NORTH WING LIGHT SPORT AIRCRAFT KIT
AMATEUR BUILT EXPERIMENTAL REGISTRATION

Assembly Manual – Apache (Rotax 912 engine)

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General Information

Introduction

Congratulations on your purchase of the North Wing Navajo light sport aircraft kit. The Navajo is a 2-place, weight-shift controlled light sport aircraft constructed of high quality aircraft-grade materials. The assembly process will provide a strong familiarity with your trike's components that will help you maintain and enjoy this aircraft for many years of fun flights.

Tools Required

1/8" Hex Tool	Rubber Mallet
3/16" Hex Tool	Open-End Wrench Set
1/8" – 3/16" – ¼ - 1/2" Drill Bits	Pop Rivet Gun
Level	Sanding Flap Wheel
½" Deburr Drill Bit (Counter Sink)	Hack Saw
"F" Drill Bit (3/1000 oversize - included in kit)	Step Drill Bit for fiberglass holes
Clamps (small, strong clamps for fairing install)	Angle Drill (small)
Dremel Tool (for sanding down fiberglass edges)	

Supplies Required

Loctite 648 (retaining compound)	Loctite Red, Loctite Blue
200 grit Sand Paper	

Bolt Installation – "Pilot Holes" need to be drilled to correct diameter

Given the FAA assembly requirements of having the builder complete at least 51% of the assembly, most holes for bolts are drilled with smaller size "pilot holes" that serve as a reference for the exact hole location, but must be drilled-out to the correct hole diameter, per the step of the assembly.

Bolt Installation – "Snug-Tight" and Washers Advisory

Unless otherwise noted, bolts should be installed with "snug-tight" torque, where the bolt is tightened to ensure the faces of the parts assembly are in firm contact, and the wrench has been turned to refusal.

Note: During wing assembly using various bolts and nuts, the type of washer used varies. Sometimes the washer required is "thin", sometimes it is "thick". A general advisory regarding optimal assembly with bolts on the wing is: **When the Nylock or Castle nut is being tightened to the final torque, the end of the bolt should be showing 2 or 3 rows of threads.** When using washers, there may be times when using a thin, or thick washer may help arrive at that goal of showing 2 or 3 rows of threads.

Cadmium-electroplated Bolts Advisory

When installing bolts, it is best to try to minimize any scratches to the surface of the bolt, due to the health risks associated with disturbing the Cadmium plating. The Cadmium plating provides excellent corrosion resistance, so it is beneficial to not scratch the plating. To ensure the best insertion of a bolt through a hole, first carefully run the correct size drill bit through it (if ¼" hole, use the slightly-oversized "F" bit). Next, rather than twisting a bolt through a tight hole, it is better to give it a moderate impact with a rubber

hammer to get the bolt through the hole, as this will minimize the possibility of corrupting the bolt's electroplated Cadmium surface. Wash hands after handling these items.

Front Fork Assembly

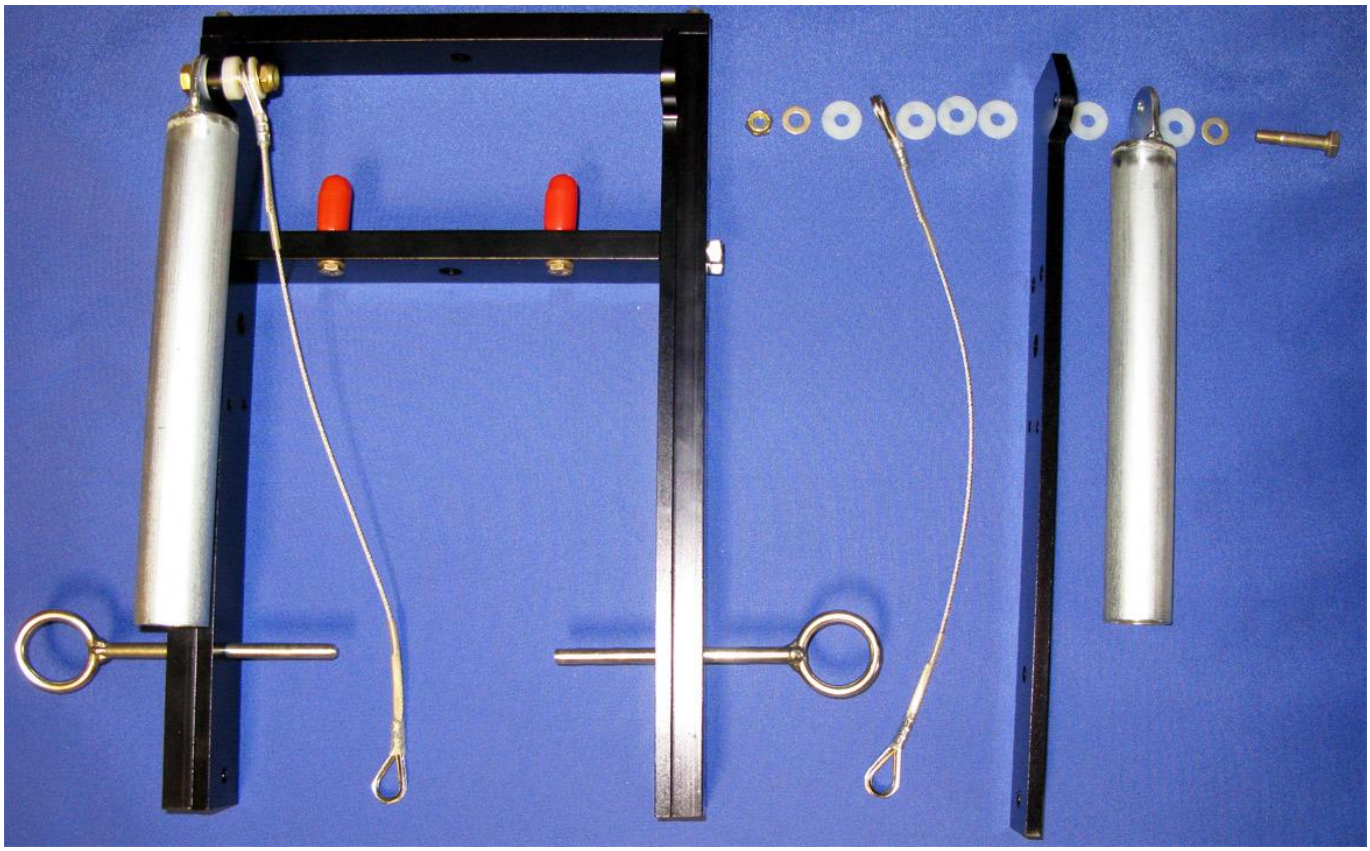
Tools and Supplies Needed

1/8" Hex Tool, 3/16" Hex Tool, ¼" Drill Bit, "F" (oversize) Drill Bit, Open-End Wrench Set, Pop Rivet Gun

Assembly Notes – Front Fork

The rugged design of the Front Fork consists of a series of coated plates, connected with hex screws. During assembly, it is best to not tighten the plates completely until you have confirmed the surfaces touch each other in an aligned, plate-to-plate connection. When the Front Fork assembly has been completed, the fork assembly can be set aside, to be attached to the Front Root Tube later. It is easier to work on the Back Frame and other rear-trike components without the weight of the front fork attached. The initial assembly steps can be viewed in the "Front Fork Exploded 1" schematic diagram and parts list.

Photo - Front Fork Plates



1. Loosely attach the Top Plate to the Outside Plates with 4 10 x 24 x1" hex screws. Prior to attaching the bolts, apply a thin coat of Anti-Sieze to each bolt.

2. Loosely attach the Inside Plates to the Outer Plates with ¼ x 28 x 1¼" hex screws.

3. Attach Inside Plates to Outside Plates with ¼ x 28 x 1¼" hex screws.

Note: To aid alignment of the plates as they are connected, insert a ¼" diameter bolt with smooth shank, as shown in photo above. (not provided in kit)

4. Attach 2 Steering-Stop Limiters to Lower Plate with AN3-13A bolts.
For each bolt, place a AN960-316L thin washer on it, then through the bottom of the lower plate. Once it is through the lower fork plate, place a Garolite Tube (Item #4 in diagram) on it, then another thin washer, then secure the bolt at top with a MS21083-N3 Nylock Nut. When tightened, add the red plastic cap to top of bolt assembly per the "Front Fork Exploded 1" schematic diagram.

5. Attach Lower Plate to Inside Plates with four 1¼" hex screws, inserted through the outside of the Outer Plates, per the diagram.

6. Attach ¼" bolts (AN4-12A) and washers to both Upper Shock Tubes (HT488), per the "Front Fork Exploded 3" schematic diagram and parts list. Tighten, but allow movement, so you can barely turn bolt with your fingers.

7. To attach the Inside Swing Arm and Outside Swing Arm to each side of the Shocks, it is necessary to compress the shock foam to permit the bolt and washer assembly to pass through the hole in the Lower Shock Tubes, per the "Front Fork Exploded 3" schematic diagram and parts list. The photo below shows the components of the shocks and a top view of the shocks attached to the fork. At the bottom of photo, note how a clamp is used to compress the shock so the Inner and Outer Swing Arm plates can be attached.

Photo – Upper and Lower Shocks, Top View of Upper Shock attachment, compressed Shock

8. Attach the Inside Swing Arm and Outside Swing Arm to the bottom of the fork plates per the "Front Fork Exploded 3" schematic diagram and parts list. **Exception to diagram**: the parts shows that AN4-15A bolts are used. Use these bolts instead: **To attach the Swing Arms to the Fork, use AN4-15 bolts (with thin washers on each side). To attach Swing Arms to the base of shocks, use AN4-15 bolts (with thin washers on each side). Use a Castle Nut on each bolt.** The holes in the end of the shank on these bolts permit the insertion of a cotter pin for additional safety for these moving parts.

Note that the bolt heads are on the inside of the fork plates, with a wide MW13L mylar washer on each side of the lower shock.

Photo – close-up of Swing Arm Plates attached to Front Fork

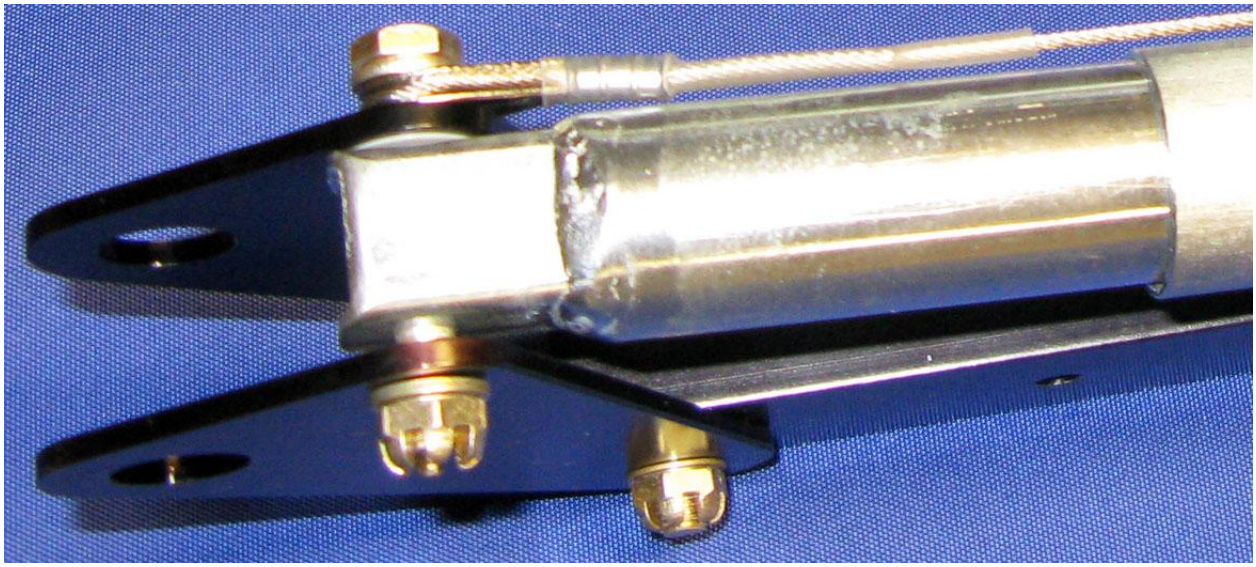


Photo: Front Fork with Shocks attached

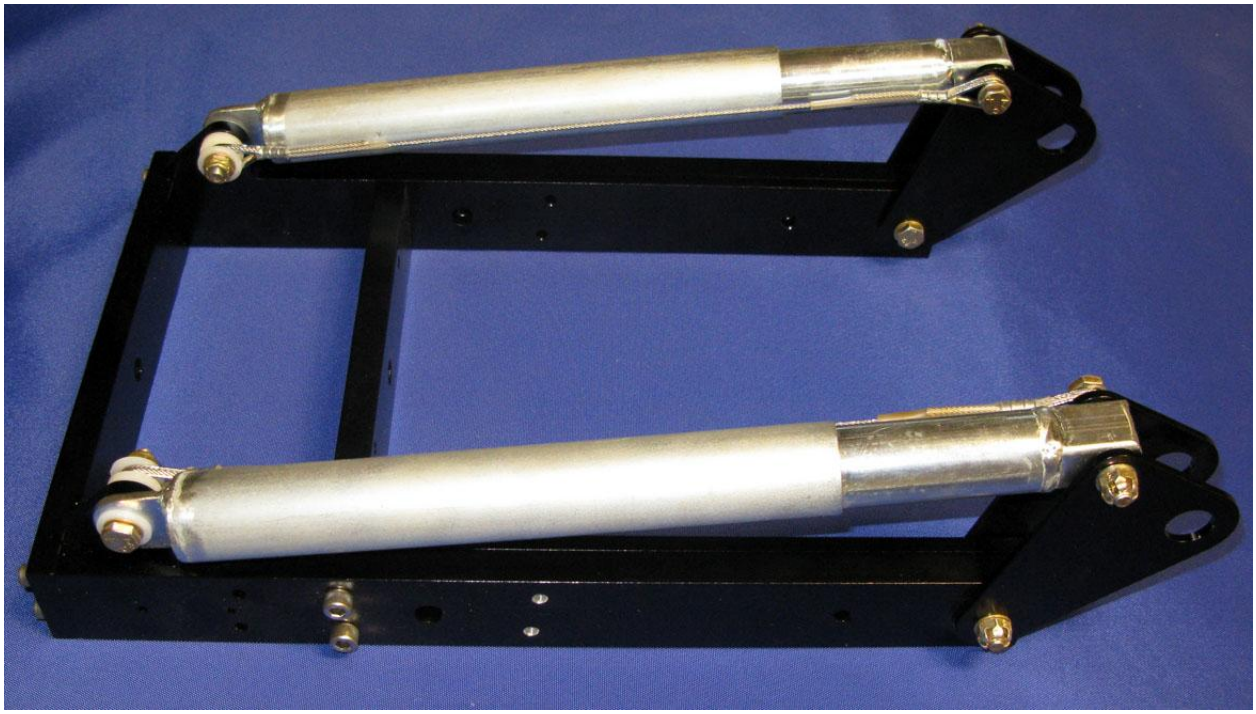
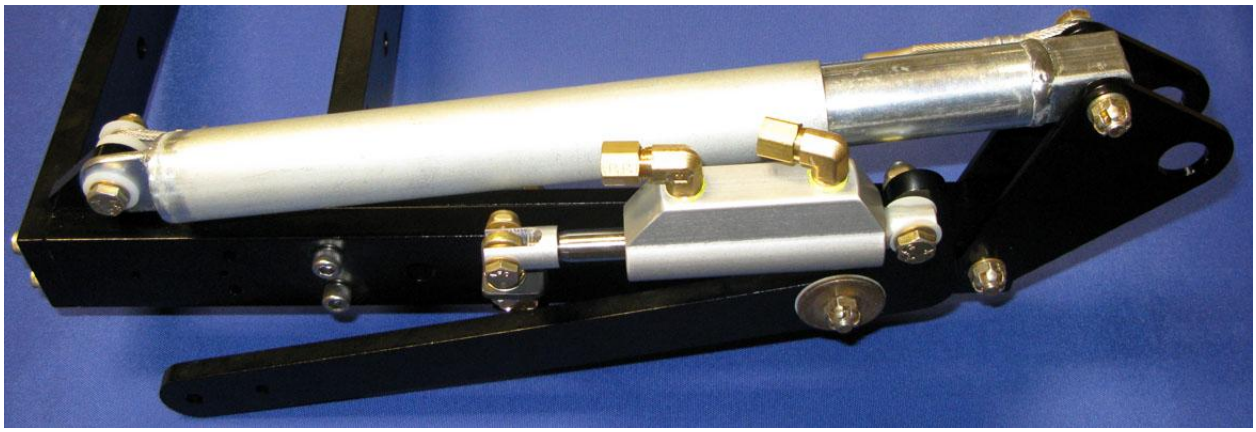
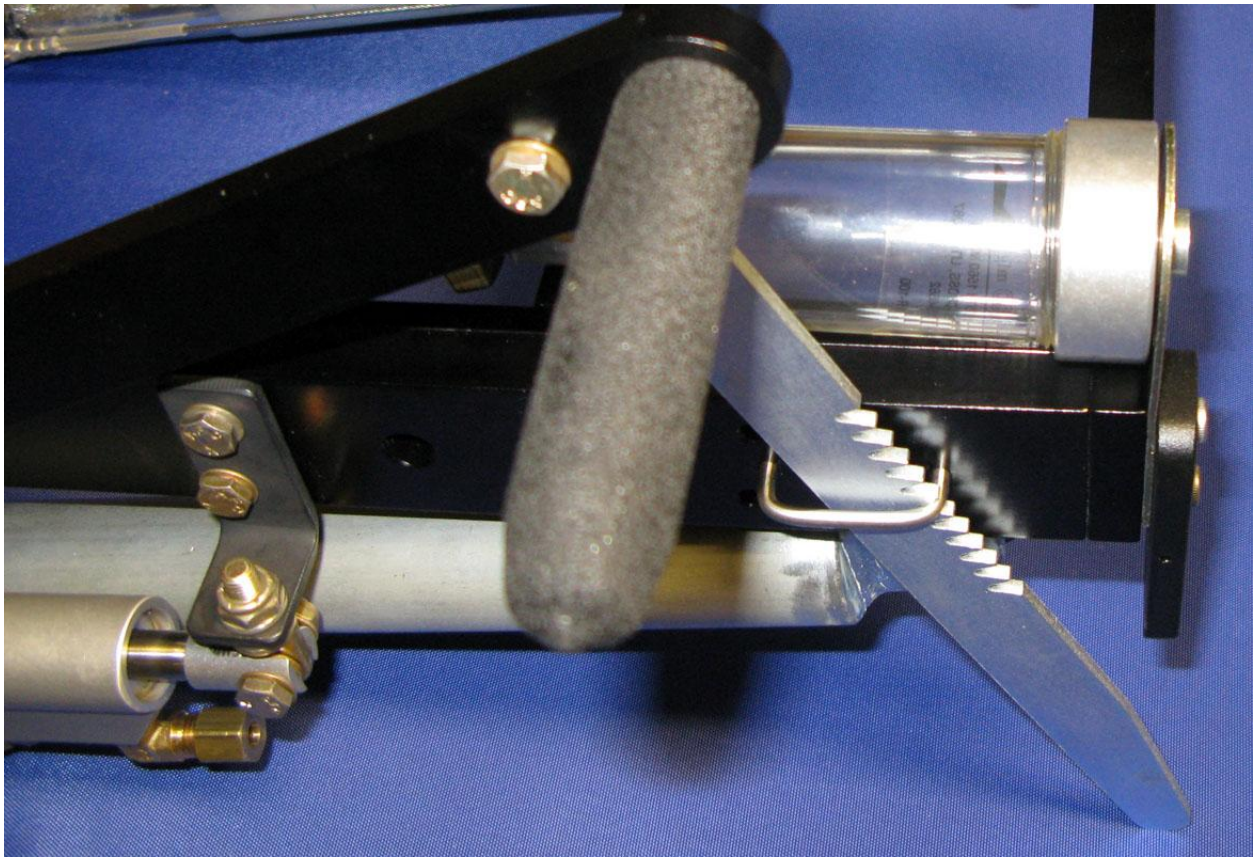


Photo: MATCO Master Cylinder mounted to Front Fork



9. Attach Master Cylinder Plate to Fork Outside Plate with two AN3-12A 3/16" x 1.28" bolts, with a thin washer on each side of plate, secure with two AN365-1032A Nylock Nuts.

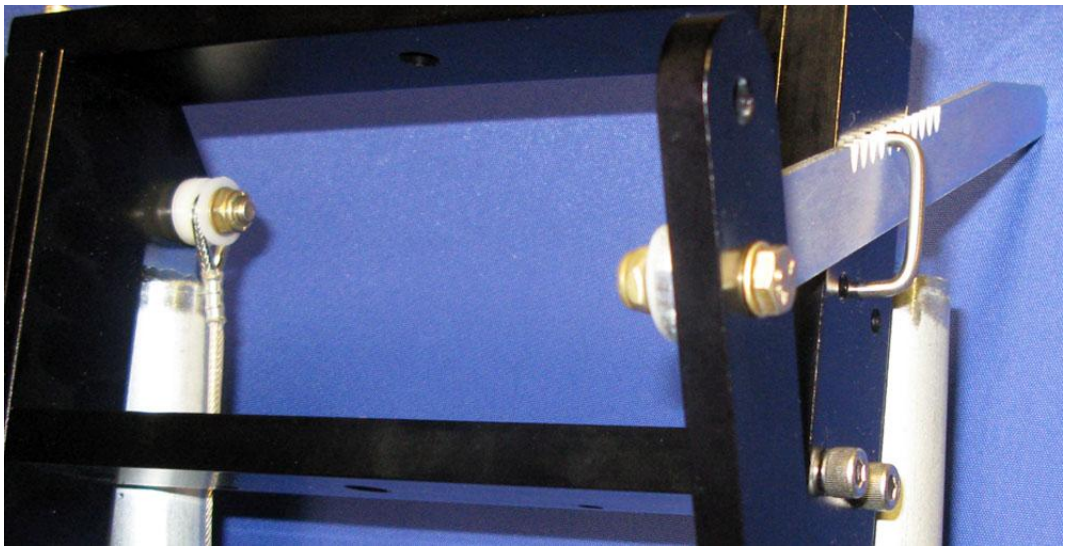
Photo: Brakes side of Front Fork with Master Cylinder, Reservoir, Parking Brake installed



10. Attach Brake Pedal Lever with AN4-16 bolt, assemble per the "Front Fork – Exploded 2" diagram.

11. Attach Master Cylinder to Master Cylinder Plate with 2 AN11 ¼" x 1 1/8" bolts, with a thick washer on each side of plate, secure with a thick Nylock Nut.

Photo: Parking Brake attached to Front Fork



12. Add some Loctite 648 Retaining Compound to Parking Brake Lock Clip. Compress Metal Clip to insert into holes, use Rubber Mallet to push clip into holes. Push in until clip meets Inner Plate.

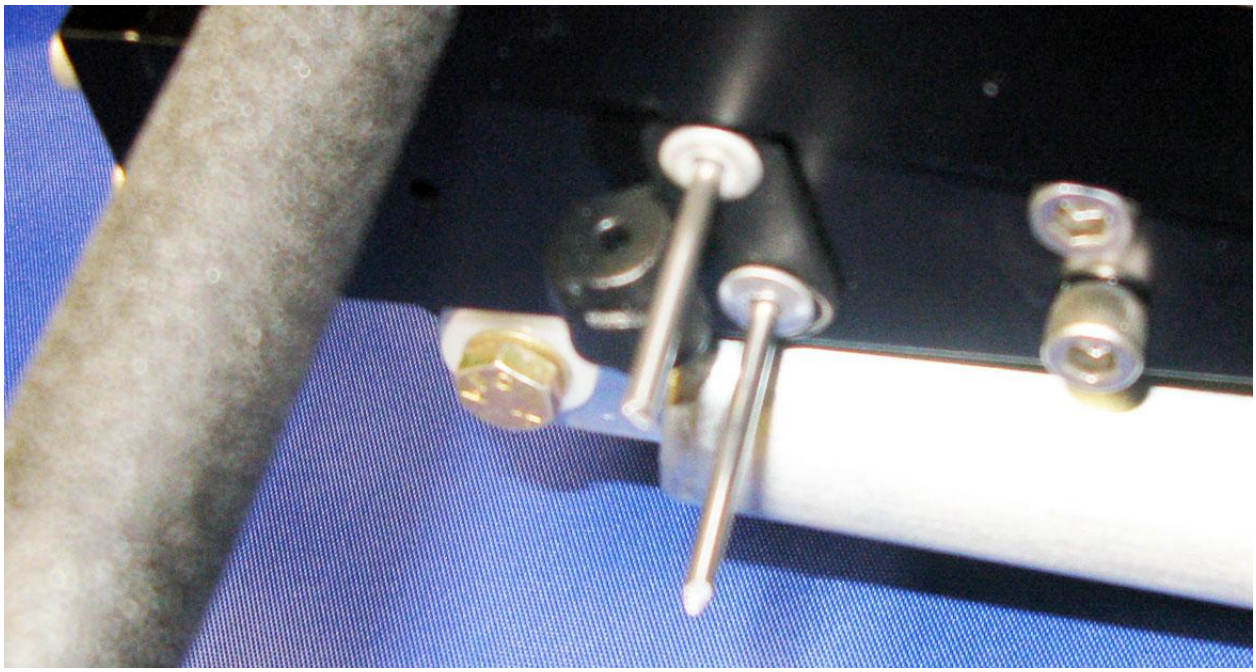
13. **Attach Parking Brake Lever** (HTD44) with teeth facing up, using AN3-6A bolt. Use a thin washer next to head of bolt, use a wide mylar washer on each side of the parking brake, then a thick nylon washer, and secure with a thick Nylock Nut. Tighten, but ensure there is some lateral movement "play" so it can move as the parking brake off and on.

14. **Attach Throttle Lever** on right side of fork, using the ¼" diameter AN4-14 bolt. Use a thick washer at head of bolt (head of bolt is inside fork, not on outside of fork), then insert through the fork plate, then through a wide mylar washer, then through the Throttle Lever, then through a wide mylar washer, then through a wide AN970-4 metal washer, then a thick washer, then secure with a Castle Nut and Cotter Pin.

15. **Attach Pegs to Brake Lever and Throttle Lever** using 3 1/8" bolts. Tighten bolts, then slide on 2 ½" Foam Tube over pegs. Secure with thin washer and thin Nylock Nut. If you lightly spray the inside of the foam tubes with hair spray prior to sliding on the bolts, it acts as an adhesive to retain the foam tubes over the bolts.

16. **Attach Throttle Cable Guide** with Pop Rivets.
Use a 3/16" drill bit to drill into inner fork from the outside, to enable 3/16" pop rivet to fully insert into fork.

Photo: Throttle Cable Guide pop-riveted to Front Fork Outside Plate



17. **Attach Brake Reservoir**.
On Parking Brake side of forks, unscrew the 2 top hex bolts. Next, attach Matco Reservoir Plate to Top Plate, then attach Steering Stabilizer Mounting Plate, secure with hex bolts.

Photo - Front Fork - Front View

The photo below shows the completed Front Fork assembly, mounted to the Front Root Tube.

