

Engineering & Design, Inc

## RV Tipper Kit

When we visited Oshkosh this summer (2005), many of you saw our airplane with its sliding canopy and tip up system. After so many expressed an interest in it, we decided to build a few kits and offer them for sale. We've actually made many improvements since you last saw it.

Here's a little history about how this design came about. My wife loves to fly cross country with me, and, of course we need to carry some luggage for that. RV6's and 7's have plenty of capacity (volume and weight), but it can be difficult to get all that stuff into the baggage compartment of the sliders. We had seen other examples of a slider with a tip up feature out there, but we wanted to do our own just for the challenge of it. We built a canopy with our own aluminum canopy roller brackets, replacing the perfectly good welded steel versions as supplied by Van's. These brackets allow the canopy to tip forward, but it still only had a broomstick to hold it up! It took about a year mostly standing there looking at the problem of how to hold the canopy up, that it finally came to us. As engineers, we like a system now. It looks good, is elegantly simple, and is as easy to install as possible. An added bonus is that it is now easier to access the baggage area for maintenance and cleaning. My wife likes how easy it is to put all of our bags in. Now she wants headrests for when she takes a nap! I guess that the RV Tipper means that we can have headrests and still have access to the baggage area!



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Here is how it should work when you get done. Stand on the left side behind the wing.

- Lift the canopy slide stop to let the canopy slide all the way back so that the UHMW guide will lift off of the T-rail
- Lift the back of the canopy up 8—12 inches
- Slide the canopy forward to the stop and tip it up
- Extend the strut straight up all the way and then tilt it forward
- Engage the strut into the UNHW canopy slide and twist ¼ turn to lock

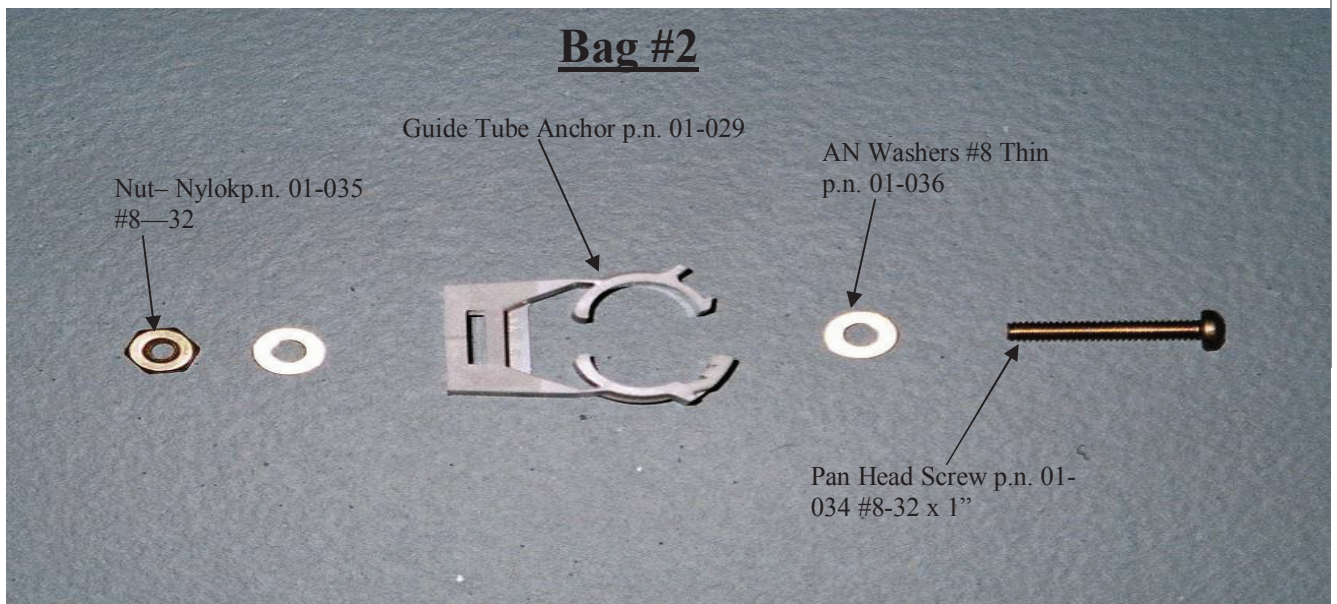
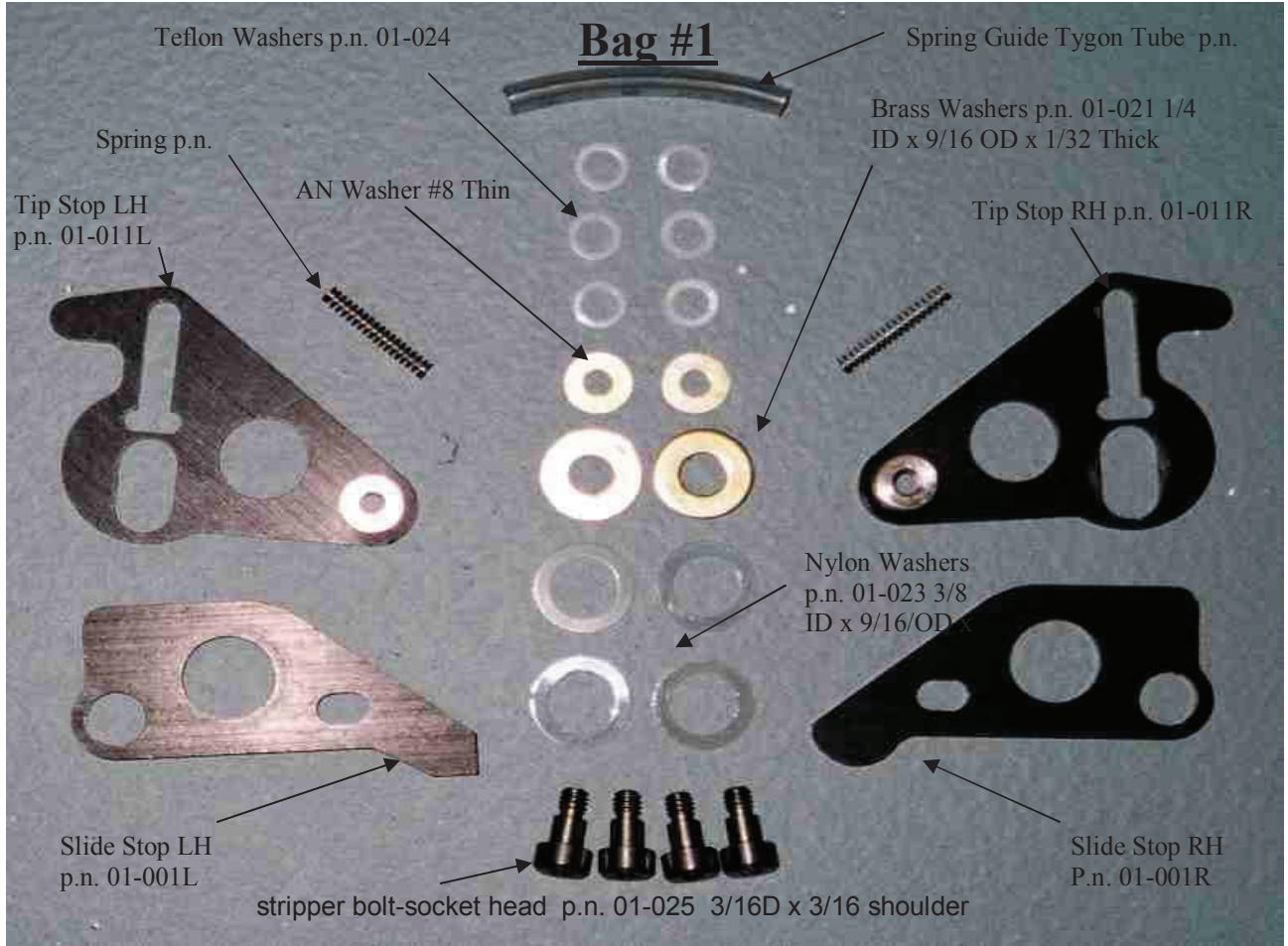
Since the strut supports the canopy in the center, no side loads are imposed. It is locked in place so that the wind won't pull it off of the strut.

