the fuselage side of the inside bracket, any excess will squeeze out from between the two surfaces.
8. Bolt the tailwheel assembly back together, tightening each side evenly to pull the inside bracket down into position. Verify the bracket is evenly pulled into the fuselage and preliminary torque bolts to 20 in-lbs, wipe away any excess and allow the adhesive to cure.

![Figure 36: Inside Aft Tailwheel Bracket](image-url)
s. Torque old tailwheel assembly
   1. Torque the aft tailwheel bracket assembly AN5 bolts to 120 in-lbs
   2. Torque the single forward fuselage AN6 bolt to 170 in-lbs

   Note: Apply Torque Seal after setting the torque on each bolt.

   Note: Consult photo from disassembly process to verify correct hardware, stack up order, etc. See Step h
Reassembly

1. Verify tailwheel geometry
   1. Reference Figure 38 to verify the tailwheel castor geometry remains acceptable.
2. Adjustments can be made by rotating the tailwheel spacer P/N: 091-01180-01. If necessary, reassemble with the thick end of the spacer forward.
3. Verify the wheel remains vertical. If the wheel is tilted to one side, remove the aluminum spacer and use a belt sander to adjust the wheel tilt until it is vertical. See Figure 40.

**Note:** If adjustments are made, replace AN365-820A lock nut, torque bolt to 45 ft-lbs, and apply Torque Seal.

**Note:** Tailwheel shimmy could occur if there is play between the tailwheel spacer and tailwheel casting. A .016” stainless steel shim sandwiched between the tailwheel spacer and casting can tighten up the installation.

![Tailwheel Spacer](image-url)

*Figure 39: P/N: 091-01180-01 Tailwheel Spacer*
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**Limitations for completion of any required corrective action:** n/a

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**Figure 40: Adjusting Wheel Tilt**

- Use the belt sander to adjust the side to side angle of the spacer.
- With fuselage level, tail wheel must be vertical +/- 3°.
u. Connect tailwheel linkages

1. Reconnect the Tailwheel Linkages

![Figure 41: Tailwheel Linkages]
v. Reinstall tail strike wheel (Tricycle gear aircraft)

1. Position strike wheel over old mounting location.
2. Tape the assembly in place
3. Drill through the repair fiberglass, inserting a bolt after each hole to maintain alignment to the brackets.

Note: Use a new, ¼ inch drill bit with minimal pressure to prevent delamination.

Note: Consult photo from disassembly process to verify correct hardware, stack up order, etc.

Figure 42: Tail Strike Wheel
w. Reconnect forward end of elevator control tube

1. On each side of the control tube verify the jam nuts are torqued (40 in-lb) to the rod end bearing with threads beyond the witness hole. Torque Seal prior to installation.

2. Install hardware that was removed in Step g See Figure 43

3. Use a new AN380-2-2 cotter pin upon reassembly

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Figure 43: Elevator Push Rod Hardware, Forward End
x. Install shear web

1. Install 12 bolts and washers that were removed in Step e, See Figure 5

   *Note:* Consult photo from disassembly process to verify correct hardware, stackup order, etc.

   2. Torque bolts to 15 in-lbs, apply Torque Seal.

y. Install horizontal stabilizer

1. Straighten Spherical Bearings

   2. Slide horizontal stabilizer forward pins into the spherical bearings.

   *Note:* A person on each side of the horizontal, and one to help with final positioning is recommended.

   3. Install four bolts and washers that were removed in Step d, See Figure 4
Note: Consult photo from disassembly process to verify correct hardware, stack up order, etc.

4. Torque bolts to 25 in-lbs, apply Torque Seal.

z. Reconnect aft end of elevator control tube

1. Install hardware that was removed in Step c, See Figure 45
2. Use a new AN380-2-2 cotter pin upon reassembly

Figure 45: Elevator Push Rod Hardware, Aft End

aa. Reinstall Fairing

1. Reconnect elevator trim motor wiring and secure wiring. Verify the wires cannot interfere with pushrod and elevator control horn movements with tail cone installed.
2. Reinstall Philips head screws holding the tail cone fairing to the fuselage. See Figure 1
3. Reinstall Philips head screws holding the rudder base fairing to the fuselage. See Figure 2
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*Note*: Consult photo from disassembly process to verify correct hardware, stackup order, etc.