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## Optional Upgrade of Pitch Trim System

### 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)  
Model: AR-1  
Serial Number(s): 0001 to 0022  
Applicable Countries: All

### 1.2 Concurrent Documents

None

### 1.3 Reason

Improvement and upgrade of AR-1 pitch trim system for better functionality

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#### 1.4 Subject

Purchase, install, inspect and verify operation of upgraded pitch trim system on the AR-1 gyroplane. Previous electric pitch trim only worked in one direction, pulling the spring down to slow the aircraft. To go faster, there was a knob under the pilot seat attached to a spring that was attached to the top scissor tube via an Adel clamp. Turning the knob made the scissor tube pull forward releasing pressure on forward cyclic. However, this system was not as effective as the new system which utilizes the linear actuator to both push and pull on the pitch trim at the rotor-head itself and has no need for the mechanism under the seat.

#### 1.5 Compliance

Compliance is optional and considered an upgrade. Customers can contact [purchasing.silverlight@gmail.com](mailto:purchasing.silverlight@gmail.com) and order upgrade parts kit for \$250.00 per kit. Customers are required to unscrew the upper shaft (silver in color) from their linear actuator body (black in color) and mail that to SilverLight Aviation's current address with full customer information.

Upon receiving this part, SilverLight will modify this part as needed and send it back after payment with the whole kit. Please allow 2 weeks for processing. You can continue to fly your gyroplane safely without this part installed, simply zip tie the black body to the mast and put packaging tape on the top hole.


- Note: Without sending the above part, no upgrade order will be processed

#### 1.6 Approval

This system has been tested for over 300 hours of operation by now on 3 different AR-1 gyroplanes and is deemed much more effective especially at higher cruise speeds. It's a customer's choice if they would like to upgrade or not.

#### 1.7 Type of Maintenance

Line Maintenance

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### 1.8 Personnel Qualifications

This upgrade should be done by a skilled mechanic or mechanically inclined owner used to power and hand tools. Installer must be capable of drilling 5 holes in tight quarters in stainless steel to install new bracket at the rotor-head.

### 1.9 Return to Service

A logbook entry should be made to indicate that the pitch trim system has been upgraded per SilverLight Aviation Service Letter 004.

### 1.10 Weight and Balance

Not applicable.

### 1.11 References

Not applicable.

### 1.12 Superseded Documents

None.

### 1.13 Contact Details


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

#### **SilverLight Aviation (or current address)**


40420 Free Fall Ave, Unit A  
Zephyrhills. FL 33542.  
USA  
info@silverlightaviation.com

### 1.14 Disclaimer

This Service Bulletin has been generated with utmost care. Nevertheless errors and misunderstandings can never be fully excluded. In case of any doubts the

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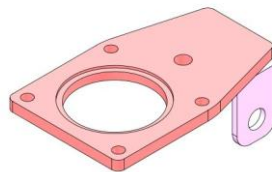
recipient of this Service Letter is requested to contact SilverLight Aviation immediately to clarify the issue.

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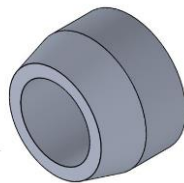
## 2 Resources

### 2.1 Parts


Part Number	Part Name	Quantity
265386	Lower Bearing Retainer Plate (weldment)	1
567890	Upper Trim Road End Spacer	2
AN3-5A	3/16" Bolts	4
AN364-1032A	3/16" Nuts	4
AN960-10L	3/16" thin washers	8
AN4-7A	1/4" Bolt	1
AN365-428A	1/4" Nut	1
AN960-416	1/4" washers	2
AN5-16A	5/16" Bolt	1
AN365-524	5/16" Nut	1
AN960-516	5/16" washer	2



Part Number 265386



Part Number 567890

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## 2.2 Materials

- 1) 6 foot tall ladder
- 2) Blanket to throw over engine and landing gear fairing to protect paint
- 3) Cutting oil or paste for drilling Stainless Steel
- 4) 10 to 12 inch long zip ties

## 2.3 Tools

- 1) Power drill
- 2) 3/16" metal cutting drill bit
- 3) 1/4" metal cutting drill bit
- 4) 7/16" socket
- 5) 1/2" socket
- 6) 3/8" socket
- 7) 7/16 wrench
- 8) 1/2" wrench
- 9) 3/8" open end wrench
- 10) Appropriate Ratchet
- 11) 9/64" Allen wrench

## 2.4 Special Tools


A long 3/16" and 1/4" drill bits help but are not mandatory

## 2.5 Manpower

1.25 hours

## 2.6 Cost

Will vary depending on tools, skill and mechanical aptitude of the person installing

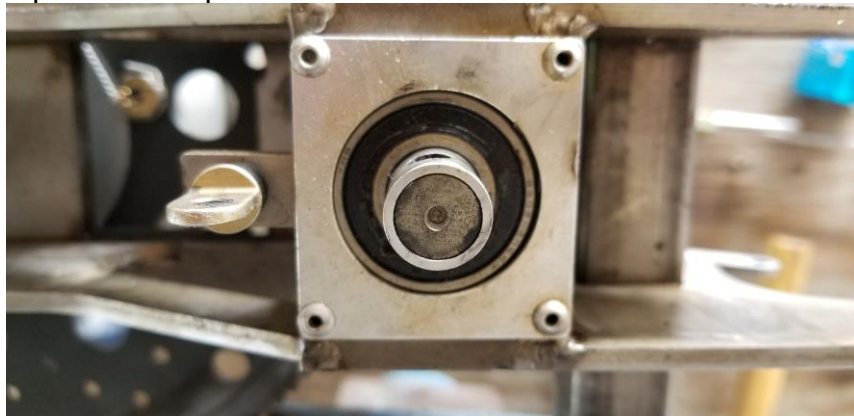
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### 3 Instructions


#### 3.1 General

- 1) Place blankets on top of the engine and landing gear fairings so if something like tools or hardware is dropped it does not get lost or nick the paint on the landing gear. Secure the blankets to minimize the spaces where tools etc. can fall through.
- 2) Set the ladder up so that you can reach the rotor-head assembly area easily
- 3) Remove the bolt that holds the upper U-joint to the Bendix shaft

- **Note:** There is a thin spacer between the Bendix and the U-joint. Secure this spacer.
- **Note:** Torque is 8 foot pounds for ¼" bolt and nut



- 4) Slide the pre-rotator shaft down, and secure it with a zip tie to the control rod while working so it's out of your way. Re-install it at the end. Re-use the hardware.