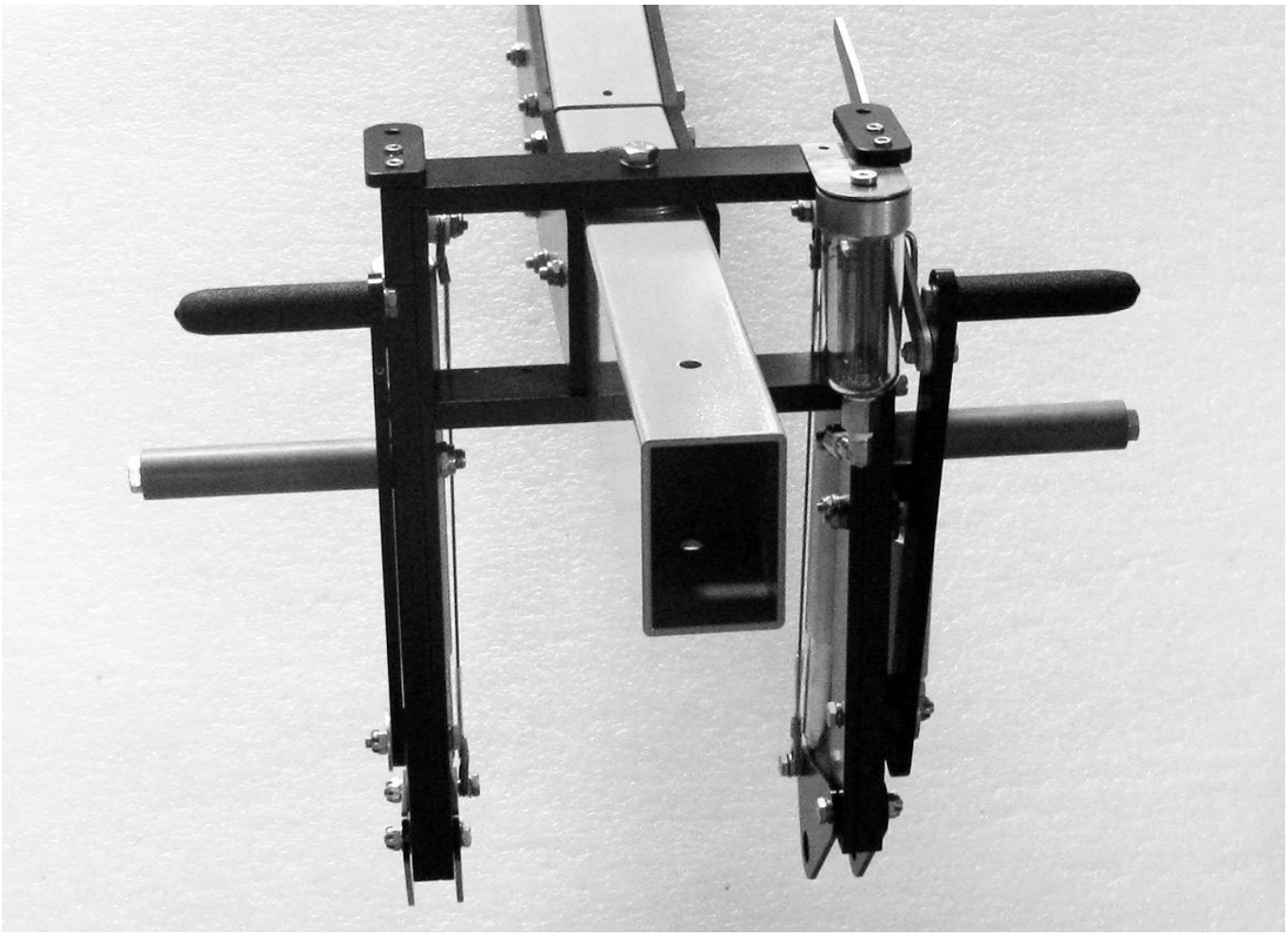


Photo - Front Fork – Brakes Side View

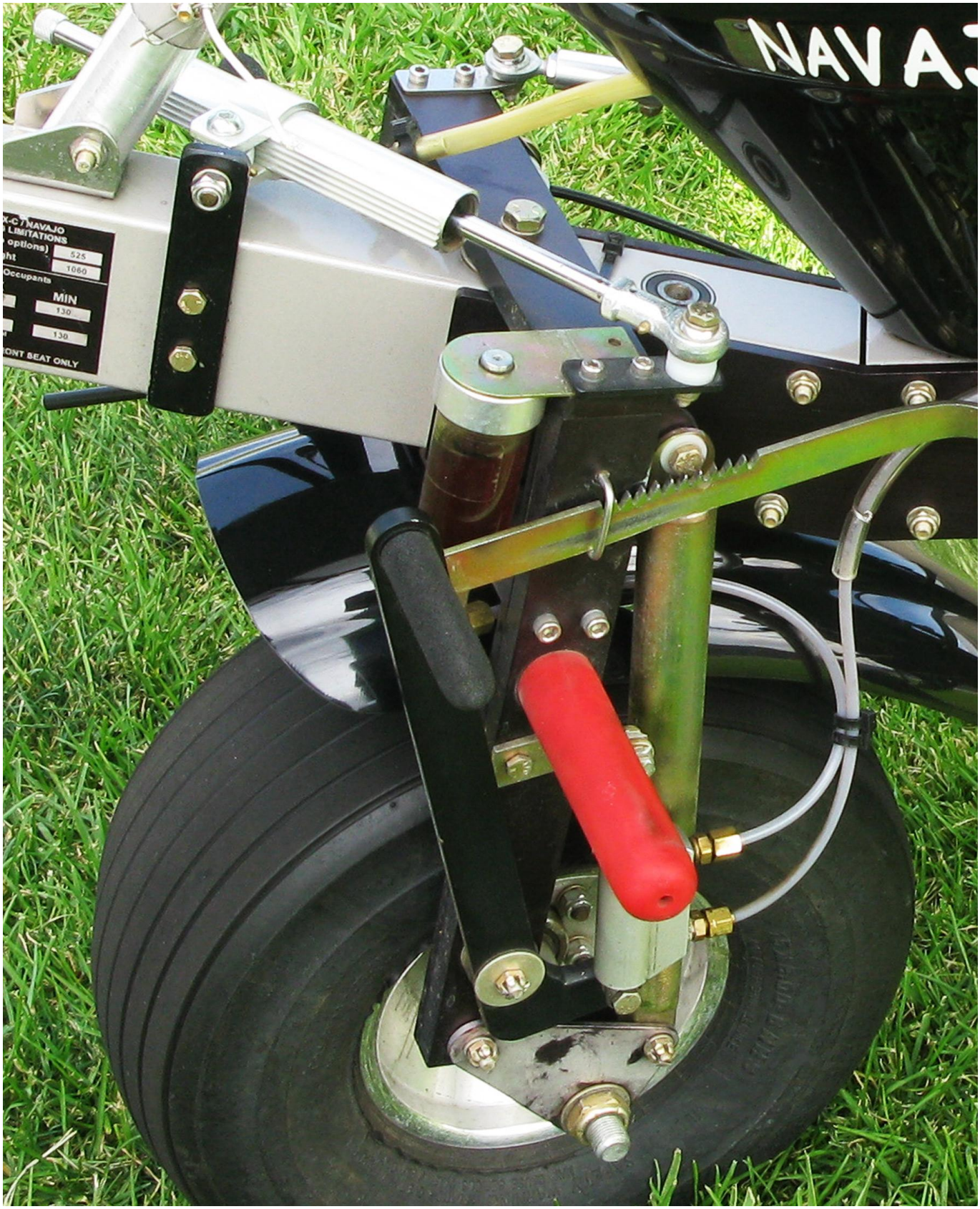


Photo - Front Fork – Throttle Side View

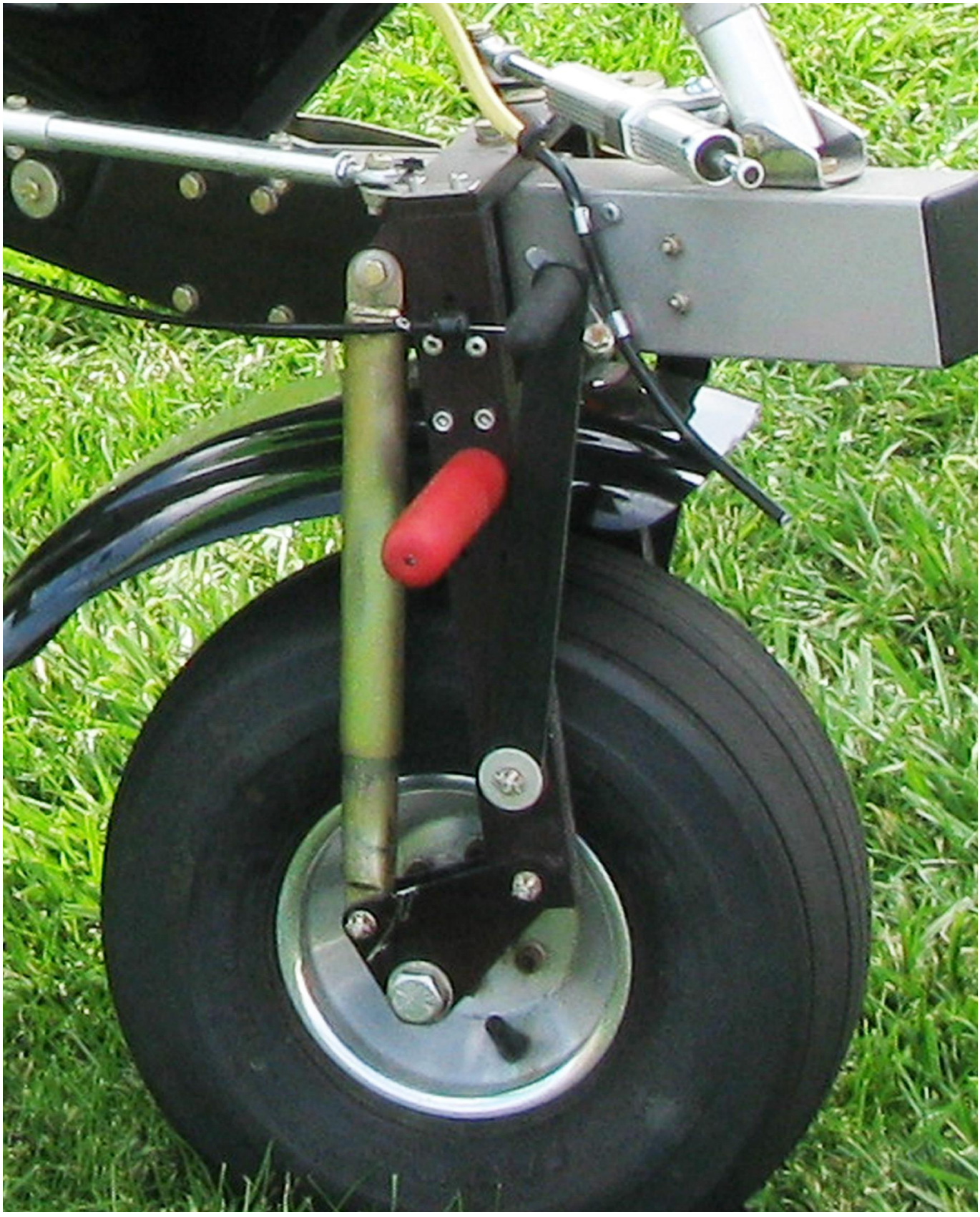
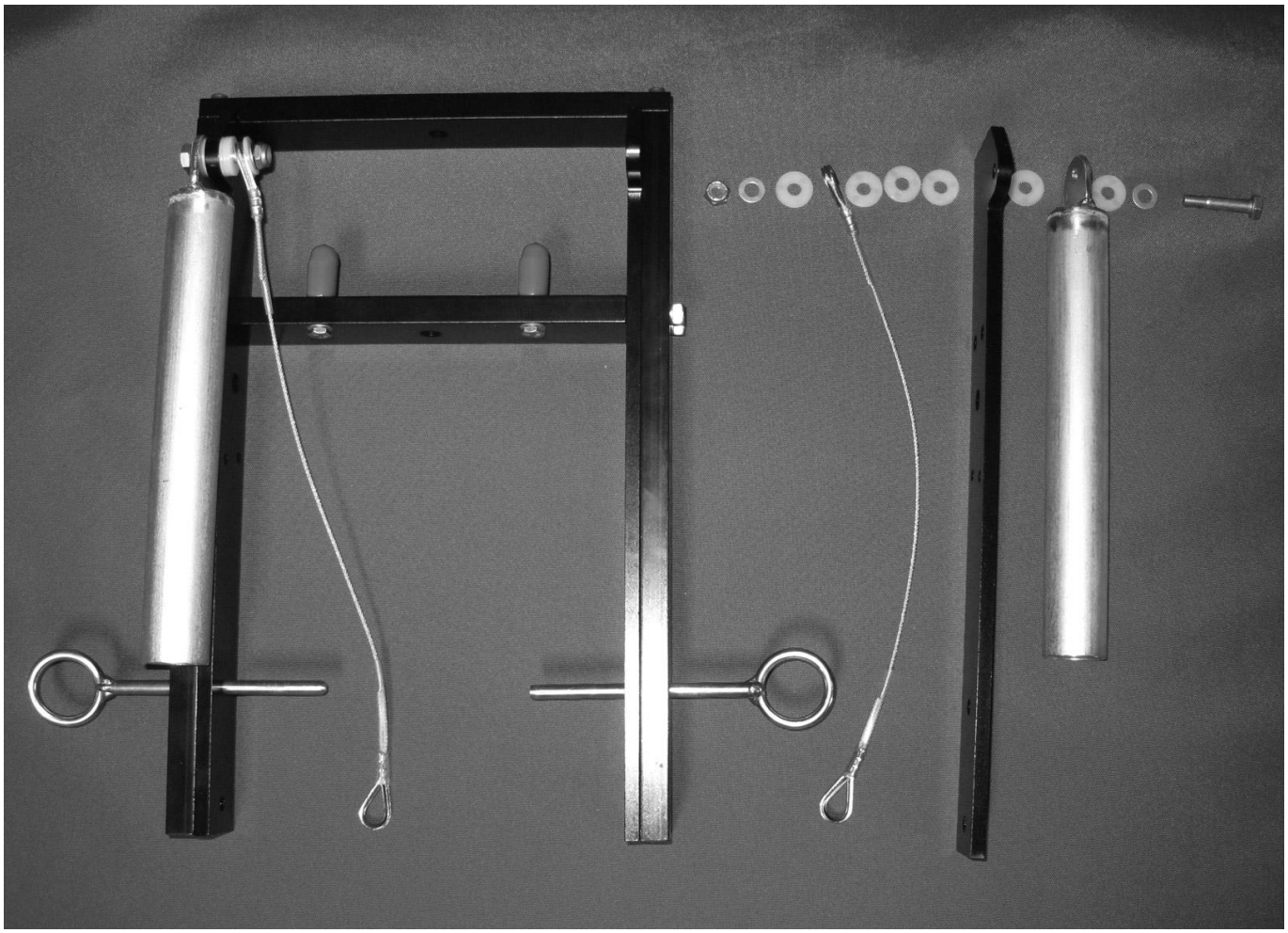


Photo - Front Fork – Plates

The photo below shows the main components used in the first steps of Front Fork assembly.



Front Root Tube to Main Root Tube Assembly

Tools and Supplies Needed

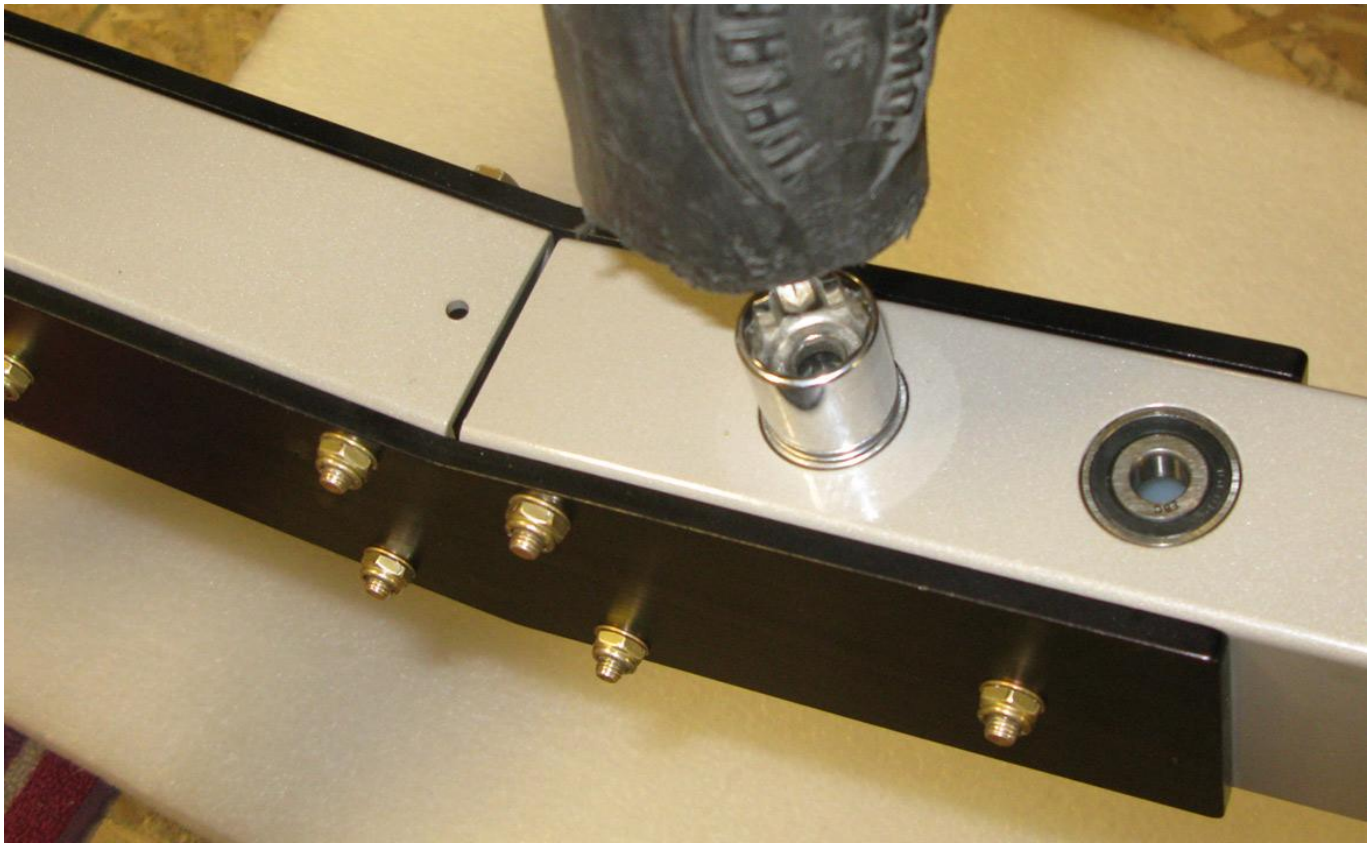
¼" Drill Bit, "F" (oversize) Drill Bit, Open-End Wrench Set.

Assembly Notes – Connect Front Root Tube to Main Root Tube

1. Attach Root Tube Angle Plate (HT463) to Front Root Tube (HT431A) and Main Root Tube with 6 bolts (AN4-27A). Use AN960-416L Thin Washers on both sides, and secure with MS21083N4 Thin Nylock Nuts.

2. Insert Root Tube Bearings into top holes. Use a rubber mallet to gently pound bearings into holes. Note how the picture shows a ¾" socket placed over bearings to aid the compression of bearing into hole as you pound it in. There are two holes with bearings, so you can choose which hole to use. A taller pilot would prefer to mount the front fork in the hole near the front of trike, and a shorter pilot may elect to use the rear hole, for a comfortable distance from seat to fork pedals for steering, braking, and foot throttle.

Photo – Insert Bearings into Main Root Tube



Main Root Tube to Back Frame Assembly

Tools and Supplies Needed

¼" Drill Bit, "F" (oversize) Drill Bit, Open-End Wrench Set.

Assembly Notes – Connect Main Root Tube to Back Frame

Refer to "Leaf Spring To Frame" diagram and parts list for exploded parts view.

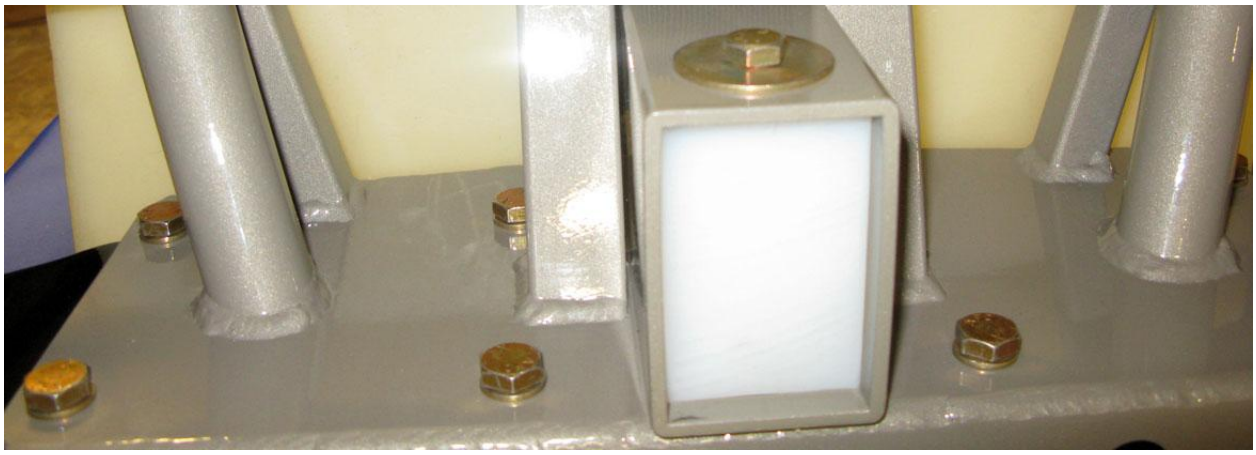
1. Set rear end of Main Root Tube between center supports on Back Frame.

2. Insert Delrin spacer into rear of Main Root Tube.

3. Align bolt holes in Root Tube to holes in Main Root Tube.

   Insert both AN5-36A bolts through holes, using a AN970-5 washer at head of bolt, and two AN960-516 washers at bottom of bolt, and secure with a AN365-524A Nylock Nut. By using 2 washers at bottom of each bolt, you can ensure that when you tighten the bolt securely, you will minimize the chance of over-tightening the bolt and compromising the threads and bolt shank.

Photo - Main Root Tube mounted to Back Frame



Back Frame – Engine Plate Assembly

Tools and Supplies Needed

¼” Drill Bit, “F” (oversize) Drill Bit, Open-End Wrench Set.

Assembly Notes – Connect Engine Mount Plate to Back Frame

1. Carefully drill-out the mounting holes on the Back Frame to remove the powder-coating, if it has been powder coated.

2. Set the Engine Mount Plate on Back Frame. Align the Engine Mount Plate to the holes in the Back Frame. Secure Plate to Back Frame with four AN5-25A bolts, including a AN960-516L thin washer under head of bolt, a AN70-5 flange washer at bottom of bolt, and secure it with a AN365-524A high-profile Nylock Nut.

Photo - Engine Mount Plate on Back Frame – Side View

Photo - Engine Mount Plate on Back Frame – Rear View

Leaf Spring Suspension Assembly

Tools and Supplies Needed

3/8” Drill Bit, Open-End Wrench Set

Assembly Notes – Leaf Spring Suspension

The leaf-spring-suspension is mounted to trike by attaching each side of the suspension to the trike frame. NOTE: The Fuel Pump Bracket is mounted to the underside of the Leaf Spring Suspension, and uses two of the eight bolts that are used to attach the suspension. When looking at the trike frame from rear, the Fuel Pump Bracket is attached to the two rear bolts on the right side of the suspension.
Refer to “Leaf Spring To Frame” diagram and parts list for exploded parts view.

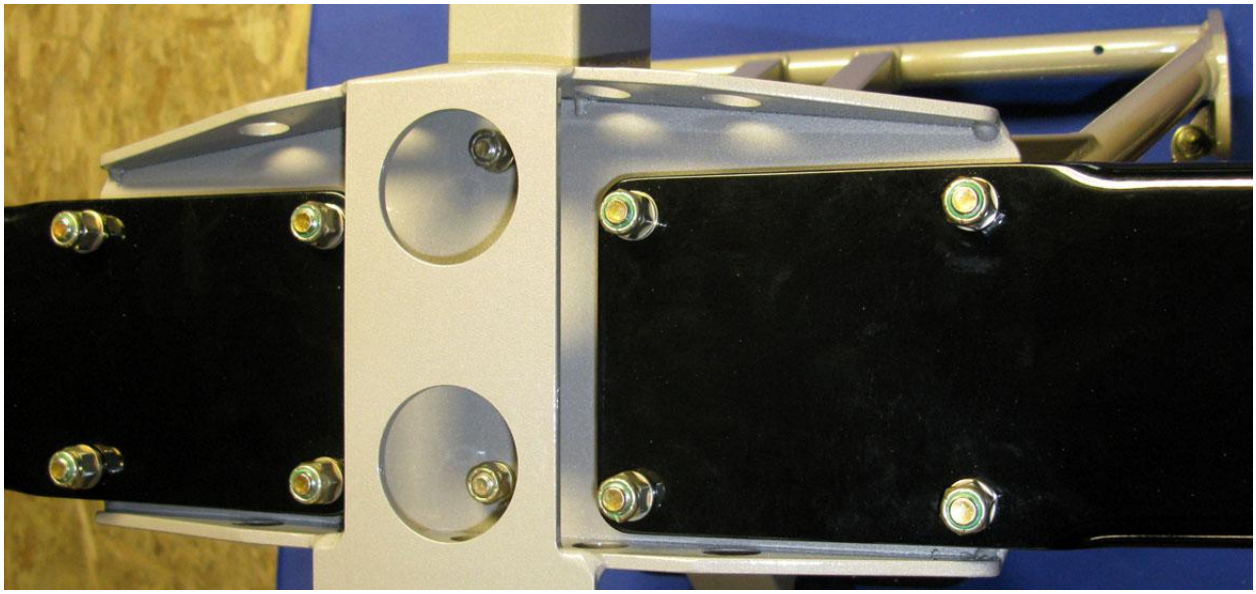
1. Drill-out the mounting holes in Back Frame carefully, to remove Powder Coat if it is coated.

2. Attach left side of suspension: Bolt the left side of the leaf spring suspension to Back Frame with four AN6-15A bolts, ensuring that the flat side of the suspension is flush mated to the Back Frame before tightening. On each bolt, include a AN960-515 thick washer at head of bolt and also at bottom of bolt. Secure bolt to assembly with AN365-624A Nylock Nut.

3. Attach right side of suspension, 2 forward holes: Bolt the 2 forward holes (the side of leaf spring suspension closest to front of trike) on right side of the leaf spring suspension to Back Frame with two AN6-15A bolts, ensuring that the flat side of the suspension is flush mated to the Back Frame before tightening. On each bolt, include a AN960-515 thick washer at head of bolt and also at bottom of bolt. Secure bolt to assembly with AN365-624A Nylock Nut.

4. Attach right side of suspension, 2 rear holes: Bolt the 2 rear holes (the side of leaf spring suspension closest to front of trike) on right side of the leaf spring suspension to Back Frame with two AN6-16A bolts, ensuring that the flat side of the suspension is flush mated to the Back Frame before tightening. On each bolt, include a AN960-515 thick washer at head of bolt. Prior to adding a thick washer and Nylock Nut, place the Fuel Pump Bracket on the 2 bolts, then add a AN960-515 thick washer on each bolt. Secure each bolt to assembly with AN365-624A Nylock Nut.

Photo – Leaf Spring Suspension attached to Frame, without Fuel Pump Bracket installed



Note: Attaching the Fuel Pump to the base of the leaf spring suspension is an efficient location for the fuel pump; however, you may decide to mount it elsewhere on the trike frame per your preferences.

