

Service Bulletin 70

Subject:

Vertical fin cracks

Applicability:

All Sportsman aircraft

Issue:

Inspection of the vertical fin and aft fuselage bulkheads B and C, repair of vertical fin and bulkheads and reinforcement of vertical fin spar attach to bulkhead C.

Compliance Time:


If exterior cracks are evident, an internal inspection should be completed prior to the next flight. If internal cracks or separation are evident between bulkhead B or C and the fuselage, repairs should be completed prior to the next flight. For aircraft with only cosmetic external cracks or no evidence of cracking, the aluminum reinforcement doubler should be installed no later than the next annual inspection.

Discussion and Background Information:

A few owners of Sportsman aircraft have reported cracks showing up at the aft base of the vertical fin and in some instances have reported cracking of the laminates and adhesion bond between bulkheads B and C and the vertical fin. Exterior cracking is most commonly found on the right-hand side where the vertical fin meets the aft fuselage at its base. The left-hand vertical fin is molded as a part of the fuselage, whereas the right-hand vertical fin half is bonded to the fuselage and vertical fin as a separate piece during fuselage assembly. The exterior cracks are commonly showing up along the bonding joint. Minor cracking may simply indicate separation of the cosmetic filler used in paint preparation.

Some movement of the vertical fin occurs when the rudder is actuated in flight. The degree of movement is dependent upon the speed of the plane and the force exerted on the rudder controls. A lack of evidence of cracking on the exterior does not necessarily mean that disbonding between the bulkheads and the vertical fin on the inside is not occurring. A simple test of the integrity of the vertical fin is to take hold of it near the top and firmly pull it side-to-side, watching the movement and listening for any sound of separation inside. Ultimately, a visual inspection of the bulkheads will determine the action required.

Bulkhead B can be inspected by crawling into the aft fuselage. Bulkhead C can also be inspected from the inside, but is best inspected by removal of the rudder base fairing. If cracking or separation is evident in the bonding laminates between the upper portion of bulkhead C and the vertical fin, then deeper inspection will be necessary through the lower inspection hole or removal of the stabilizer.

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Required Action:

