



AeroConversions

A Product Line of Sonex Aircraft LLC

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Pitch Trim Unit Installation

Rev C, 03/01/2013 (7 pages)

The AeroConversion's Pitch Trim unit replaces external (aero-dynamic) pitch trim tabs and relieves unwanted stick pressures by applying a counter-acting force to the elevator pushrod through a cable and springs. This unit is highly effective on aircraft with a wide speed range, and is the perfect system for "V"- and "Y"-tail aircraft which cannot be trimmed with a single aerodynamic tab.

Positioning the Trim Unit

The pitch trim unit must be mounted for operation without removing your hand from the stick or yoke. The trim unit must be mounted so it can be operated by your "throttle" hand.

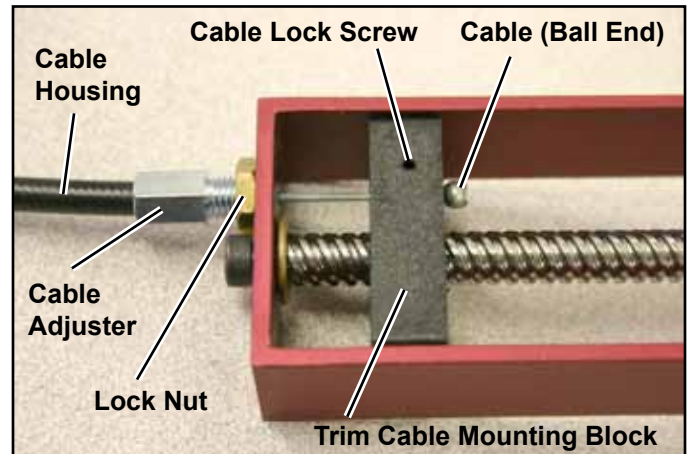


Two mounting locations for the trim unit: Upper photo is in a Sonex ST, lower photo is a standard Sonex. Both aircraft have the trim unit mounted for operation with the "throttle" hand.

Preparing the Trim Unit

1. Install the cable adjuster and lock nut in the back of the trim unit (see photo, next column).
2. Pass the cable through the cable mounting block and cable adjuster until the cable's ball end stops against the cable mounting block.

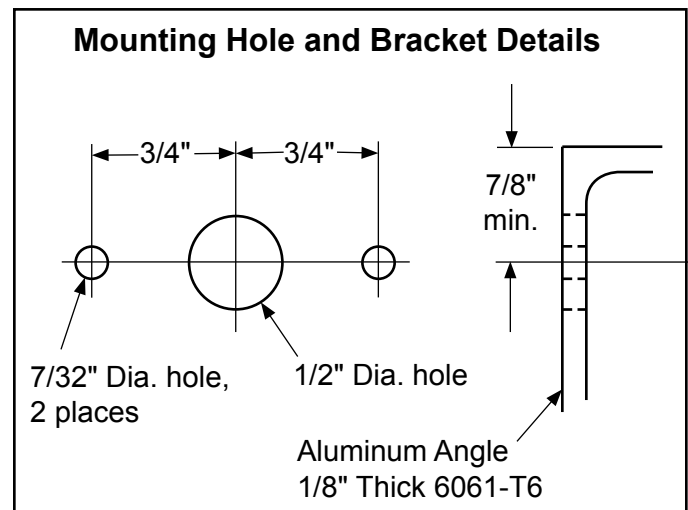
3. Install the cable lock screw, ACV-T01-17, in the threaded hole in the cable mount block to lock the cable in place.
4. Slide the black cable housing over the cable.



Install the trim cable before installing the trim unit in your airplane.

Mounting the Trim Unit

The primary considerations in mounting the trim unit are that it be firmly mounted and that the mounting hardware does not interfere with the free movement of the trim cable mounting block.