Photo – Leaf Spring Suspension attached to Frame, with Fuel Pump Bracket installed

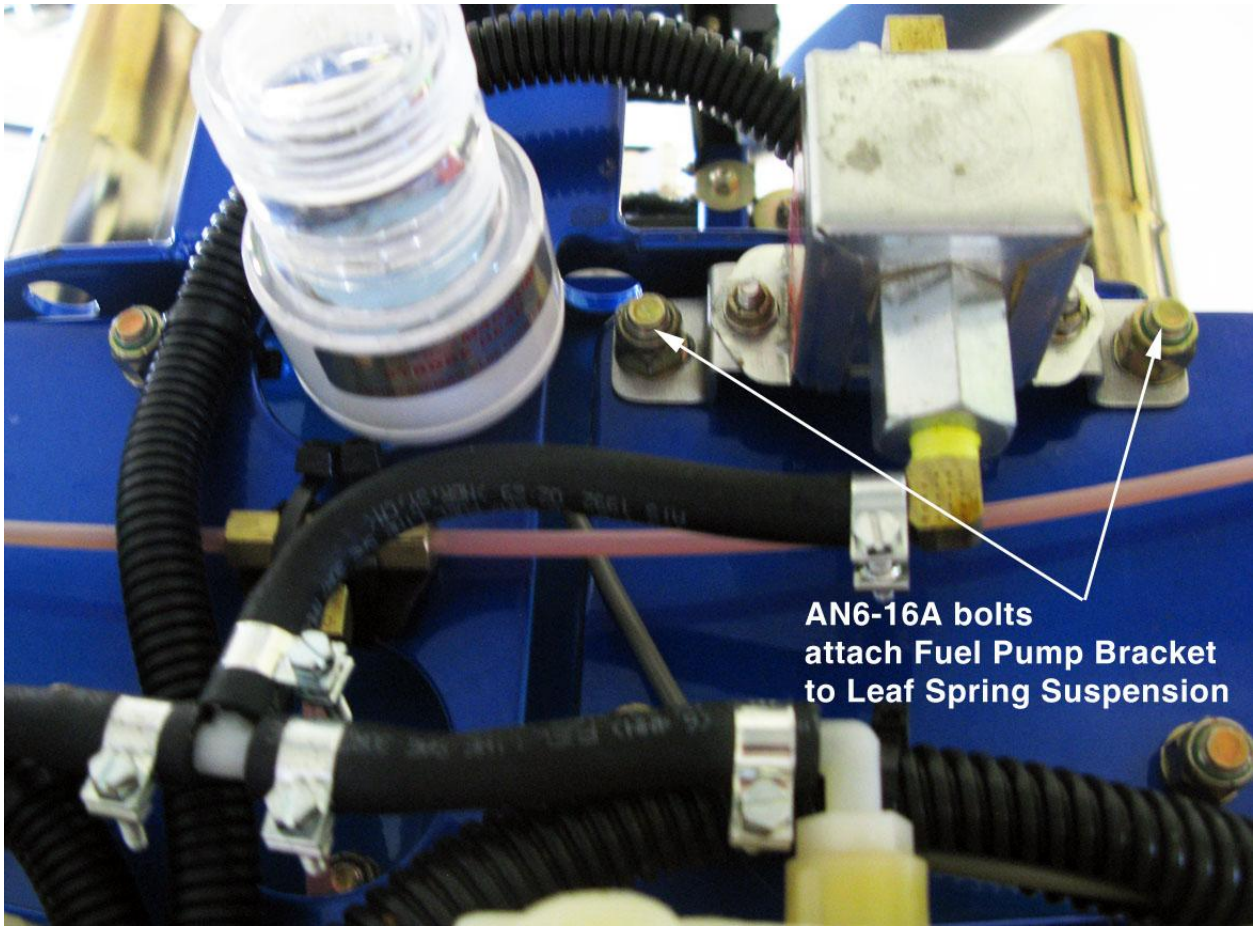


Photo –Fuel Pump Bracket

Note: Attaching the Fuel Pump to the base of the leaf spring suspension is an efficient location for the fuel pump; however, you may decide to mount it elsewhere on the trike frame per your preferences.

Fuel Tank Assembly

Tools and Supplies Needed

¼" Drill Bit, "F" (oversize) Drill Bit, Zip-Ties, Open-End Wrench Set.

Assembly Notes – Fuel Tank

The Fuel Tank is attached to the Root Tube, resting on foam pads applied before attaching tank. Limiter Brackets, horizontal and vertical Restraint Straps keep the tank in position.

1. Install the four Bulkhead Fittings into the four holes at the bottom sides of the rear of the Fuel Tank.

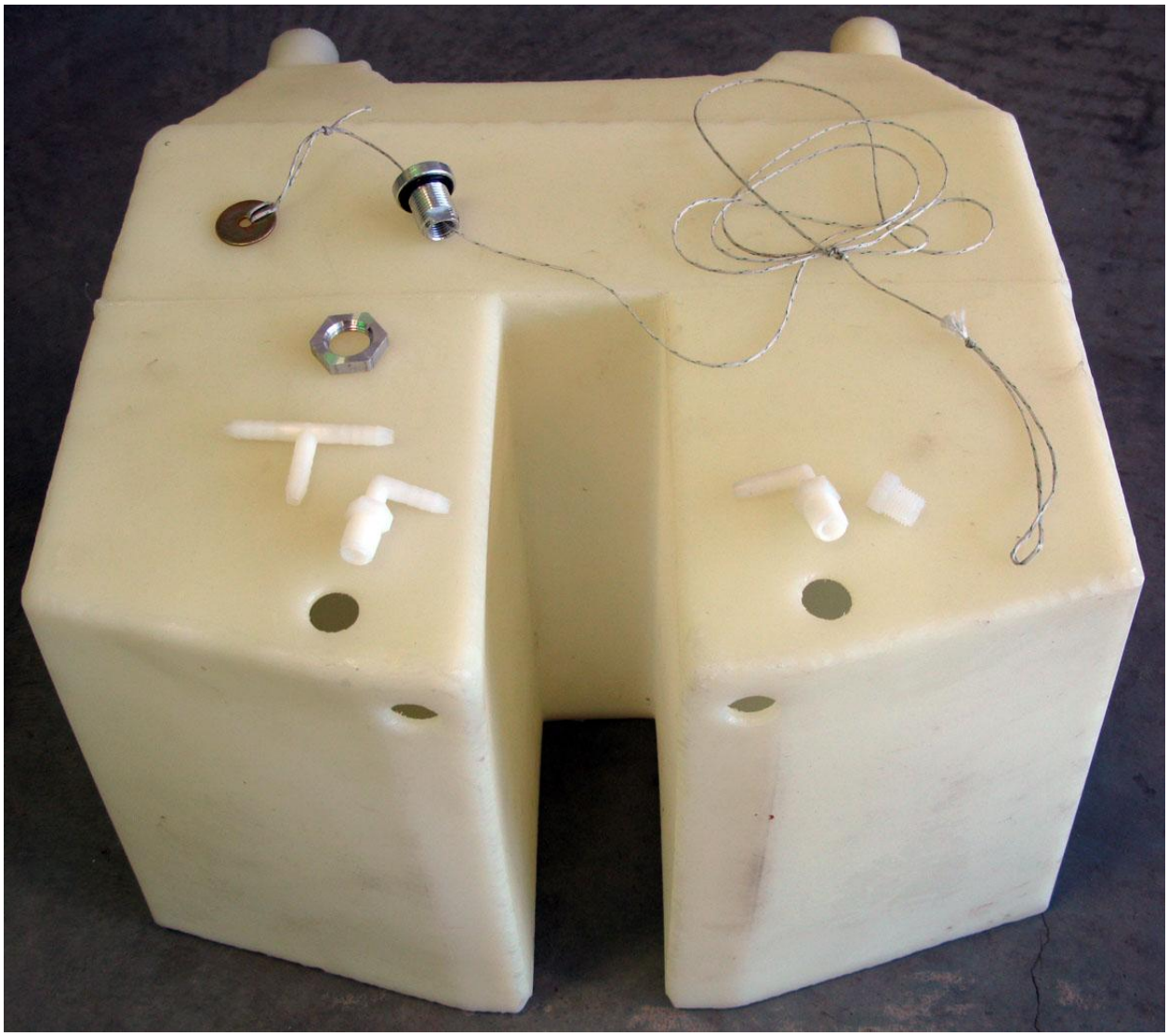
The Bulkhead Fittings provide a tight, leak-free connection for the fuel lines. They consist of two parts; the Fitting with Washer (inserted through inside of tank), and the Nut (secured to Fitting from outside of tank). The Fuel Tank has a unique shape as it rests on the root tube, with the tank divided into two halves.

To position the four Fittings, with washers, into the fuel tank locations at bottom and rear-side of the fuel tank, there are two methods that can be used:

- **Method 1**: Tie a long string to a washer that will fit into the hole in top of fuel tank, then pass that string through one of the bulkhead fittings, ensuring that you put the string through the head of the fitting first, so the threaded end is facing the hole in the fuel tank when looking inside the tank. Tie a small loop in the opposite end of the string, and insert that end into the tank and rotate the tank in the air to position the loop near the hole you are working on, so you can reach in with a needle-nose Pliers to grab the string and pull it through the hole so you can tighten the nut and secure the fitting in place. Once the external nut has been tightened to the fitting, you can turn the tank upside-down and retrieve the washer and string through the hole in top of tank. Note: it may be easier to get the string through the hole by tying a small plastic bag to the loop at end of string, and using a "Shop-Vac" to vacuum the string through the hole.

- **Method 2**: Use a piece of heavy wire to route the Fitting to the hole location, with the stiffness of the wire allowing you to place the fitting into the hole.

Photo – Fuel Tank, Bulkhead Fitting, Fuel Line Connectors



2. Drill-out the single hole on top side of root tube, and drill out the two forward-most side holes.

3. Gently de-burr the holes with counter-sink.

4. Place 14” x 2 3/8” sticky-back Foam Pads on both sides of Root Tube. Note how pad is positioned so the rear-edge of Foam Pad is placed approximately 6 7/8” from rear edge of Back Frame.

Photo – Placement of Foam Wraps for Main Root Tube

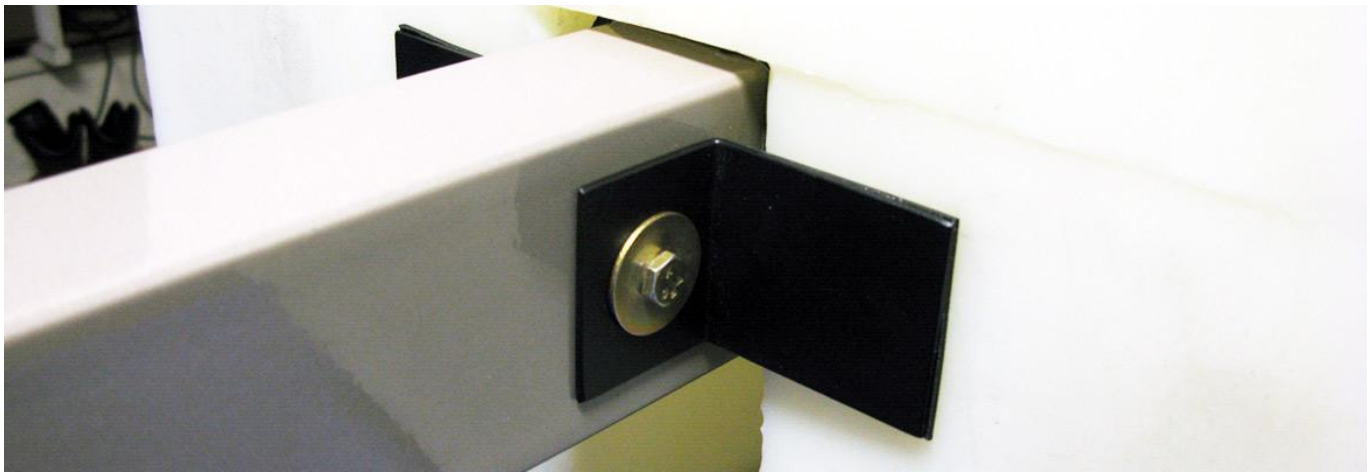
5. Wrap additional sticky-back Foam Pad over top and both sides of Root Tube, and use Zip-Ties to secure it to the Root Tube.

Photo – Placement of Zip-Ties for outer Foam Wrap on Main Root Tube

6. Set Fuel Tank over foam pad on Root Tube.

7. Attach Fuel Tank Limiter Brackets to Root Tube with a AN4-25A bolt, including a flange washer on each side of Root Tube, secure with Nylock Nut. Ensure foam pad on bracket faces the Fuel Tank.

Photo – Fuel Tank Limiter Brackets on Main Root Tube



8. Attach horizontal Fuel Tank Restraint Strap to Fuel Tank by routing it through rear of Back Frame, and tighten buckle of strap at front of Fuel Tank.

Photo – Horizontal Restraint Strap routed through Back Frame at rear of Fuel Tank

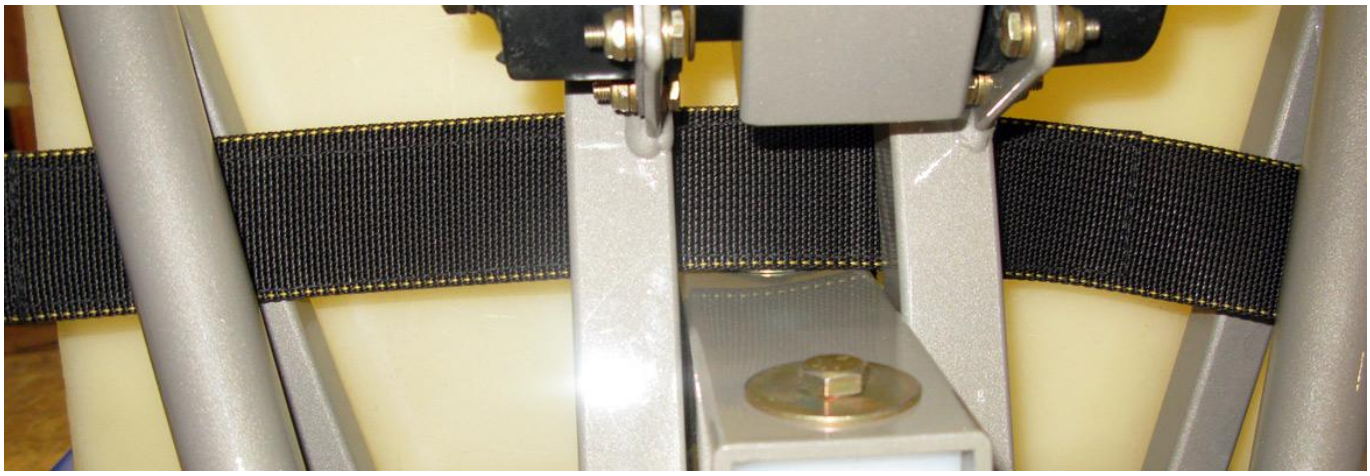
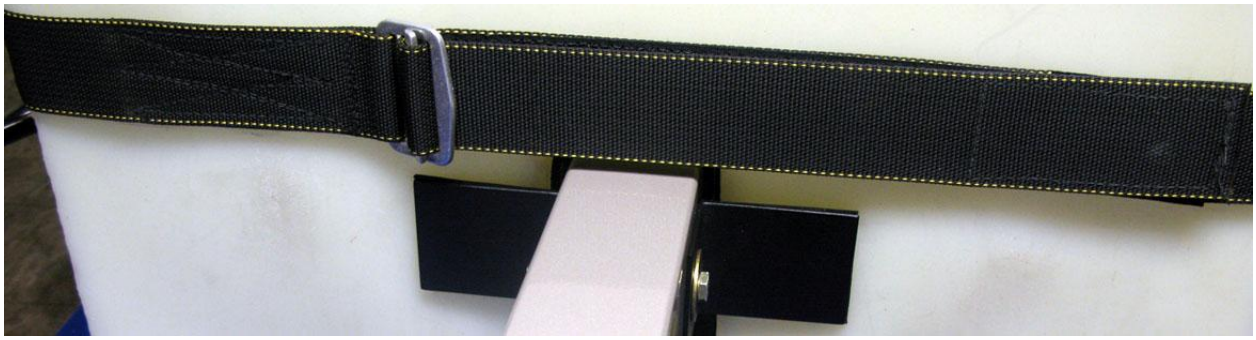


Photo – Horizontal Restraint Strap secured at front of Fuel Tank



9. Attach vertical Fuel Tank Restraint Strap by routing it under Root Tube at rear, over top of Fuel Tank, under Root Tube at front of tank, then secure strap with buckle.

Photo – Vertical Restraint Strap secured at front of Fuel Tank

Seat Rail Assembly

Tools and Supplies Needed

¼” Drill Bit, “F” (oversize) Drill Bit, Sanding Flap Wheel, Open –End Wrench Set

Assembly Notes – Seat Rail

Assembling the Seat Rail is basic assembly per the “Seat Rail Assembly – parts diagram” and “Seat Rail to Main Root Tube Assembly – parts diagram” schematic diagrams.

Note: The Seat Rail consists of the left-side rail and right-side rail joined together at the front and rear sides of the rails. To insert each side of the seat rail over the Seat Rail Tube at front-center of the Main Root Tube (Item #26 on “Seat Rail to Main Root Tube diagram), **it is necessary to saw off 1” (one inch) from each seat rail side at front**, to fit the 2-inch width of the main root tube at front of seat rail.

Note: The "Seat Rail Assembly" parts diagram contains a few parts that are specific to the Apache trike kit, which includes a streamlined Fairing. The following parts on this schematic diagram DO NOT APPLY to building the Navajo "open style" trike: Item 21 (Right and Left Upper Fairing Mount Plate), and the following items that are associated with the fairing mount plates: Items 11, 12, 13, 16, 19.

Note: if you have requested the Powder Coat Option for your trike frame parts, it may be necessary to use a Flap Sander to sand the inner walls of the seat rail sections where they are joined with sleeves, so they can be inserted in each other without binding.

1. Insert the Seat Rail Sleeve (Item #26 on "Seat Rail to Main Root Tube diagram) through the hole in the Main Root Tube and center it. Secure this sleeve with a AN4-35A ¼" bolt, a thin washer on each side of root Tube, and secured with a thin Nylock Nut.

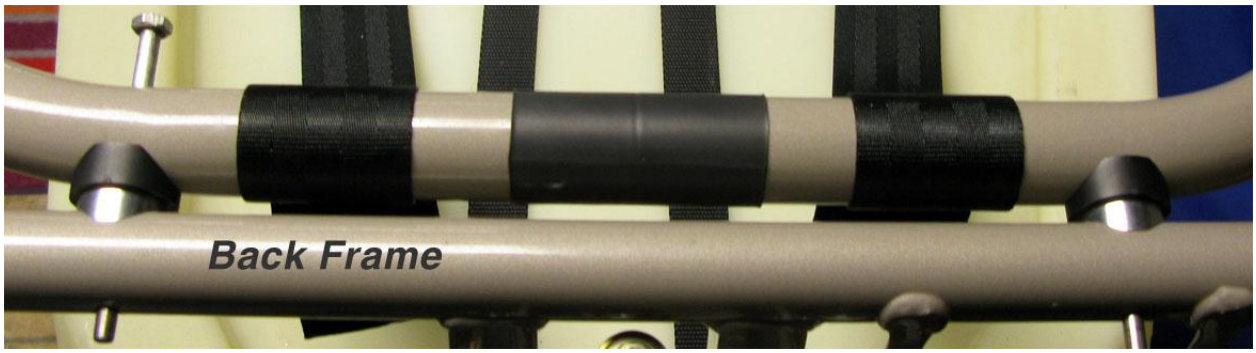
Later, when both sides of the seat rail are bolted to the back frame and the front edges of each seat rail side are inserted over this central sleeve, you will drill a hole on each side to bolt the seat rail sides to the inner sleeve.

2. Prepare both Tube Connector Saddles for assembly by pressing a AN365-428A thick Nylock Nut into the hex-shaped hole on the end of the Tube Connector Saddle. IMPORTANT: be sure to set the nut into the hole in the correct orientation, so the bolt can be screwed into it… be careful not to reverse direction.

3. Attach the Tube Connector Saddle to the Left Seat Rail using the bolt assembly as depicted in the "Seat Rail Assembly – parts diagram". The AN4-30A bolt passes through a thin washer, through the Stop Bushing (Item 10 in diagram), through another thin washer, through side of Seat Rail, through the Tube Saddle Connector, then secure it with by tightening it into the AN365-428A thick Nylock Nut. Do this same process with the Right Seat Rail to attach the Tube Connector Saddle.

4. Attach the rear of the Left Seat Rail to the Back Frame by inserting a AN4-31A ¼" bolt through a AN960-416 thick washer, then place that through the seat rail (towards rear of trike), through the 1 ¼" Nylon Saddle, through the 1 1/8" Aluminum Saddle, through the back of the Back Frame, through a thick washer, into thick AN365-428A Nylock Nut. Slide the front of the seat rail over the sleeve at the same time. **Do not tighten this connection until later**, when you have confirmed the back and front edges of the seat rail are aligned to be set well, and there is no excessive torque necessary to connect all and tighten securely.

Photo – Seat Rail to Back Frame



In the center of the seat rail in photo, the black covering is a length of Shrink Wrap that has been placed over the center to cover the pop rivet used to secure the seat rail to the inner sleeve.

5. Prepare the Right Seat Rail to be connected to the Left Rail by placing the inner sleeve half-way into the Right Seat Rail, and drill a 3/16" hole in the center of the sleeve and secure the inner sleeve to the Right Seat Rail with a 3/16" Pop Rivet. This is to keep it stationary when it is joined to the Left Seat Rail.

6. Attach the Right Seat Rail to the Left Seat Rail by following these steps:
- set the Center Support Tube into the Tube Connector Saddle on the Left Seat Rail.
- slide the two Rear Seat Webbing fabric straps over the Center Support Tube, placing the end with closed loops over the Center Support Tube, and the other end (with buckles on top side) over the rear of the Left Seat Rail.
- insert the Right Seat Rail into the Left Seat Rail, aligning the sleeve at top and sliding the lower end of the Right Seat Rail over the sleeve extending from the Main Root Tube, and inserting the Center Support Tube over the saddle on the Right Seat Rail.

7. When you get the alignment of the bolts at top of the seat rail assembly centered on their holes, and the lower junction of the seat rail halves meet well at the main root tube, you can drill the holes through the seat rail into the lower sleeve and secure with the AN4-15A bolts (Item 9 in the "Seat Rail to Main Root Tube Assembly – parts diagram"), thin washers on both sides, and thin Nylock Nuts.

8. Attach the rear of the Right Seat Rail to the Back Frame by inserting a AN4-31A ¼" bolt through a AN960-416 thick washer, then place that through the seat rail (towards rear of trike), through the 1 ¼" Nylon Saddle, through the 1 1/8" Aluminum Saddle, through the back of the Back Frame, through a thick washer, into thick AN365-428A Nylock Nut.

9. Attach Spring-Assist Rotation Plates to each side of seat rail per the "Seat Rail to Main Root Tube Assembly – parts diagram". The AN4-17A bolt is inserted through a thin washer, a nylon washer, then through the Rotation Plate, through a nylon washer, through a thin washer, through the seat rail, then through a thin washer, and secured with a thin Nylock Nut.

These rotation plates serve to provide some space to remove the upper section of the limiter tube from the lower section of the limiter tube, so the mast can be laid down during storage or between flights. The rotation plate is all the forward, and resting on the bushing in normal flight mode. To obtain some space to detach the lower limiter tube section from the upper limiter tube section, this rotation plate can be "rocked back" away from the bushing, to permit removal of the limiter tube.

Photo – Tube Connector Saddle on Seat Rail with Spring-Assist Rotation Plate installed

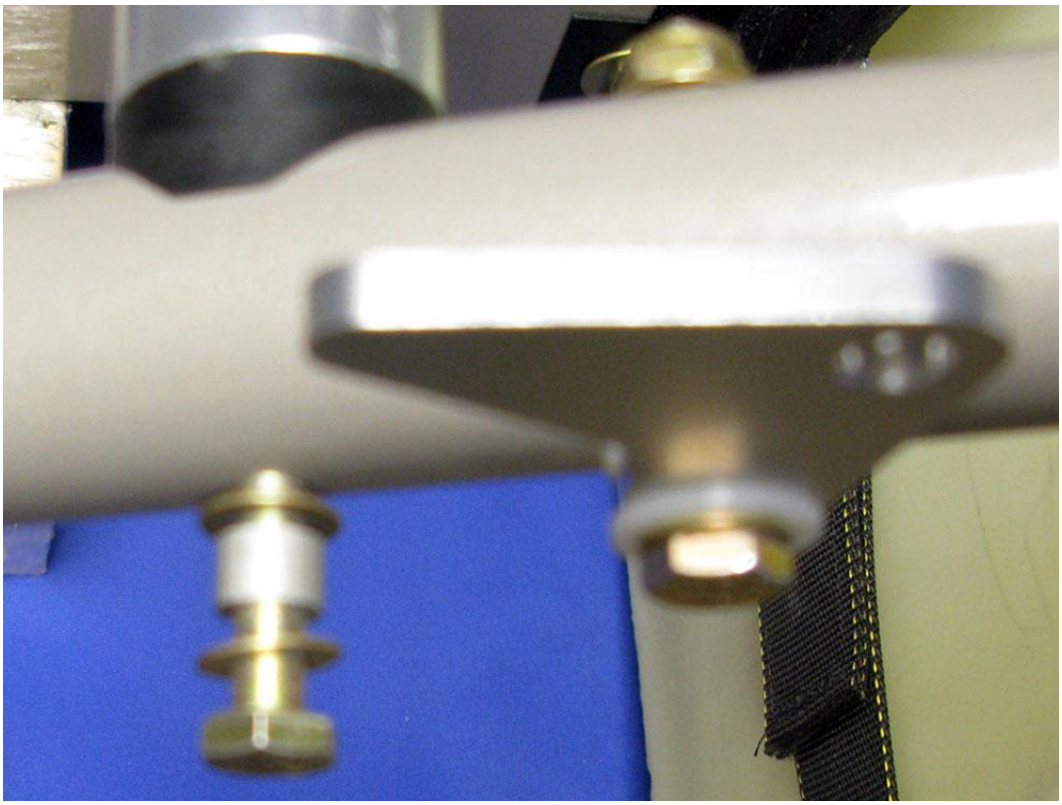


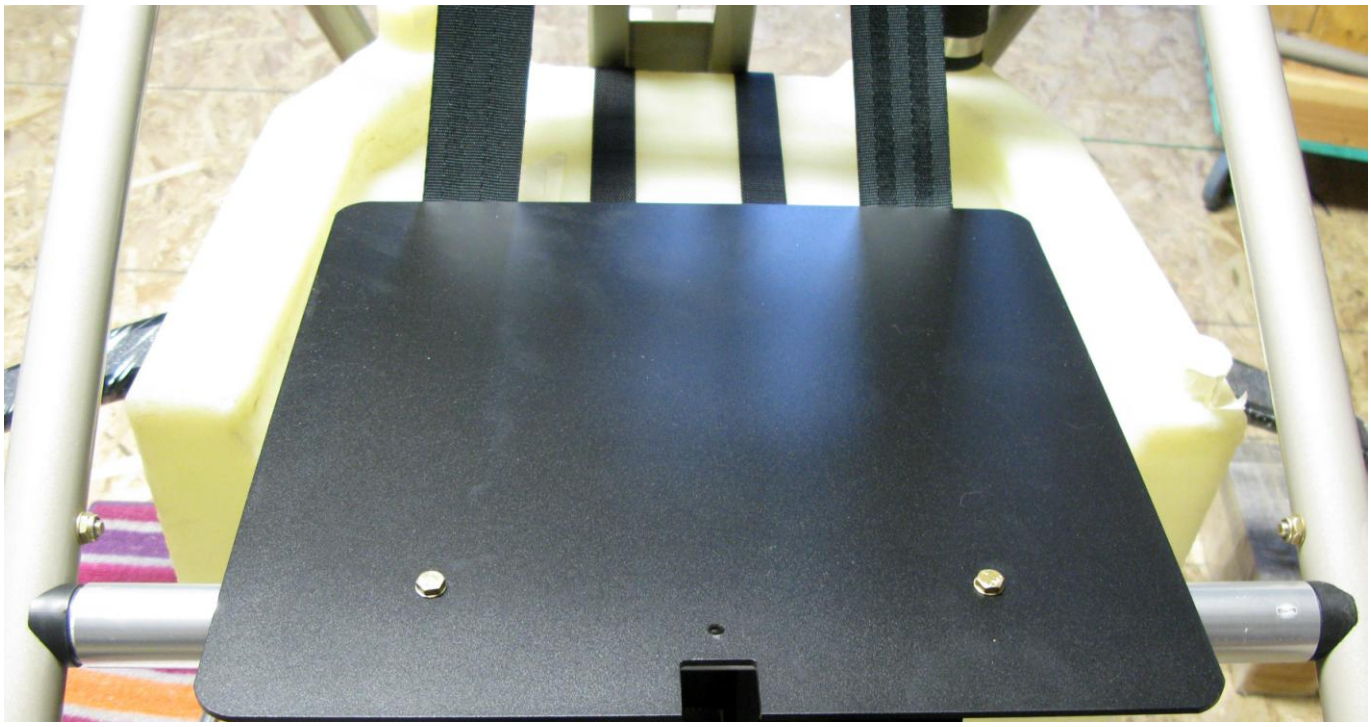
Photo: Side View of Spring Assist Rotation Plate

10. Attach the Rear Seat Plate to the Center Support Tube with two bolts, two thin washers, and a thin Nylock Nut. The Rear Seat Plate is secured at the front by the bolts, and rests on the Rear Seat Webbing Straps. The buckle on each strap can be adjusted to slightly elevate the rear of the plate so it is **always above the Fuel Tank**, and does not "bottom-out" on the Fuel Tank.