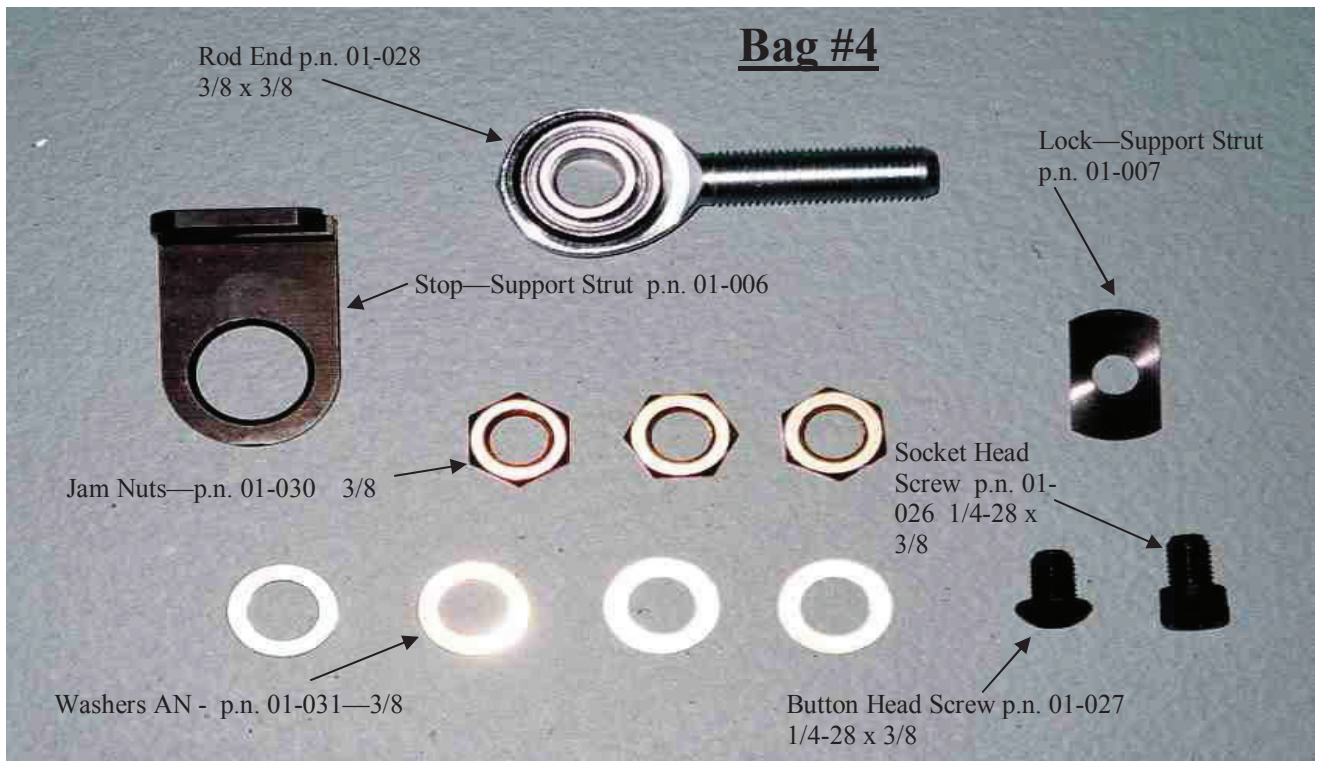
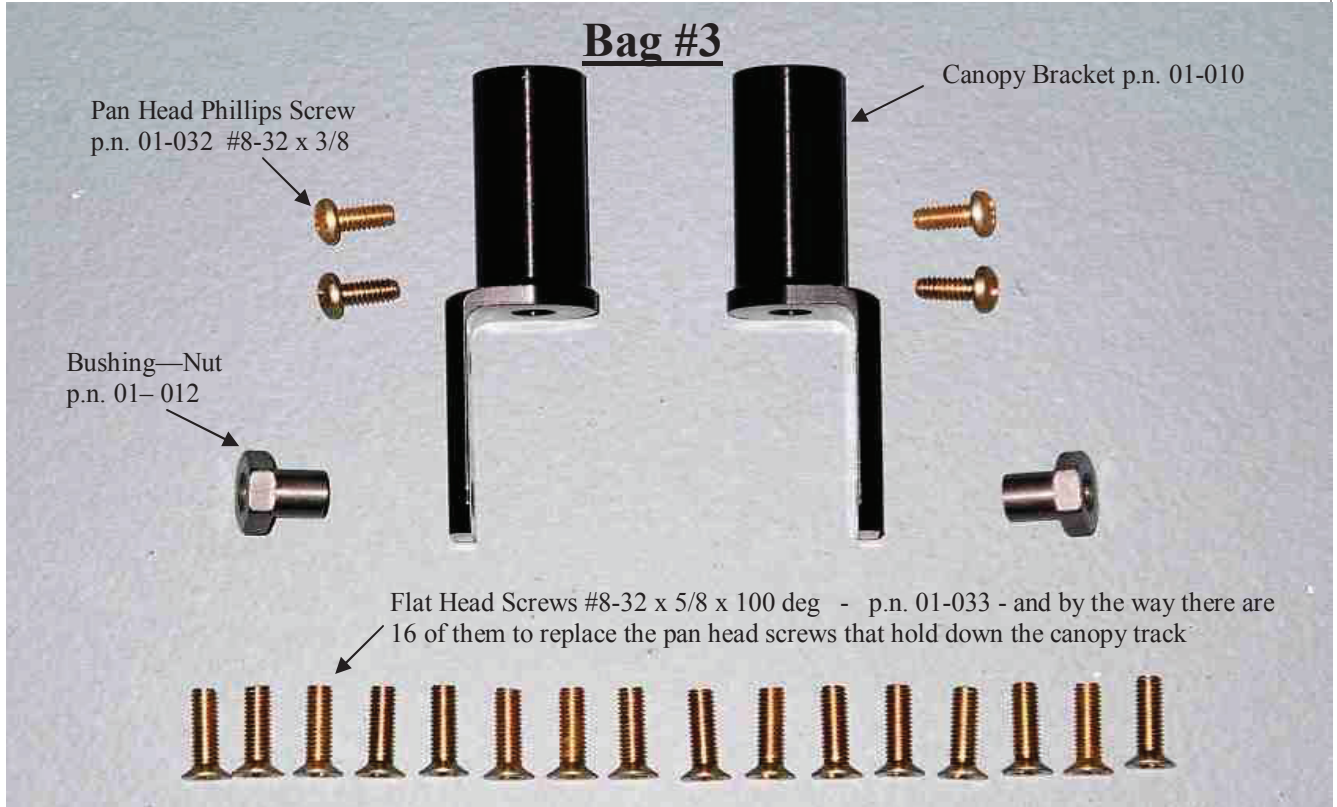
The intermediate stop can be used to limit how far open the canopy slides when we are in taxi or run-up mode. It keeps the charts in the plane!