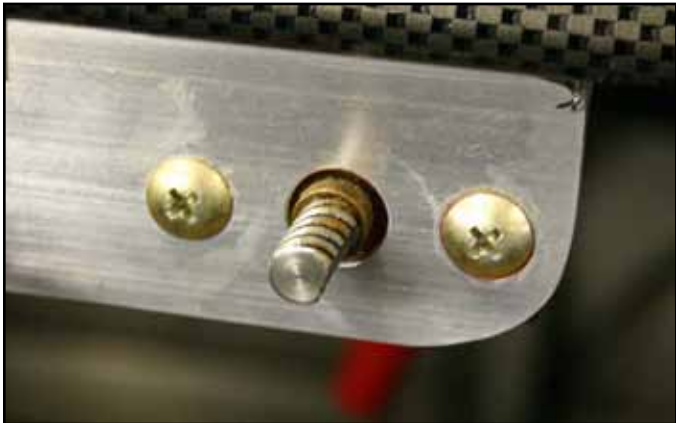
This illustration provides the key dimensions for installing the trim unit through a panel, or mounting it under the panel using a piece of aluminum angle as a mounting bracket.

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Through-the-Panel Mounting

The unit can be mounted through a panel up to 1/4" thick.

1. Drill three mounting holes sized and spaced as shown in the drawing above.
2. Remove the trim wheel from the trim unit. It is held to the shaft by a set screw.
3. Secure the trim unit to the back of the panel with two AN525-10 screws of the appropriate length for your installation.



The trim unit is mounted to a panel with two AN525-10 screws of the appropriate length for your installation. Note the flat side on the threaded shaft. The trim wheel must be re-installed so its set screw tightens against this flat.

4. Re-attach the trim wheel. **Be sure to tighten the trim wheel's set screw against the flat side of the threaded shaft.**

Under Panel Mounting

The unit can be mounted with the frame oriented either vertically or horizontally under a panel. Two 10-32 tapped holes spaced 1" apart are provided on the side of the frame. Additional mounting holes can be drilled and tapped if needed, or aluminum angle can be attached to the trim unit for additional mounting options.

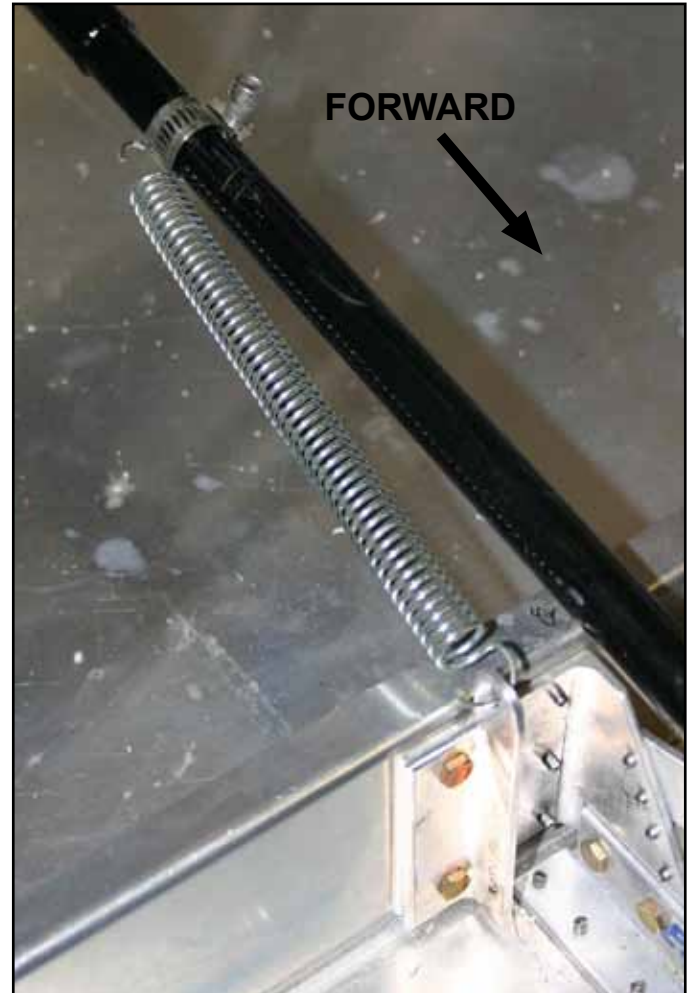
Key dimensions for mounting the bracket under a panel are provided in the illustration on page 1.