11. Attach the Rear Plate to the Main Root Tube per the "Seat Rail to Main Root Tube – parts diagram", including the two side brackets.

12. Attach the Front Plate to the Main Root Tube per the "Seat Rail to Main Root Tube – parts diagram", including the two side brackets.

Photos: Rear Seat Plate bolted to Center Support Tube



Front Fork to Front Root Tube Assembly

Tools and Supplies Needed

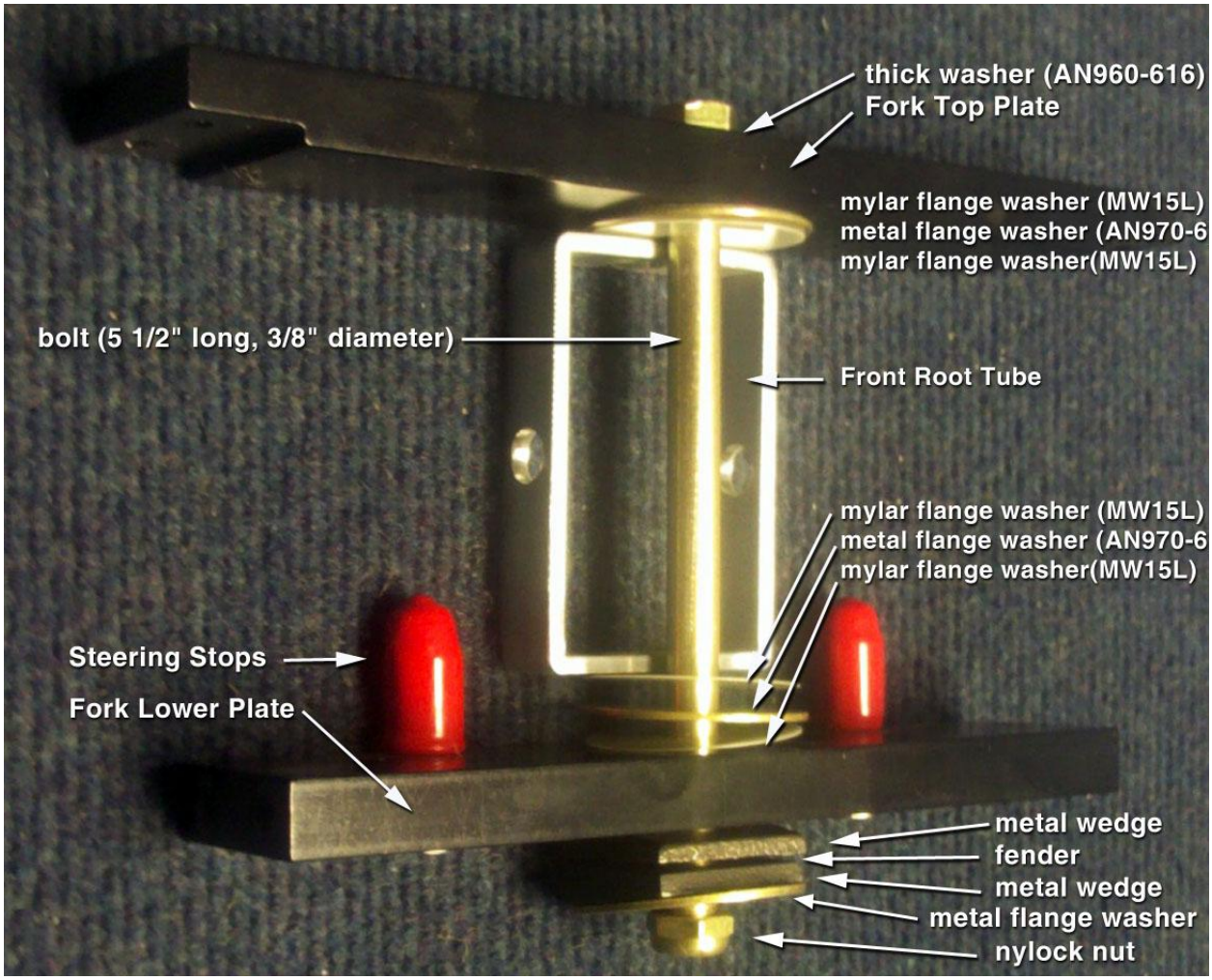
Open –End Wrench Set.

Assembly Notes – Front Fork to Front Root Tube

The Front Fork is attached to the trike by using a 5 ½" long, 3/8" diameter bolt, with a series of washers and 2 metal wedges at bottom, on each side of the fender, and is secured with a Nylock Nut.

The Front Root Tube has two holes with bearings, so you can choose which hole to use. A taller pilot would prefer to mount the front fork in the hole near the front of trike, and a shorter pilot may elect to use the rear hole, for a comfortable distance from seat to fork pedals for steering, braking, and foot throttle.

Photo – Order of washer placement when mounting Front Fork to Front Root Tube



Steering Stabilizer to Front Fork Assembly

Tools and Supplies Needed

3/16” Drill Bit, Ruler, Open –End Wrench Set.

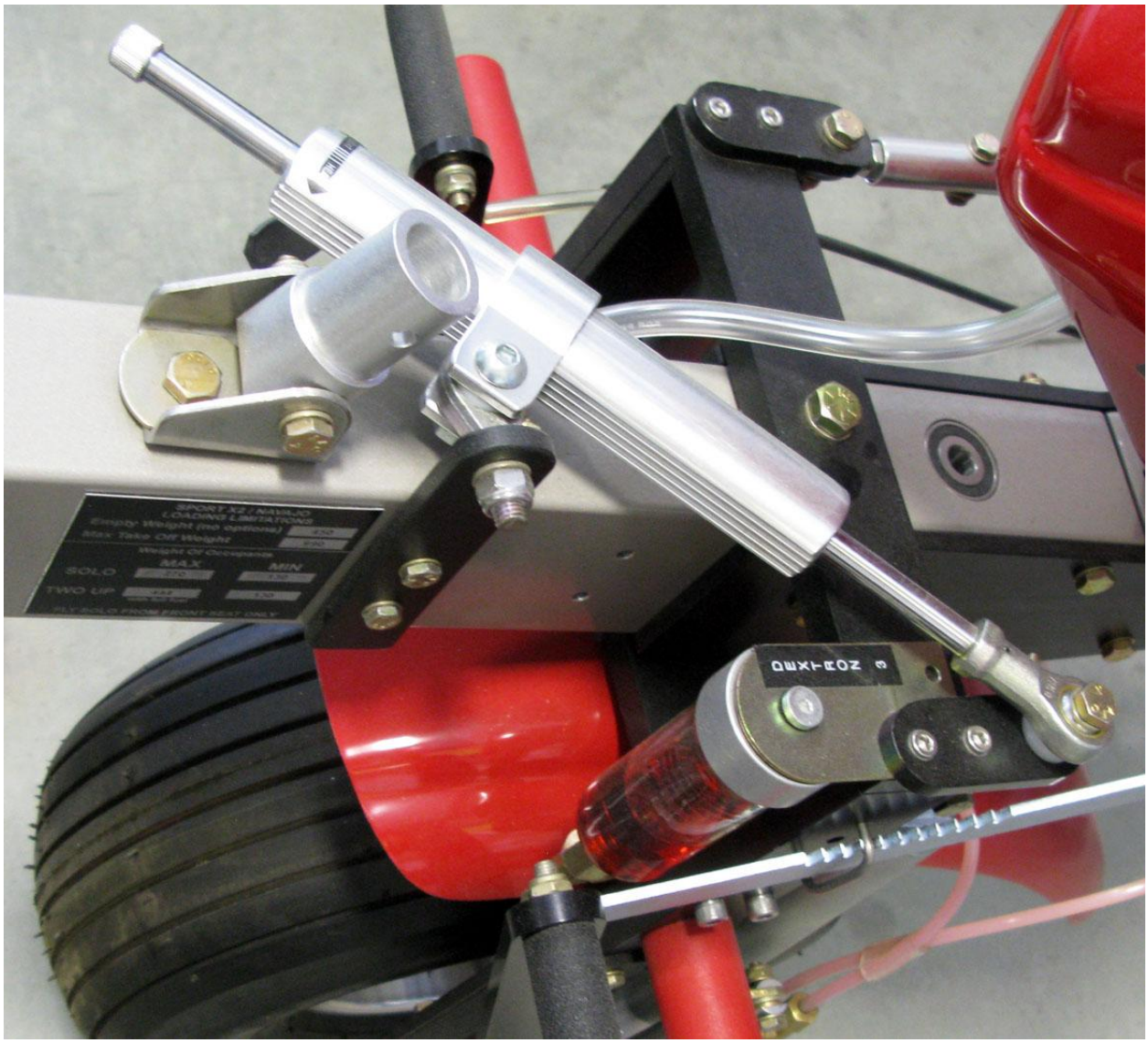
Assembly Notes – Steering Stabilizer to Front Fork

Once the Front Fork has been attached to the trike frame, you can add the Steering Stabilizer. This innovative design allows you to adjust the steering dampening to your preference, and helps control “shimmy” when the trike is taking-off and landing.

Adjusting Steering Dampening with the Steering Stabilizer

Once mounted to Front Fork, the Adjustment Knob at the front of the stabilizer can be turned Clockwise (to the right) for Heavier steering dampening, or turned Counter-Clockwise (to the left) for Lighter steering dampening effect.

Photo – Steering Stabilizer – Brake side view



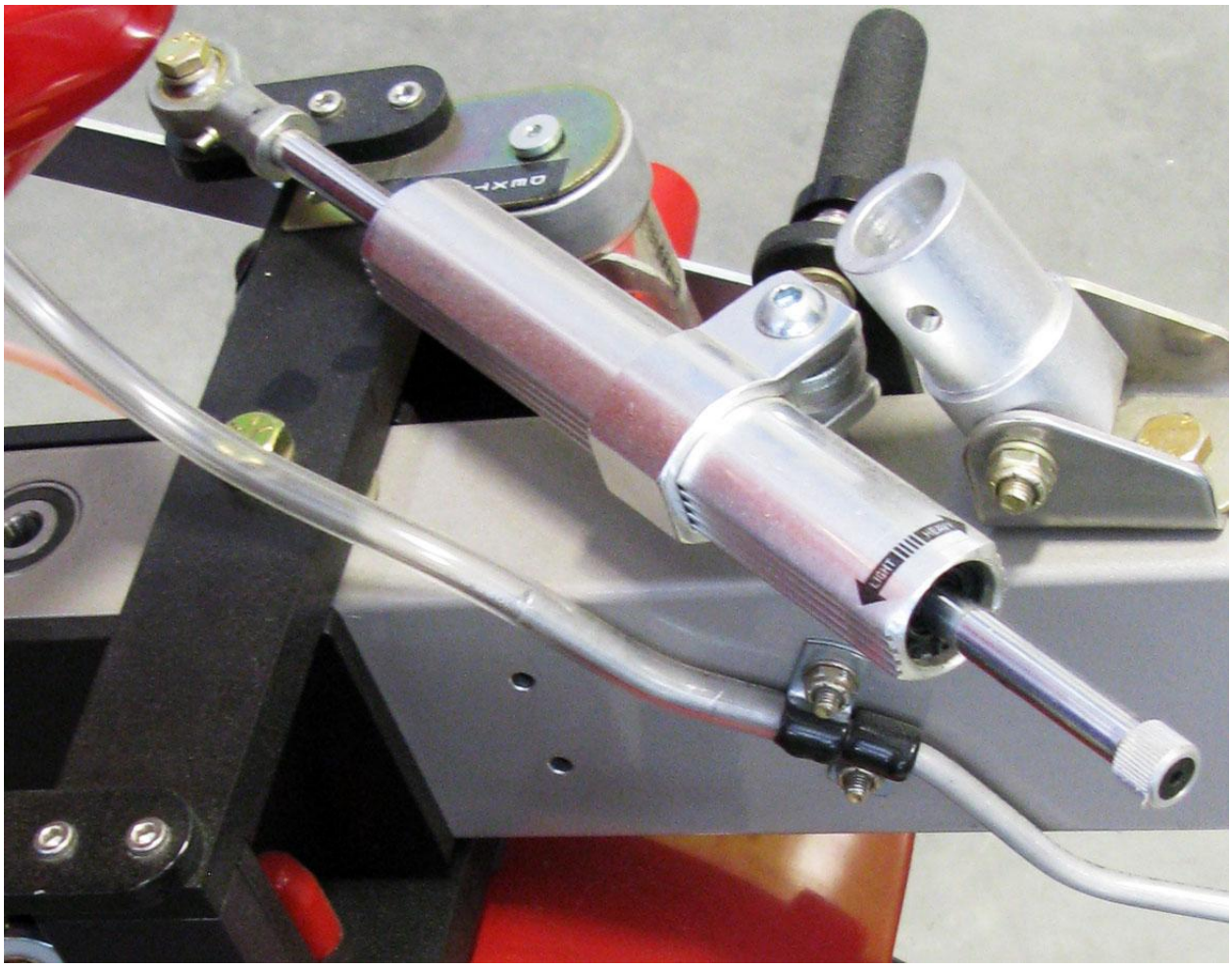
Steering Stabilizer Assembly

1. On the Brake side of the Front Root Tube, there are two 1/8" pilot holes, with their centers located 5 5/16" back from the front edge of the Root Tube. Use a 3/16" drill bit to ream-out these holes to fit the two 3/16" AN3-24 bolts used to attach the Steering Stabilizer Mount Bracket.

2. Attach the Mount Bracket to the side of the Root Tube using two AN3-24 bolts. Include a thin washer next to the head of the bolt, and a thin washer next to the thin Nylock Nut that secures the end of the bolt, on the throttle-side of the Root Tube.

In the photo below, note how the ends of the bolts have been used to include small brackets for guiding the Pitot Tube of the Airspeed Indicator into the air flow.

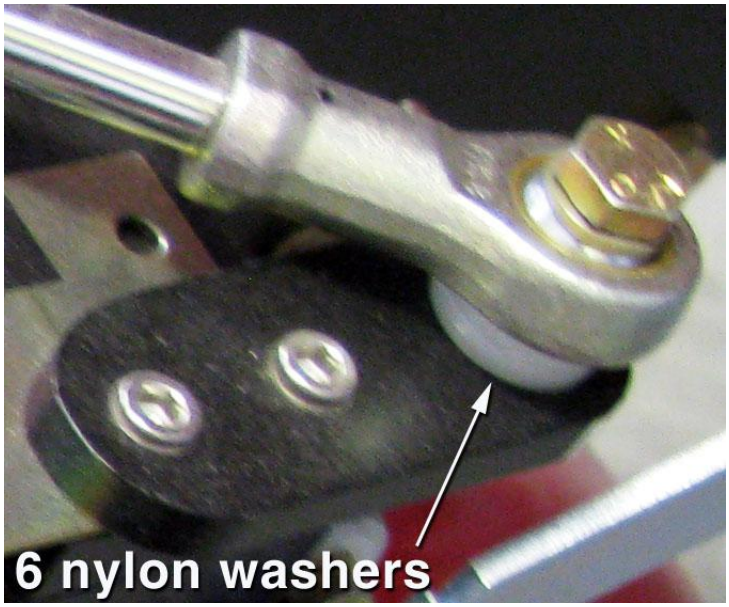
Photo – throttle side of Root Tube at Steering Stabilizer bracket attachment



3. Attach the Steering Stabilizer to the mount bracket by inserting the course-thread ¼" bolt in the middle of the stabilizer through the top hole of the mount bracket, using a thin washer on each side of the mount bracket, and secure the stabilizer with a thin Nylock Nut. Refer the "brake side view" photo to view this assembly.

4. Attach the eye bolt at the end of the stabilizer arm by inserting the AN4-12A bolt through the top, using a thin washer under the head of the bolt, use 6 nylon washers below the eye bolt and above the black plate at top of fork, use a thin washer at bottom of bolt under black plate, and secure with a thin Nylock Nut.

Photo – Bolt and washer assembly at rear of Steering Stabilizer



Rear Steering & Rear Throttle – Connect to Front Fork

Tools and Supplies Needed

1/4" Drill Bit, Open –End Wrench Set.

Assembly Notes – Connecting Rear Steering & Rear Throttle

Once the Front Fork has been attached to the Front Root Tube, the Rear Steering and Throttle components can be linked to the Front Fork to provide steering and throttle control from the back seat of the trike.

The assembly parts and diagrams associated with this assembly are the "Seat Rail to Main Root Tube – parts diagram", the "Rear Steering and Rear Throttle Assembly - parts diagram", and the "Steering Tie Rod Assembly - parts diagram".

1. Insert the Center Pivot Tube through the hole in side of root tube, so it can receive the vertical bolt to secure it. Insert the AN6-40A 3/8" bolt through a thick washer, then through the front seat plate, then through the AN970-6 wide washer, then through the MW15L wide mylar washer, then through the Center Pivot Tube, then through the MW15L wide mylar washer, then through the AN970-6 wide washer, then through the Steering Bar Plate, then through the AN960-616 thick washer, then secure it with MS21083-N4 Nut.

2. Attach the Rear Steering Right Tube to the Center Pivot Tube with the AN3-13A bolt, two AN960-316 thick washers, and the MS21083-N3 Nut.

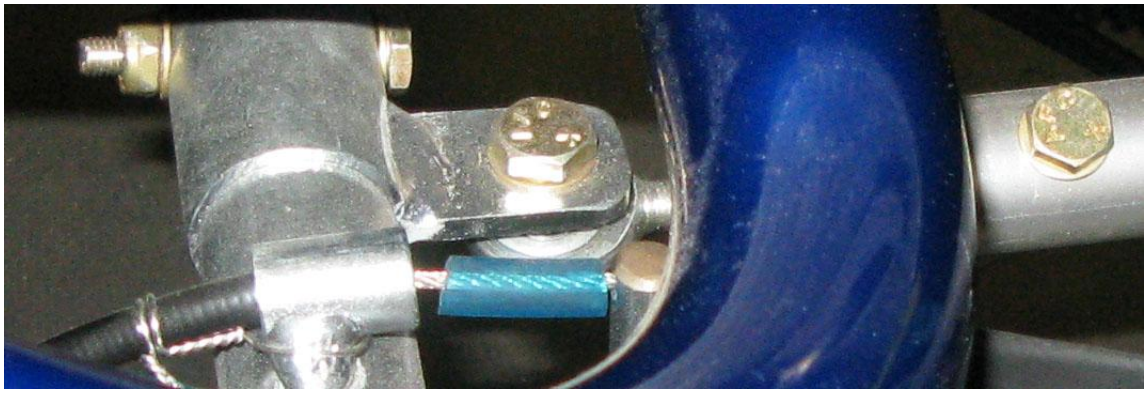
3. Attach the Left Steering Right Tube to the Center Pivot Tube with the AN3-13A bolt, two AN960-316 thick washers, and the MS21083-N3 Nut.

Note: All holes for bolts in the Steering Tie Rod Assembly are pre-drilled except one hole (Item 7). DO NOT drill this hole until the Rear Steering has been assembled, and Front Fork has been mounted to the trike. See notes below for aligning the trike parts to ensure the correct hole location.

4. Assemble the Steering Tie Rod per the "Steering Tie Rod Assembly - parts diagram", using the AN3-10A bolts with thin washers. Remember, one of the holes (Item 7 on Steering Tie Rod diagram) is not drilled yet.

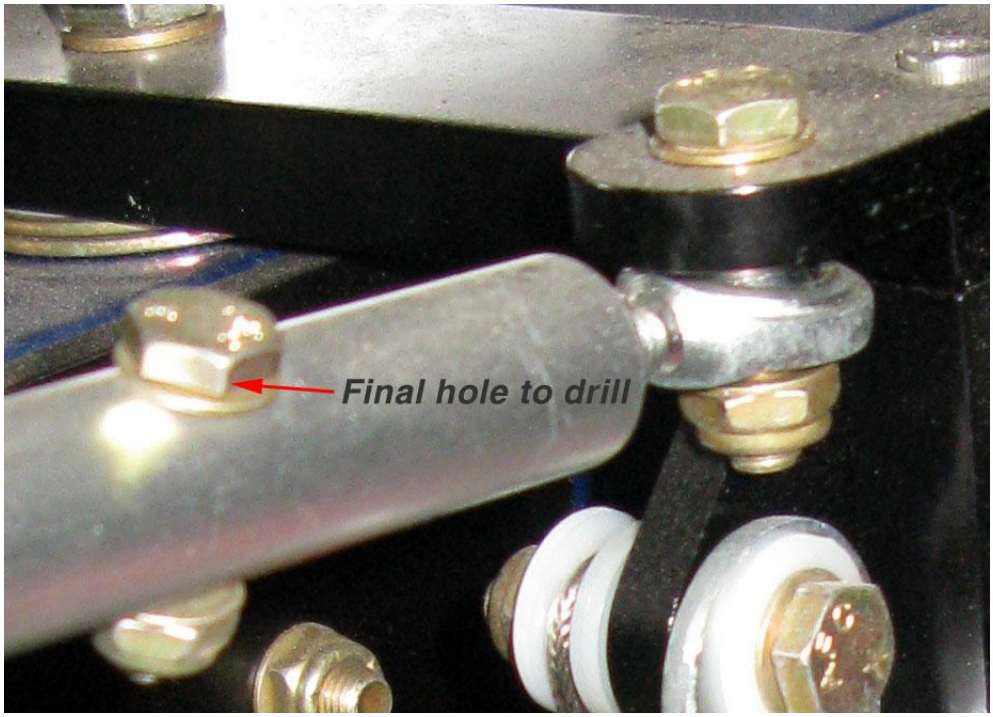
5. Connect the rear of the Steering Tie Rod to the Center Pivot Tube as follows: the AN4-10 bolt is inserted through a thick washer, through the metal tab on the Center Pivot Tube, through a thick washer, through the Eye Bolt hole on the Tie Rod, through a thick washer, then secured with a thick Nylock Nut.

Photo: Steering Tie Rod connection to Center Pivot Tube at rear of Tie Rod



6. Connect the front of the Steering Tie Rod to the Front Fork as follows: the AN4-10 bolt is inserted through a thick washer, through the metal tab on top of Front Fork, through a thick washer, through the Eye Bolt hole on the Tie Rod, through a thick washer, then secured with a thick Nylock Nut.

Photo: Steering Tie Rod connection to Front Fork



7. Align Steering for locating final Steering Tie Rod length.
To locate the hole position to be drilled through the Steering Tie Rod, it is essential that you:

- Set the Rear Steering Tube to be at a right angle to the root tube, steering neither left or right.
- Set the Front Fork so the wheel is pointing straight ahead, steering neither left or right.

Note: when inserting the telescoping sections of the tie rod together, you may want to wind a small amount of masking tape on the inner, small tube to reduce the "play" that may exist between the parts. This helps reduce any clattering sound when there is excessive space within the tie rod assembly.

8. Once both front and rear steering are pointing straight ahead, place some masking tape around the Steering Tie Rod where the telescoping rod parts join, to secure the length of the tie rod, so you can drill the hole. Drill a 3/16" hole through the Tie Rod, then lock the tie rod length in place by inserting the AN3-10A bolt with a thin washer on each side of tie rod, and secure it with a thin Nylock Nut.

Mast Assembly

Tools and Supplies Needed

Drill Bit set, Open-End Wrench Set

Assembly Notes – Mast Assembly

The mast assembly is installed per the "Lower Mast Assembly" parts diagram first, then follow the parts assembly per the "Upper Mast Assembly parts diagram. A close-up photo of the upper mast assembly and Pivot/Hang Block is included at the end of this document. When the lower and upper ends of the mast assembly have been completed, the Limiter Tube should be attached at the upper mast and also near the dashboard. When the mast is upright, and the limiter tube completely attached, the location for the upper bolt of the Spring Assist arm can be located and drilled per notes below.

Note: The hole for the upper bolt for the Spring Assist arm is not drilled. Once the mast is assembled, the Limiter Tube installed, and the lower end of the spring assist is attached near the seat rail (with Rotation Plate completely forward, resting on bushing), the hole for the bolt that attaches the Spring Assist can be located by raising the Spring Assist Arm and marking the location on the mast. Note in the photo that there is an internal reinforcement tube that is inside the aerofoil mast – the hole to be drilled must be centered on this tube to have the strongest assembly.