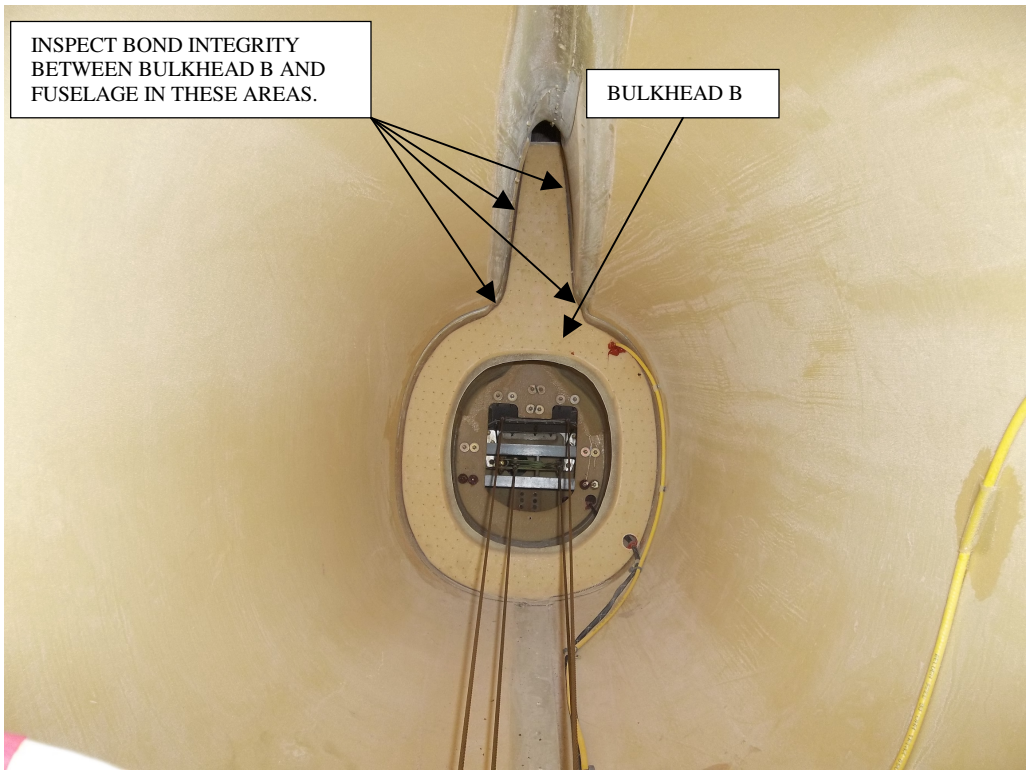
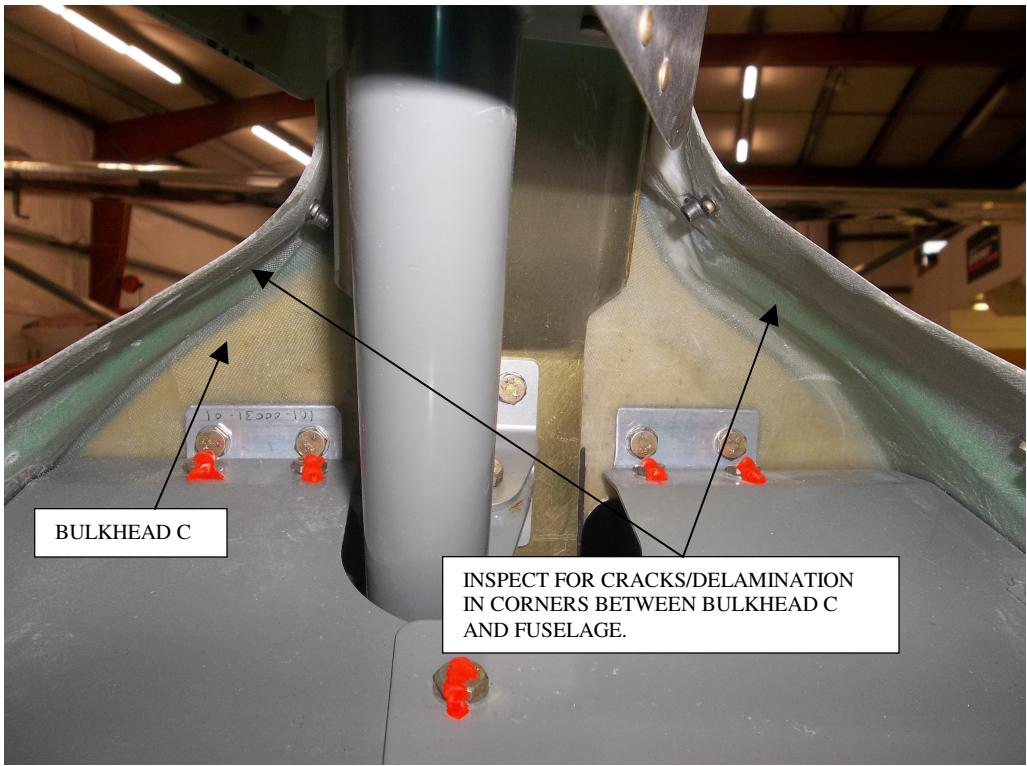
- 1) An inspection is to be completed prior to the next flight.
- 2) Repairs to interior cracks and separation are to be completed as outlined below prior to the next flight.
- 3) Reinforcement of the attachment of the vertical fin spar to bulkhead C with part # 101-00019-01 should be completed after all composite repairs are accomplished. Installation should be completed prior to or during the next annual inspection.

Note: we found that while repairs to the existing structure are important, the reinforcement doubler by far is the most significant component to prevent future cracking issues in this area.