The primary considerations in mounting the trim unit are that it be firmly mounted and the mounting hardware does not interfere with the movement of the trim cable mounting block.

Pitch Trim Unit Installation

Rear Spring Installation

IMPORTANT: If you are fitting the trim system to an airframe which does not have a spring attach angle installed per plans (see photo, below), you will need to modify your airframe by adding a rear spring attach point. A recommended installation is shown on page 6 of these instructions.



The rear spring is attached to the spring attach angle (foreground) and the elevator pushrod (upper left). Note: In this photo the rear spar carry through is removed for clarity. The assembly is being viewed in this photo from the right side of the aircraft, looking aft.

1. Attach one end of a spring to the trim spring mount on the lower cross tie. The loop in the spring's end must be squeezed closed to prevent the spring from coming off.
2. Attach the aft end of the spring to the elevator pushrod with the included hose clamp. With the joystick pushed fully forward, the balance spring should be under slight tension. The spring's aft attach position can be adjusted from this original position as needed.

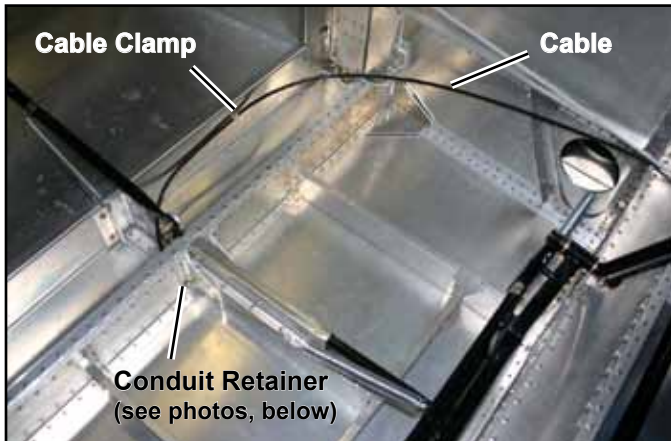
Cable Routing and Installation

The cable must be routed with gentle bends and secured as needed.

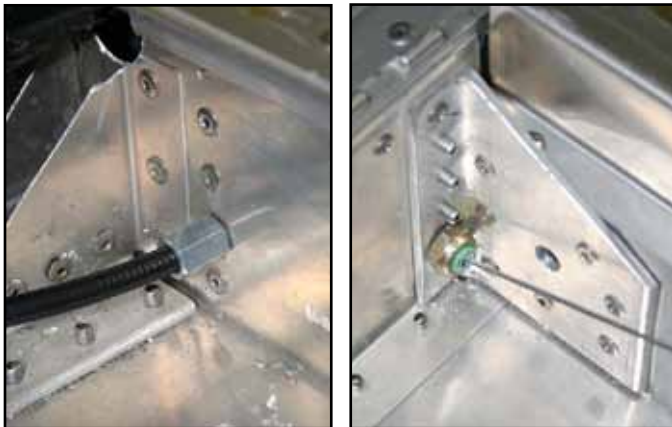
The cable housing must be trimmed to the appropriate length for your installation, but the cable itself must be left full-length until both springs are installed.

A conduit retainer is included with the trim kit to terminate and secure the end of the cable housing.

These photos detail a typical cable installation in a Sonex airframe.



The trim cable is shown here with a smooth routing. Detail photos of the cable installation are provided below. In these photos the rear spar carry through is removed for clarity.