Photo: Locating bolt hole location on upper end of Spring Assist arm

Fairing Assembly

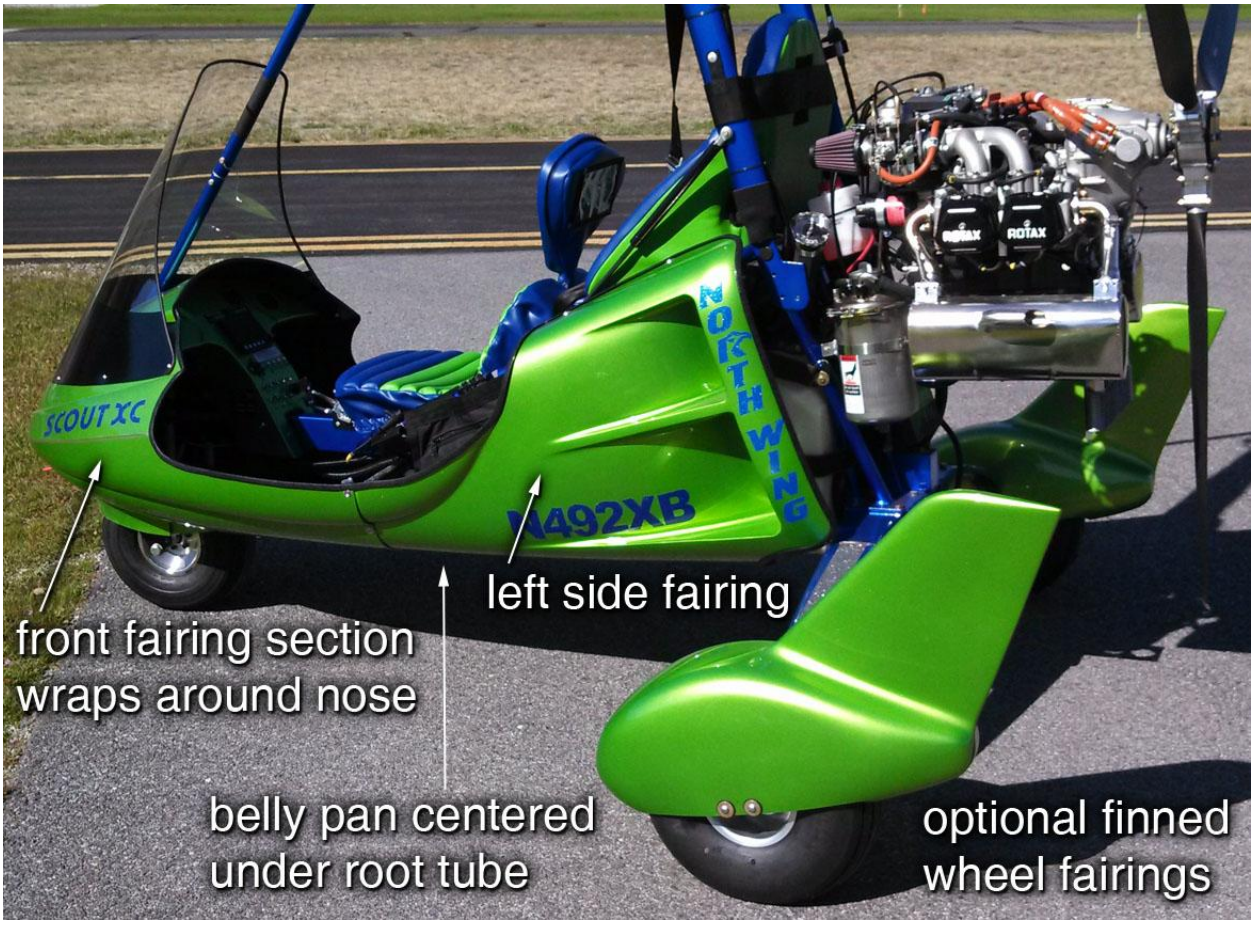
Tools and Supplies Needed

Step Drill Bit, Open-End Wrench Set, Pop Rivet Gun, Angle Drill, Clamps, Level, Dremel Tool

Assembly Notes – Fairing Assembly

The photos that show the phases of Fairing Assembly show a fairing that is already mounted to a trike. The fiberglass sections that comprise the complete assembly are noted in the photo below.

Photo: North Wing Apache light sport aircraft – Streamlined Fairing Sections



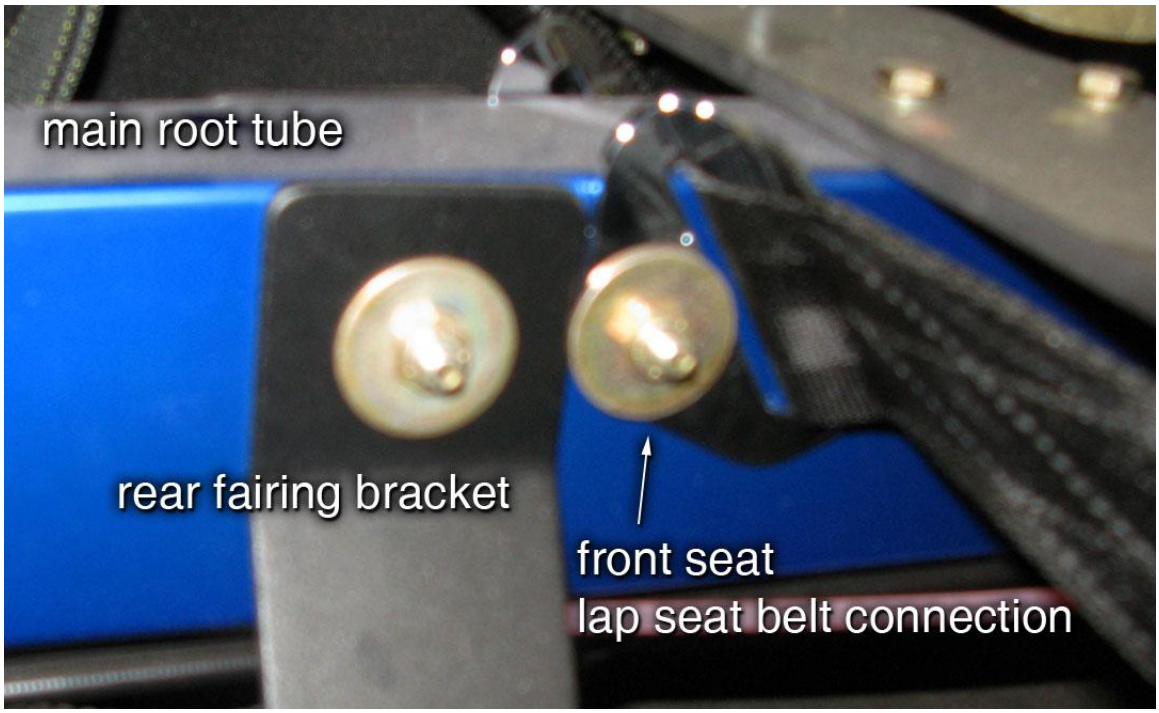
Fairing Assembly – Attaching Fairing Brackets, Limiter Tube to Root Tube

Note: The four brackets that comprise the two forward fairing brackets, and the two rear fairing brackets, do not have a nut welded to the base tab of the bracket.

The single bracket at the nose of the root tube has a nut welded to the top side of the base tab of the bracket, to make it easier to secure this connection from the front of the trike at the bolt head, as this bracket base is in a hard-to-reach location within the nose of the fairing.

1. **Attach the two rear brackets** (HT460 - that attach to rear fairing sides) to the main root tube by inserting a AN4-26A bolt through a wide metal washer (AN970-4), then through the bracket, then through the root tube holes just forward of the Fuel Tank Limiter Brackets, then through the opposite side bracket, then through another wide metal washer, then secure this assembly with a thin Nylock nut, and tighten to snug.

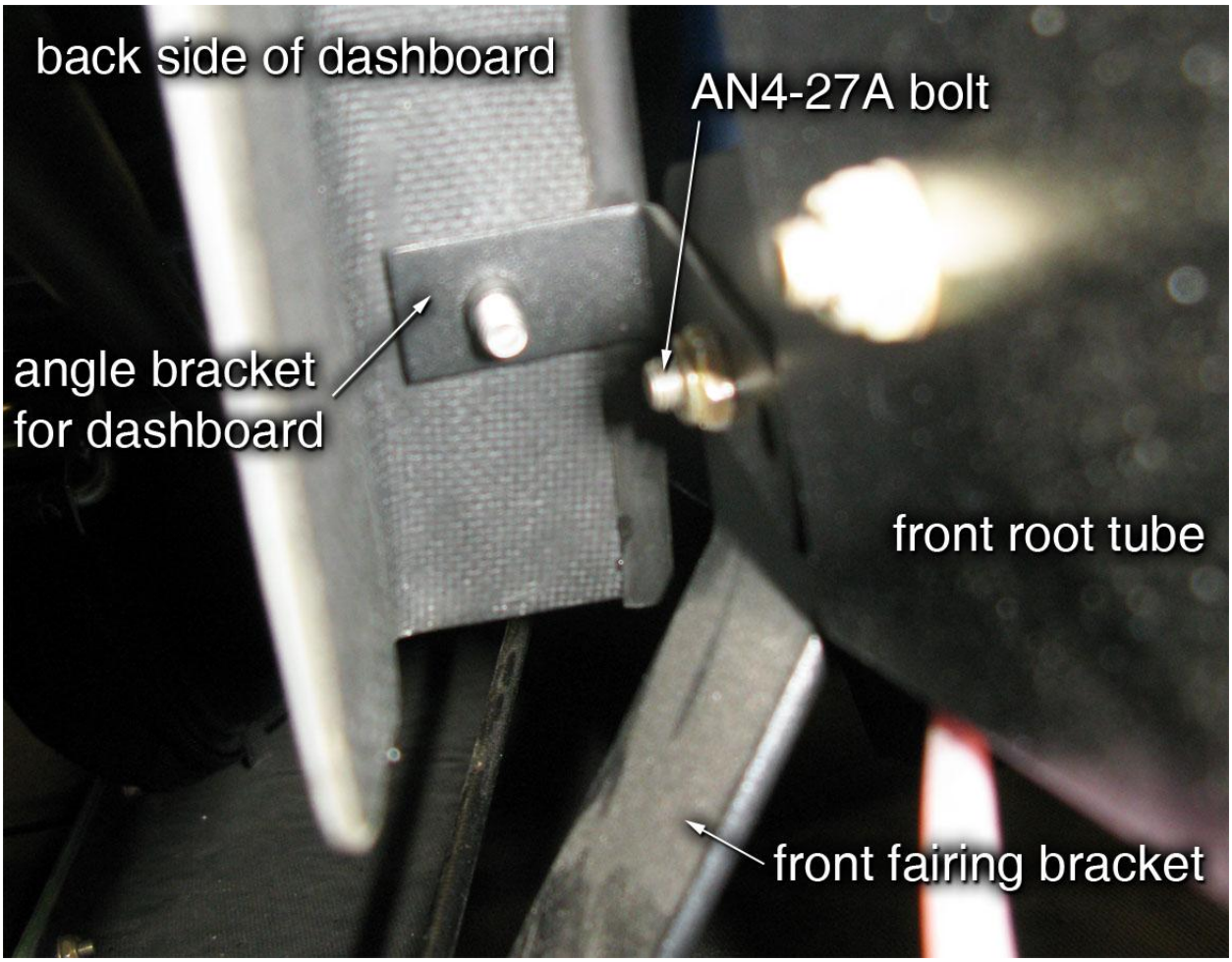
Photo: Top of Rear Fairing Bracket and Front Seat – Lap Seat Belt Connection



2. **Attach the two forward brackets** (that attach to sides of front fairing section) to the main root tube by inserting a AN4-27A bolt through a thin metal washer, then through the angle-bracket for the Dashboard (with nut welded to backside, for dashboard-bolt to be attached later) then through the front fairing bracket, then through the root tube holes, then through the other Dashboard-mount angle bracket (with welded nut on it), then through the opposite side front fairing bracket, then through another thin metal washer, then secure this assembly with a thin Nylock nut, and tighten to snug.

Note in the photo that the Angle Bracket that is used to attach the dashboard at its base, near the root tube, has two holes – use the hole that is closest to the rear of trike.

Photo: Angle Bracket for attaching Dashboard above Root Tube, attached to Front Fairing Bracket



3. **Attach the fairing bracket at the nose of the trike**. This bracket has a nut welded to the back of the bracket to receive the bolt inserted through the nose of the fairing, later in the assembly. Refer to the "Front Root Tube Assembly" parts diagram for reference.

Attach the bracket to the main root tube by inserting the 5/16" diameter AN5-36A bolt through the AN970-5T wide washer, then insert the bolt through the Apex Stainless Steel Channel Bracket (note orientation of bracket on diagram), then through the Front Root Tube top and bottom holes, then through the Front Fairing Bracket, then through the AN970-5 wide washer, then through the AN960-16 thick washer, then secure this assembly with the AN365-524A thick (high-profile) Nylock nut, tighten to snug.

4. **Attach the Limiter Tube Bracket to the Root Tube.**
Refer to the "Front Root Assembly" schematic diagram for reference to this assembly. Attach the Channel Bracket (item #21 on diagram) to the top hole at the front of the main root tube by inserting the AN4-35A bolt through the AN970-4 wide flange washer, then insert the bolt through the Channel Bracket, then through the top hole at the front of the main root tube, then out through the bottom of root tube, then through a thick metal washer, and secure the assembly with a thick Nylock nut, tighten to snug.

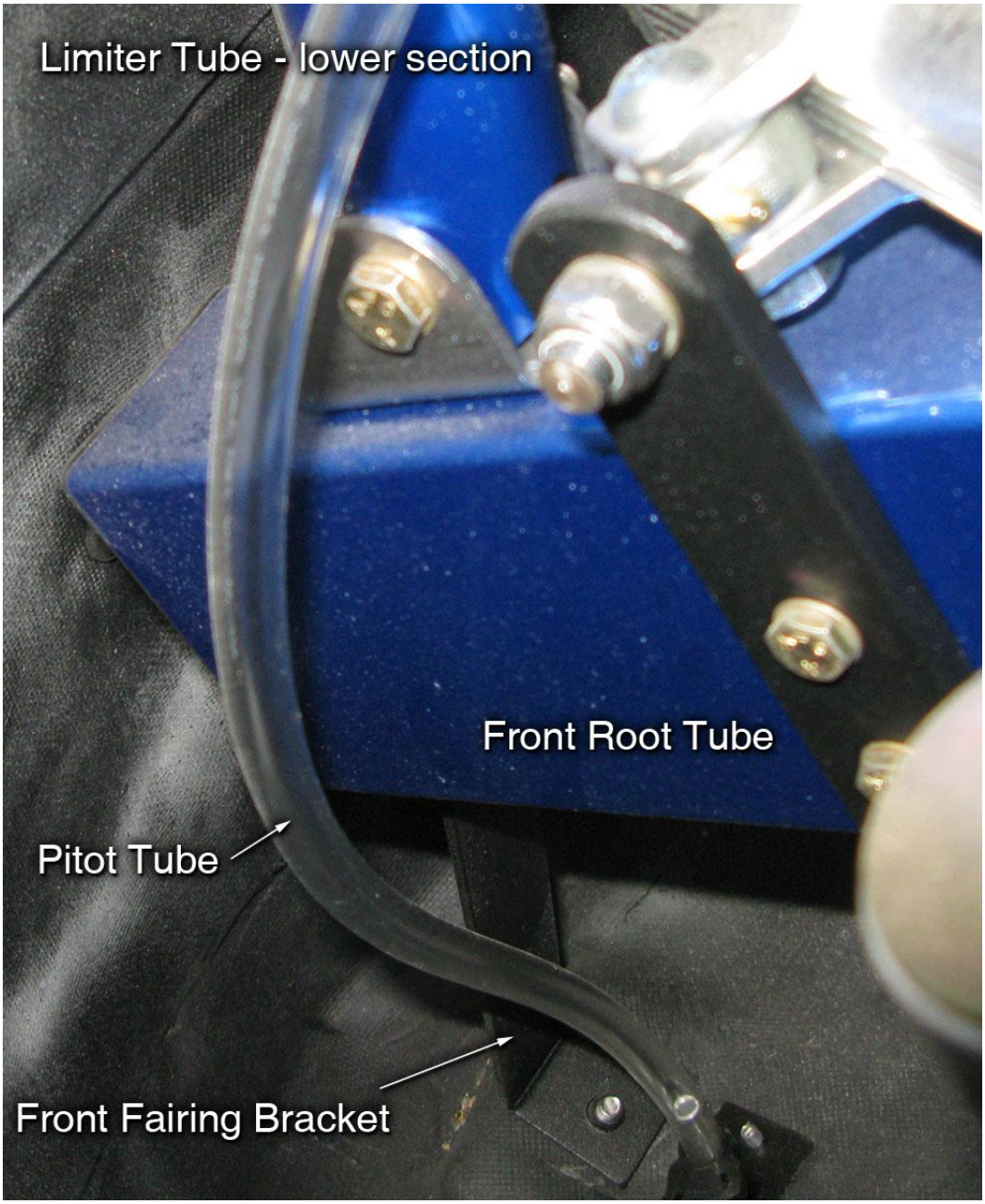
Per the schematic diagram, **attach the Limiter Tube Bracket to the Channel Bracket** by inserting the AN4-16A bolt through the top side hole of the channel bracket, then through the limiter tube bracket, then through the plastic spacer, then through the other side of the limiter tube bracket, then through a thin metal washer, then secure the assembly with a thick Nylock nut, tighten to snug.

5. **Attach the Limiter Tube (lower section) to the Apex Channel Bracket and Limiter Tube Bracket**
Refer to the "Front Root Tube Assembly" schematic diagram for this step of the assembly.

Attach the limiter tube to the limiter tube bracket by inserting the AN4-20A bolt through the side hole of the limiter tube bracket, through the limiter tube, through the other side of the bracket, then secure the assembly with a thin Nylock nut. Tighten to snug, but do not over-tighten to avoid deforming the round shape of the tube.

Attach the base of the limiter tube to the Apex Channel Bracket that is on top of the front root tube by setting the base of the limiter tube on the apex channel bracket, then insert the AN4-17A bolt through a wide metal flange washer, then through the channel bracket, then through the limiter tube, then through the other side of the channel bracket, then through a wide metal flange washer, then secure the assembly with a thin Nylock nut.

Photo: Front Fairing Bracket and Apex Channel Bracket at nose of trike

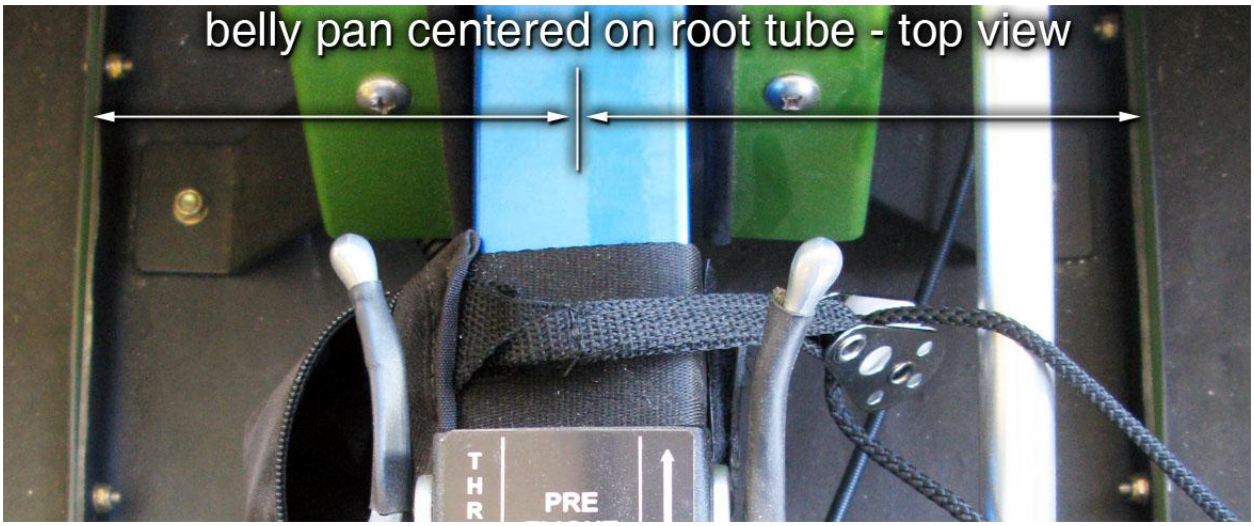

Limiter Tube - lower section
Front Root Tube
Pitot Tube
Front Fairing Bracket

Note: The following assembly steps include drilling through the fiberglass sections for the bolts that connect the sections to each other and also to the brackets on the root tube where they attach.
It is highly recommended that you use a "step drill bit" for drilling through the fiberglass, to get the best results when you drill the holes – minimizing cracking the fiberglass near the holes as you drill.

Fairing Assembly – Attaching the Belly Pan to Root Tube

After the five Fairing Brackets have been attached to the Root Tube, the Fairing can be installed.
The first step to attaching the streamlined Fairing is to attach the center fiberglass lower section, the "Belly Pan", to the Brackets on the Root Tube. In the photo, disregard the front fairing bolts attached to the belly pan on each side. This step of assembly requires that you center the belly pan to the trike, using the root tube as a reference, before you can mark and drill the holes to attach the belly pan to the brackets.

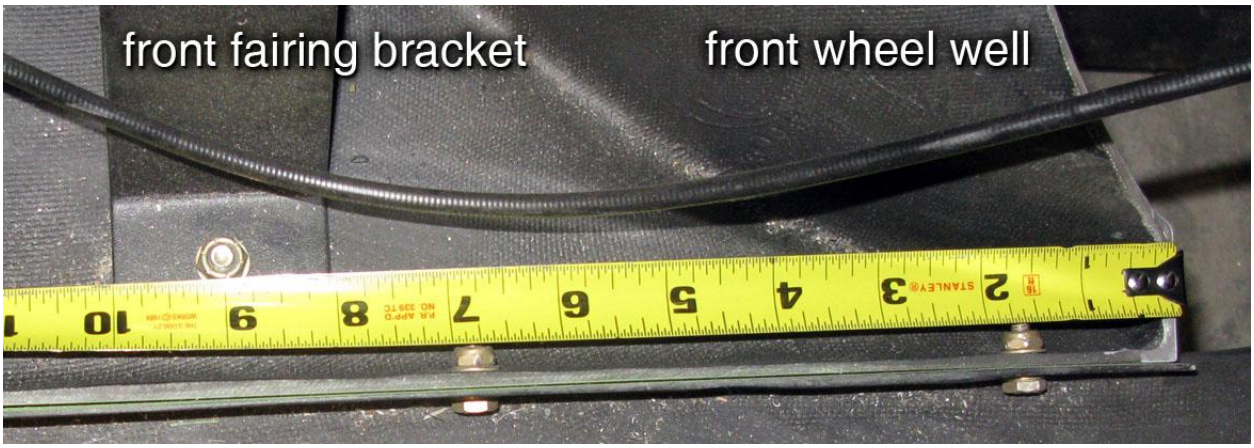
Photo: Fairing Belly Pan section centered on Root Tube of trike frame



1. Use a cardboard box, or any adequate spacer support, to raise the belly pan off the floor and adjacent to the base of the forward and rear fairing brackets on each side of the root tube. By "blocking up" the belly pan and having it meet the base of the brackets, you can more accurately center the belly pan and mark the holes to drill.

2. When the belly pan is centered on the root tube, position the belly pan in the correct location for marking the holes to drill by positioning the front edge of the belly pan 9 inches forward of the center of the hole in the base of the brackets, as shown in the photo.

Photo: Fairing Belly Pan positioned in relation to Front Fairing Brackets on Root Tube



Note: When you have positioned the belly pan section centered on the root tube (when viewed from above), and positioned it so the front edge of belly pan is 9 inches forward of the front brackets-base-holes center as shown in previous photo, note that the base of the bracket may be flat, while the actual shape of the belly pan section likely has a gentle curve to its profile.
For best assembly results, gently bend the base-tab of the forward and rear root tube brackets to match the curve of the belly pan – so when you finally bolt the assembly together, the surfaces of the brackets and the belly pan match closely, with minimal if any gaps between them.

3. Measure the distance between the bottom side of the root tube and the belly pan top surface, directly **below the forward brackets** on the root tube. **This distance should be 6 ¼"**. If it is more or less than that, gently bend the brackets on each side to achieve that amount of clearance between the root tube and the belly pan.

4. Measure the distance between the bottom side of the root tube and the belly pan top surface, directly **below the rear brackets** on the root tube. **This distance should be 5 1/8"**. If it is more or less than that, gently bend the brackets on each side to achieve that amount of clearance between the root tube and the belly pan.

5. When the previous belly pan placement steps have been achieved, anchor the belly pan so it does not move and **mark the center of the four 1/4" diameter holes to be drilled** - in the center of the holes at the base of the two forward and two rear fairing brackets.

6. Drill the holes in the four locations on the belly pan marked per previous step. It is **best to drill these holes with a step drill bit**, to minimize chances of fraying and cracking the fiberglass. Start with a very small hole, and gently drill wider until the **1/4" diameter hole** has been drilled for the bolts.

7. **Attach the belly pan section to base of the two forward and two rear fairing brackets on the root tube** by inserting the AN4-5A bolt through a wide metal flange washer, then through a wide rubber flange washer, then upwards through the bottom of the belly pan, then through the hole in the fairing bracket, then through a thin washer, then secure this attachment with a thin Nylock nut, tighten to snug.

Photo: Location of Belly Pan – Rear Fairing Bracket Holes

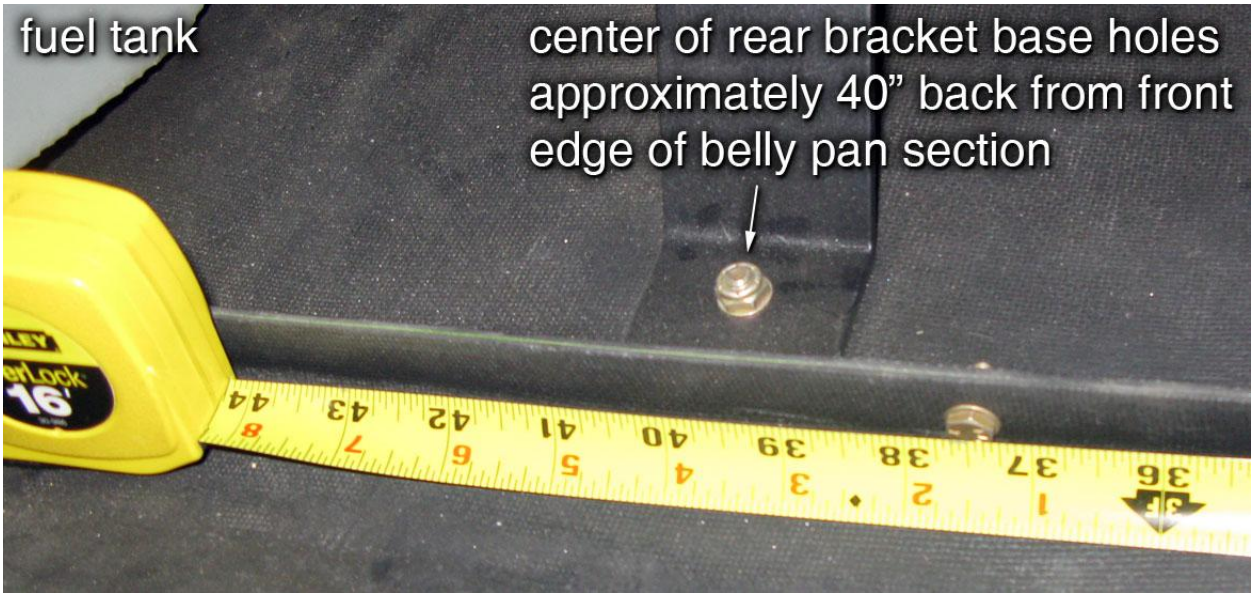
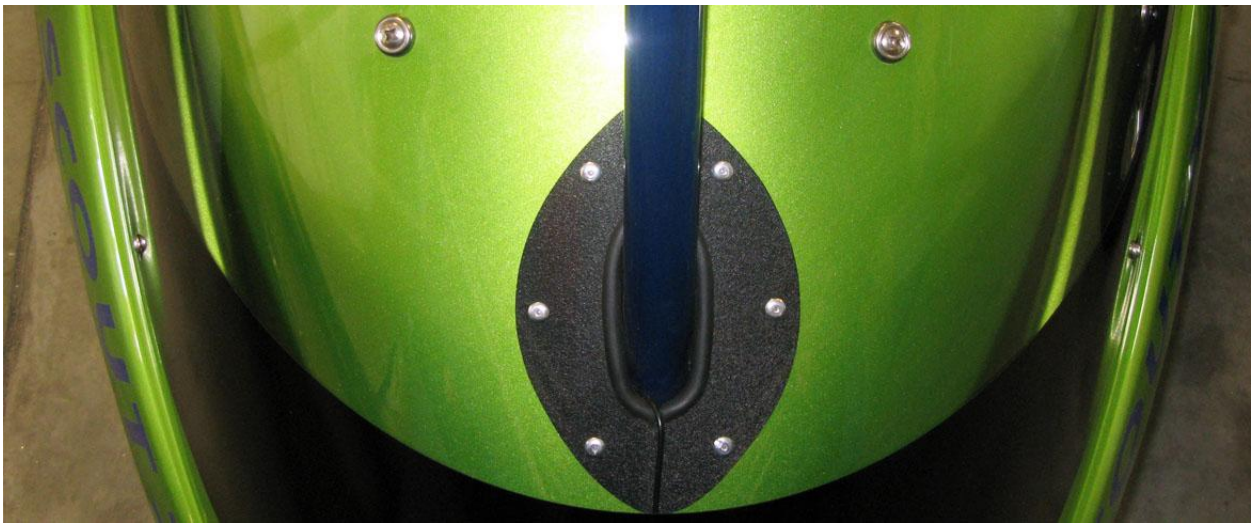


Photo: Bottom View of Belly Pan Attached to Root Tube Fairing Brackets

Fairing Assembly – Front Fairing Section to Root Tube and Belly Pan

1. Prepare the front fairing section for installation by first **attaching the plastic rim around the top-center of the front fairing section** where the lower Limiter Tube extends up from within the fairing. This plastic rim is secured to the top of the fairing with six 3/16" pop rivets. Refer to the photo to note how the rivets are spaced along the perimeter of the hole. **When drilling the 3/16" holes for the pop rivets, best results will be achieved by using a Step Drill Bit** to drill through the fiberglass, minimizing chances of fraying and cracking the fiberglass near the holes.

