RV 7, 8, 9 & 10 Installation Kit
Trio Gold Standard Roll Servo

Thank you for purchasing the *Trio Avionics* EZ Pilot Installation Kit. This guide provides a general overview for installation of the Trio Gold Standard Servo in the RIGHT WING of Van's RV-7, RV-8, RV-9 or RV-10. The RV-9 requires an adapter as specified on the last page of this document. Specific techniques may be varied by the builder. If you have any questions or suggestions for improvement regarding this guide, please contact us at info@trioavionics.com

Getting Ready

- Please read this entire Guide before beginning.
- Time required is generally 60 – 90 minutes. Actual time will vary by aircraft as existing electrical system and wire runs determine what needs to be done.
- Techniques may be varied by the builder - this document is only intended to provide a general guide.

Tools

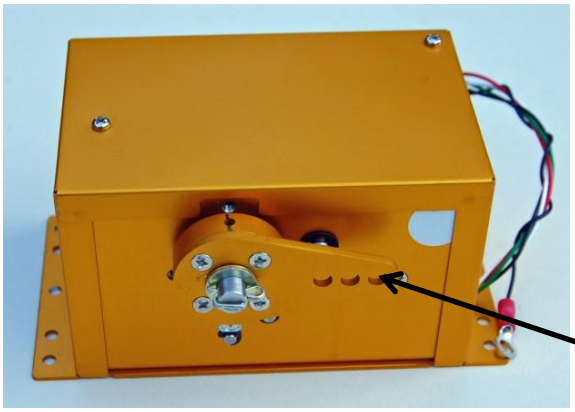
- Torque wrench
- General shop tools

Kit contents

- Professionally engineered servo mounting bracket. Laser cut and painted.
- All required hardware for mounting servo and installing in the wing.
- Detailed Installation guide
- This kit does NOT contain wire, terminals, or any materials required for the electrical hook-up of the servo. Harness assemblies are sold separately. You can also wire the servo according to the schematics included with your Trio Avionics documentation.
- The pushrod shown is for reference only. It is shipped with the Gold Standard Roll Servo when it is known that this mount will be used.
- The bracket is mounted to the spar using the bolts from the aileron bell crank frame assembly that is removed from the aircraft.

Step 1: Rotate the existing **Servo Crank Arm** 90 degrees.

Above: Gold Standard Servo as delivered from Trio



A) Point the crank arm to the six o'clock position, as shown at left. Mark the crank arm (and the hub it mounts to) at the twelve o'clock position

B) Remove the screws attaching the crank arm. **BEFORE DOING THIS READ <u>Appendix A</u> in the back of this guide! Failure to do so will result in broken fasteners !**

(Note: New servos are now shipped with the crank arm removed)

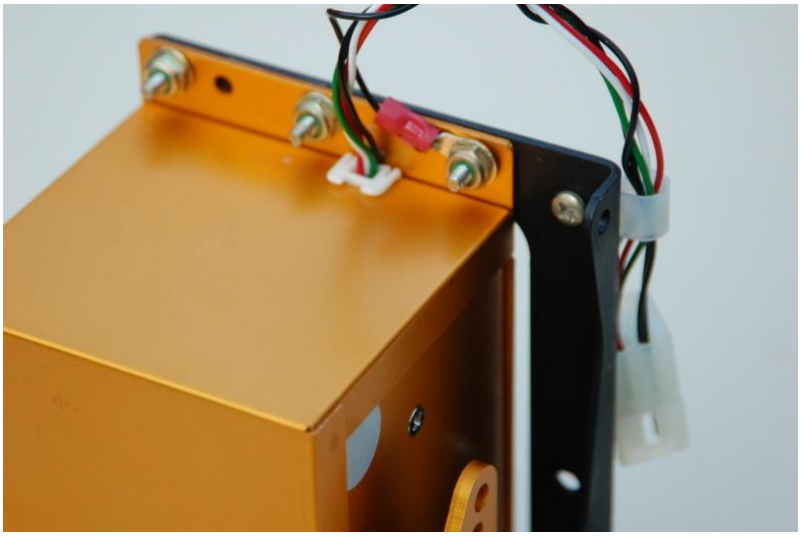
C) With the hub index mark at the 12 o'clock position, rotate the crank arm **to the 3 o'clock position.**

D) Reinstall the screws in accordance with **<u>Appendix A</u>.**

Crank arm must be rotated 90 degrees Counter-Clockwise. When complete, the crank arm should point to the 3 o'clock position as shown.