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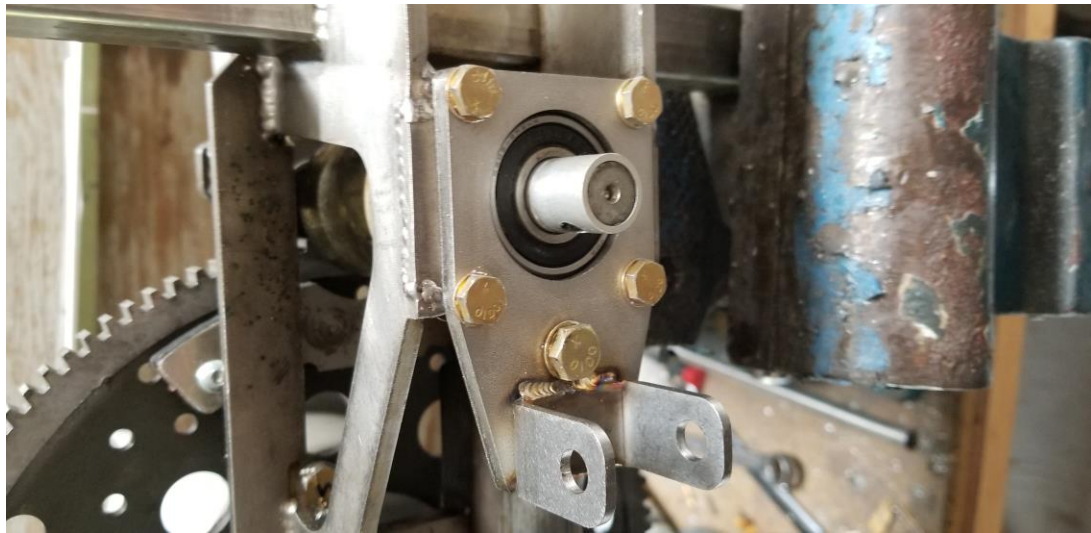
- 5) Disconnect existing trim spring from the rotor head (if not already removed)
- 6) Using power drill and 3/16 drill bit, drill out Aluminum rivets holding bearing retainer plate on the rotor-head and remove this plate. This plate will not be re-used




- 7) Remove the eye bolt, delrin spacer and nut
- 8) Drill out the four (4) holes where the rivets were installed to accept 3/16" AN3-5A bolts supplied with the kit. Use cutting oil and slow drilling speed
- 9) Drill out hole where eye bolt was to accept AN4-7A bolt supplied with the kit (1/4") using 1/4" drill bit and cutting oil
- 10) Install the Lower Bearing Retainer Plate (Part Number: 265386) welded assembly as pictured using AN3-5A bolts, AN4-7A bolt, and corresponding washers and lock nuts supplied with the kit. Use 2 foot-pounds for AN3 and 8 foot pounds of AN4 bolts.



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11) Screw on the new modified trim shaft into black actuator body. Secure tight

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- 12) Attach the upper rod end on the modified shaft to the new retainer plate weldment bracket using the two spacers, one spacer on each side of the rod end (Part Number: 567890) and AN5-16A bolt, AN960-516 washers and AN365-524 nut supplied with the kit. Torque to 12 foot-pounds. Tighten the jam nut on the rod end thread using 1/2" open wrench.
  - Note: Spacers will feel tight going in and may feel difficult to go in
  - Washers go just under the bolt head and just under the nut
- 13) Re-install pre-rotator shaft and bushing that was previously removed. Use 8 foot pounds of torque on the AN4 1/4" bolt and nut
- 14) Check installation that all nuts are tight and that spring does not bottom out at full back cyclic with the actuator actuated all the way to its tallest/extended position. If the spring bottoms out before you hit the pitch

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stop in the rotor-head assembly, adjust the upper locking collar for the spring higher up towards the rod end. Do this by loosening the socket head allen screws in the collar and sliding the collar up and retightening the screws tight.

- 15) Clean up the area, remove all unnecessary hardware, tools and materials from the aircraft
- 16) Optionally you can also remove the front trim knob mechanism completely. It will not be needed with this upgrade. To do that you have to remove the front seat to gain access to the Adel clamp, loosen it and remove the spring, Adel clamp and threaded knob completely and re-install the front seat.
- 17) Do ground test without running the engine, but by having the Master switch ON, and by tilting the unlocked rotor-head to different angles forward and backwards and sideways (roll) and extending and retracting the linear actuator. Note that no cables, wire looms or other items should not interfere in this test. If any interference is noted now, correct it appropriately using common sense.


### 3.2 Documentation

Log this upgrade in the logbook as Pitch Trim System Upgrade per SilverLight Aviation Service Bulletin 004 and sign it off.

## 4 Appendix

### 4.1 Changes to Previous Revision

Original Revision – no changes

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#### 4.2 Feedback Template

No feedback necessary.