Photo: Top View of Front Fairing Section – Limiter Tube



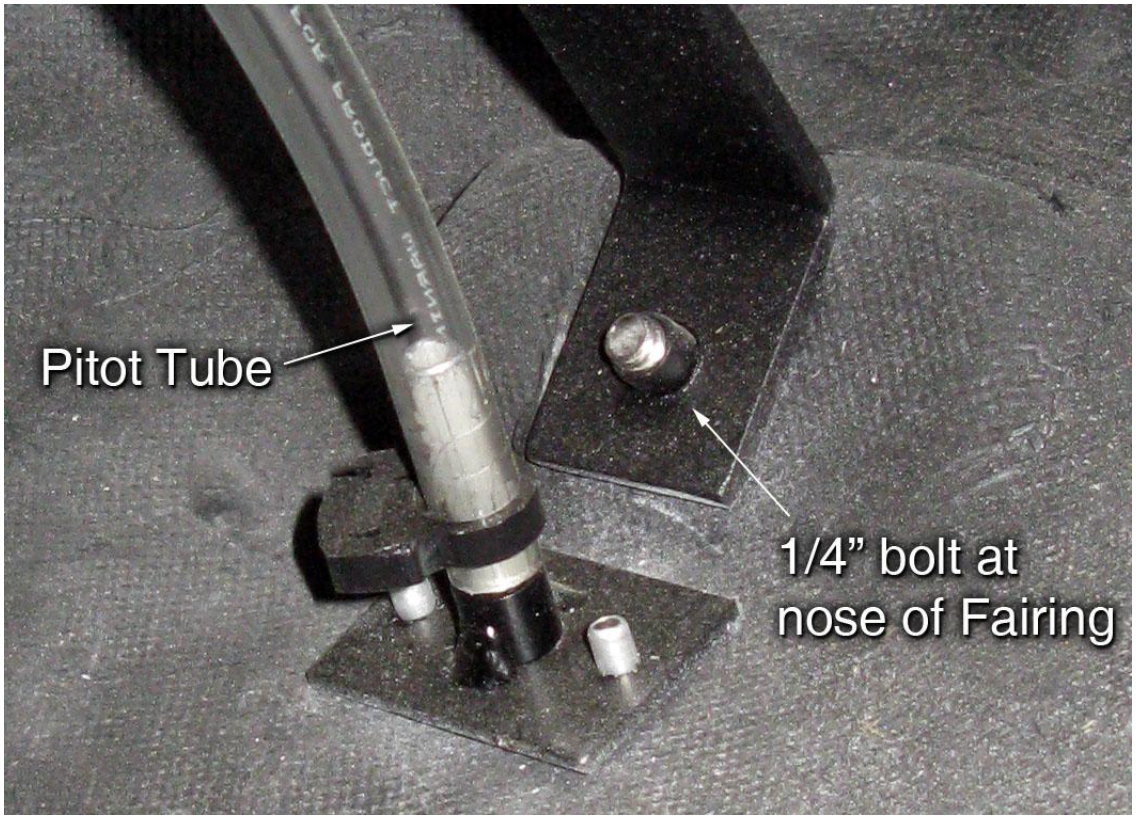
2. **Set the Front Fairing section over the Limiter Tube, and attach the front bolt to the nose Bracket.**

Note: to avoid causing any unwanted bending of the fiberglass fairing during this phase of assembly, place boxes or some other spacer items to "prop up" the front fairing section so the front bolt, and side bolts where the front section attaches to the sides of the belly pan can be easily inserted and worked on.

Mark the location for drilling the hole, and **use a step drill bit to drill a ¼" diameter hole** in the center of the indented space at the front of the fairing. Insert the bolt into the front of the fairing by first inserting the bolt (¼" diameter, oval head, ¾" long with Phillips screw head) through a wide metal flange washer, then through a wide flange rubber washer, then through the bolt hole, and screw it into the nut which is already welded to the back side of the front fairing bracket.

Photo: Bolt with Metal and Rubber Washers attached to nose of Fairing

Photo: Inside Fairing View of Nose Screw to Fairing Bracket and Pitot Tube



3. Attach the sides of the Front Fairing section to the sides of the Belly Pan.
With the bolt attached to the fairing bracket at the nose of trike anchoring the fairing position, use a few small, strong clamps to hold the edges of the belly pan to the edges of the front fairing section on each side of the belly pan. This makes it easier to ensure that the best matching of the edge surfaces can be obtained to mark the holes to drill and drill them. When the edges of the front fairing section and the belly pan have been aligned per previous notes, mark the hole locations to be drilled. Note that in the photo, there is a bolt approximately 1” back from each end of the front fairing section, and the remaining 3 bolt locations are placed so they are evenly spaced within these two outer bolts.

Photo: Fairing Front Section to Belly Pan Connection

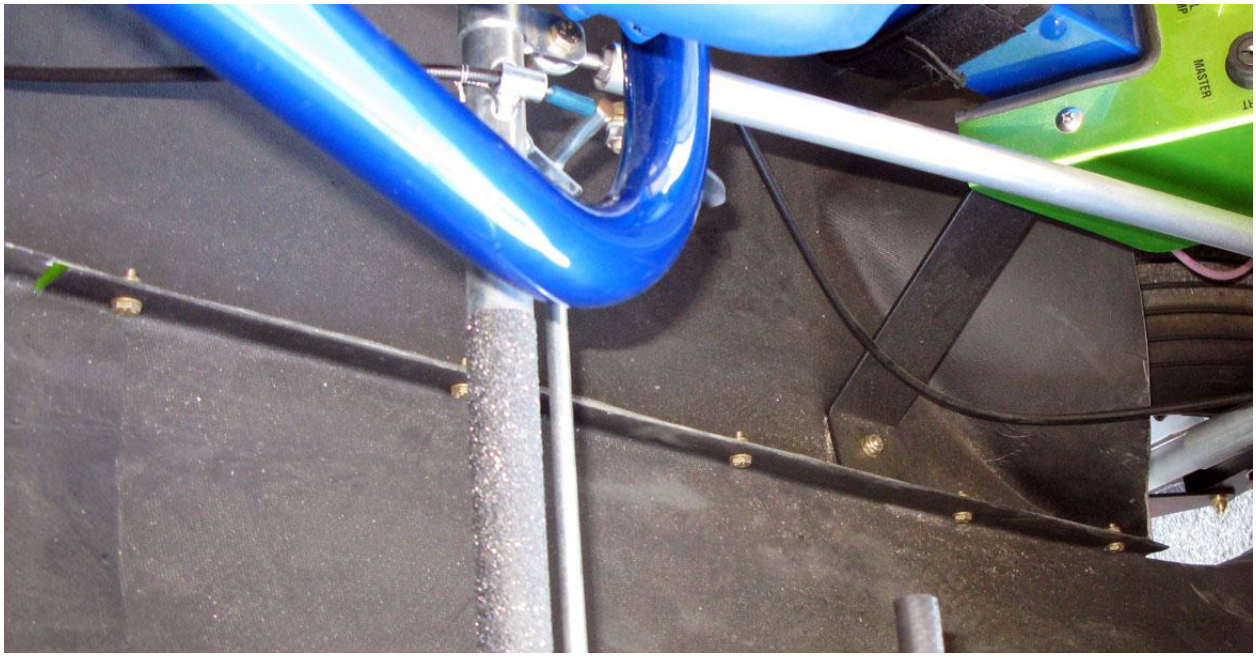
Photo: Example of small Angle Drill for drilling Front Fairing Section to Belly Pan Junction

The space between the base of the belly pan and front fairing section is not very large, so drilling these 3/16" diameter holes is much easier if you use a small angle drill, as shown in the photo.

Before the holes are drilled, check to ensure that the bottom-side of the belly pan and the adjacent bottom side of the front fairing section are at the same level, so they rest evenly on the same surface below, and the bottom of the fairing appears as one flat surface instead of having adjacent edges that are offset.

After the holes have been drilled, connect **the sides of the front fairing section to the sides of the belly pan** by inserting a AN3-4A bolt through a thin washer, then through both fairing sections, through another thin washer, and secure the assembly with a thin Nylock nut, tighten to snug – be cautious not to crush the fiberglass by over-tightening. Note how the bolt heads are located on the outside of this assembly, farthest away from the root tube.

Photo: Front Fairing bolted to Belly Pan


MASTER

Fairing Assembly – Dashboard to Front Fairing Section and Root Tube

Note: The mast of the trike should be upright at this phase of assembly, with the limiter tube completely attached at the mast and the connection to the lower limiter tube assembly. As the fairing installation continues with the addition of the Dashboard fiberglass section, the limiter tube extending up from within the fairing serves as an important reference. It is important to attempt to keep the front fairing section and dashboard centered on the root tube and limiter tube. Later in the installation of the rear side fairing sections, there is further opportunity to "tweak" the centering of the fairing in relation to the limiter tube.

In the photo, note that the face of the dashboard is recessed 3 inches in from the top edge of the fairing. If you measure this distance in the angled area, the "upper corner" where the arrow points, you will get best results.

Photo: Front Fairing and Dashboard

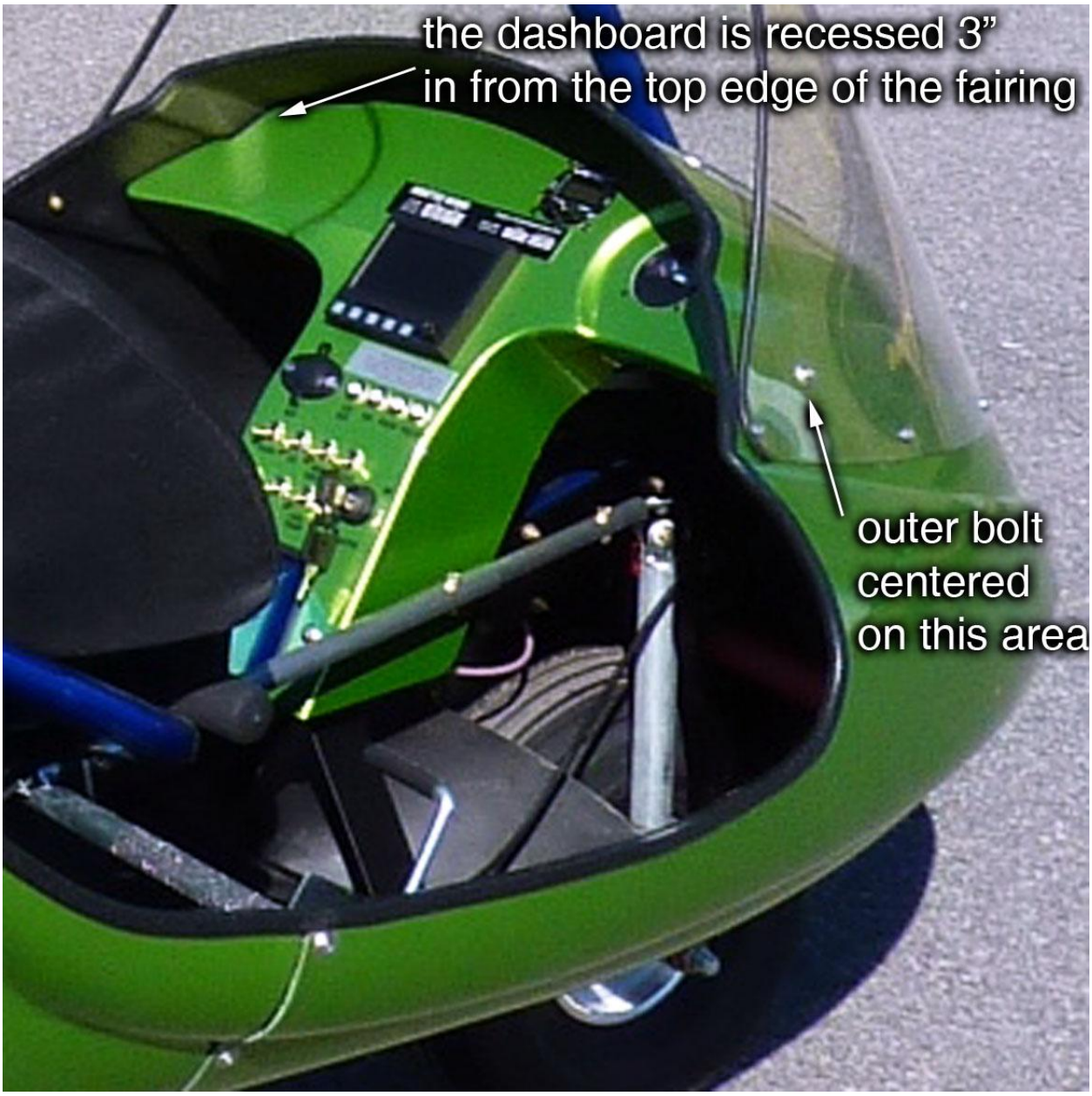


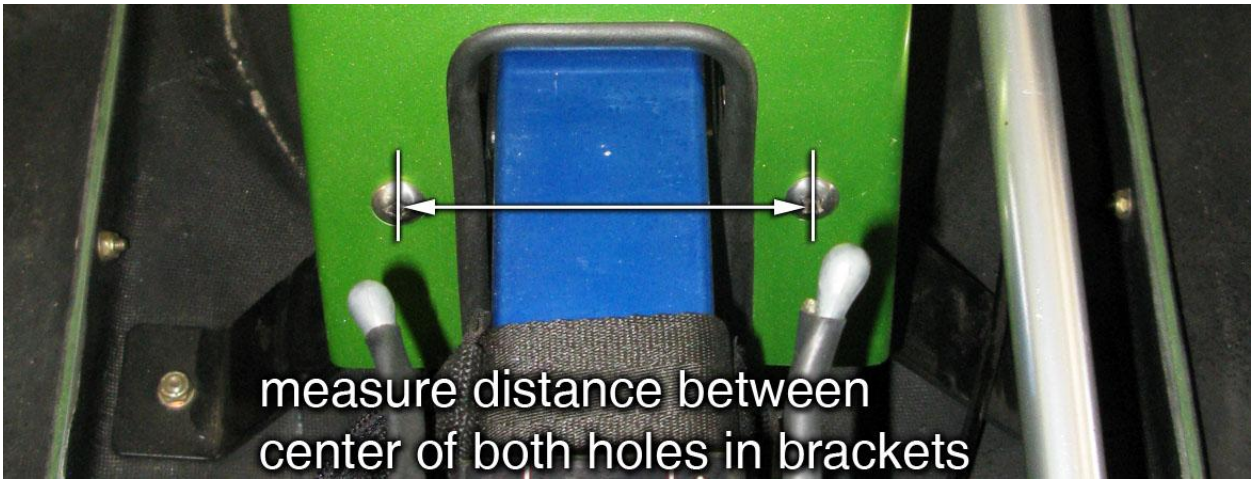
Photo: Bolt, Counter Sink Washer, and Well Nut

The top of the front fairing section attaches to the top edge of the dashboard with 4 bolts.
The bolts are ¼" diameter, 1" long, oval head, with a Phillips head. A Counter Sink Finish Washer is included at the head of the bolt.

To accommodate the size of the rubber diameter of the well nuts, a ½" hole is drilled into the top flange of the dashboard, and a ¼" hole is drilled through the top of the fairing. When tightened, the well nuts expand to anchor the screw into the hole.

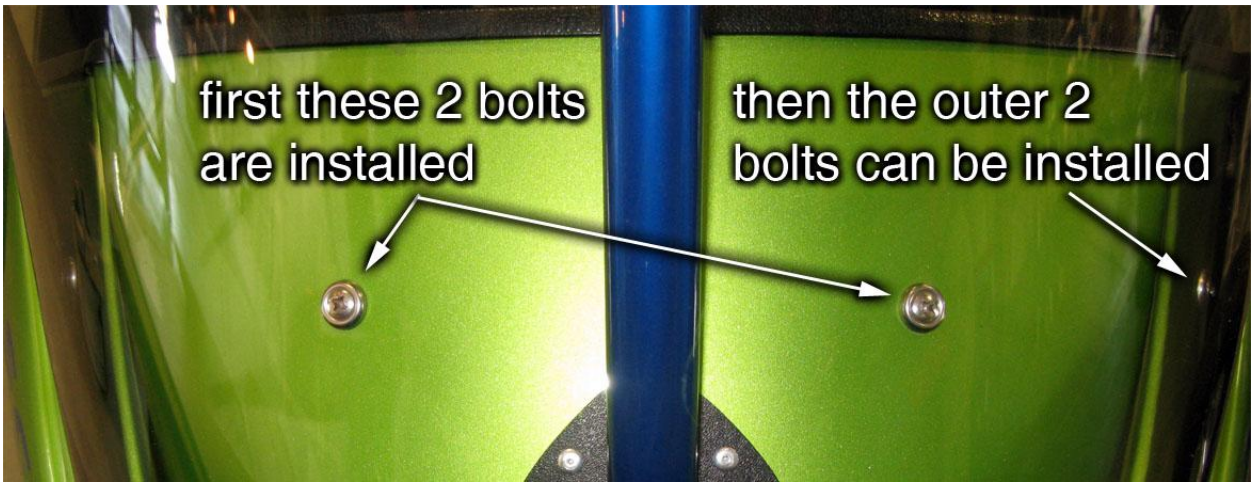
1. Measure the distance between the center of the holes in the brackets that are at the base of the Dashboard. It is easiest to do this now, before the dashboard is bolted to fairing. Save this measurement.

Photo: Bolt Locations at base of Dashboard



The top-view photo shows the location on the top of the fairing for the four bolts that attach to dashboard.

Photo: Top View 1 of Fairing above Dashboard - four bolts attach top of fairing to dashboard



As noted earlier, the dashboard is recessed 3 inches in from the top edge of the fairing, when measured in the upper corners of the angled area of the fairing, per the "Front Fairing and Dashboard" photo. After you measure the distance between the holes for the 2 lowest bolts, just above the root tube and on either side of the root tube, the dashboard can be placed under the top edge of the fairing to get it in approximate position for marking the locations for the 2 top holes to drill, the holes for the bolts on either side of the limiter tube. By installing these 2 bolts in place, the outer 2 bolt locations can be marked.

2. Mark the location, and drill holes for the 2 bolts that are on either side of the limiter tube.
To accurately mark the hole locations, ensure that the dashboard is recessed 3 inches in from the top edge of the fairing, as noted in the photos. It is best to use a "step drill bit" to drill through fiberglass to avoid cracking and fraying the Gel Coat. Drill a small 1/8" hole first, then increase bit size to ¼" to accommodate the size of the ¼" diameter, 1" long bolt (oval head, Phillips head). After both holes have been drilled to ¼" diameter, remove the dashboard from the fairing so the top 2 holes in the dashboard can be further drilled-out to ½", to fit the Well Nuts that are used with the bolts.

3. Insert the 2 well nuts into the holes in the top of the dashboard, then put the dashboard in position to be attached. Place a Counter Sink Finish Washer on the bolt, then insert it into the well nut and tighten to snug. As the bolt is tightened into the well nut, the well nut expands to secure the connection.

4. Mark the location, and drill holes for the 2 outer bolts.
To accurately mark the hole locations, it may be helpful to have a second person mark the locations for the holes, as you gently squeeze-in the sides of the fairing, so the angled upper corners of the top of the fairing are mated as flush as possible with the matching angled edges of the top of the dashboard. When the holes are drilled, install these bolts the same as the inner 2 bolts.

Photo: Side View of Fairing top outer bolt location

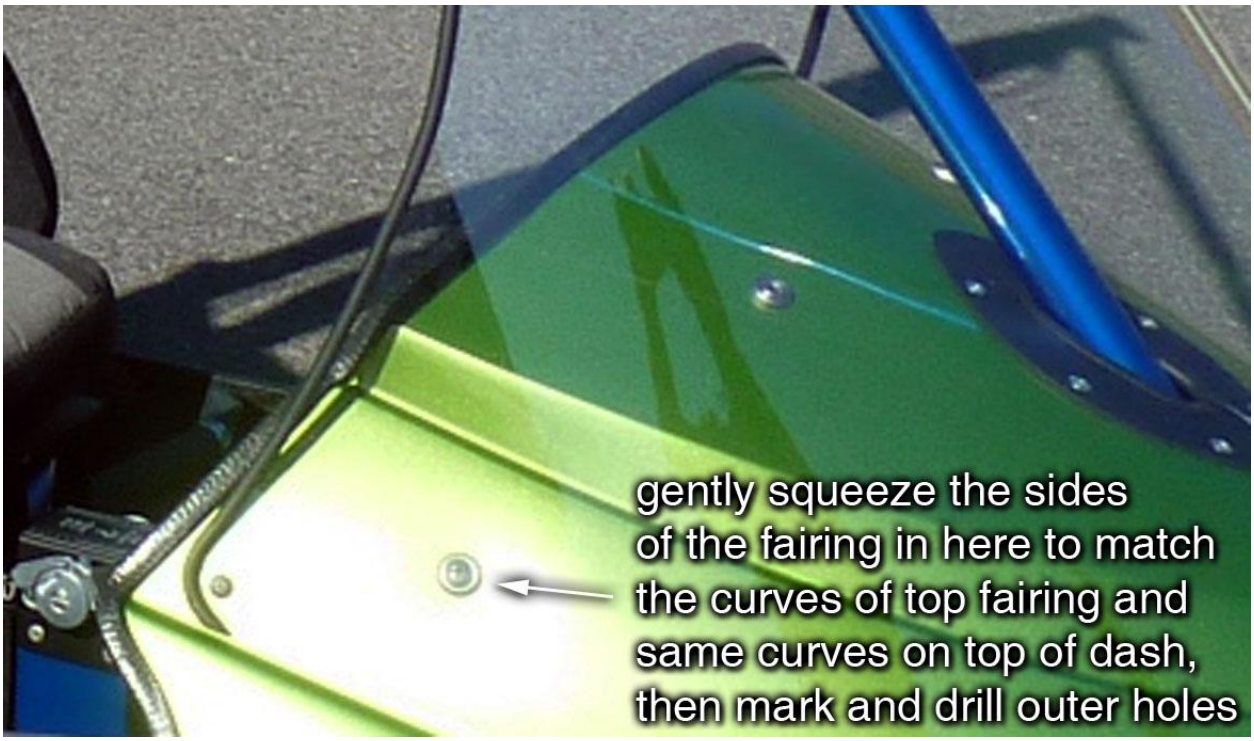


Photo: Bolt locations for base of Dashboard above Root Tube

In the first step of this fairing installation, the measurement between the centers of the holes in the lower brackets was acquired. Note that if you look on each side of the root tube, you can see the brackets for these bolts.

With the top-of-fairing 4 bolts installed, the hole locations for these 2 lower bolts can be acquired by gently lifting upwards on the dashboard so it rises high enough to provide a 1/8” clearance above the root tube, after the rubber trim has been added to edge of fiberglass. Position the dashboard so it is centered on the root tube and raised to provide the 1/8” clearance, and mark the position on the fairing where the 3/16” diameter bolt holes should be drilled. You can view the back-side of this bracket in the earlier photo labeled “Angle Bracket for attaching Dashboard above Root Tube, attached to Front Fairing Bracket”. **Note:** Once the holes are drilled in the correct locations, the Phillips-head bolts can be screwed directly into the bracket behind the dashboard, as it already has a nut welded to the back of the bracket. Apply the rubber trim to the fiberglass edge around the root tube, and apply the rest of the fairing trim later, after the rear side fairing sections have been installed.

Fairing Assembly – Rear Side Sections to Front Fairing Section

Photo: 2 Bolts that attach Front Fairing to Rear Side Fairing Sections

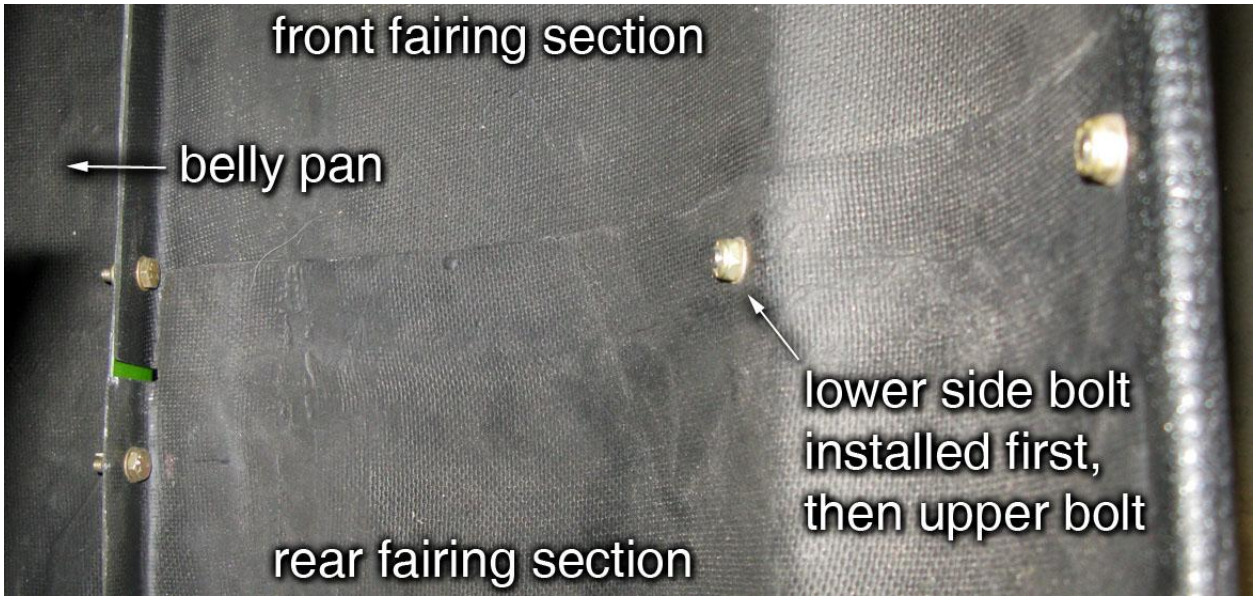
The two rear side fairing sections attach the front fairing section, the belly pan, and also to the brackets at the top-sides of the sear rail. The lower bolt location is marked and drilled first, then the upper bolt.

