

WAITER's

Roll Trim System

LONGEZ

Waiter's Roll Trim System

PARTS LIST

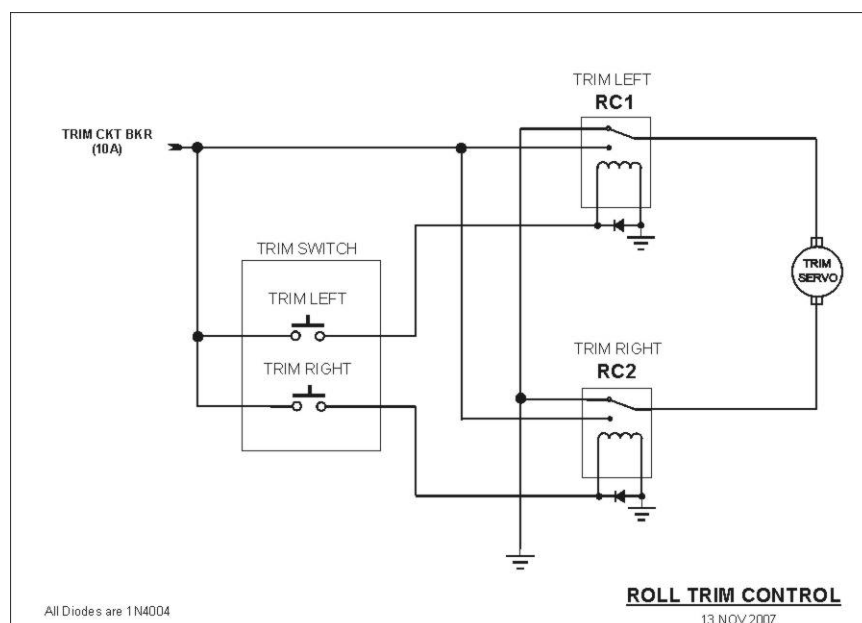
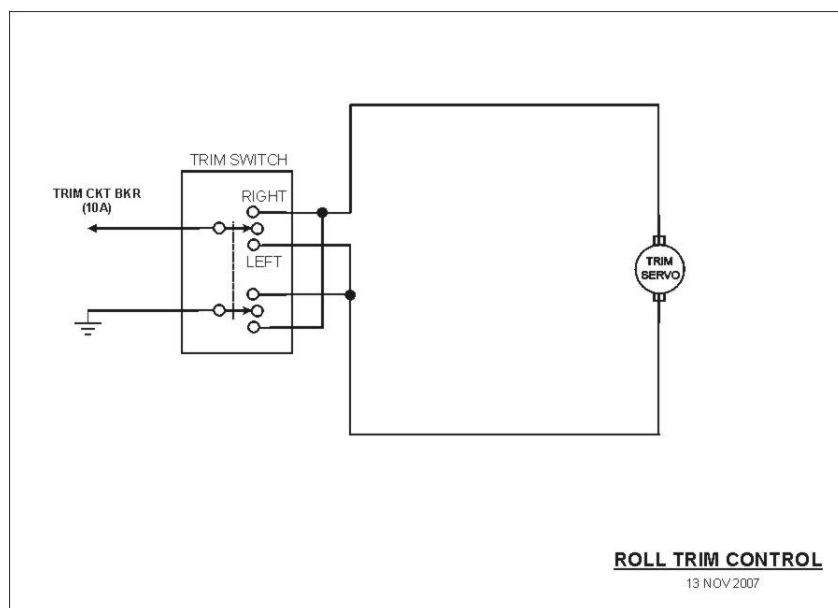
1 ea	MAC S6A Servo motor (RAC = T2-10A)
1 ft	¼ x .028 wall Steel Tube (Cut off two pieces ¾ long)
1 ft	1 x 1x 1/16 2024T3 Angle Aluminum (Cut off two pieces ¾ inches long)
2 ea	AN4 flat washer
6 ea	AN3 flat washer
1 ea	AN3-15A bolt
1 ea	AN3 self locking nut
2 ea	4x32 self locking nut
2 ea	Spring - 3 inches, 8 turns per inch, .375 OD - .275 ID (Purchase enough spring to make two extra springs)
2 ea	1 inch diameter stainless hose clamps
4 ea	#6 x ½ inch sheet metal screws
7 inch	4x32 threaded rod (Purchase at Hobby Store)
5 inch	Nylon tube (Purchase at Hobby Store)

ELECTRICAL

Follow the installation instructions that came with the Servo. Review the following drawings, There are two styles of connections, Direct to the Servo motor, and Via power relays.