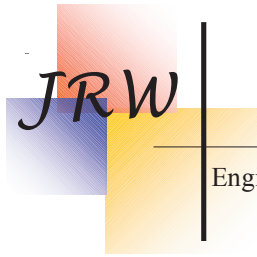
Happy Flying!

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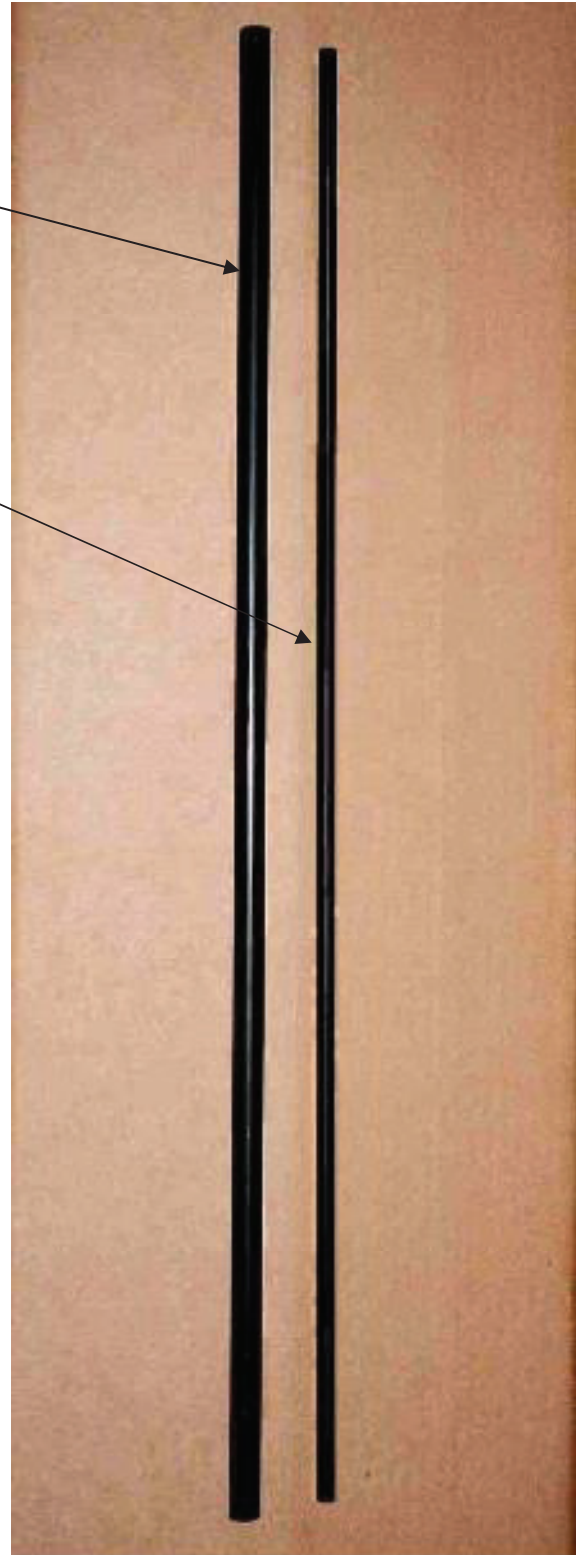


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Guide Tube—p.n. 01-008

Support Strut—p.n. 01-005

Not pictured is an 8 “ length of Aluminum  
bar 1/8 x 1/2 to be cut and used as stops  
Abutment Stop p.n. 01-009



## RV Tipper Instructions (retro-fit or for new construction)

**Note1: Before you unpack the parts**

**Measure the distance as shown in the picture at right. Both sides must be greater than .88" for the tipper to work. Most RV's actually measure between 1.0" and 1.25".**

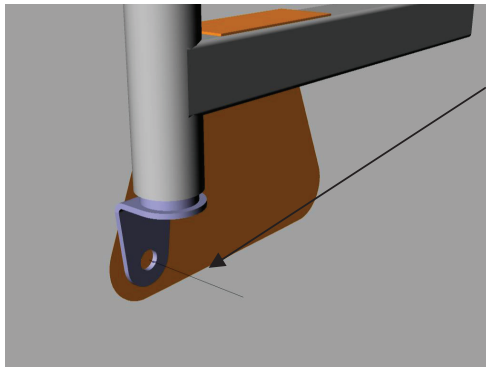
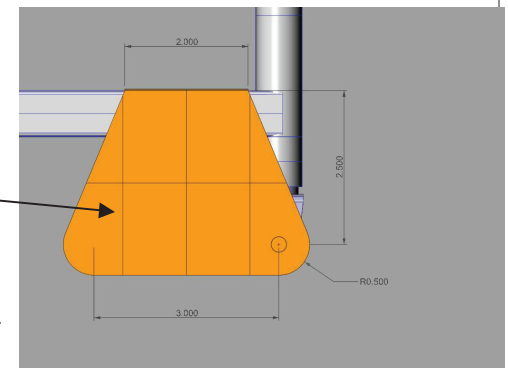
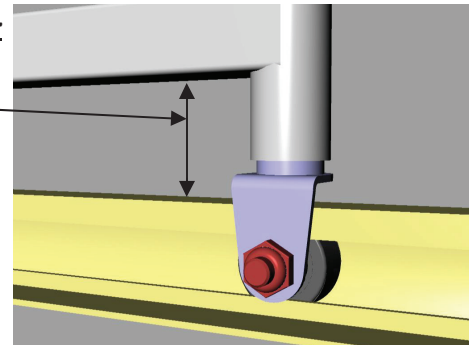
### Step 1:

Remove all contents from the box and insure that all parts are there and in good condition. See the bag contents pages 2,3,and 4

### Step 2: Canopy Modification (short version)

In order for the canopy to tip, the canopy frame WD 640 and roller bracket WD-644 on an RV-6 must be modified to accept the new roller bracket. For this, it is best to remove the canopy and place it carefully, front side down on a couple of pieces of wood or other suitable material.

The new canopy bracket must keep the roller in exactly the same position as the old bracket. This is a typical template that will work, made from scrap .025 aluminum.



With the original Van's WD-644 bracket still in place, clamp the template down and mark or match for the 1/4" dia hole thru template.

Remove the Van's bracket and use the new roller bracket to determine the cut-off point for the canopy frame tube. Ideally you would sneak up on this, keeping the tube as long as possible.

Protect the canopy skirt with a scrap of aluminum and cut off the tube. Trial fit the new bracket to check that the canopy frame tube is the correct length by making sure that the new bracket lines up with the holes in the template. See pages 4 and 5 for more pictures and illustrations. *The new bracket must be secured to the*

*canopy frame. Thru bolts can be used, but we recommend using the 4 socket head bolts provided ( #8-32 course threads). Use 2 bolts per side. Make marks on the canopy frame where you want these bolts to be.*

Remove the new brackets and drill 2 pilot holes in the canopy frame (inside wall of tube only). Put the new roller bracket back in place aligned with the fixture and mark or drill into the new roller bracket. The bracket can now be removed and be tapped for the #8-32 screws. The canopy frame holes can also be enlarged with a #18 drill.