To anchor the rear fairing section so you can position the side bolt location for marking the holes and drilling, set the top of the fairing on the seat rail bracket and clamp it in place, as close as possible to its approximate final location. The 2 side bolts will be drilled first, then the 3 bolts to the belly pan will be installed, and the bolts that attach top of side-fairing to the seat rail bracket will be installed last.
Do this procedure on both sides of the trike.

Photo: Top View of Rear Side Fairing Section

With the top of the rear side fairing clamped to seat rail bracket to hold it in place, the goal is to join the front fairing section to rear section with the lower bolt – to attempt to get a clean looking seam between the 2 sections, and the base of side fairing even with the base level of the belly pan, so they appear as one surface. As viewed from outside the trike, the front fairing section slightly overlaps the rear section.

Photo: Inside View of Front Fairing Section to Rear Side Fairing Section



1. Mark and drill (with step drill bit) the 3/16" hole for the lower side bolt. You can see the location of both side bolts in the photo entitled "2 Bolts that attach Front Fairing to Rear Side Fairing Sections". When you have drilled the hole through both front and rear fairing sections in the optimal location, place a Flange Counter Sink Finish Washer #10 on the 10-32, 3/4" long, 3/16" diameter bolt (Phillips head, oval), insert it through the hole, place a thin washer on the bolt, and secure this assembly with a thin Nylock nut. Do not over-tighten this initially, leave a small amount of "play" until all fairing connections are made, then tighten to snug. **Do this procedure on both sides of the trike.**

2. Mark and drill (with step drill bit) the 3/16" hole for the upper side bolt. Again, the goal is to mate the front and rear fairing sections with a clean-looking seam. Gently squeeze the front fairing against the side of the rear fairing and adjust position to achieve the best fit, then mark and drill the 3/16" hole through both fairing sections.

When you have drilled the hole through both front and rear fairing sections in the optimal location, place a Flange Counter Sink Finish Washer #10 on the 10-32, 3/4" long, 3/16" diameter bolt (Phillps head, oval), insert it through the hole through both fairing sections, place a thin washer on the bolt, and secure this assembly with a thin Nylock nut. Do not over-tighten this initially, leave a small amount of "play" until all fairing connections are made, then tighten to snug. **Do this procedure on both sides of the trike.**

Note: The top edge, the edge that gets trim applied to it above the upper side bolt, may be uneven between the front fairing section and the rear side fairing section. If so, use some sandpaper, or a Dremel Tool, to sand down this uneven edge so it is flat across the top edge when you apply the trim to the edge.

3. Clamp the edges of Belly Pan and Rear Side Fairing Section, then mark and drill the 3/16" holes. There are three 3/16" holes to be drilled. The forward hole is approximately 1 ¼" back from the junction with the front fairing section, the rear hole is 1 ¼" forward of the Fuel Tank, and the third hole is centered between the outer 2 holes. **Do this procedure on both sides of the trike.**

Note: When you clamp the edge of the rear side fairing section to the belly pan, ensure that you have the bottom of both surfaces on the same level; so when bolted together, they appear as one continuous surface when viewed from below.

4. After the holes have been drilled, connect the sides of the rear fairing section to the sides of the belly pan with 3 bolts by inserting a AN3-4A bolt through a thin washer, then through both fairing sections, through another thin washer, and secure the assembly with a thin Nylock nut, tighten to snug – be cautious not to crush the fiberglass by over-tightening. **Do this procedure on both sides of the trike.**

Photo: Rear Side Fairing Section bolted to Belly Pan

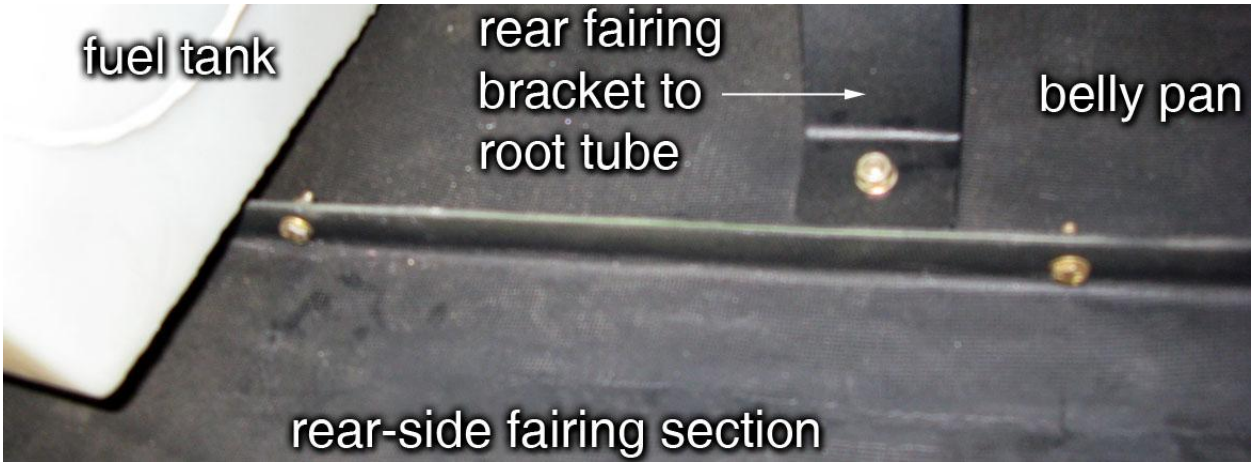
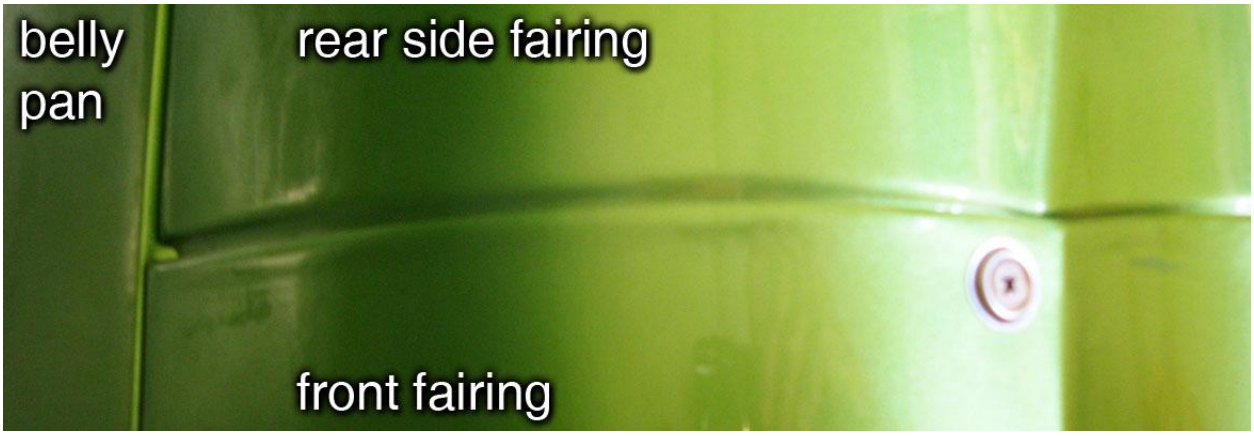

fuel tank
rear fairing
bracket to
root tube
belly pan
rear-side fairing section

Photo: Bottom view of Front Fairing, Rear Fairing, and Belly Pan Junctions

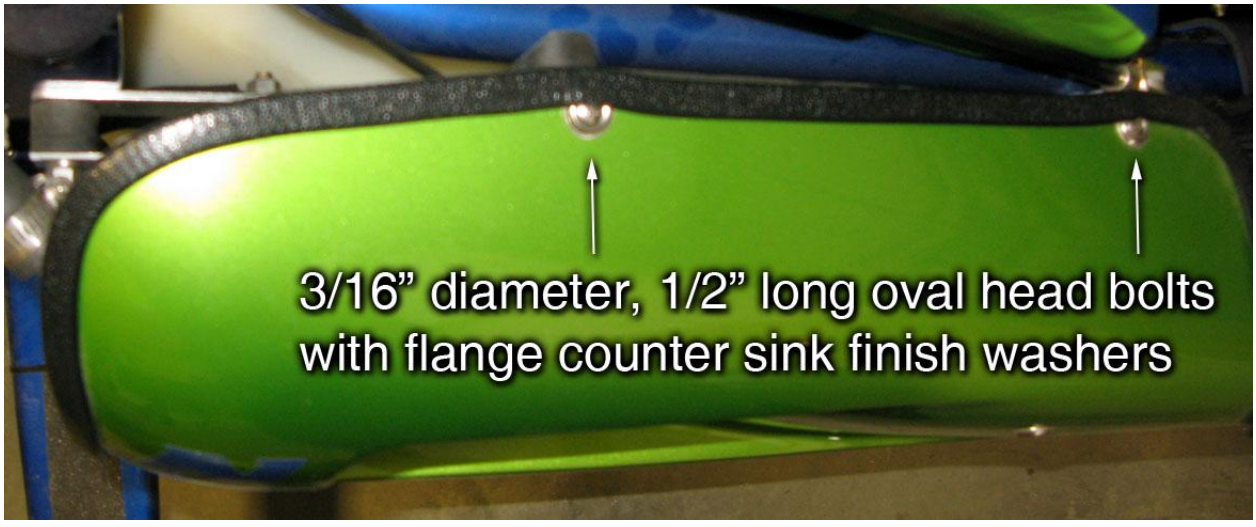


The final step to attaching the rear side fairing sections is to bolt the top of the fairing to the bracket extending from the sides of the Seat Rail.

Note: Prior to drilling the holes for the 2 bolts that attach the rear side fairing to the seat rail bracket, **you can shift the top of the rear side fairing slightly forward, or slightly rearward, to adjust the centering of the limiter tube in the top center of the front fairing section.** If the limiter tube is already centered within the hole in the top center of the fairing above the dashboard, no "tweaking" of this centering is necessary. However, if the limiter tube is off-center at this point, you can gently move the position of the top of the rear side fairing sections slightly forward toward nose of the trike, or toward the rear of the trike, to obtain better centering at the limiter tube above the dashboard.

5. Mark and drill (with step drill bit) the 3/16" holes for the rear side fairing top bolts. The following photo shows the relative location for these bolts. It is necessary to drill through both the rear side fairing section, and also the metal Seat Rail Bracket below it when you install these bolts. Ensure that you drill through the fiberglass with a step drill bit, and use a metal drill bit to drill through the seat rail bracket. When you have drilled the hole through both surfaces in the optimal location, place a Flange Counter Sink Finish Washer #10 on the 10-32, 3/4" long, 3/16" diameter bolt (Phillips head, oval), insert it through the hole, place a thin washer on the bolt, and secure this assembly with a thin Nylock nut. Do not over-tighten this initially, leave a small amount of "play" until all fairing connections are made, then tighten to snug. **Do this procedure on both sides of the trike.**

Photo: Top View of bolt locations at top of Rear Side Fairing



An additional location where the rear side fairing section is bolted is the connection to the Radiator bracket at the bottom of the radiator. If the engine is a Rotax 912, there is one radiator used, on the right side of trike when viewed from the rear. If the engine is a Rotax 582, there is a radiator on each side. The following photos show how this connection is made with 2 bolts to the bracket under the rear side fairing.

Photo: Top view of rear side Fairing bolts, attached to Radiator Bracket

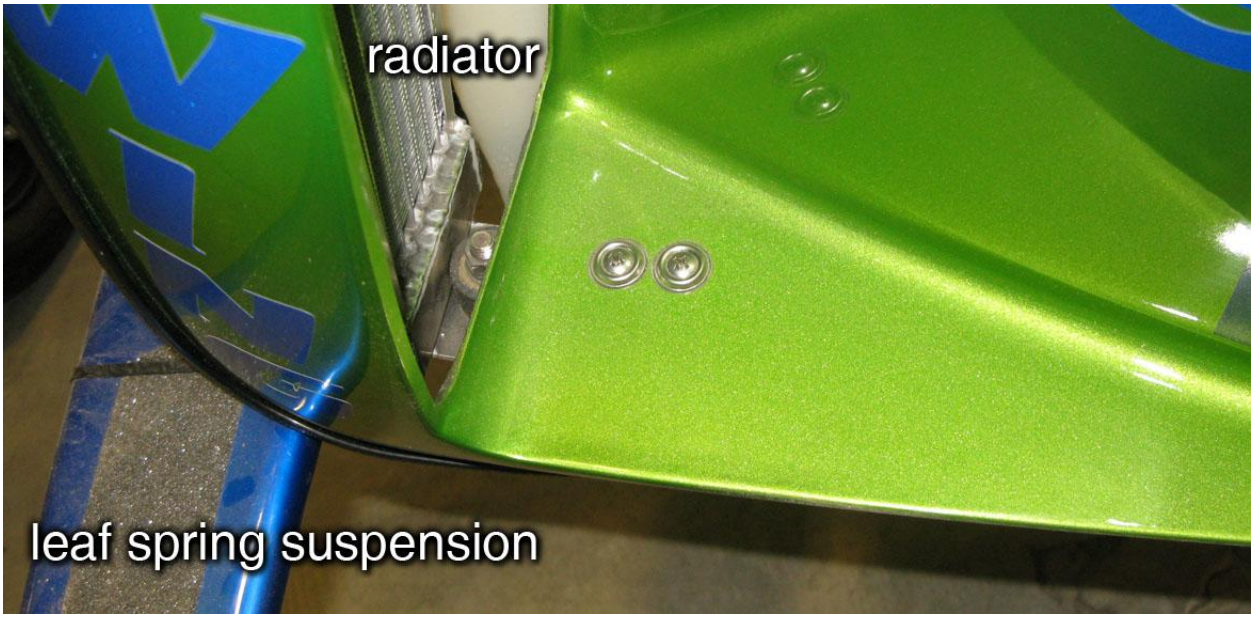
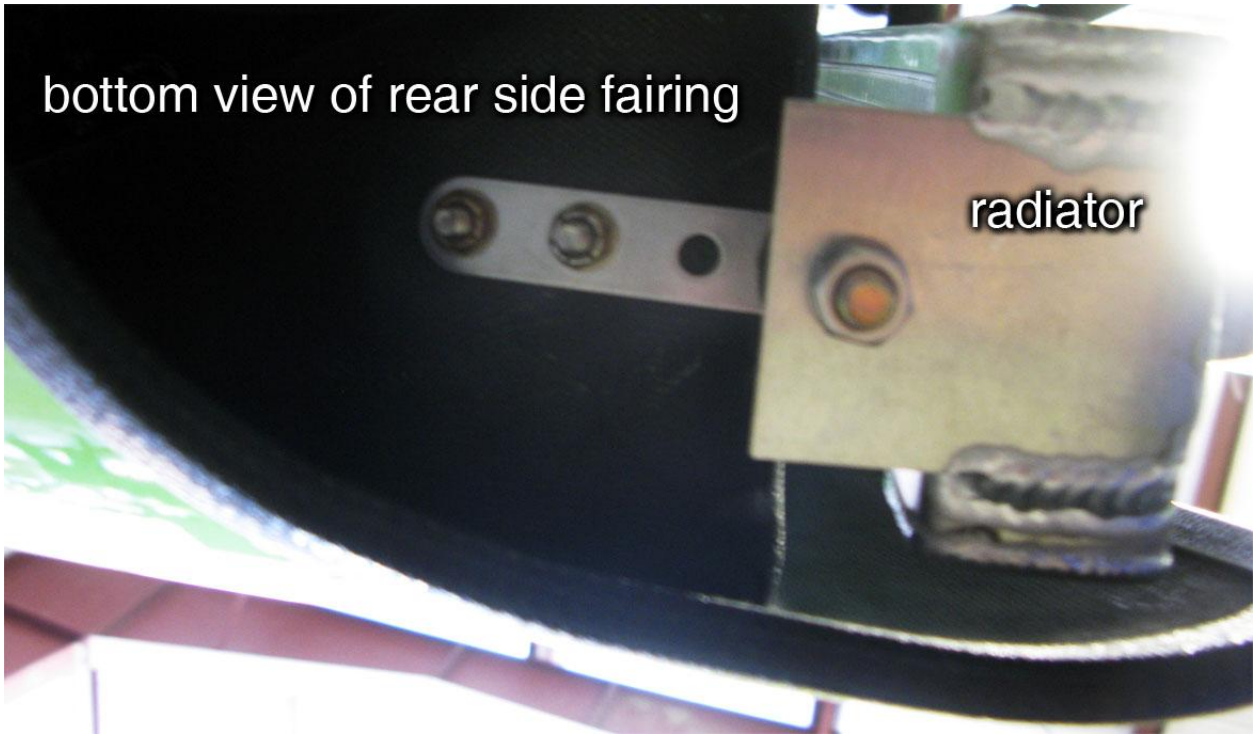


Photo: Bottom view of rear side Fairing bolts, attached to Radiator Bracket



Fairing Assembly – Windshield to Front Fairing Section

The final phase of attaching the fairing to the trike is the attachment of the windshield to the front fairing. The attachment of the windshield begins with installing the 2 bolts that are farthest back from the nose of the trike, one bolt on each side of the windshield.

Photo: Bolt and Well Nut used to attach Windshield to Fairing

The Windshield attaches to the front fairing section with 7 bolts. The bolts are 10-32, 3/16" diameter, 3/4" long, flat head, with a Phillips head.

To accommodate the size of the diameter of the well nuts, a 3/8" hole is drilled into the side of the fairing, and a 3/16" hole is drilled through the side of the windshield. When tightened, the well nuts expand to anchor the screw into the hole.

Photo: Rear bolt location for Windshield attachment to Fairing

1. Mark the locations for the 2 rear bolts, drill the 3/16" hole through the windshield and drill the 3/8" hole for the well nut through the fairing. Bolt each side of the windshield, but do not tighten too much, wait until all bolt holes and have been drilled and installed.

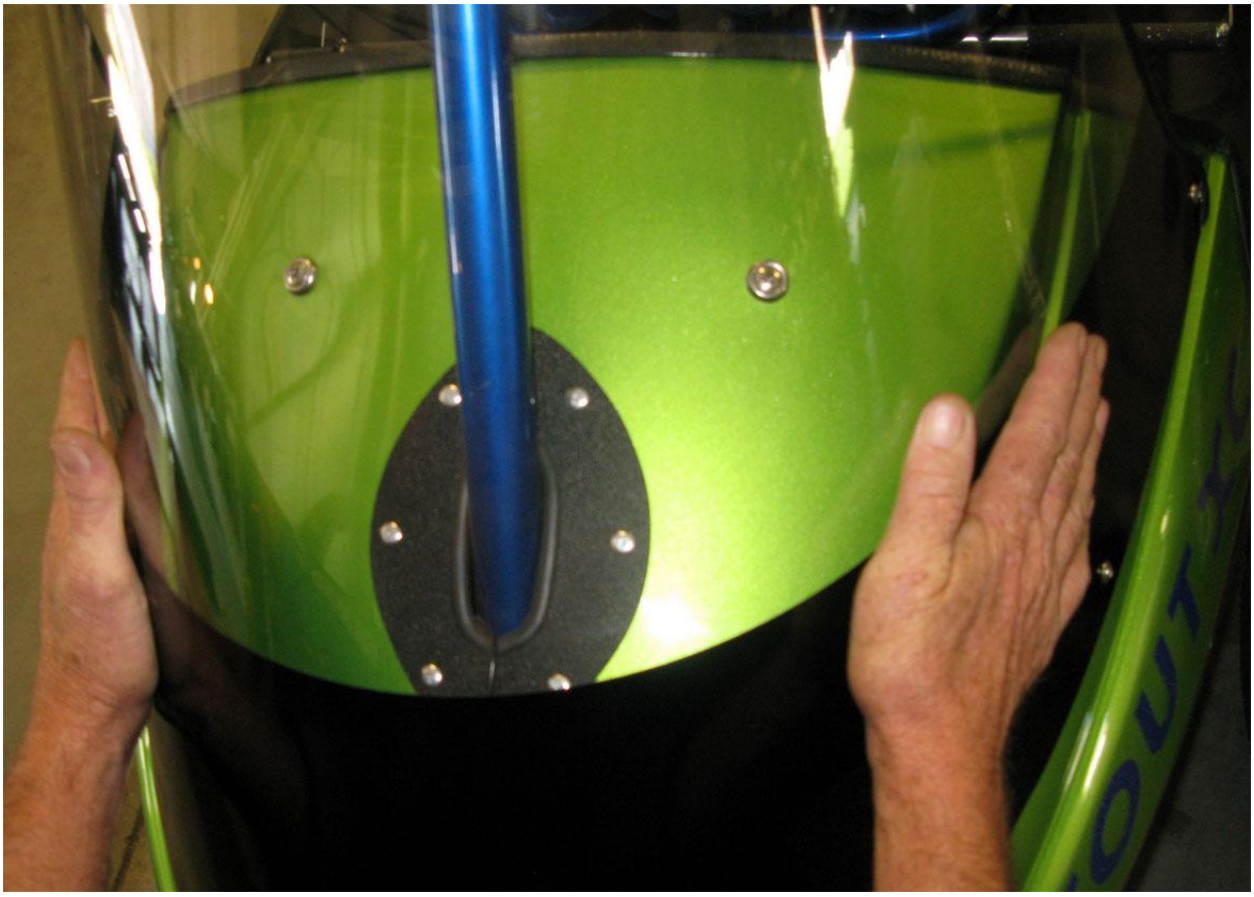
In the photo, note that there is a bolt at the front center of the windshield. The other 2 bolts to be drilled are spaced evenly between the front bolt and the rear bolt on each side of the windshield.

Photo: Front View of Windshield attached to Fairing

To find the best locations for the remaining bolts on the front and sides of the windshield, it is best to have another person assist you. With the 2 rear bolts already attached, one person gently squeezes in the sides of the windshield so the windshield lays on the fairing in the final position when it is bolted, per the photo.

2. Mark the locations for the 5 remaining bolts, drill the 3/16" holes through the windshield and drill the 3/8" holes for the well nut through the fairing. The front bolt location is in the center of the windshield. The other 2 bolts are evenly spaced between the front-center bolt and the 2 rear side bolts.

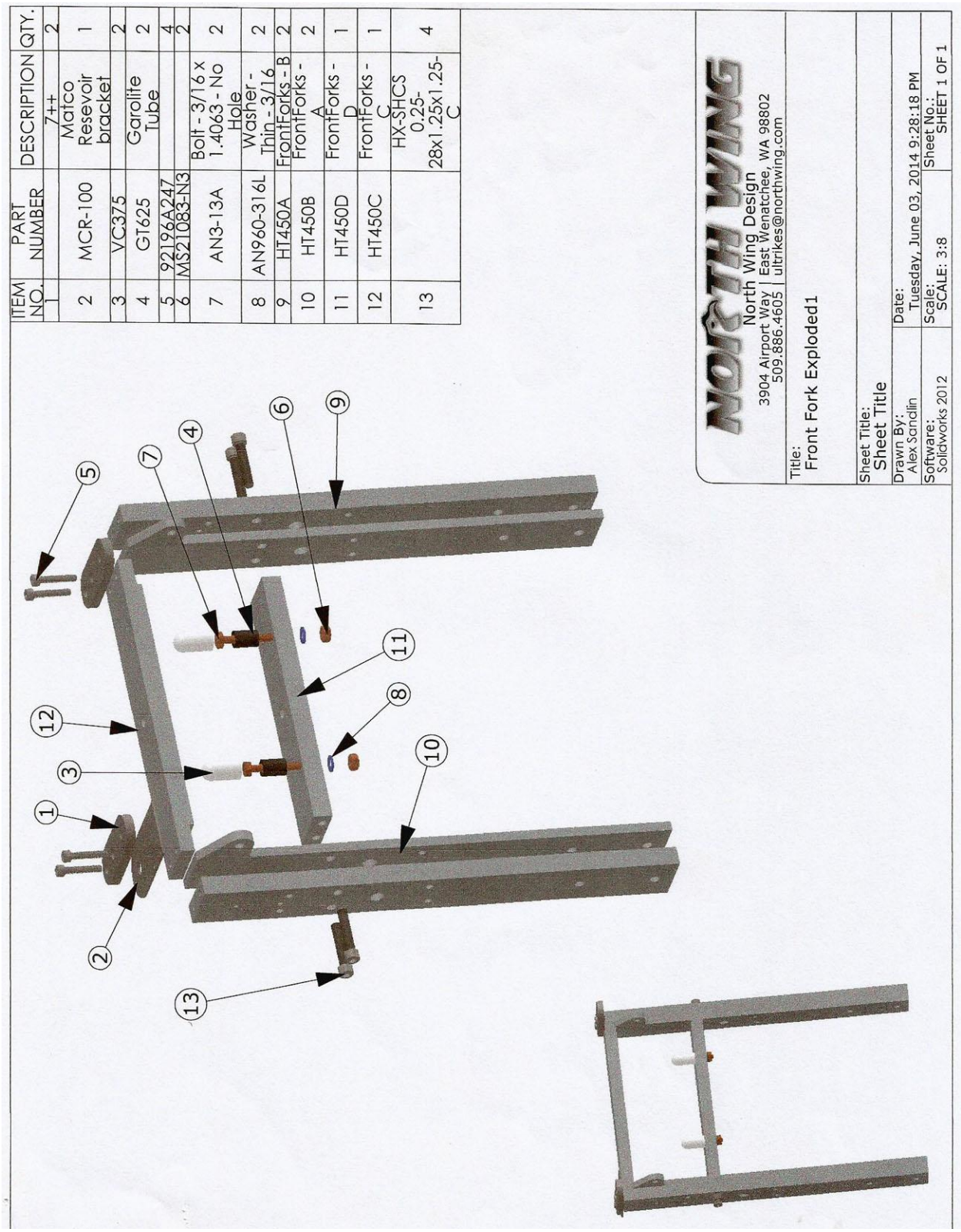
Photo: Gently squeeze in the sides of the Windshield to mark and drill the bolt holes



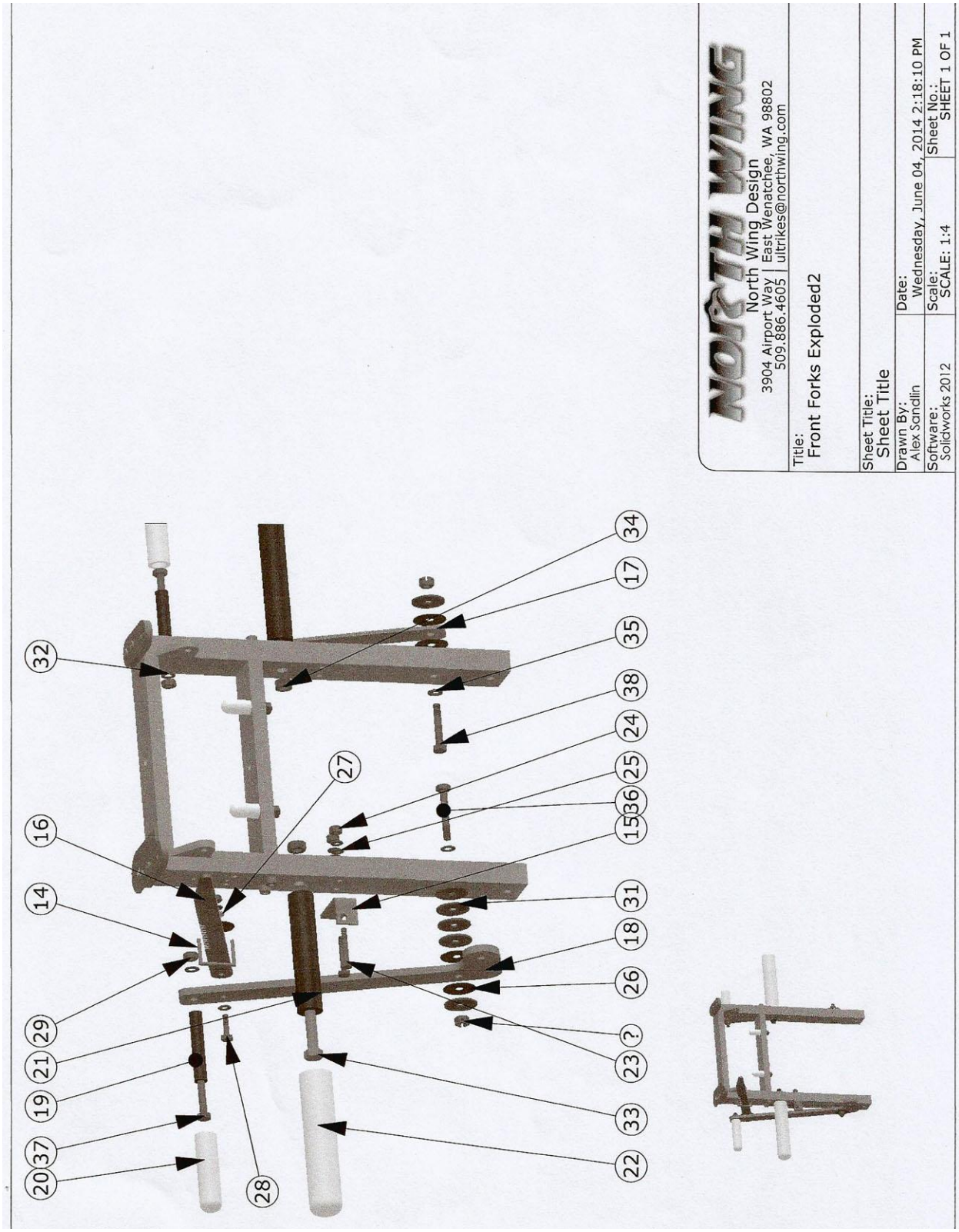
When all the bolts have been installed, you can tighten each bolt to snug, and apply the trim to the border of the windshield.