Your choice will depend on the type of switch you use to control the servo. i.e. The Infinity Stick uses a "Coolie Hat" switch. These are two separate momentary contact switches that cannot reverse the current flow for the servo motor, so we need to use relays.

If you use a Double Pole Double Throw switch, you'll be able to wire directly to the Servo motor as the switch is wired so it reverses the current flow.



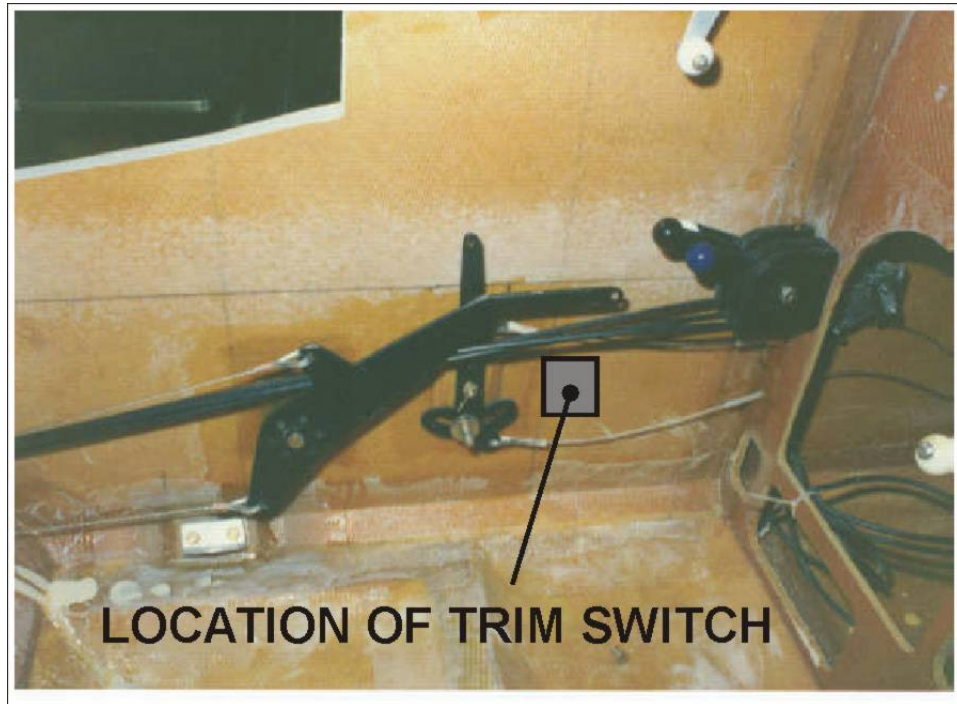
Waiter's Roll Trim System

You can buy just the servo (my recommendation) or a kit that includes a switch and a position indicator.

I bought just the servo and used my own switch.

My original installation, I used a small snap in rocker switch, Double Pole Double Throw (DPDT), three position, momentary contact, with center off.

The switch was recessed into the left console, just below and aft of the Throttle assembly. If you had X-Ray vision (see photo), the switch was situated so it was just in front of the original pitch trim, and in between the two pitch trim cables.



This is a generic description of how I installed my switch, The size of the hole depends on the switch you use.