Step 2

Using six #6 screws and locknuts, mount the servo to the bracket. Set the assembly aside and let's go to the wing.



Step 3: Removing **Aileron Bell Crank**

Remove the aileron bell crank inspection panel from the right wing. Disconnect the two push rods from the bell crank. Make note of the hardware so you can reinstall it in accordance with the manufacturer's specifications.

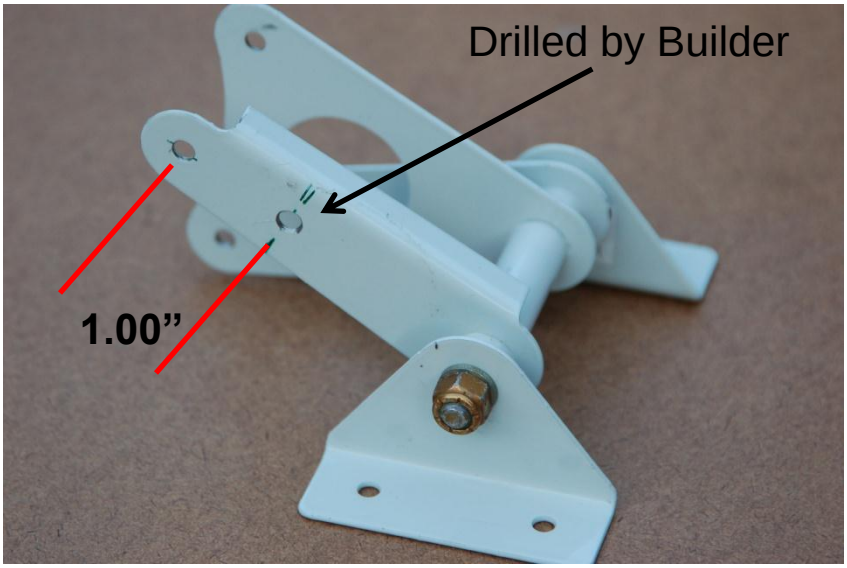
Mark the bell crank with a pen, noting which side faces down (as oriented while in the aircraft) so it will be installed in the new bracket with the proper orientation.

Remove the four AN3 bolts that mount the aileron bell crank. Remove the bell crank from the wing and let's go back to the bench!

Step 4:

Remove the bell crank from the factory mounting tabs. There is no need to remove the bronze bushing from inside the bell crank.

Mark and drill a #11 hole (centered) in the bell crank to attach the small push rod from the servo.



The #11 hole is drilled 1.00” below the existing push rod attachment hole (the pushrod that goes to the control stick). Debur the hole when you're done. (See above photo)