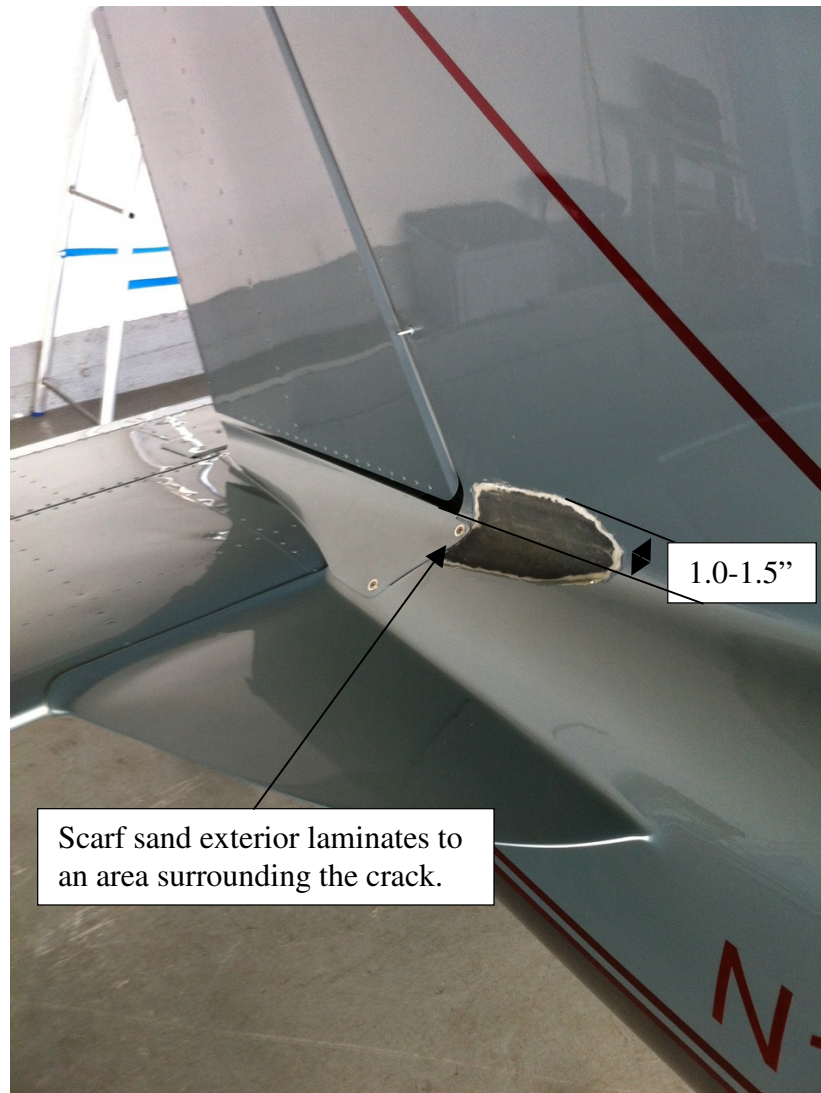
INSPECTION:



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REPAIRS:



External cracks: Sand through the paint and filler in the areas of external cracks to determine if the cracks are deep enough to be in the laminates. If so, scarf (taper) sand the external laminates down to a level where the cracks disappear (do not exceed a depth of 1/16" deep). The taper-sanded area should extend approximately 1.0-1.5" beyond the crack. Cut some plies of 7781 fiberglass cloth on a 45 degree bias to fill the area sanded. You will need to use 2 or 3 plies depending on the depth of your scarf joint at the deepest point. The pieces of cloth will need to increase in size from approximately 1.0" wide to 2.0" wide so that the edges do not stack directly on top of each other.

Clean the area with acetone and laminate the cloth layers in place followed by a piece of peel ply. (Do not add extra resin with the peel ply. Wipe any excess resin from the brush and allow

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resin from the laminates to saturate the peel ply.) Once the resin has fully cured, remove the peel ply and prepare the surface for paint.

Internal delamination or cracks: Sand or carefully grind away any loose laminates in the corners between the fuselage sides and bulkheads B and C. Prep sand the surrounding laminates on the fuselage sides or bulkhead face with 36-80 grit sand paper and wipe with acetone to clean the area.