Try Mouser Electronics at www.mouser.com

Part Number = 629-GRS4023C13

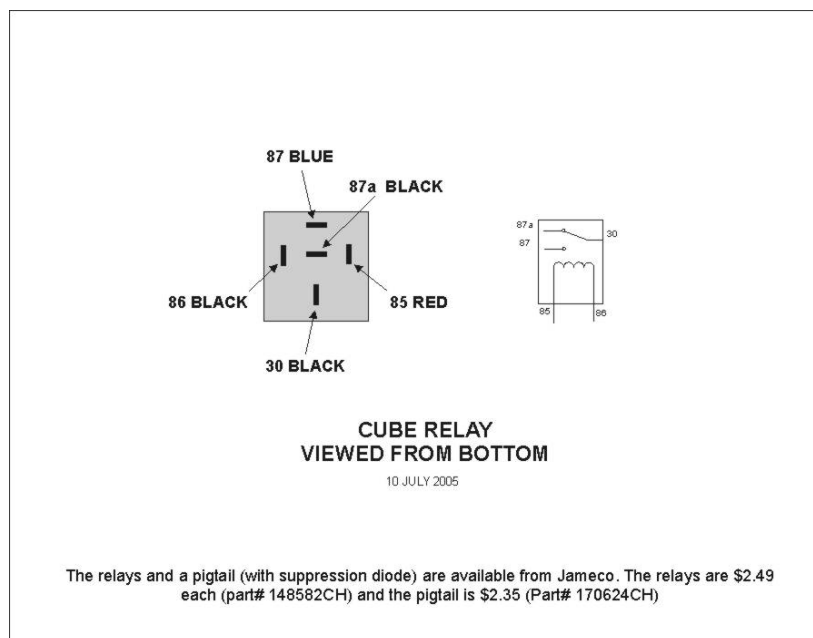
Don't cut any holes until you have the switch in hand.

In my example, the switch would snap into a hole $\frac{3}{4} \times \frac{1}{2}$ inch. The outer dimensions of the switch are $1 \times \frac{3}{4}$ inch.

- 1) Locate the position of the switch on the side console. The switch will be oriented UP/DOWN, not forward back. I.e. Press the top of the switch = trims left, press the bottom of the switch = trims right.
- 2) Mark a rectangle, 1-1/4 tall by 1 inch wide, for the switch cutout, center it at the switch position.