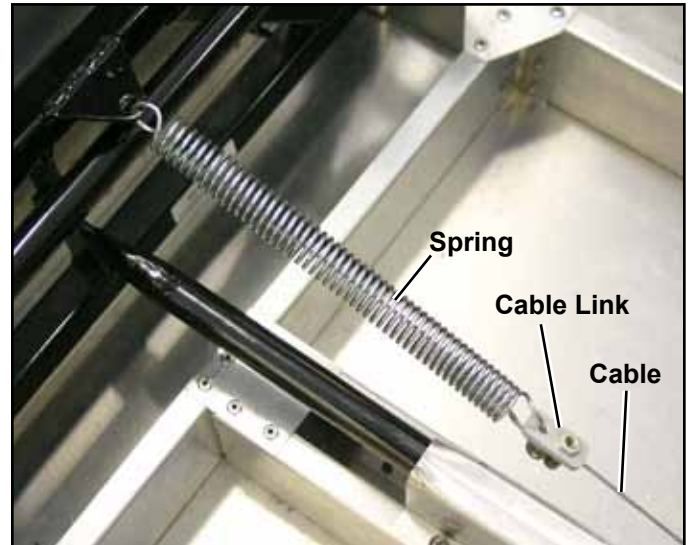
A conduit retainer is installed to hold the cable where it passes through the lower seat channel. The conduit retainer is secured with an MS20364-524 fiberlock nut.

Front Spring Installation

IMPORTANT:

Dual Stick Installations. If you have an earlier version (SNX-C05-02) of the Control Stick Frame Assembly and it does not have a triangular tab welded on the top tube, you must add a tab. See page 5 before continuing.

Center Stick Installations. If you have an earlier version (SNX-C04-02) of the Control Triangle and it does not have a triangular tab welded near the top, you must add a tab. See page 5 before continuing.



This is an over-all view of the front spring installation.

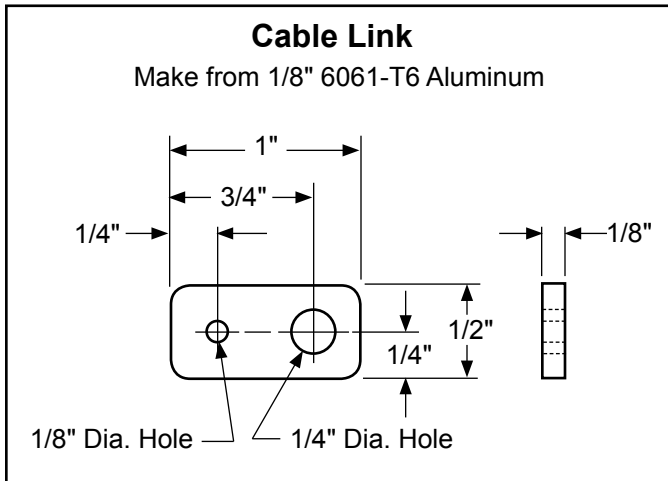
1. Attach the trim spring to the triangular tab on the top of the control frame. *Do not* use the round tab as this is too low on the frame to be effective as an attach point for the trim system. The loop in the spring's end must be squeezed closed to prevent the spring from coming off the tab.



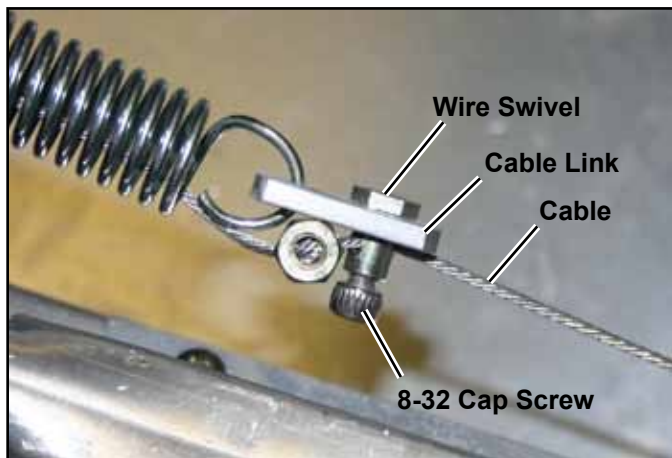
The trim spring is attached to the triangular tab on the control frame, and the spring's end is pinched closed to keep it from coming off.