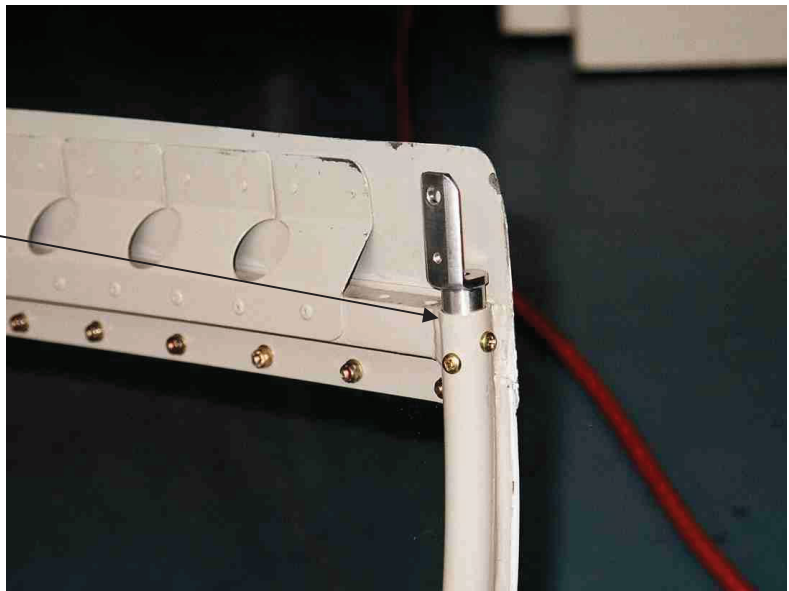
It is easiest to remove the new brackets to assemble all of the hardware to them as shown on page 7. Note that the right side has a rounded slide stop and that some standard Van's parts are used. A very sparing amount of grease can be used. Once these mechanisms are installed and working smoothly, they can be permanently attached to the canopy frame.

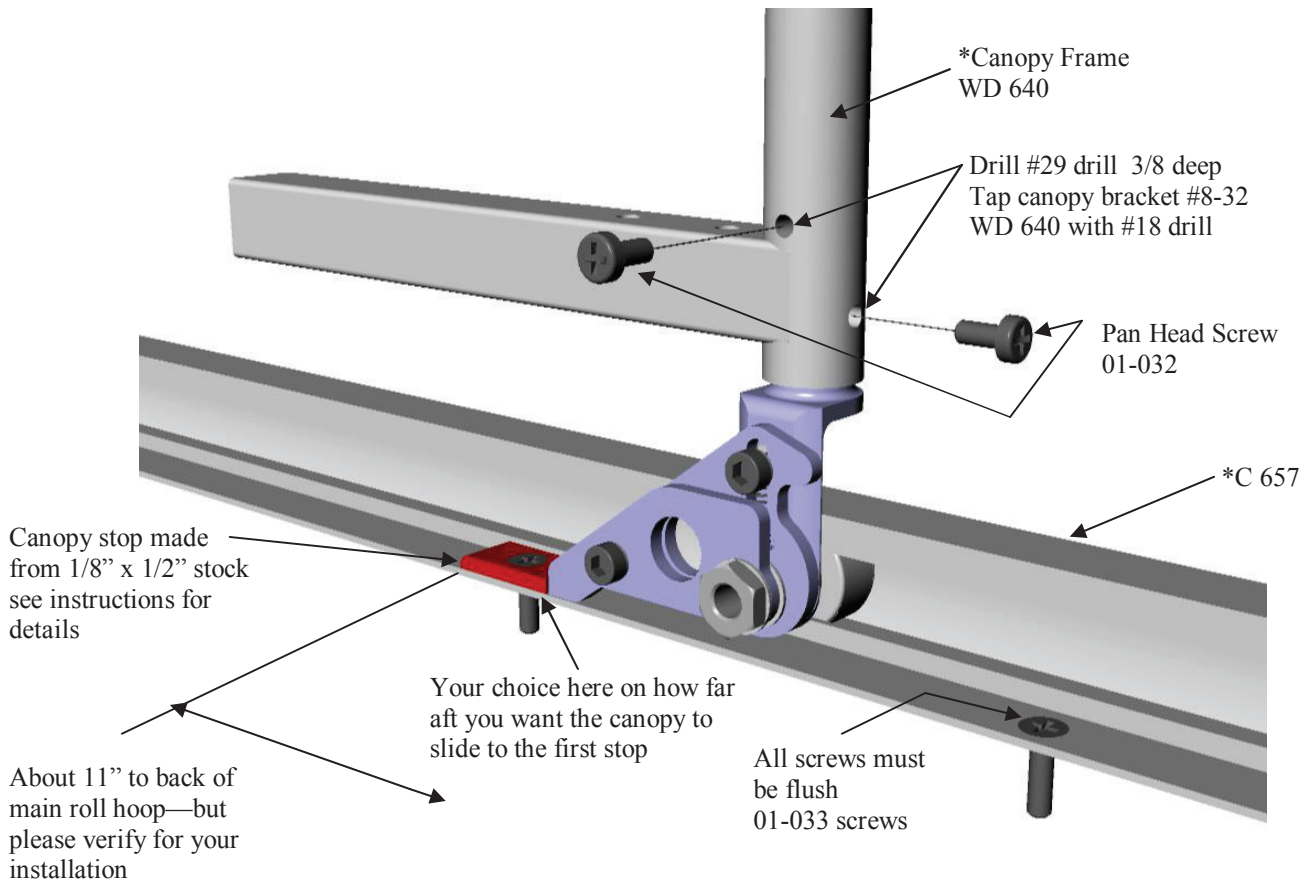
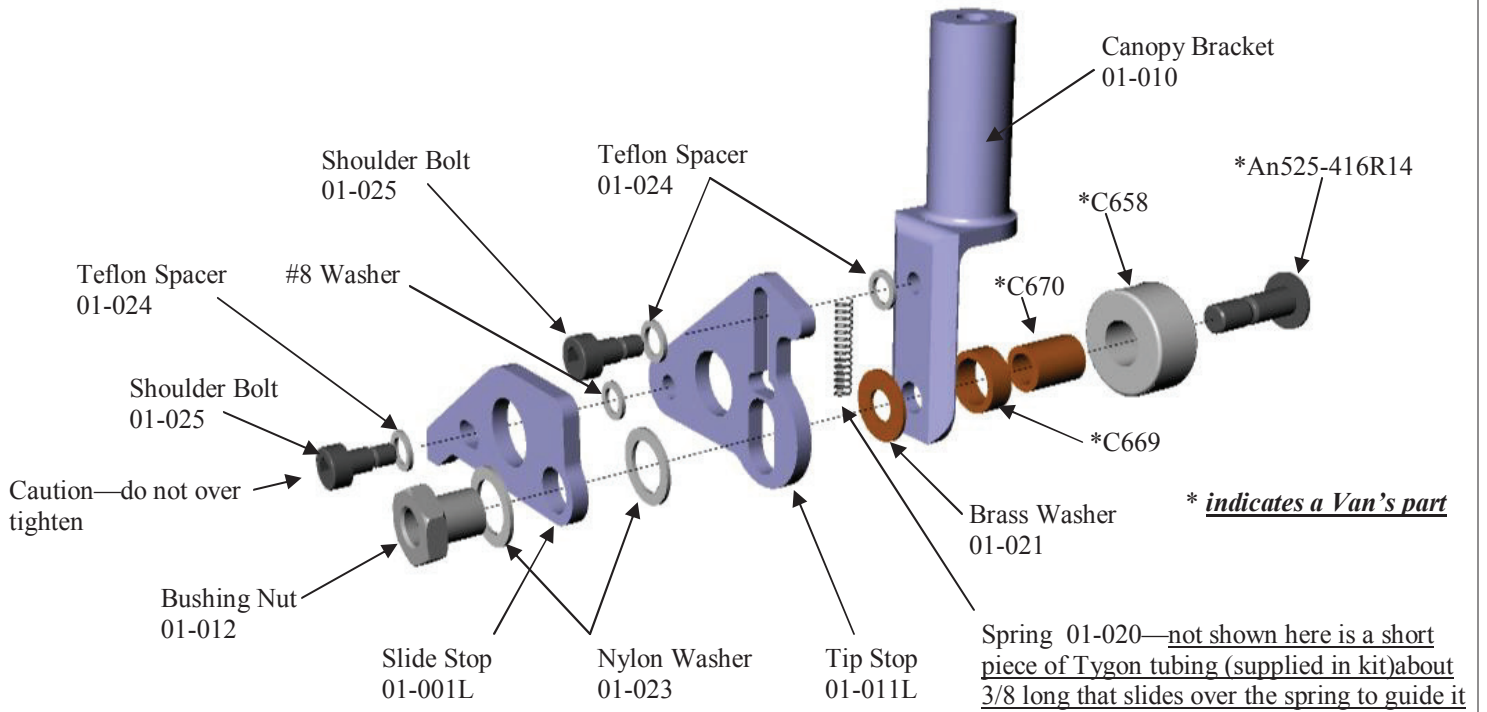
Clean, de-burr, and bolt the new roller bracket in place using a low strength thread lock (Blue Lok-Tite or equivalent).