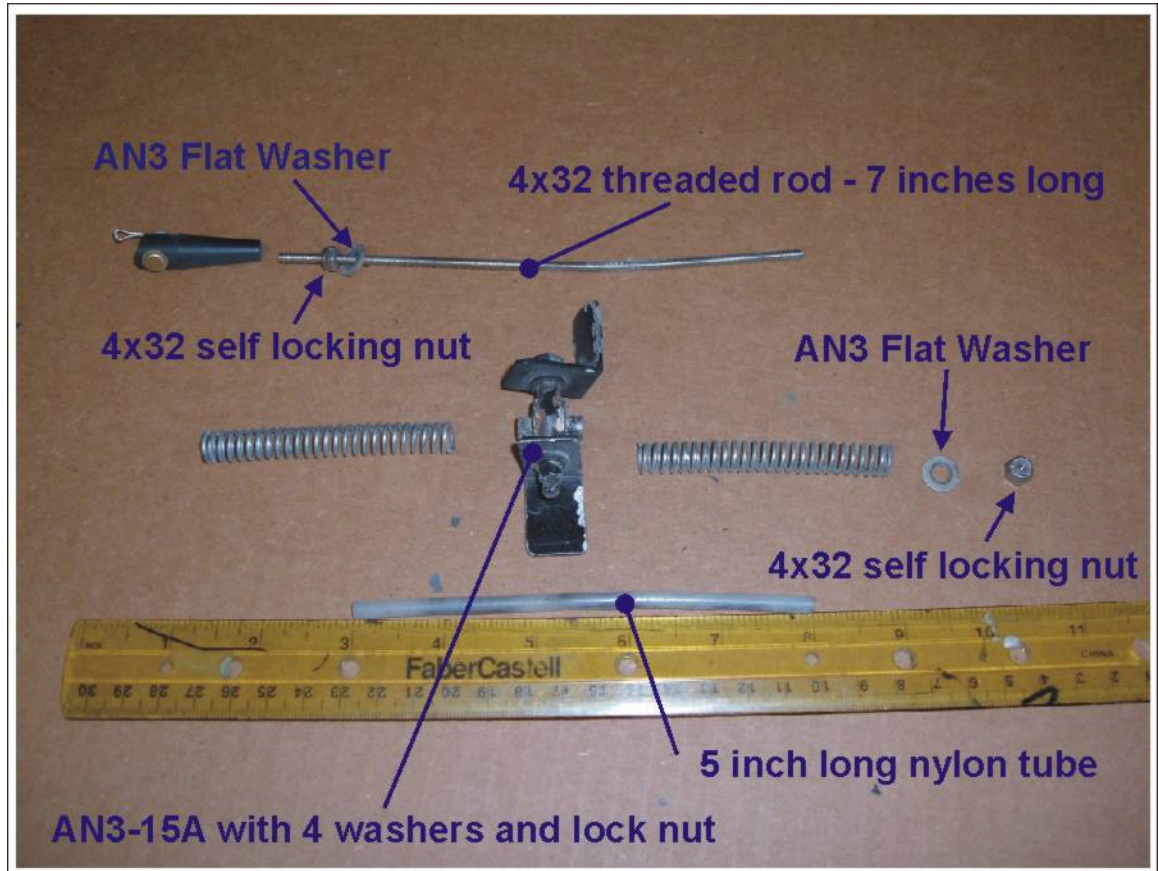
Waiter's Roll Trim System

- 3) Carefully cut the outer skin only following the outline from step 2.
- 4) Remove the small piece of outer skin, then clear away foam to the inner skin.
- 5) On the underside of the outer skin, trim away about $\frac{1}{4}$ foam. This will be a flox corner that will form the recess that out switch will mount in.
- 6) Place a small bead of flox on the underside of the outer skin. Lay up three layers of BID into the recess and onto the flox.
- 7) When ready, knife trim the BID so its even with the outer skin.
- 8) When cured, sand the newly formed recess smooth, no sharp edges.
- 9) Center the cutout dimensions for the switch inside the recess. Cut out the recess.
- 10) When you route the wires to the switch, make sure they will not rub against the pitch trim cables.
- 11) Connect the wires to the switch, Check servo operation and direction.
- 12) Snap the switch into the recess.



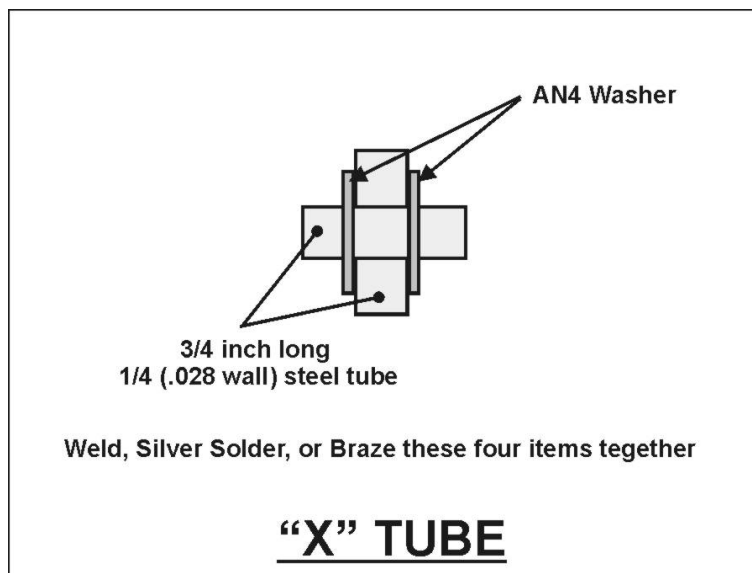
ASSEMBLY

The following photo shows how Waiter's Roll Trim system is assembled. Review the photos and drawings.