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2. Make the cable link (drawing below) and attach it to the free end of the spring. Squeeze the spring's end closed to prevent the spring from coming off the cable link.



3. Insert the wire swivel in the cable link and install an 8-32 x 1/4" long patched, socket head cap screw in the wire swivel.
4. Pass the cable through the wire swivel.



Pitch Trim Unit Installation

5. To set the spring tension:
 - a. Turn the trim wheel counter-clockwise (Nose Down) until it stops.
 - b. Hold the control stick fully forward.
 - c. Pull the cable through wire swivel until the trim spring is under slight tension.
 - d. Tighten the 8-32 cap screw to lock the cable in the wire swivel.
 - e. When the spring is properly tensioned, the top of the joystick will move rearward approximately 1" to 2" from its fully forward position when the control stick is released. Adjust the cable's position in the wire swivel as necessary to achieve proper tension.
6. Install the wire stop against the wire swivel as shown in the photos. An 8-32 patched, socket head cap screw is used to lock the wire in the wire stop.
7. Trim the free end of the cable so it is about 3" long and tuck it inside the spring for security.

Final Inspection and Tuning

To inspect the system for proper installation:

1. Turn the trim wheel fully clockwise (Nose Up). As you turn the knob the control stick must move aft and the elevator must move upward. When the trim wheel can no longer be turned clockwise the control stick must be fully aft, and the elevator will be fully up.
2. Turn the trim wheel fully counter-clockwise (Nose Down). When the trim wheel can no longer be turned counter-clockwise the control stick must be nearly fully forward (see Step 5) and the elevator will be nearly fully down.

The trim system can be tuned as needed for proper feel and operation. This is done by changing the attach position of the rear spring on the elevator pushrod, and the amount of tension on the forward spring, as described in step 5. **Do not attach the rear spring farther aft on the elevator pushrod than is necessary to achieve full Nose Up trim.** This will only apply unnecessary tension to the spring and associated parts.

Installations in aircraft other than a Sonex, Waiex, or Xenos may require different springs.

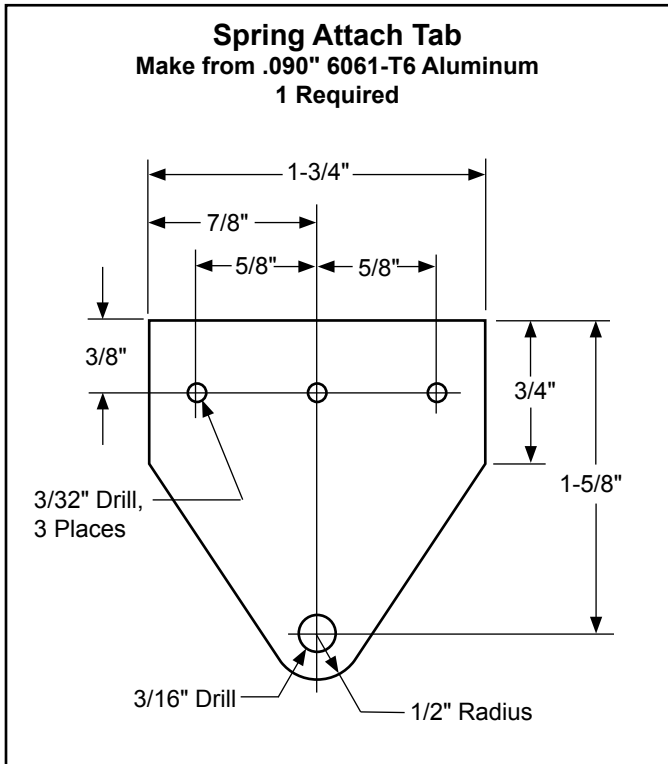
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Control Frame Modifications

