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Installing secondary support brace on rod end bearing receptacle for rudder

Repeating Symbols:

Please pay special attentions to the following symbols throughout this document, which are used to emphasize particular information.

- ◆ **Warning:** Used to identify an instruction that, if not followed, may cause serious injury or fatality.
- **Caution:** Used to identify an instruction that, if not followed, may cause severe damage to the aircraft or lead to suspension of warranty.
- **Note:** Used to identify useful information for better handling.

1 Planning Information

1.1 Affected Aircraft

Make: SilverLight Aviation (Kit Built)


Model: AR-1

Serial Number(s): Any AR-1 with rod end bearing top hinge (new tail)

Applicable Countries: All

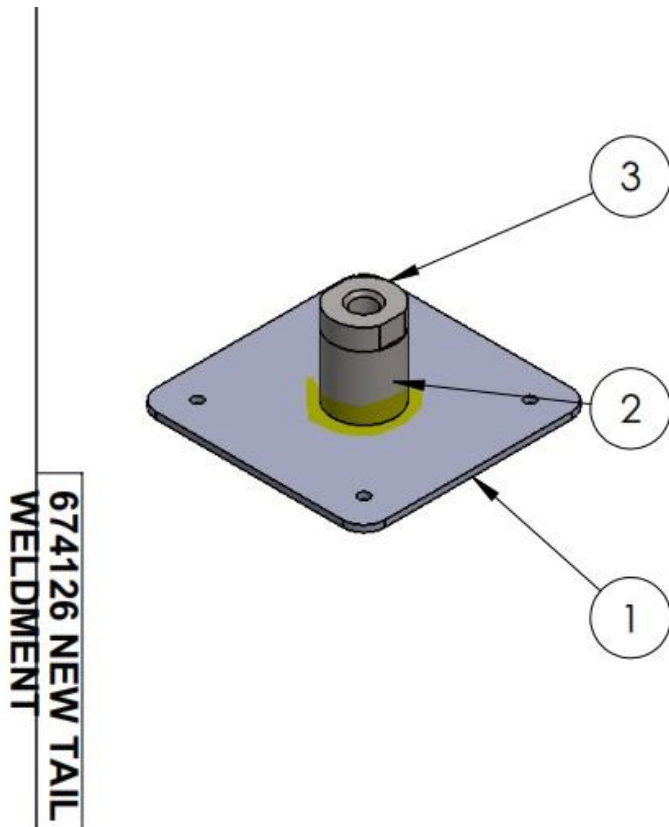
1.2 Concurrent Documents


Not Applicable. There is an explanation video on YouTube on SilverLight Aviation channel about this directive

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1.3 Reason

From a field report that showed crack next to the weld on this bracket after trailering and usage. Even though other AR-1 gyroplanes that were also trailered have not shown this and it is possible this is a one off event, it is appropriate to install this brace for peace of mind as many people trailer the gyroplane. This brace will provide extra support and will not just rely on the weld (highlighted area) alone



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1.4 Subject

To provide additional triangulated support to this part so reliance on weld during activities like trailering is reduced or eliminated

1.5 Compliance

A new part with triangulated gussets has to be slid over this part and structurally glued on the flat plate as well as the round tube with provided 2 part structural glue that is mixed 1:1

1.6 Approval

Not applicable

1.7 Type of Maintenance

Heavy Maintenance

1.8 Personnel Qualifications

Maintenance Mechanic (mechanic recommended)

1.9 Return to Service


Logbook entry, taxi testing, single flight down a long runway with post inspection

1.10 Weight and Balance

Not applicable

1.11 References

Not applicable

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1.12 Superseded Documents

None

1.13 Contact Details


For further information on this Safety Alert or to report any Safety of Flight or Service Difficulty issues, please contact SilverLight Aviation at:

SilverLight Aviation

39514 Aviation Ave
Zephyrhills, FL 33542.
USA
info@silverlightaviation.com

1.14 Disclaimer

This Safety Alert has been generated with utmost care. Nevertheless, errors and misunderstandings can never be fully excluded. In case of any doubts the recipient of this Service Alert is requested to contact SilverLight Aviation immediately to clarify the issue.

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2 Resources

2.1 Parts

674127

2.2 Materials

Acrolok structural 2 part glue. Mixed 1:1 (provided)

4 x Cherrymax rivets (CR3243-4-4) (provided)

1 x 674127 weldment support

Cardboard piece for mixing glue (provided)

Wooden stick to mix glue (provided)

A soft blanket (moving blanket would suffice)

Painter's masking tape (blue)

Sharpie

Safety wire for turnbuckle

2.3 Tools

Pop rivet gun

#25 steel drill bit

Power drill

1/2" wrench and socket

7/16" wrench and socket

1/8" hex allen wrench


Dremel tool or an air tool to trim thin fiberglass

Round file

Safety wire pliers

2.4 Special Tools

None

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2.5 Manpower

1 person, 2 hours


2.6 Cost

\$50 for safety directive parts kit


3 Instructions

3.1 General


1) Start by cutting off safety wire from the right turn buckle under front seat. Then mark a spot with a sharpie marker and loosen the turnbuckle 4 turns to allow less tension. Take the pin in the turnbuckle attaching it to the cable thimble out. This takes away all the tension in the rudder cable assembly. Once this tension is released, you can take the table off the groover in the rudder pulley.