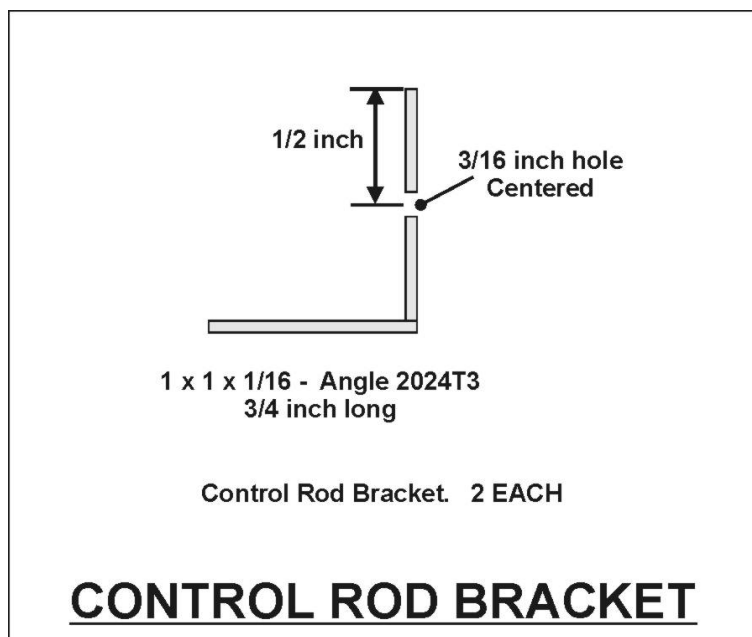


Waiter's Roll Trim System

- 1) Review Figure 1, "X" TUBE. Weld the "X" tubes together. The AN4 flat washers **MUST** be welded into place.

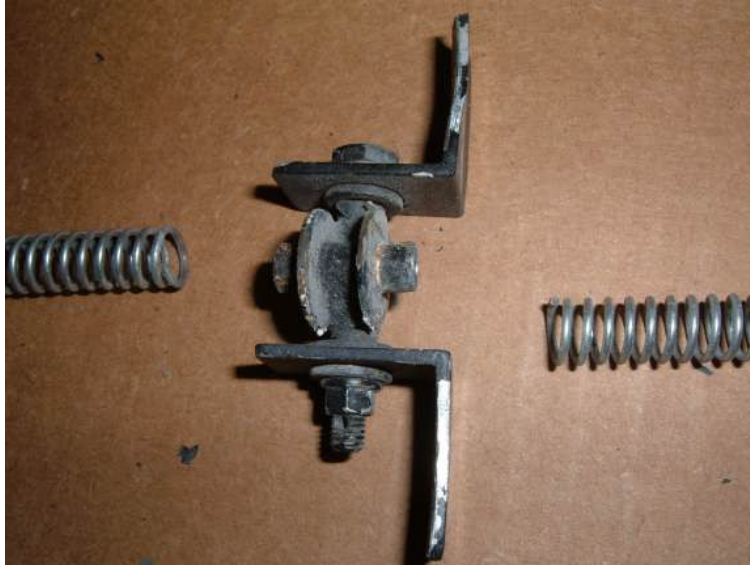


- 2) Review Figure 2, CONTROL ROD BRACKET. Drill a 3/16 hole in each of the brackets. Position the hole center, and 1/2 inch from the outer edge.



Waiter's Roll Trim System

- 3) Review Figure 3. Assemble the "X" tubes, AN3-15A, AN3 flat washers, and Locking nut. Tighten the nut so the "X" tubes move freely around the Control Rod Brackets, No binding, and not to much play.



- 4) Cut the 4x32 threaded rod to 7 inches. Clean up the threads on each end.
- 5) Place a 4x32 nut on one end of the rod, thread to about $\frac{1}{2}$ inch.



Waiter's Roll Trim System

- 6) Cut the Nylon tube to 5 inches.

The Nylon tube must fit over the 4x32 threaded rod.