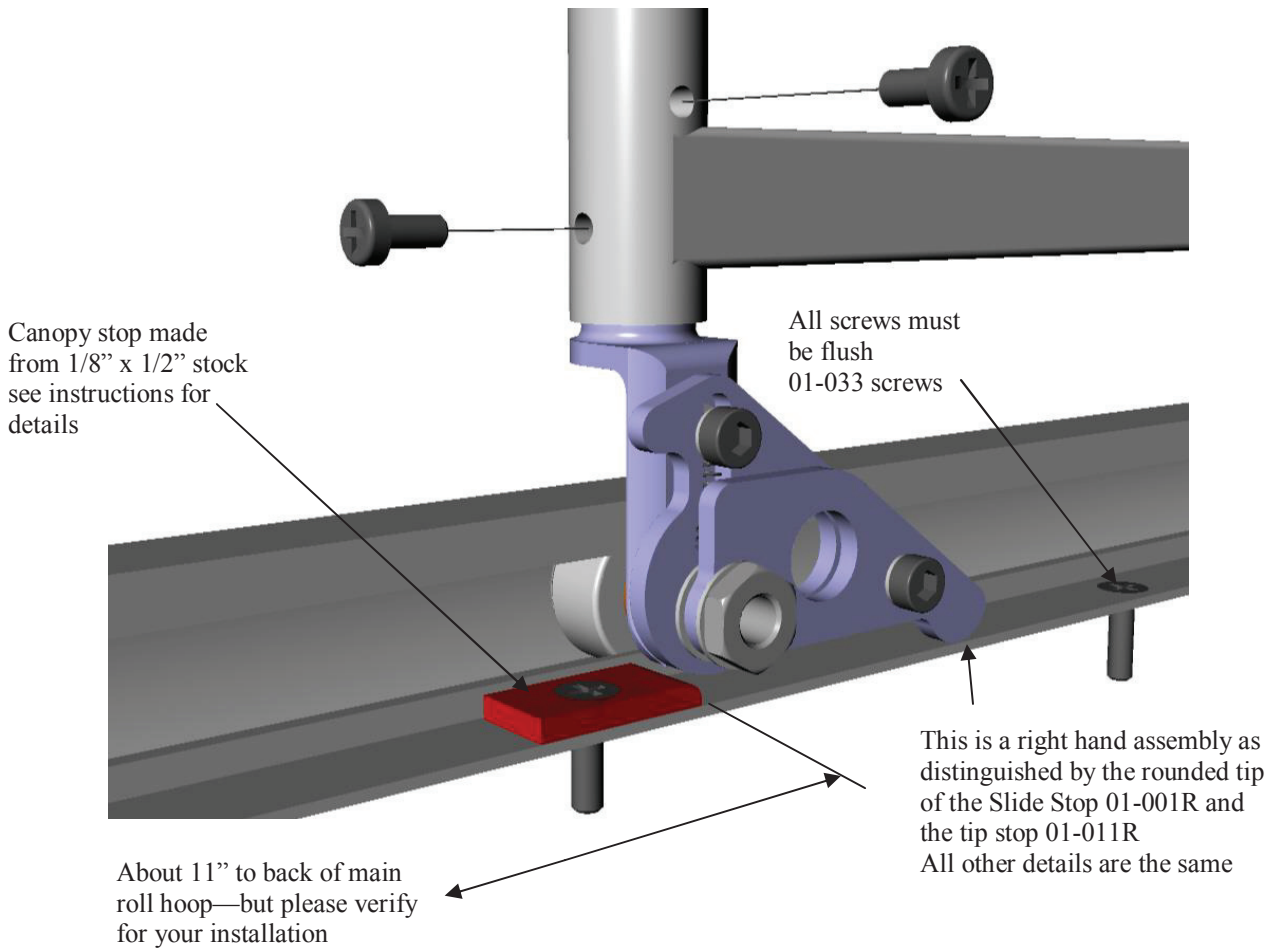
The new canopy bracket 01-001 replaces the original Van's canopy bracket Wd-644. For retrofit installations, you must devise a method or fixture that will hold the new bracket at exactly the same height as the original bracket. We bent up a simple sheet aluminum bracket for this purpose.



Here the bracket is shown installed. Note that our canopy had been modified for another version of this bracket, and hence it has been cut off a little too far. You should be able to leave a little bit more of the tube depending on your exact canopy height.