If there are large voids to fill (this will be rare), mix up a small structural adhesive batch of resin, milled fibers and cabosil (for thickening) and fill the voids. Once cured, sand the surface flat and clean wipe with acetone.

Cut and fit two strips of 7781 fiberglass cloth 2.5 – 3.0” wide so that the cloth will adequately cover both the bulkhead face and the fuselage side by 1.25- 1.50”. Laminate these strips in place with resin and cover with a layer of peel ply. Remove the peel ply once the resin has fully cured.

The most challenging repair we have conducted was to the aft face of bulkhead B. Crawling into the fuselage and poking one’s head through the bulkhead and laminating to the aft side of this bulkhead was a lesson in patience and yoga. If possible, find a young person who you can coach to perform this task.

REINFORCEMENT OF VERTICAL FIN SPAR:




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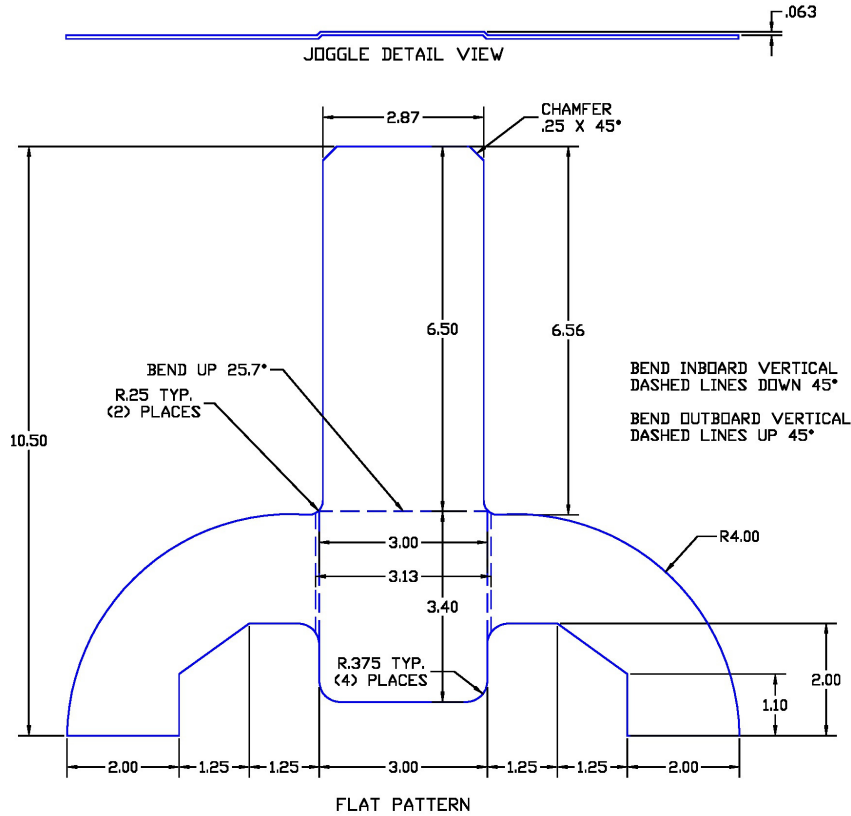
To add an extra degree of stiffness to the attachment of the vertical fin spar to bulkhead C for prevention of future cracking, an aluminum doubler (shaped like an inverted sling-shot) is placed beneath the lower rudder hinge flush against the spar and bulkhead. It is fastened with AAPQ-42 pull rivets to the vertical fin spar. It uses the four AN-3 rudder hinge bolts and forward shearweb bracket bolts to tie the doubler to bulkhead C as well as additional AAPQ-42 rivets. A part drawing has been included for reference, should you wish to fabricate the part yourself. The part will also be available for purchase from Glasair Aviation; contact customer service by phone (360-435-8533 EXT. 232) or email (harry.delong@glasairaviation.com) for details.