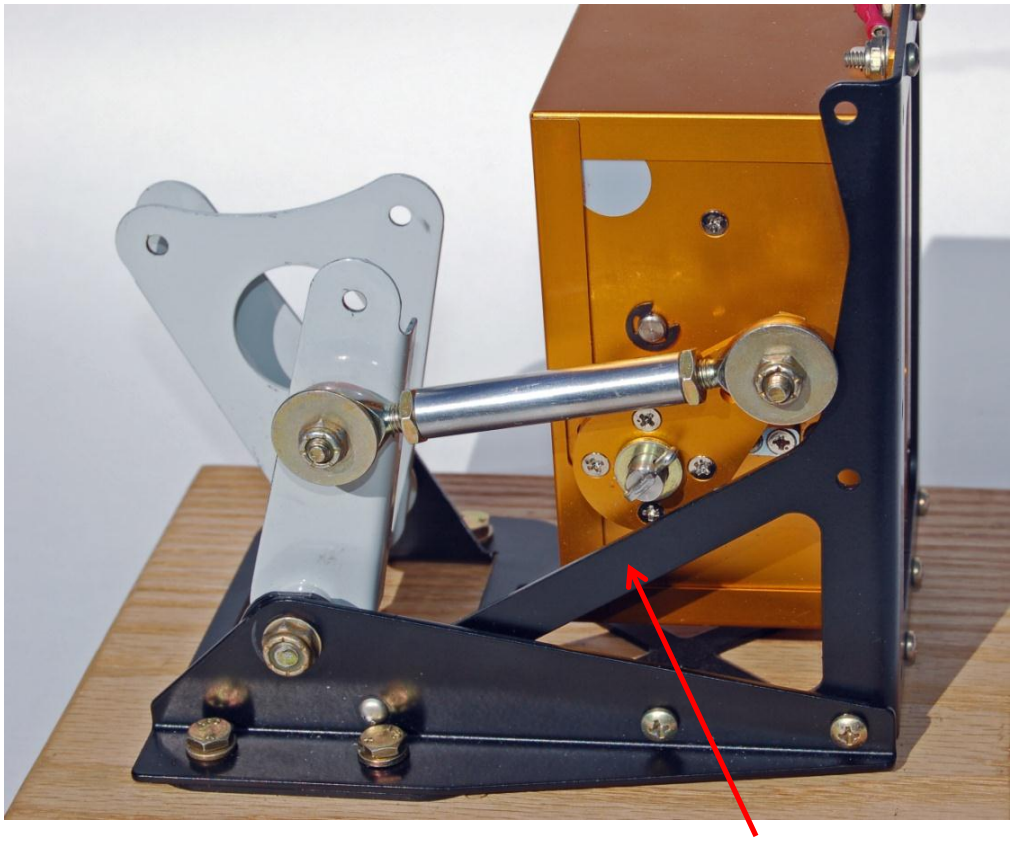
Step 5:

Install the bell crank between the tabs of the Servo Mounting Bracket. (Remember the knee brace is the bottom of the bracket. Make sure the bell crank is mounted in the same orientation as before)

When installing the AN4 bolt that secures the bell crank, you may need to add a washer or use a “thin” stop nut, supplied in the kit. (AN364-428A ; aka: MS21083N4 elastic stop nut)

Regardless, use a new elastic stop nut and make sure you have at least 1.5 threads protruding from the elastic nut. (Standard practice to ensure the security of the fastener)

Torque the AN4 mounting bolts **50-70 in/lbs**, or to what Van's specifies.



“Knee Brace” faces down when installed in wing.

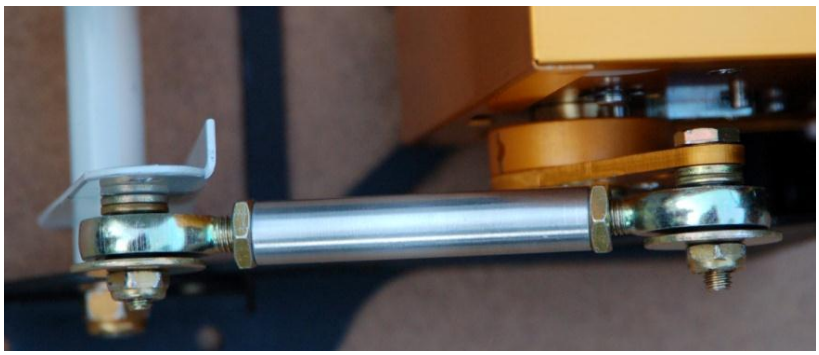
Step 6:

Install the push rod. There are two AN3 bolts of different length. The longer AN3 bolt is used for attachment to the **Servo Crank Arm**. The shorter AN3 bolt is for attachment to the **Aileron Bell Crank**. The image (below) shows the hardware components and placement.