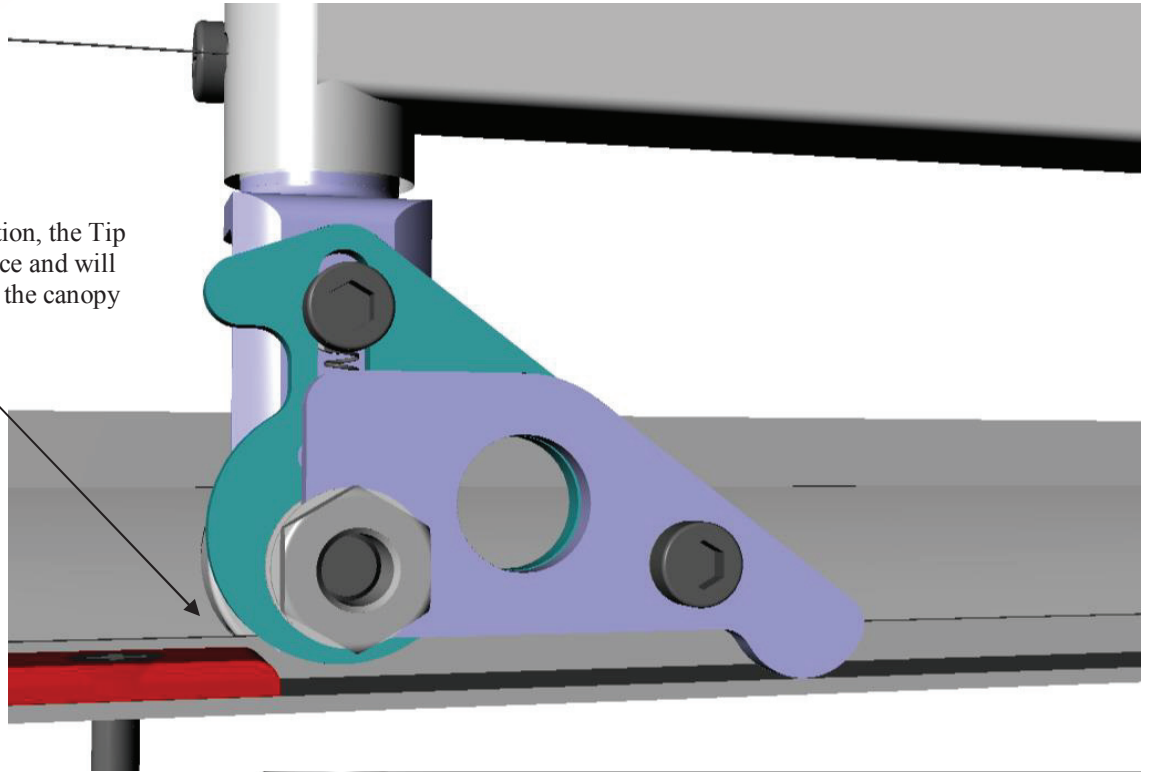


**Step 3: Canopy track flush screws**

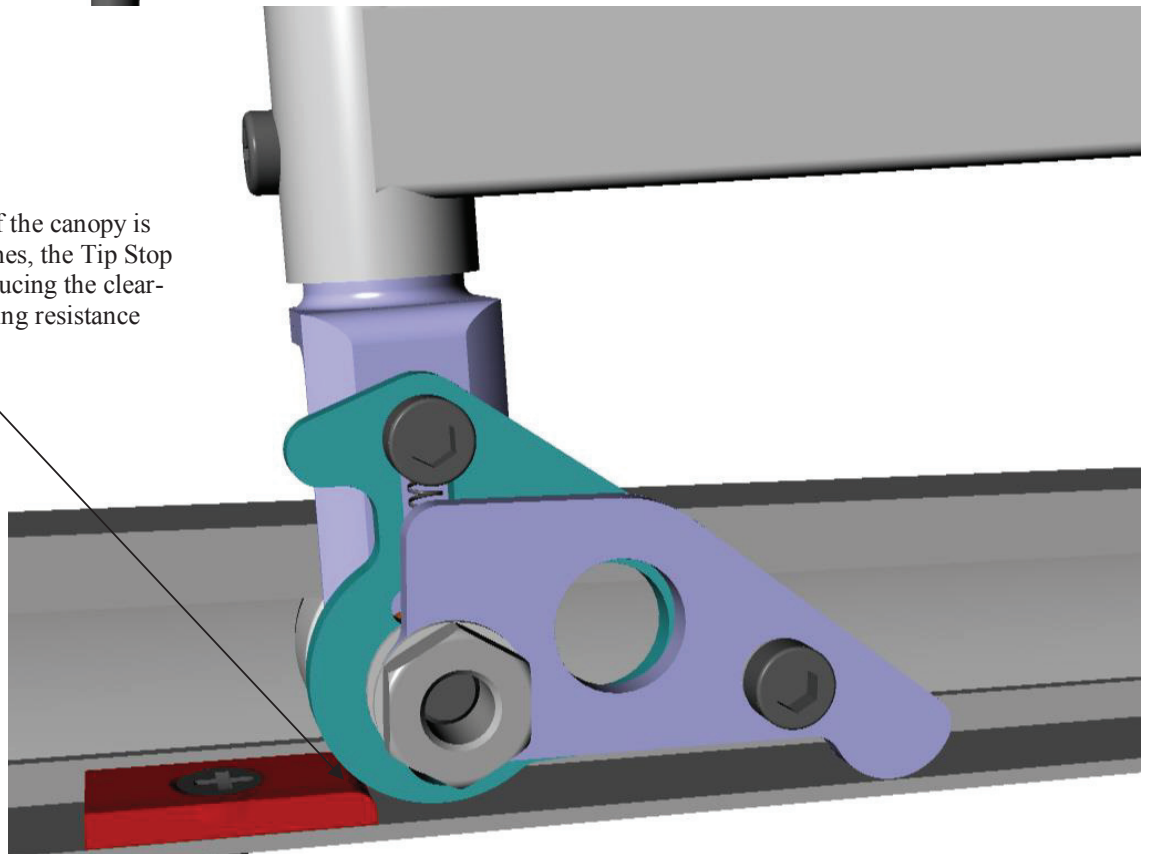
The screws that attach the C-657 canopy track need to be flush with the surface so that the slide mechanism will work. The kit has 16 screws #8-32 x 5/8 long 100degree ( our p.n. 01-033). See page 8 for an illustration. Both left and right sides will need stops about 11 inches aft of the main roll hoop. These stops provide a stop to locate the canopy fore and aft prior to tipping. It is best to fully assemble the system and use the 11 inch dimension as a guideline, verifying that the canopy does not touch the main roll hoop when it is fully tipped. Cut these stops from the 1/8 x 1/2 aluminum provided. A radius on the aft end of about 3/32 inch is about right. The forward end should only have a 1/32 inch radius.



In normal operation, the Tip Stop has clearance and will slide easily over the canopy stop

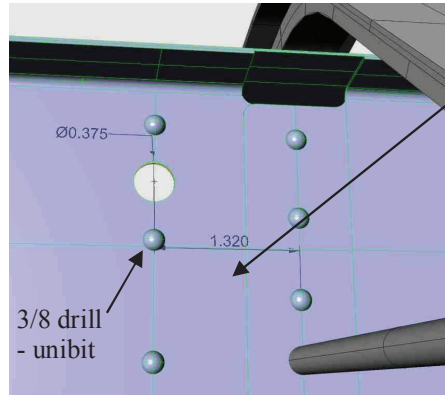


When the rear of the canopy is raised a few inches, the Tip Stop drops lower, reducing the clearance and providing resistance



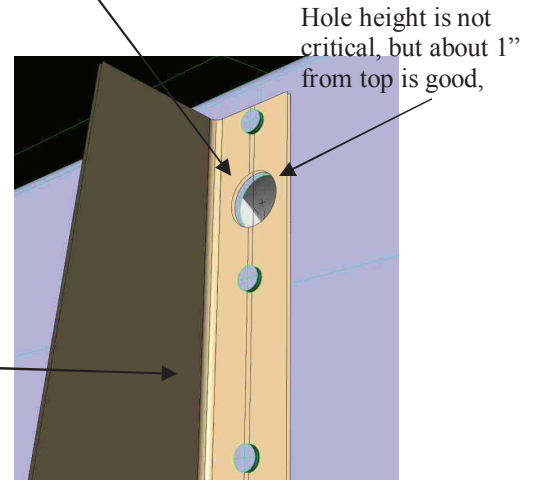
**Step 3: Support Strut Stop**

Remove the upper baggage bulkhead covers (F652 on RV-6).