Note: Locating the holes in the doubler for the rudder hinge and shearweb brackets can be a bit tricky, as this task needs to be accomplished without enlarging the existing holes or drilling them crooked. After positioning the bracket and drilling/clecoing it to the base of the vertical fin spar and bulkhead C, take a cordless drill into the aft fuselage with a new, sharp #10 bit and pass drill through the reinforcement doubler through the four existing holes used to attach the lower rudder hinge fitting. It is imperative that the holes be drilled straight and perpendicular to the face of bulkhead C in order for them to match up to the rudder hinge pattern. As a minimum, drill two opposing corner holes from inside the fuselage; bolt the hinge in place, then drill the opposite holes using the hinge as a guide.

The result of adding the .063” thick doubler beneath the hinge and brackets will be to shift the rudder and shearweb brackets back by 1/16”. Simply file the holes in the forward shearweb oblong by this amount to accommodate alignment of the bolts to the nutplates.

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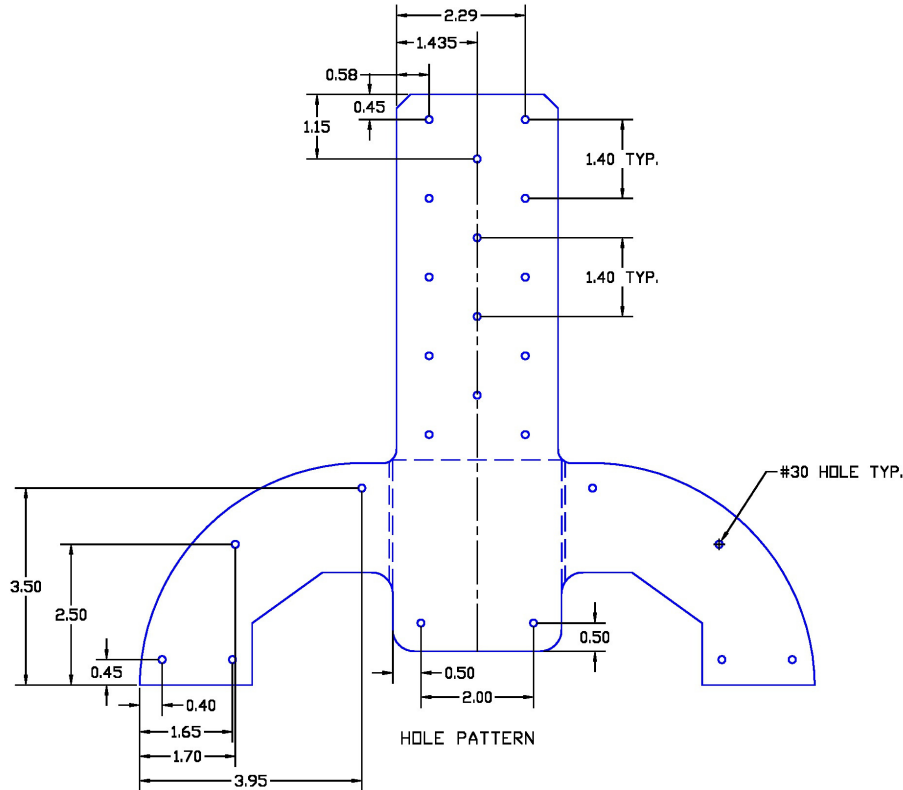


CHEM. FILM PER MIL-C-5541 CLASS 1A (CLASS 3 OPT.)
 PRIME PER BMS 10-11 TYPE 1 OR EQUIVALENT.

-01	1	DOUBLER	.063 2024-T3 ALUMINUM SHEET (6061-T6 OPT.)
DETAIL NO.	QTY	PART DESCRIPTION	MAT'L DESCRIPTION AND SPECIFICATIONS

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	FILE NO. 00019-01 LOCATION 101	DRAWN BY: KEVR APPROVAL DATE: 02/19/13 DATE: SIZE A	SCALE: NONE DWG NO. 101-00019 USED ON: SHT. 1 of 2

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