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- 2) Now walk back to the rudder and on the upper half of the rudder you will see the covers around the rod end hinge. Using 1/8" allen hex wrench remove the fasteners to remove the covers on left as well as right side. Save these items in a secure place.
- 3) Now move to the dorsal fin (the part in front of the tail), if it is installed, it is secured with 4 screws on each side (8 total) on either side on the keel. Using 1/8" allen hex wrench remove all these screws and secure them. Remove the dorsal fin and gently lay it on the soft blanket
- 4) Now look underneath the tail. There are 4 bolts securing the tail to the frame. Using 7/16" socket loosen but not completely remove these bolts. They should be loose enough that you should be able to tilt the tail forward from the top
- 5) There is a AN5 bolt and a castle nut with a safety pin holding the rod end bearing into the welded bracket at the upper rudder hinge. Using two 7/16" wrenches loosen and take this bolt and nut out
- 6) Tilt the tail forward gently enough so that the rudder slips up and off rudder pulley pin. Remember that rudder cable is loose and can be slipped off the pulley for this purpose. This allows us to now gently pull the rudder back so it gets free of the top hinge. In other words, the rudder is free from the airframe now
- 7) Note the rod end bearing and how much it sticks out (number of threads or length and write that down). Loosen the rod end bearing by loosening the jam nut. Please note that in some cases this rod end and jam nut may be left turning, meaning opposite turning to tighten and loosen than what you may be used to (right handed). The rod end bearing and jam nut have to be completely off. The threaded hole in the weldment should be covered with some blue tape so no glue can go inside.
- 8) Inspect by trying to move this weldment by hand if it may be cracked. If it is cracked, you should contact us at info@silverlightaviation.com for further instructions and replacement and not follow the rest of this directive.
- 9) Now sand with 80 grit paper the back of the new stainless steel reinforcement bracket part to get it ready to install
- 10) Now slide the new part over the existing weldment to see if it fits over easily
- 11) Wear gloves. Use the provided cardboard piece as a mixing surface and use the wooden mixing stick to scoop equal but generous amount of white and dark

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grey parts onto the cardboard surface. Mix well with the stick for 30 seconds to a minute.

12) Apply the mixed structural MMA glue to new metal part back side and also to the inside of the round tube of this part so a nice film is left.

13) Slide the new part on to existing part keeping it centered all the way till it makes contact with back surface. Press lightly. Some excess glue may come out of the side of the part. Wipe with paper towel soaked in rubbing alcohol. Let stand for 2 hours. If the temps are cold, heating it with a heat gun or blow dryer may help activate the glue quickly


14) Using #25 drill bit and a power drill, drill through the 4 holes on the new reinforcement plate holes.

15) Use a pop rivet gun to pop rivet the 4 provided cherrymax rivets securely into the part.

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- 16) Screw in the rod end with jam nut using a drop of blue Loctite or blue Permatex. Secure this to same length or number of threads that you had noted before taking it off
- 17) Now put the rudder back on the pulley bearing pin at the bottom and slide it in to spot for upper hinge and put the AN5 bolt and castle nut (with safety cawling pin or cotter pin) to secure the upper hinge. Again, you may have to lightly pull up and forward on the loose tail to make room to be able to slide and align the rudder upper hinge bearing.
- 18) Pay special attention to the bottom of the rudder where the pulley sits and rests on the welded pin. The rudder should be completely resting on this pin and if there is any gap, that means a washer (10 mm or AN6) has to be installed as a

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shim so rudder and its pulley are not hanging up and are completely rested on the flange of the bottom pin swivel

19) Once satisfied, tighten up the 4 bolts that were loosened holding the tail to the frame using 7/16" socket. 10 foot pounds

20) Re-install the dorsal fin in front of tail if it was previously installed

21) Slide the rudder cable into the rudder pulley groove as it was before and go to the turn buckle which was undone.