Baggage Bulkhead Looking Aft

1.32" from center-line is approximate— the idea is to line up with the F-628 channel

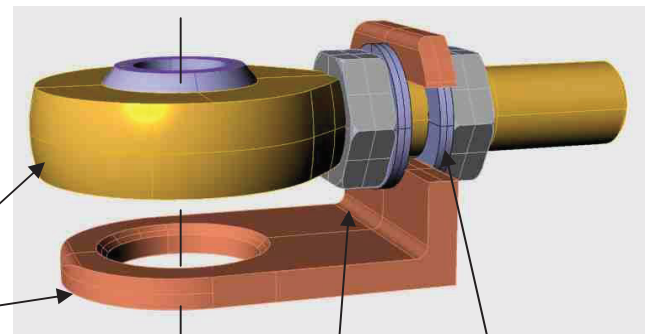


Baggage Bulkhead Looking Fwd

Carefully mark and drill a 3/8" diameter hole in the baggage bulkhead.

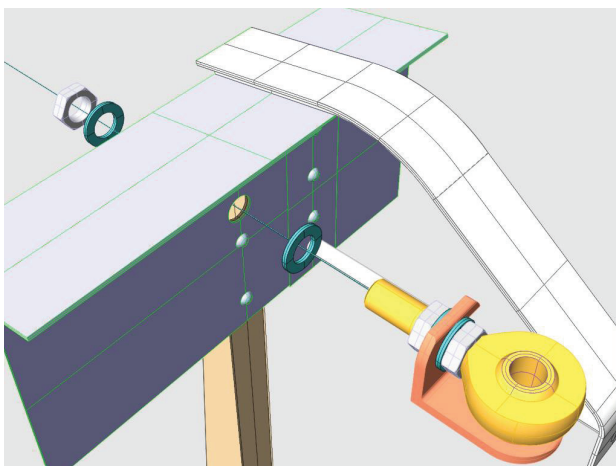
Assemble the strut stop (01-006) and rod end as shown below. The key here is to set the jam nuts so that the rod end centerline is directly over the hole for the guide tube. Some rod ends require a die to be run over the threads in order to get the 1st jam nut far enough on to achieve this.

Rod End, 3/8 x 3/8-  
Stop—support strut



3/8 jam nuts NAS 679-A6

3/8 washer AN 960-616



Now, just slack the jam nuts slightly and remove the strut stop. Without moving the jam nuts, insert the rod end into the hole in the bulkhead and tighten in place, keeping the rod end orientation as shown .

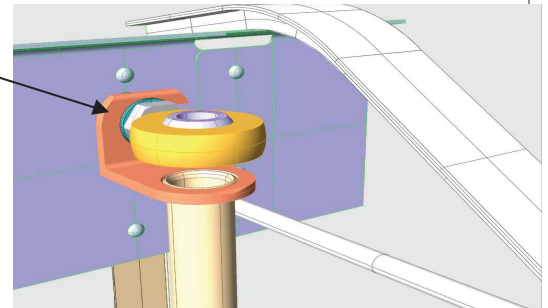
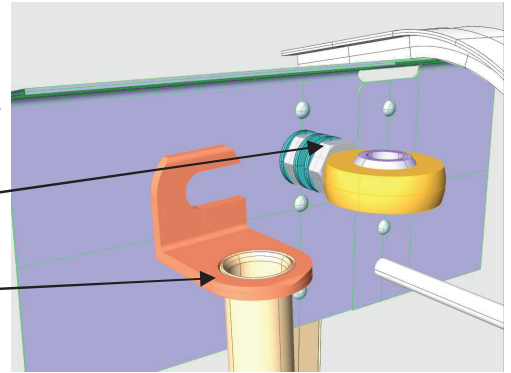
**Step 4: Support Strut Guide**

Slide the Support Strut Guide Tube (01-008) into the Strut Stop bracket (01-006) and slide it back onto the rod end with the Guide tube hanging vertically.

Back this jam nut off and slide the bracket out.

Install the guide tube in place as shown

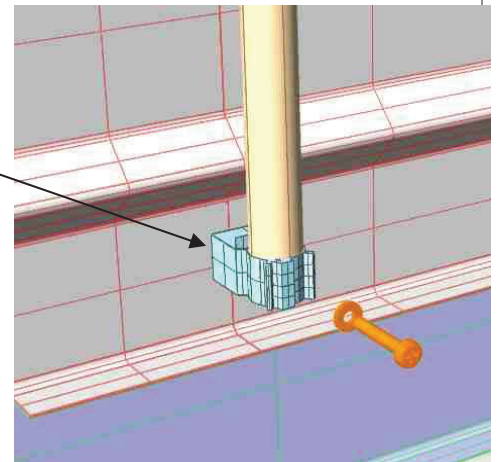
Slip the bracket and guide tube assembly back into place



Mark the lower baggage bulkhead cover about 1 1/2" above the baggage floor (and above the bulkhead itself). Caution: **Do Not Drill Into The Baggage Bulkhead**, only the cover (F651 on RV-6). This hole should not go thru the F-628 channel, so offset the hole to either side. Drill for the #8 screw and mount the Guide Tube Anchor as shown. .

It is recommended that you not bolt to the F-628 channel. This will allow the baggage cover to be removed more easily.

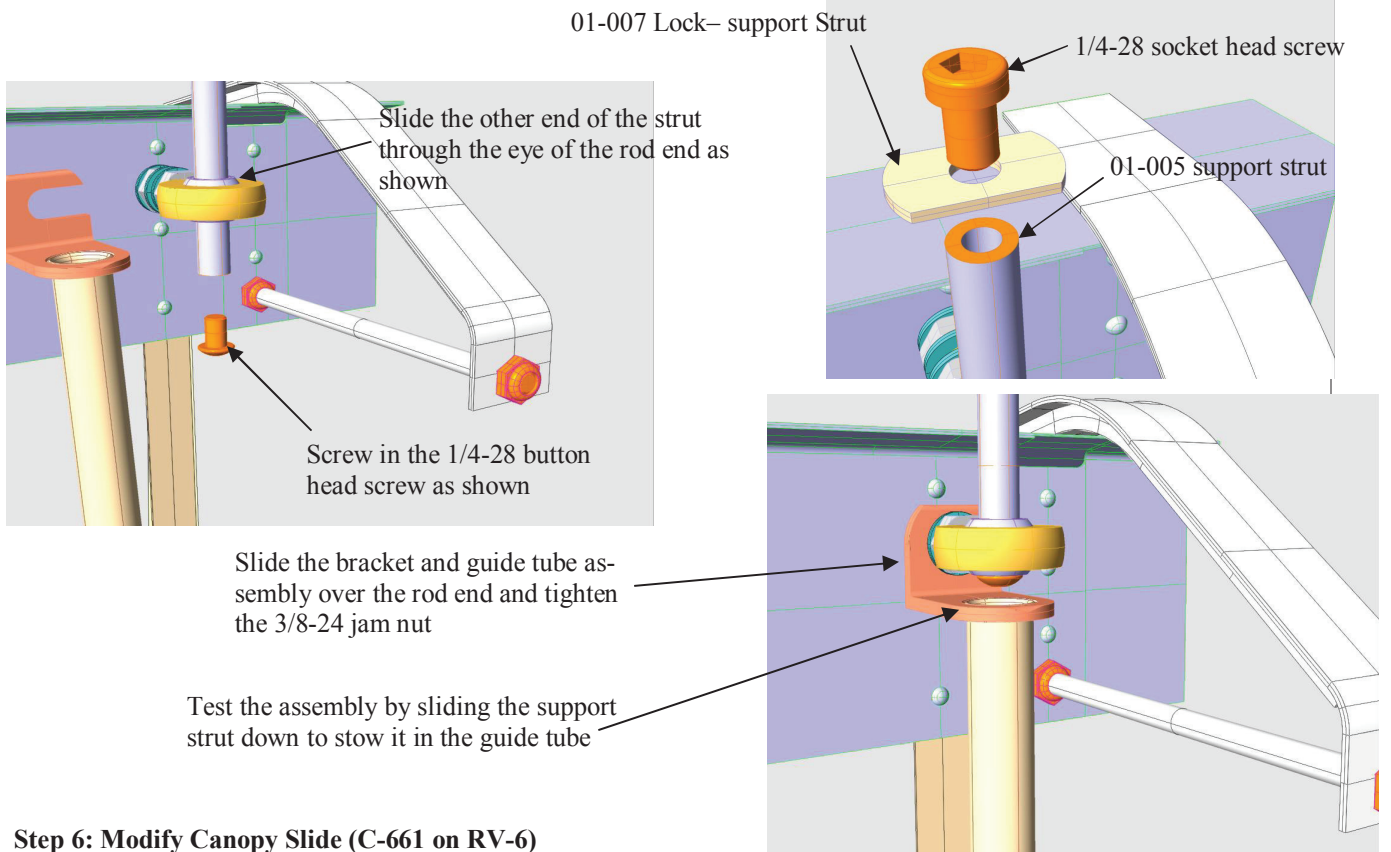
The guide tube will not hang perfectly vertical in order to side step the F-628 channel.