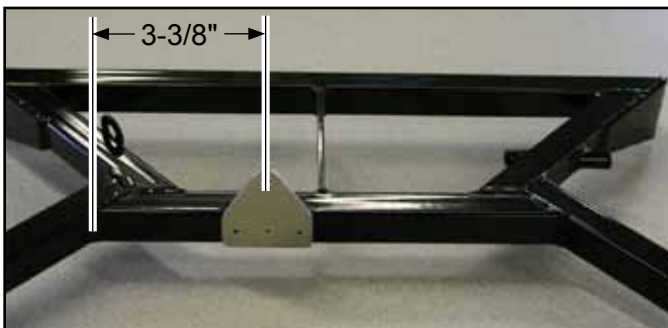
Airframes equipped with Control Stick Frame Assembly part number SNX-C05-02 (dual stick) or Control Triangle part number SNX-C04-02 (center stick) must have a tab added to accept the front spring.

Important: If your control frame already has a triangular (*not* round) tab welded to it, the tab shown below is not required.

1. Make one Spring Attach Tab, detailed below.

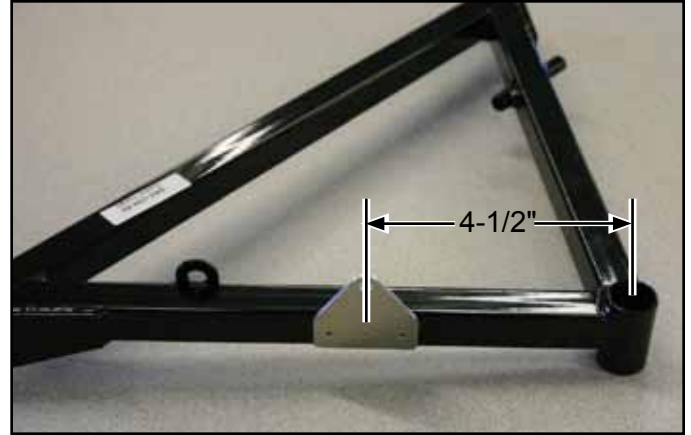


2. Clamp the tab in position on the control frame and drill the three holes to accept CCP-44 rivets (#30 drill).



The spring tab attachment position for the dual stick control frame.

Pitch Trim Unit Installation



The spring tab attachment position for the center stick control triangle.

3. Deburr the holes and rivet the tab in place with CCP-44 rivets.

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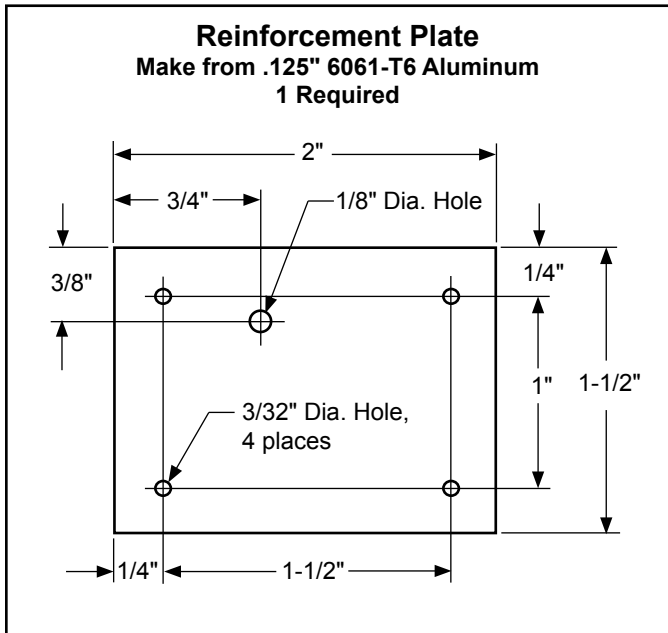
Pitch Trim Unit Installation