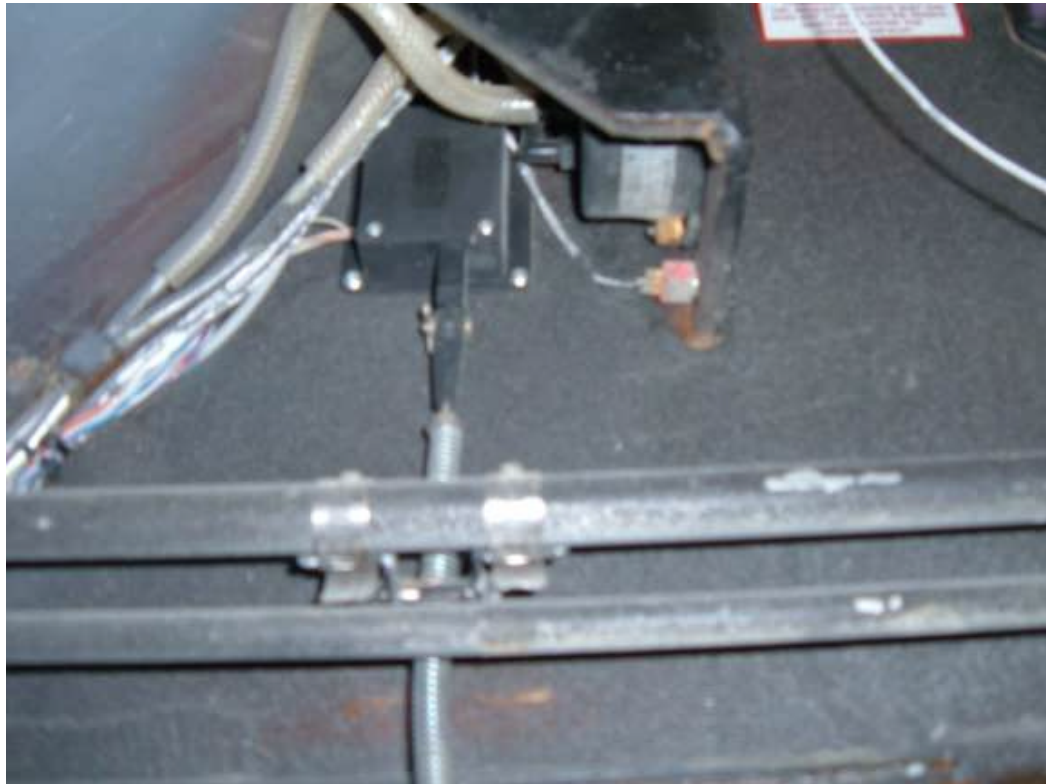
The Nylon tube must slide freely inside

- 7) Slide the tube over the Threaded Rod. It should fit against the Nut from step 5.
- 8) Slide one AN3 washer over the rod/tube. It should rest against the Nut from step 5.
- 9) Slide a spring over the rod/tube. It should rest against the washer from step 8.
- 10) Slide the "X" tube over the rod/tube. The spring from step 9 should ride up on the outside of the "X" tube and rest against the AN4 washer that was welded to the "X" tube. (Look at the photo in step 3)
- 11) Slide other spring over the rod/tube. It should rest on the other side of the "X" tube.
- 12) You'll need to hold the springs compressed in the following steps.
- 13) Slide an AN3 washer over the rod/tube. It should slide up on the Nylon tube and rest against the spring that your holding compressed.
- 14) Install the other 4x32 locking nut on the end of the 4x32 threaded rod. You can hold the other end (fin step 5) with a pair of pliers. Tighten the 4x32 nut until it rests against the nylon tube.
- 15) Screw the spring rod assembly onto the 4x32 fitting located on the MAC servo, As far as it will go.

INSTALL WAITERS ROLL TRIM ON AIRCRAFT

I located the Roll Trim Servo system in the rear seat, as far forward against the front seat bulkhead.

My servo is protected by the installation of a mini instrument panel in the rear seat. The following photo is taken looking UP from the floor of the rear seat. You can see the MAC Servo mounted just in front of the Airspeed indicator.