Slide the Strut Stop and Guide Tube out of the way, and re-install the upper baggage bulkhead cover.

**Step 5: Support Strut**

On one end of the strut, screw in one of the 1/4-28 socket head (p.n. 01-01-026)screws with the Lock – Support Strut (01-007). Test fit this end in the canopy slide that you just modified. Insert the other end of the strut from the top down thru the eye of the rod end. Screw in one of the 1/4-28 button head screws (p.n.01-027).

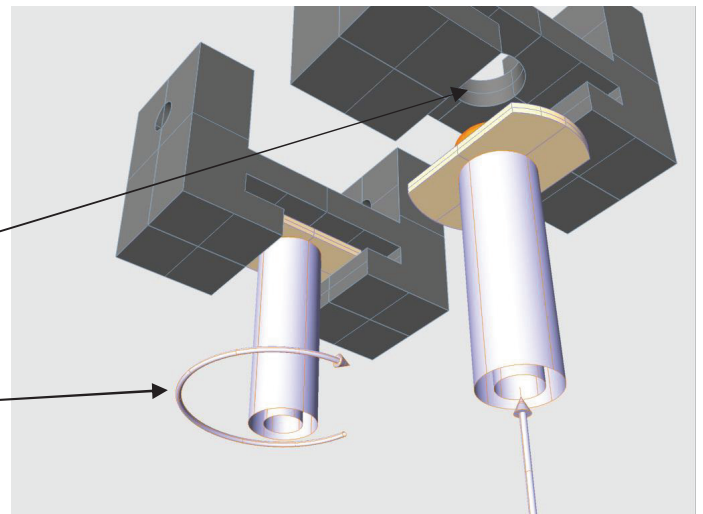


**Step 6: Modify Canopy Slide (C-661 on RV-6)**

The aft canopy is supported and guided by this UHMW Plastic piece. Remove it from the canopy and drill a 3/8" dia hole per the drawing. Slight chamfering will be required. .

We used a uni-bit to drill a 3/8 dia hole in the C-661 canopy slide. This hole should be in the center of the C-661

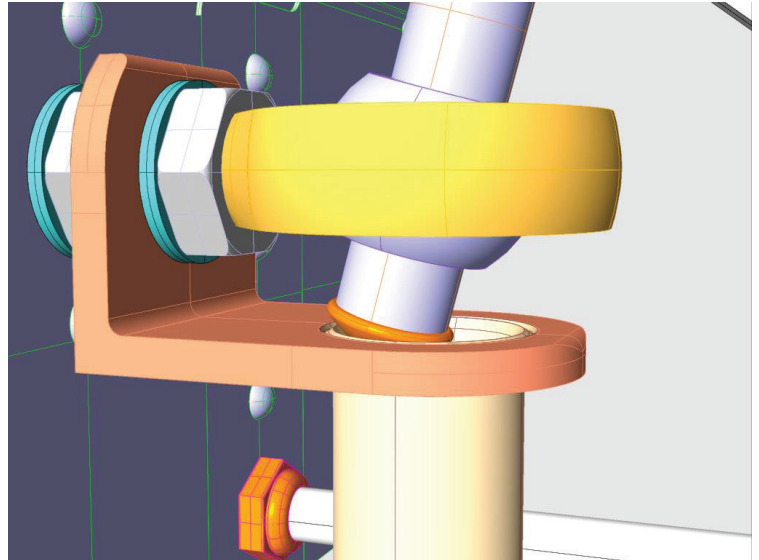
The head of the 1/4-28 socket head screw should slide into the hole you just drilled, and with a 1/4 turn of the strut, be locked in place. This fit can be adjusted for ease of use.



**Step 7: Final Support Strut Assembly**

Check to be sure that the support strut will stow inside the guide tube (proper alignment of strut and guide tube).

When the strut is extended fully and then tilted forward about 15 degrees, it should be locked from sliding down or any further up. The strut is now complete.



**Step 8: Install aft canopy stop**

We need to have an aft stop. At the aft end of the canopy track there needs to be a stop made from a 1 inch long piece of the 1/8 x 1/2 aluminum stock. We only need this on the left side of the cockpit. You probably have a screw at the aft end of the track that can be used to secure this stop. The purpose is to stop the canopy's aft travel about 1 inch short of its normal full aft travel. The new slide stop mechanism can then be lifted to allow that extra 1 inch of aft travel. This will allow the center slide C-661 UHMW and canopy to be lifted up off of the T-rail



Aft stop

**Step 9: Re-install Canopy**

The canopy with its new roller brackets can now be re-installed. Once it is back into its tracks, bolt the modified UHMW canopy slide back onto the canopy. The canopy should still close and slide just the way it did before it was modified.



Clearance can be close here so please check to verify before you slam your canopy closed

**Step 10: Canopy Center Track Modification**

Reach in as shown and mark the center track (C-662 and C-663 on RV-6). When the canopy is against the new stop, and again when it is released to go back the extra 1".

Remove the UHMW Plastic Canopy Slide and slide it off the back of its track. Re-attach the Canopy Slide above the track as shown. Very carefully slide the canopy about 8" forward and tip it up slowly making sure that the new roller brackets don't bottom out on the canopy rail and that the canopy itself does not hit the forward roll hoop. You should be able to latch it with the support strut as shown. This will allow you to verify the fore and aft location of the forward stop.



We used 11" from roll hoop

And 9" from roll hoop

The center track must now be relieved as shown from the forward line that you just made, to the rearward line plus about 1/16" either way for clearance. Drop the rear of the canopy down and slide it all the way back to the slide stop. Release the slide stop and slide the canopy all the way back allowing the UHMW guide to fall into the clearance you just made. Sliding the canopy about 1 – 2 inches forward should engage the UHMW slide.



**Step 11: Forward slide stops**

Install the forward canopy stops to the location you just verified.

It should all be working now. When you lift the rear of the canopy, raise it about 8 inches or so as you slide it forward. You should see and feel the canopy stop system as it comes up against the stops. At this point just tip it up and connect the support strut. Now you can easily get access to the baggage area of your RV. We hope that you enjoy it!