Rear Spring Attachment Eyebolt

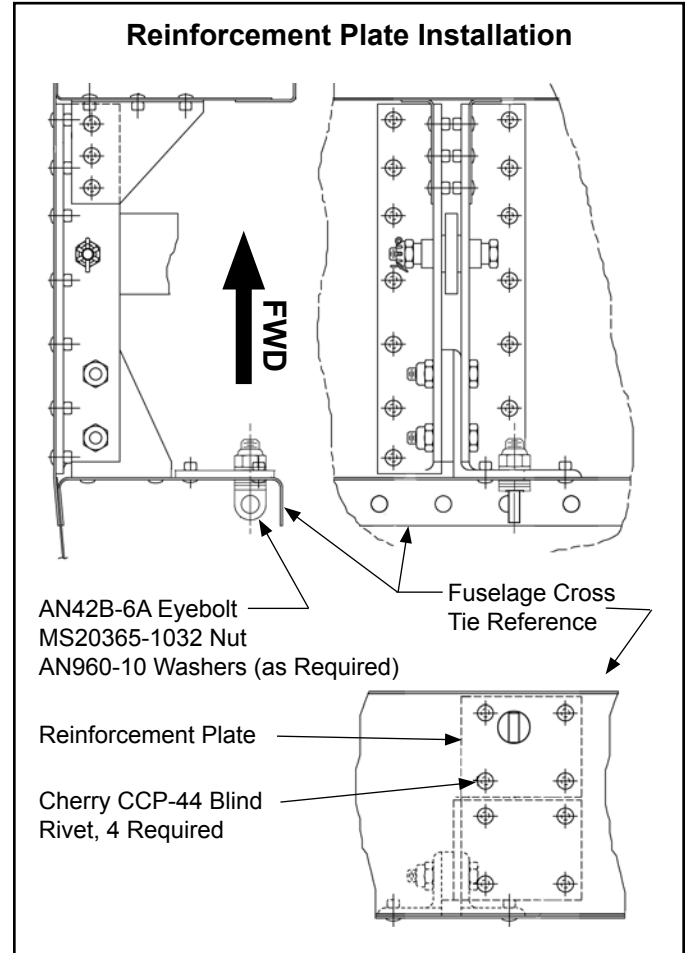
If your airframe does not have a plans-built rear spring attach angle, this recommended modification to the rear spar carrythrough will provide an attachment point for the front spring.

IMPORTANT: This installation is not required on airframes which have a plans-built rear spring attach angle. See page 2.

1. Make a reinforcement plate from 1/8" thick 6061-T6 as shown in the drawing below.

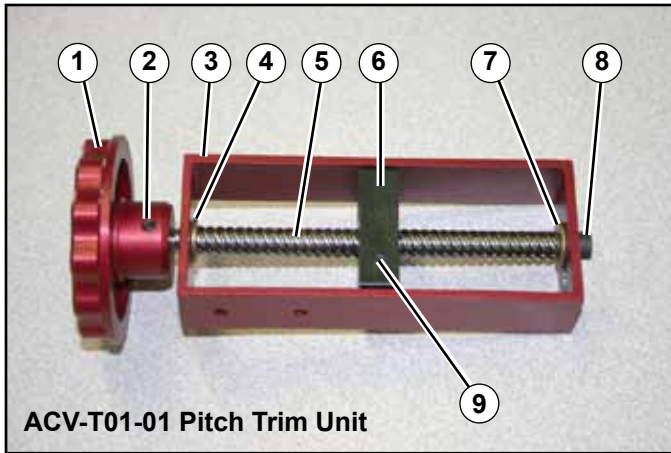


2. Rivet the reinforcement plate to the Fuselage Cross Tie with CCP-44 rivets. See installation drawing, next column.
3. Updrill the 1/8" pilot hole to 3/16" diameter and install an AN42B-6A Eyebolt using an MS20365-1032 fiberlock nut and AN960-10 washers (as required).