22) Align the thimble of the cable to the turnbuckle and secure the pin with safety pin

23) Adjust the tension of the cable back to original by tightening this turn buckle 4 turns as it was loosened 4 turns at the start


24) Safety wire the turnbuckle using an approved method

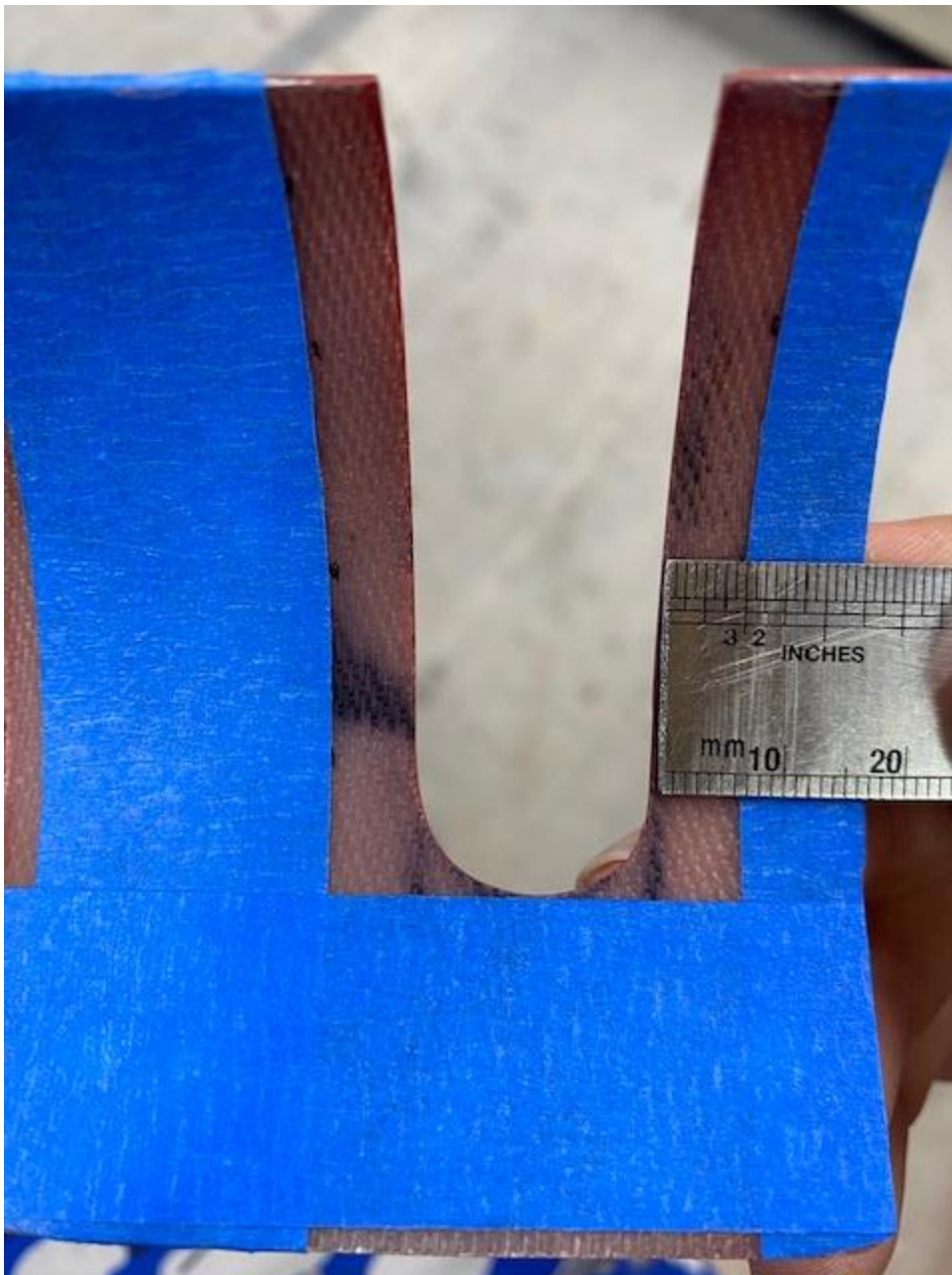
25) The upper hinge covers have an opening that will have to be widened so it does not interfere with the triangular supports that were not there. With rudder straight, you can temporarily install them with the 4 screws and notice how much they interfere. Usually a 1/4" on top and 1/4" on bottom has to be trimmed using a Dremel tool. Use painters masking tape (usually blue) on the painted side and mark a line with a sharpie where you need to trim it. Use Dremel or an air tool to trim the covers. Round off sharp edges and re-install

26) Test the rudder operation on the ground by hand and then by taxi test. If possible, a test flight can be done just down the runway at low altitude with some rudder usage if a trained gyroplane pilot is available, followed by post inspection

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3.2 Documentation

Conduct of this Safety Alert must be logged in the aircraft logbook with date and signature of the responsible Person conducting the procedure. The entry must include the following information:

- Identified AR-1 Serial Number and N-Number (if applicable)

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4 Appendix

4.1 Changes to Previous Revision

Original Revision – no changes

4.2 Feedback Template

No feedback is necessary