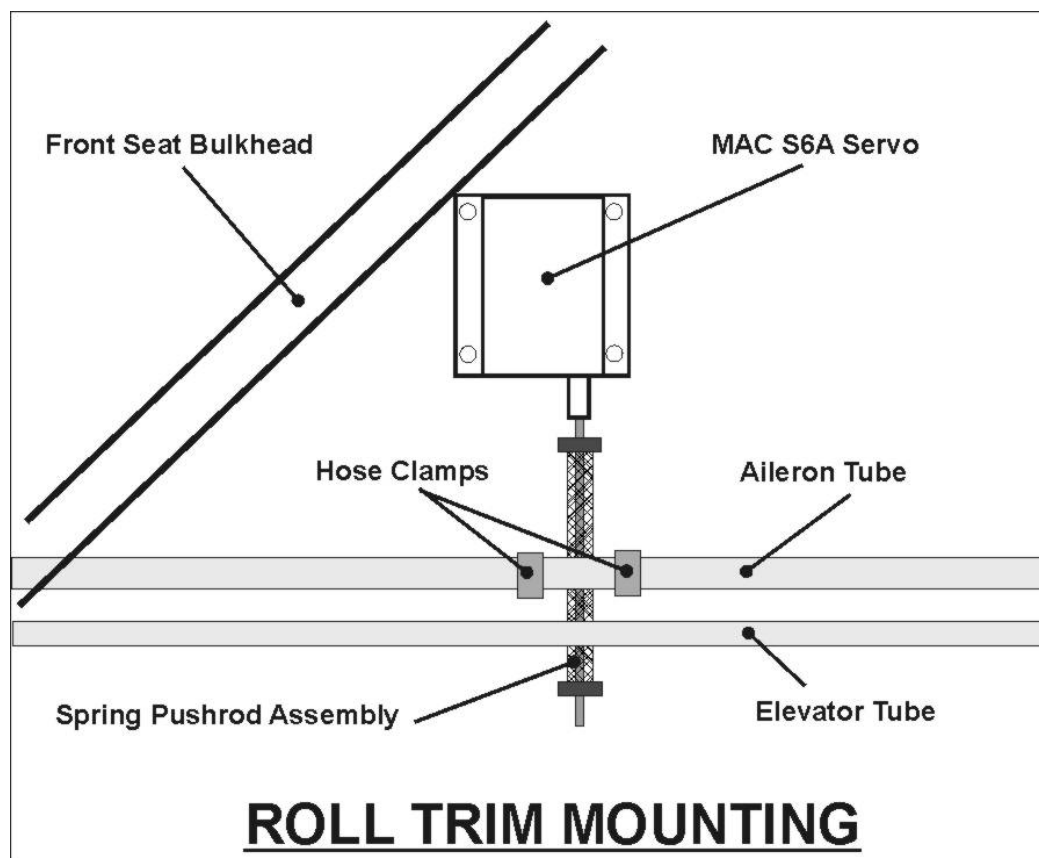
CAUTION - Its possible that a rear seat occupant could rest their knee against the servo and interfere with its operation. I would recommend a small fiberglass cover to protect the MAC servo from inadvertent knees.

INSTALLATION

- 1) Install the two Stainless clamp onto the Aileron Torque tube. Leave them loose.
- 2) Position the system in its approximate location. Slide one of the Stainless clamps over the forward Control Rod Bracket.
- 3) Slide the other Stainless clamp over the other Control Rod Bracket.
- 4) Position the Stainless clamps so that the heads are resting on the Control Rod brackets. This will place the heads between the Aileron Torque tube and the fuselage wall.

This positions the heads so that they will not be protruding out into the rear seat area where they could catch on rear seat occupants clothing.

- 5) Check the position of the MAC Servo. It should be as far forward as possible, BUT, not against the front seat bulkhead (Maybe $\frac{1}{4}$ to $\frac{1}{2}$ inch from the bulkhead).



- 6) Tighten the two hose clamps. (They'll be readjust a little later, we are just checking clearance for the MAC Servo).