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Pitch Trim Unit Installation

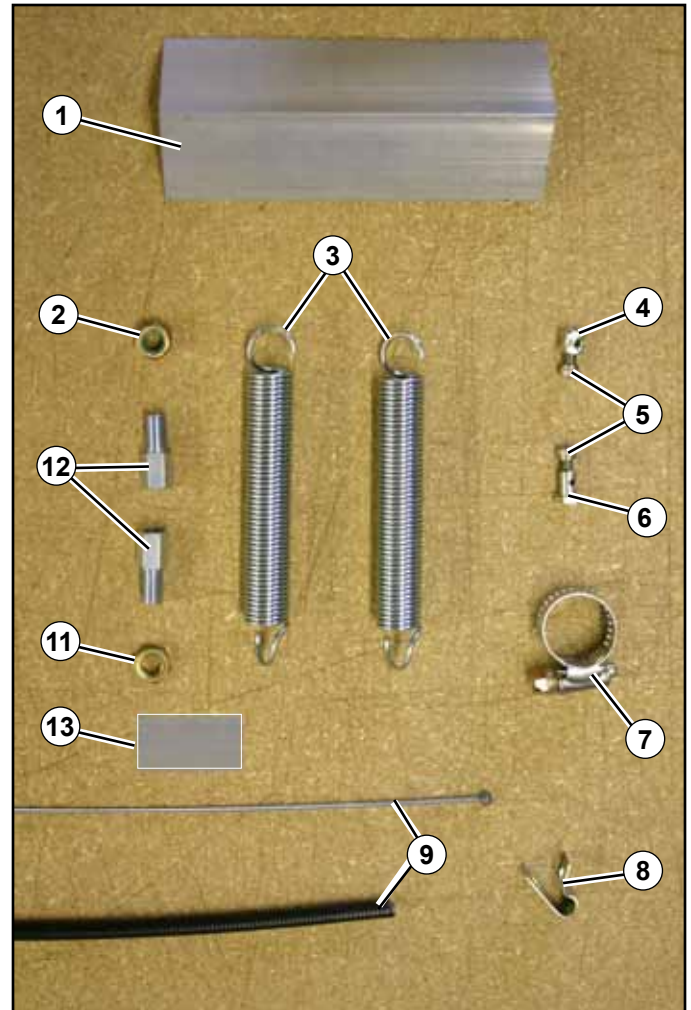


ACV-T01-01 Pitch Trim

The Pitch Trim unit consists of:

Key.....Qty..... Part No.Description

- 1 1 ACV-T01-10.....Control Knob
- 2 1 ACV-T01-31.....8-32 x 1/4" Set Screw
- 3 1 ACV-T01-12.....Housing
- 4 1 ACV-T01-14......312 Flanged Bearing
- 5 1 ACV-T01-11.....Shaft Screw
- 6 1 ACV-T01-13.....Trim Cable Mounting Block
- 7 1 ACV-T01-15......25 Thrust Bearing
- 8 1 ACV-T01-16......25 x .25 Shoulder Bolt
- 9 1 ACV-T01-17.....8-32 x 5/8" Cap Screw



Pitch Trim Installation Kit

The ACV-T01-01 Pitch Trim Installation kit consists of the Pitch Trim Unit (ACV-T01-01) and these additional parts:

Key.....Qty..... Part No.Description

- 1 1 ACV-T01-32.....Aluminum Angle 1/8" x 2-1/2"
.....(Onex)
- 1 ACV-T01-29.....Aluminum Angle 3/16" x 2"
.....(Sonex / Waix / Xenos)
- 2 1 ACV-T01-27.....Fiberlock Nut, MS20364-524
- 3 2 ACV-T01-20.....Trim Spring, 5/8" OD x 4.5" long
- 4 1 ACV-T01-19.....Wire Stop
- 5 2 ACV-T01-24.....8-32 x 1/4" patched, S/S, SHCS
- 6 1 ACV-T01-23.....Wire Swivel
- 7 2 ACV-T01-21.....Hose Clamp
- 8 1 ACV-T01-26.....Cable Clamp
- 9 1 ACV-Q01-40Cable w/ Cast Ball and Conduit
- 10 1 ACV-T01-22.....Cable with Cast Ball
- 11 1 ACV-T01-28.....5/16-24 Jam Nut, AN316-5
- 12 2 ACV-T01-18.....Conduit Retainer
- 13 1 ACV-T01-30.....Aluminum Bar (1/8" x 1/2" wide)