NOTE

•TWO standard thickness washers on the inside of each rod end bearing.

•ONE large diameter washer on the outside of each rod end bearing



Step 7:

Install the bracket/servo assembly in the wing. Install the 4 AN3 bolts to secure the assembly to the spar (Use the same bolts that you removed from these positions.)

Step 8:

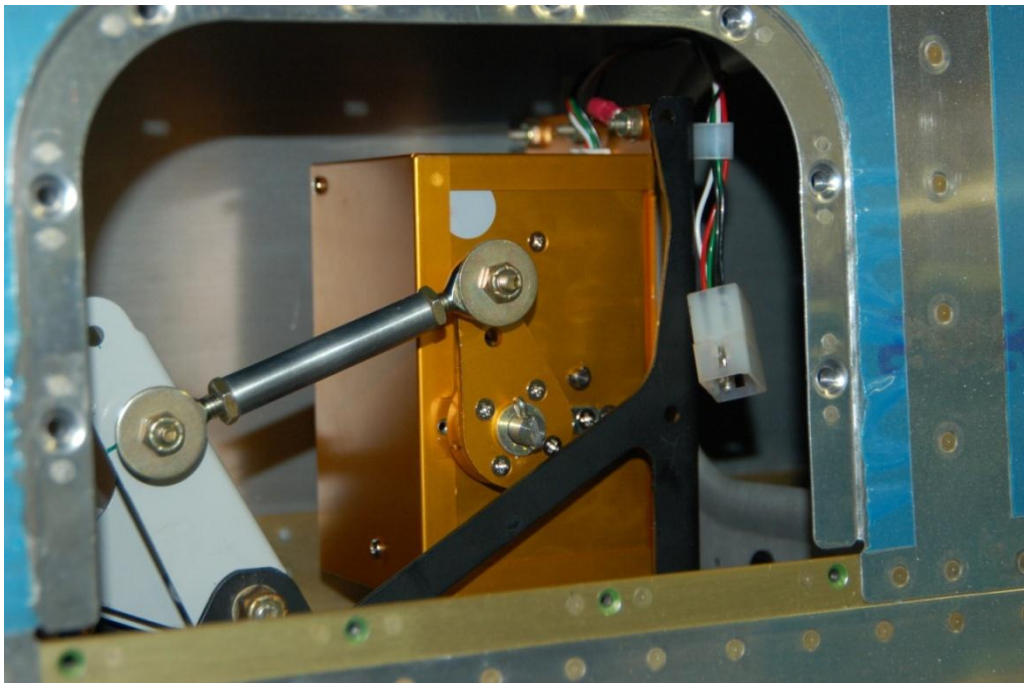
PROPERLY TORQUE ALL FOUR AN3 mounting bolts attaching the servo bracket to the spar. Torque the AN3 mounting bolts **20-25 in/lbs**, or to what Van's specifies.

Step 9:

Check all of your work. If you are unfamiliar with accepted practices and methods for aircraft control systems, you may want to seek advice and have your work reviewed by an A&P or another RV builder having competent skills and familiarity with the RV.

•Verify proper placement of all washers and spacers.
•PROPERLY TORQUE ALL FOUR AN3 mounting bolts attaching the servo mounting bracket to the spar. Torque the AN3 mounting bolts **20-25 in/lbs**, or to what Van's specifies.
•Ensure all tools and other items are removed from the work area.
•Ensure proper free travel and clearances for all control mechanisms and surfaces.

The image below shows the new servo and bracket fully installed inside the right wing bell crank access area on an RV7/8 wing. RV10 installations look very similar but the access panel is larger and there is slightly more space inside the bay.