Waiter's Roll Trim System

- 7) Hold the MAC Servo in position with your hand. Twist the Aileron Torque tube, It should move freely, there should be binding of the "X" tube as it slides up and down on the nylon tube.
- 8) When satisfied with the position, use 4 self tapping sheet metal screws and mount the MAC servo to the Fuselage.
- 9) Verify that there is no binding of the "X" tube (step 7)

ADJUSTMENT

There are two adjustments that can be made to Waiters Roll Trim System;

a) CENTERING – This is the easiest, and can be done in minutes.

b) RANGE – This is the spring tension that's applied to the torque tube. This is a little more difficult and may require removing the spring rod assembly.

The range can be made tighter (more spring tension) by removing the bottom 4x32 nut, sliding the nylon tube down a little, cutting off a small amount of the nylon tube (1/4 inch), sliding the nylon tube back up, then reinstalling the

CENTERING

The CENTERING adjustment must be performed prior to first flight. After flight testing, you may need to make small adjustment to get the center a little closer.

With fuel tanks loaded equally and the aircraft at your normal cruise speed, the MAC servo should be just about center.

- 1) Loosen the two Hose Clamps.
- 2) Using the "TRIM" switch, position the MAC servo so that its in its center position.
- 3) Hold the Stick full Left (turning left). Tighten the Stainless steel hose clamps.
- 4) TEST FOR FULL TRAVEL. You should be able to easily override Waiters Roll Trim System with the stick.

Send the trim to full left. Move the stick to full right. You can feel a little of the spring loading, but you should be able to move the stick, freely with no binding.

Now send the trim to full right. You should be able to move the stick full travel, with no sticking or binding.

RANGE

With the plane in a normal configuration and the CENTER adjusted properly, The trim should be able to adjust for about a 10 – 15 gallon difference between the strakes.

The RANGE adjustment is a little more difficult. We are going to add or subtract spring tension to get range.

ADDING TENSION – This can be done either by changing the springs (one more turn of the spring) or shortening the nylon tube by a small amount. (1/4 inch)

REMOVING TENSION – This can be done by changing springs (cut off one turn of the springs) or lengthening the nylon tube (1/4 inch)

NOTE – Changing the length of the Nylon Tube may be the easiest to do.

CHANGING NYLON TUBE LENGTH

- 1) Review the assembly procedures from above.

- 2) Remove the bottom 4x32 nut.

The bottom washer and bottom spring will fall off.

- 3) You should be able to slide the old Nylon tube out.

- 4) If the Nylon tube is made longer, i.e. $\frac{1}{4}$ inch, the top 4x32 nut must be moved up approx $\frac{1}{8}$ inch (two turns).

If the Nylon tube will be shorter, i.e. $\frac{1}{4}$ inch, the top 4x32 nut must be moved down approx $\frac{1}{8}$ inch (two turns)

You must move the top nut if you change Nylon Tube length, this will keep the spring assembly "X" Tube centered.

- 5) Slide the new tube over the 4x32 threaded rod. The Nylon tube must rest against the top nut, NOT the top AN3 washer. The AN3 washer must slide over the tube.
- 6) Reinstall the bottom spring, AN3 washer. Hold these compressed while you reinstall the bottom 4x32 nut.
- 7) Tighten the bottom nut so it just touches the Nylon Tube. Recheck the Nylon Tube is resting against the Top 4x32 nut, and not the AN3 washer.
- 8) Perform the TEST FOR TRAVEL as outlined above. NO BINDING.

CHANGING SPRINGS

Changing spring length will be easier if the rod spring assembly is removed.

- 1) Loosen the hose clamps and slide them off the Control Rod Brackets.
- 2) Remove the cotter pin and roll pin from the MAC Servo arm that the Spring/Rod assembly is screwed into.
- 3) Replace the springs in a manner similar to the initial assembly.
- 4) Reinstall the Rod Spring assemble onto the MAC Servo.
- 5) Reinstall the Hose clamps as described in the initial assembly directions.