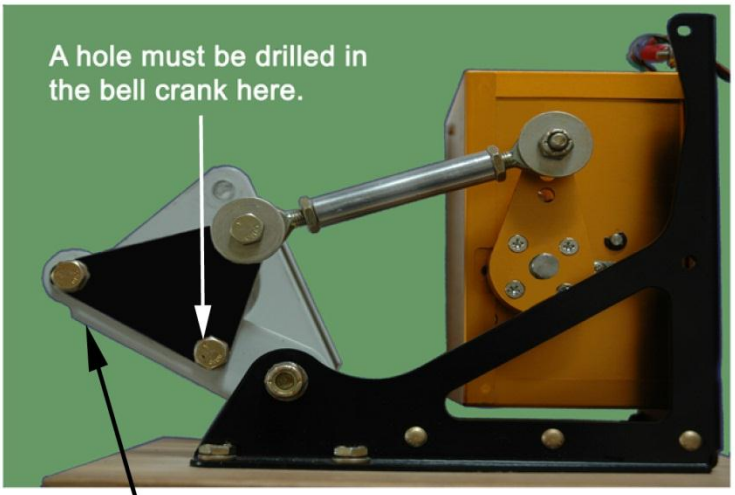


Congratulations !

You've completed the installation of your Gold Standard Servo!
You'll want to refer to your Trio autopilot documentation for wiring, adjustments, and testing of your new autopilot system.

RV-9 Aileron Bell Crank Modification

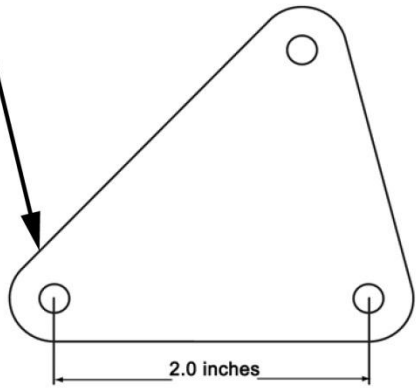
Because the RV-9 aileron bell crank is configured differently than it is in the RV-7,8 & 10, an adapter is needed for the bell crank. The photo to the right shows the trianglular adapter when it is affixed to the bell crank.



It is necessary to drill a hole in the bell crank to fit the adapter. The hole should be the same size as the others that are in the bell crank, so that it can accept an AN-3 bolt.

The orientation of the adapter is critical to proper operation.

The adapter may be used as a template to drill the hole in the bell crank. Remove the aileron bell crank from the aircraft. Place a bolt into the leftmost hole (as shown in the diagram) and then insert the bolt into the bell crank. Inscribe the rightmost bolt hole pattern onto the bell crank, remove the adapter and drill the hole using a #10 drill.



Note that the bottom of the adapter has the holes exactly 2 inches apart. It is ***very important*** to orient this as shown. If any other orientation is used, it will alter the mechanical gain of the system and result in poor autopilot operation. Worse, it could possibly limit control movement if installed incorrectly.

Once the bolt hole is drilled and deburred, assemble the servo onto the bracket as shown.

The entire assembly may then be bolted onto the wing spar using the 4 bolts that originally held the aileron bell crank.

If you have any questions about this procedure, please contact us at:

Trio Avionics
1820 Joe Crosson Drive
El Cajon, CA 92020
619-448-4619
email: info@trioavionics.com

Appendix A

If you have previously purchased a Trio Gold Standard Servo and need to repositioning the crank arm on your servo, please follow the directions below.

CRITICAL INFORMATION – READ ME !

From the Trio Installation Manual

7.8 Repositioning the Servo Crank Arm

To suit your particular installation, you may need to reposition the servo crank arm to get the correct geometry to drive the roll control system. This can be accomplished by rotating the crank arm to one of 4 positions, in 90 degree increments.

It is important, because the screws are secured with Loctite®, **to apply heat with a heat gun before attempting to loosen the four screws. Failure to heat the assembly will more than likely cause the screws to break off when being removed**.

To reposition the servo Crank Arm, perform the following steps:

1. Use a #2 Phillips screwdriver to remove the screws.
2. Rotate the crank arm to the correct position for your installation.
3. When satisfied with the positioning, apply a small amount of Loctite® 222 to the screws, reinsert and tighten the screws.