Schematic Diagrams and Parts Lists

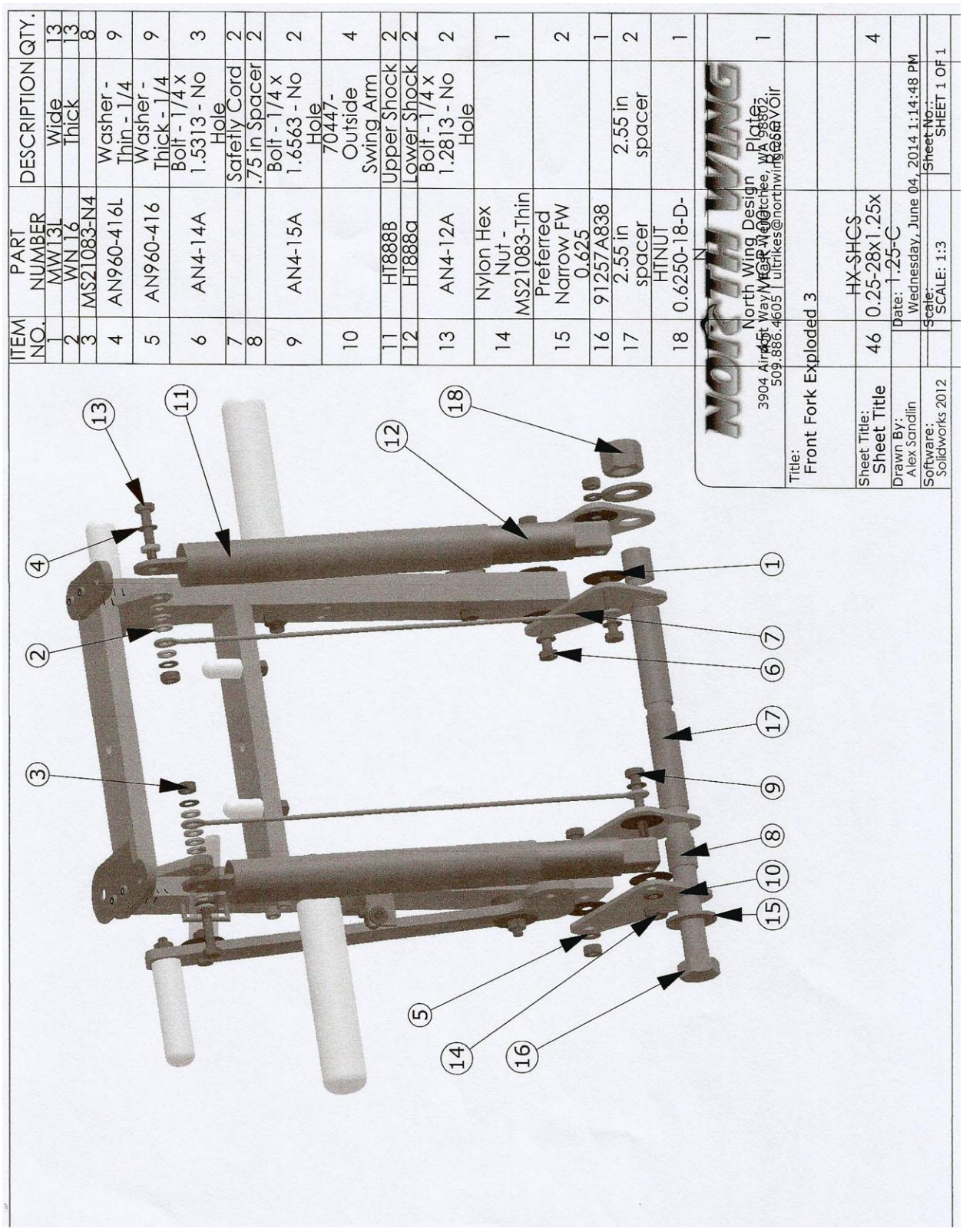
Front Fork – parts diagram 1



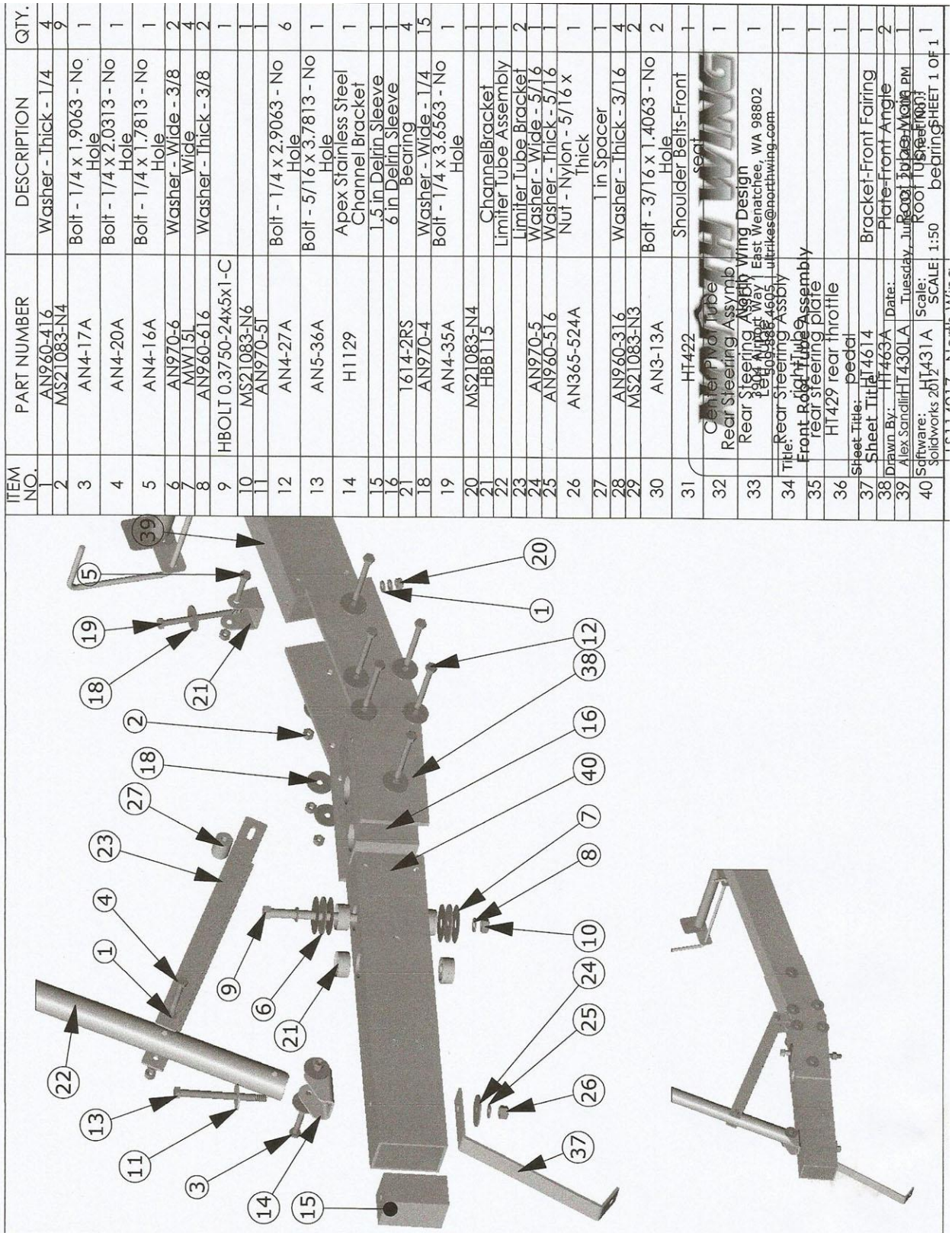
Front Fork – parts diagram 2



Front Fork – parts diagram 3



Front Root Tube Assembly - parts diagram



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	AN960-416	Washer - Thick - 1/4	4
2	MS21083-N4		9
3	AN4-17A	Bolt - 1/4 x 1.9063 - No Hole	1
4	AN4-20A	Bolt - 1/4 x 2.0313 - No Hole	1
5	AN4-16A	Bolt - 1/4 x 1.7813 - No Hole	1
6	AN970-6	Washer - Wide - 3/8	2
7	MW15L	Wide	4
8	AN960-616	Washer - Thick - 3/8	2
9	HBOLT 0.3750-24x5x1-C		1
10	MS21083-N6		1
11	AN970-5T		1
12	AN4-27A	Bolt - 1/4 x 2.9063 - No Hole	6
13	AN5-36A	Bolt - 5/16 x 3.7813 - No Hole	1
14	H1129	Apex Stainless Steel Channel Bracket	1
15		1.5 in Delrin Sleeve	1
16		6 in Delrin Sleeve	1
21	1614-2RS	Bearing	4
18	AN970-4	Washer - Wide - 1/4	15
19	AN4-35A	Bolt - 1/4 x 3.6563 - No Hole	1
20	MS21083-N4		1
21	HBB115	ChannelBracket	1
22		Limiter Tube Assembly	1
23		Limiter Tube Bracket	2
24	AN970-5	Washer - Wide - 5/16	1
25	AN960-516	Washer - Thick - 5/16	1
26	AN365-524A	Nut - Nylon - 5/16 x Thick	1
27		1 in Spacer	1
28	AN960-316	Washer - Thick - 3/16	4
29	MS21083-N3		2
30	AN3-13A	Bolt - 3/16 x 1.4063 - No Hole	2
31	HT422	Shoulder Belts-Front seat	1
32	Center Mid Tube Rear Steering Assembly		1
33	Rear Steering Assembly 1904 Airport Way | East Wenatchee, WA 98802 Letter 4605 | ultrikes@northwing.com		1
34	Rear Steering Assbly Front Root Tube Assembly		1
35	rear steering plate		1
36	HT429 rear throttle Sheet Title: pedal		1
37	Sheet Title: HT4614	Bracket-Front Fairing	1
38	Drawn By: HT463A	Date: Plate-Front Angle	2
39	Alex Sandlir HT430LA	Tuesday, June Root Tube-Main	1
40	Software: Solidworks 201 HT431A	Scale: SCALE: 1:50 Root Tube Front bearing	1

Leaf Spring Suspension to Frame - parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1		2 Stroke Leaf - Frame	1
2	GA7120	Leaf Spring Suspension	2
3		Main Root Tube - LeafSpring	1
4	AN970-5	Washer - Wide - 5/16	2
5	AN960-616	Washer - Thick - 3/8	16
6	AN960-516	Washer - Thick - 5/16	2
7	AN6-15A	Bolt - 3/8 x 1.703 - No Hole	8
8	AN5-36A	Bolt - 5/16 x 3.7813 - No Hole	2
9	AN365-624A	Nut - Nylon - 3/8 x Thick	8
10	AN365-524A	Nut - Nylon - 5/16 x Thick	2

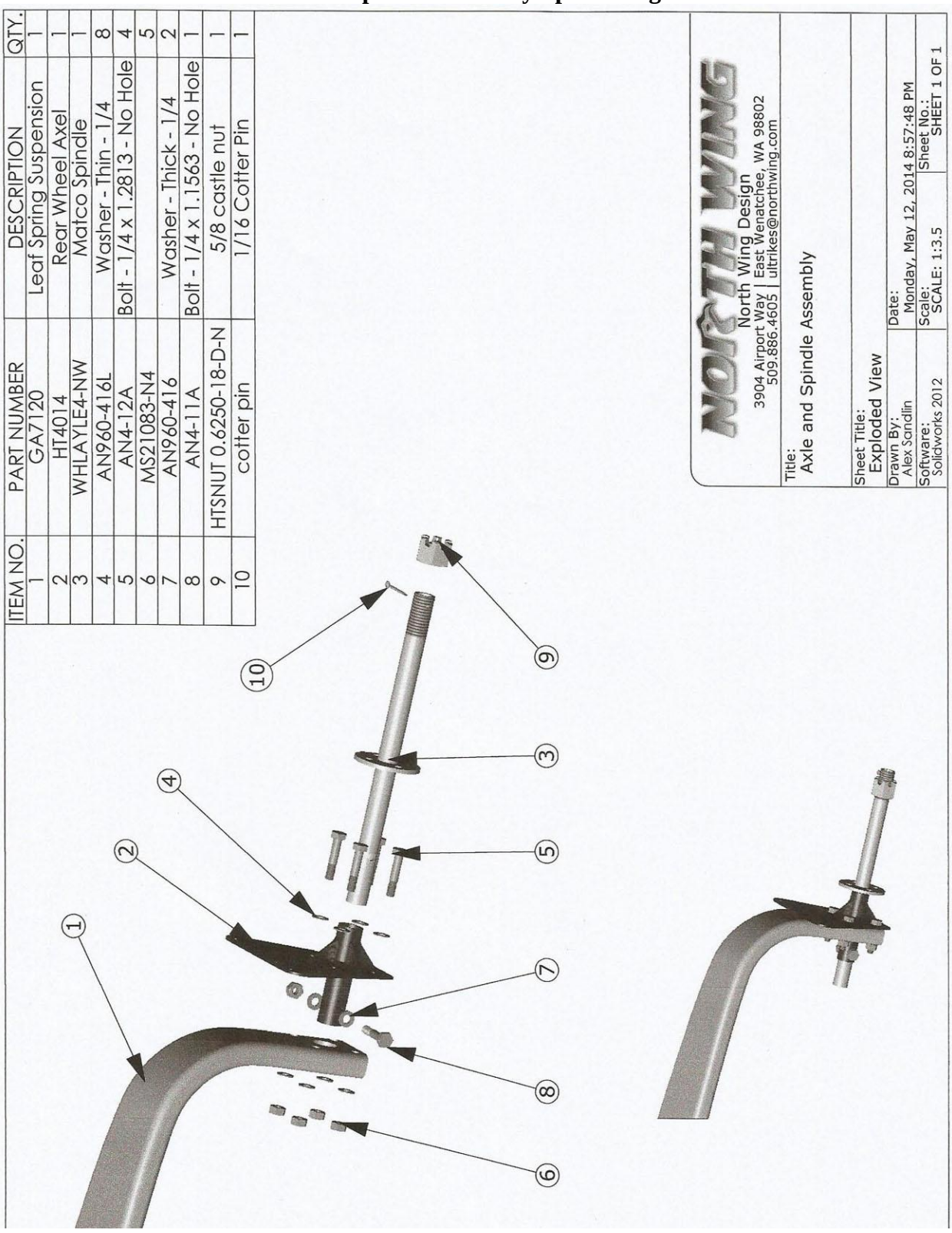
NORTH WING
North Wing Design
3904 Airport Way | East Wenatchee, WA 98802
509.886.4605 | ultrikes@northwing.com

Title: Leaf Spring to Frame

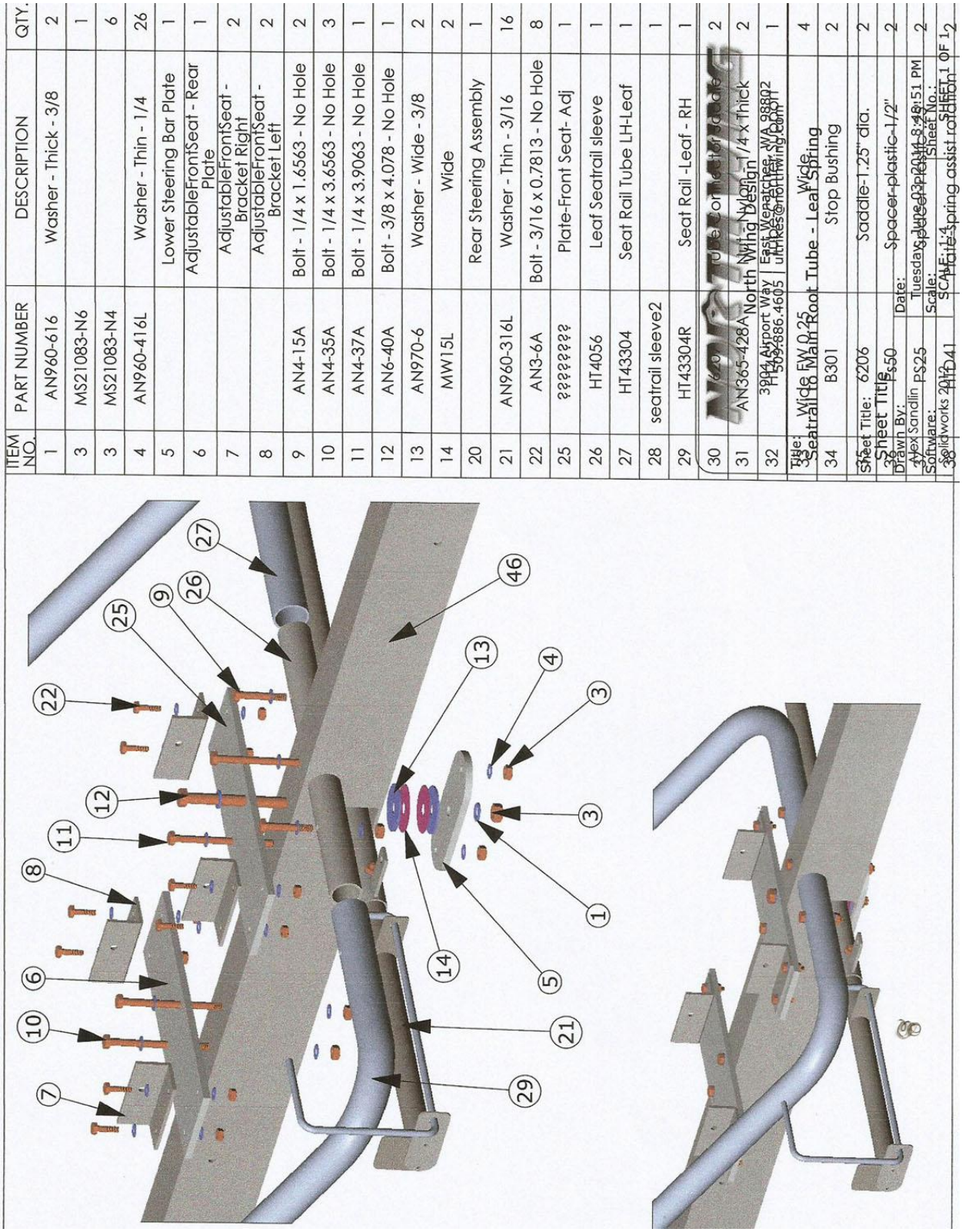
Sheet Title: Exploded View

Drawn By: Alex Sandlin
Date: Tuesday, June 03, 2014 8:50:01 PM
Software: Solidworks 2012
Scale: SCALE: 1:50
Sheet No.: SHEET 1 OF 1

Axle and Spindle Assembly - parts diagram



Seat Rail to Main Root Tube Assembly – parts diagram



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	AN960-616	Washer - Thick - 3/8	2
3	MS21083-N6		1
3	MS21083-N4		6
4	AN960-416L	Washer - Thin - 1/4	26
5		Lower Steering Bar Plate	1
6		AdjustableFrontSeat - Rear Plate	1
7		AdjustableFrontSeat - Bracket Right	2
8		AdjustableFrontSeat - Bracket Left	2
9	AN4-15A	Bolt - 1/4 x 1.6563 - No Hole	2
10	AN4-35A	Bolt - 1/4 x 3.6563 - No Hole	3
11	AN4-37A	Bolt - 1/4 x 3.9063 - No Hole	1
12	AN6-40A	Bolt - 3/8 x 4.078 - No Hole	1
13	AN970-6	Washer - Wide - 3/8	2
14	MW15L	Wide	2
20		Rear Steering Assembly	1
21	AN960-316L	Washer - Thin - 3/16	16
22	AN3-6A	Bolt - 3/16 x 0.7813 - No Hole	8
25	??????	Plate-Front Seat- Adj	1
26	HT4056	Leaf Seatrail sleeve	1
27	HT43304	Seat Rail Tube LH-Leaf	1
28	seatrail sleeve2		1
29	HT43304R	Seat Rail -Leaf - RH	1
30	[illegible]	Tube for Motor Saddle	2
31	AN365-428A	Nut - Nylon - 1/4 x Thick	2
32	HT4302	3904 Airport Way | East Wenatchee, WA 98802 | 509.886.4605 | ultimatechairs@hotmail.com	1
33	Title:	Seatrail to Main Root Tube - Leaf Spring Wide FW 0.25	4
34	B301	Stop Bushing	2
35	Sheet Title: 6206	Saddle-1.25" dia.	2
36	Sheet Title: B50	Spacer-plastic-1/2"	2
37	Drawn By: Alex Sandlin Software: SolidWorks 2010	Date: Tuesday, June 03, 2014 8:48:51 PM Scale: SCALE: 1:4	2
38	PS25 HTD41	Sheet No.: SHEET 1 OF 1 Plate-Spring assist rotation	2

Seat Rail Assembly – parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	HT4056	Leaf Seatrail sleeve	1
2	HT43304	Seat Rail Tube LH-Leaf	1
3	seatrail sleeve2		1
4	HT43304R	Seat Rail -Leaf - RH	1
5	6207	Tube Connector Saddle	2
6	AN365-428A	Nut - Nylon - 1/4 x Thick	2
7	HT452	Tube-Center Support	1
8	AN960-416L	Washer - Thin - 1/4	14
9	Wide FW 0.25	Wide	4
10	B301	Stop Bushing	2
11	6206	Saddle-1.25" dia.	2
12	Ps50	Spacer-plastic-1/2"	2
13	PS25	Spacer-Plastic-.25"	2
14	HTD41	Plate-spring assist rotation	2
15	AN4-17A	Bolt - 1/4 x 1.9063 - No Hole	2
16	MS21083-N3	Nut-Nylock .1/4" LP	3
17	MS21083-N4	Nut-Nylock .1/4" LP	1
18	HT4062	Plate-Fairing mounting	1
19	AN4-23A	Bolt - 1/4 x 2.4063 - No Hole	2
20	AN4-30A	Bolt - 1/4 x 3.0313 - No Hole	2
21	HT4062 R&L	plate-upper rear fairing mount	1

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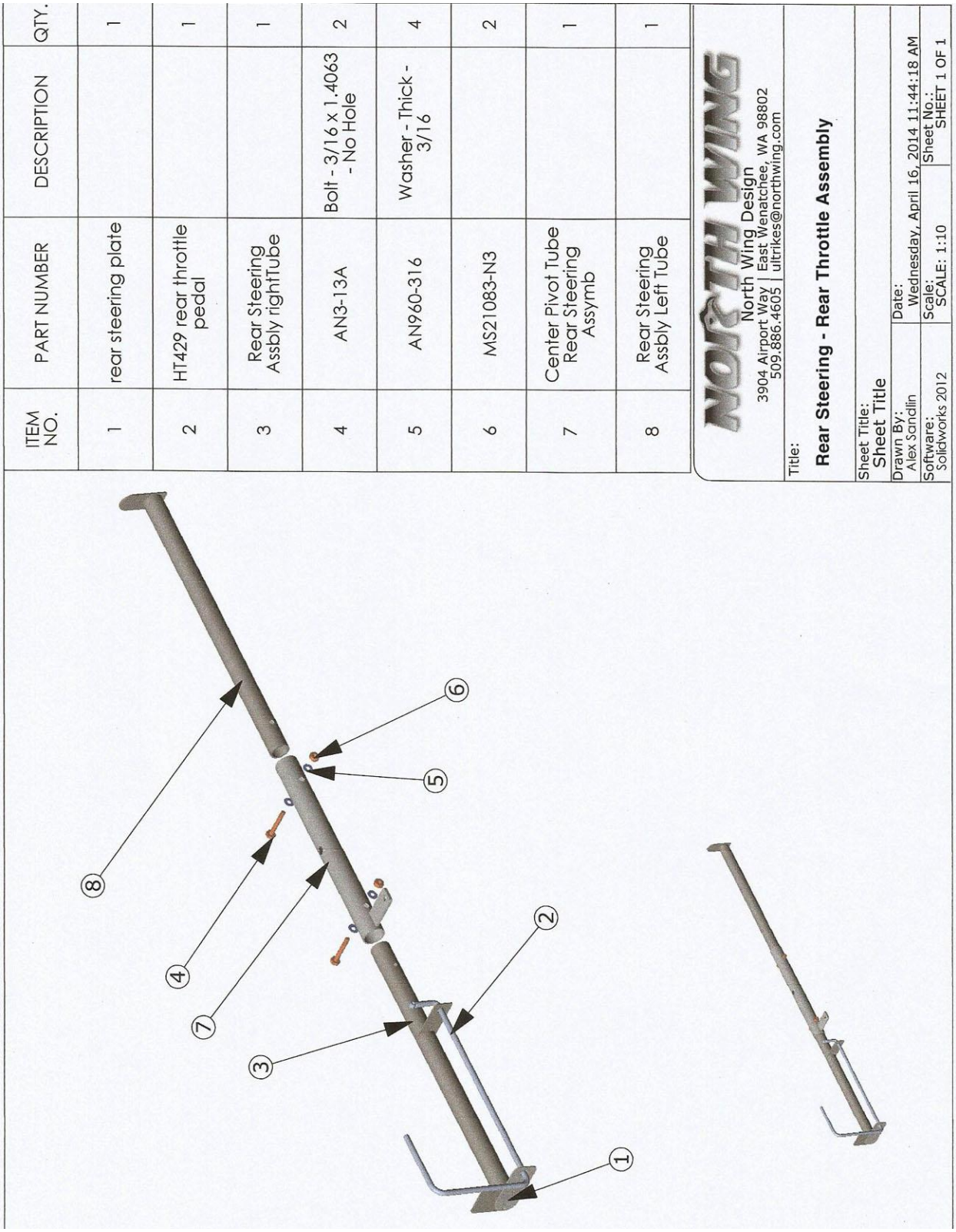
Title: Seat Rail Assembly

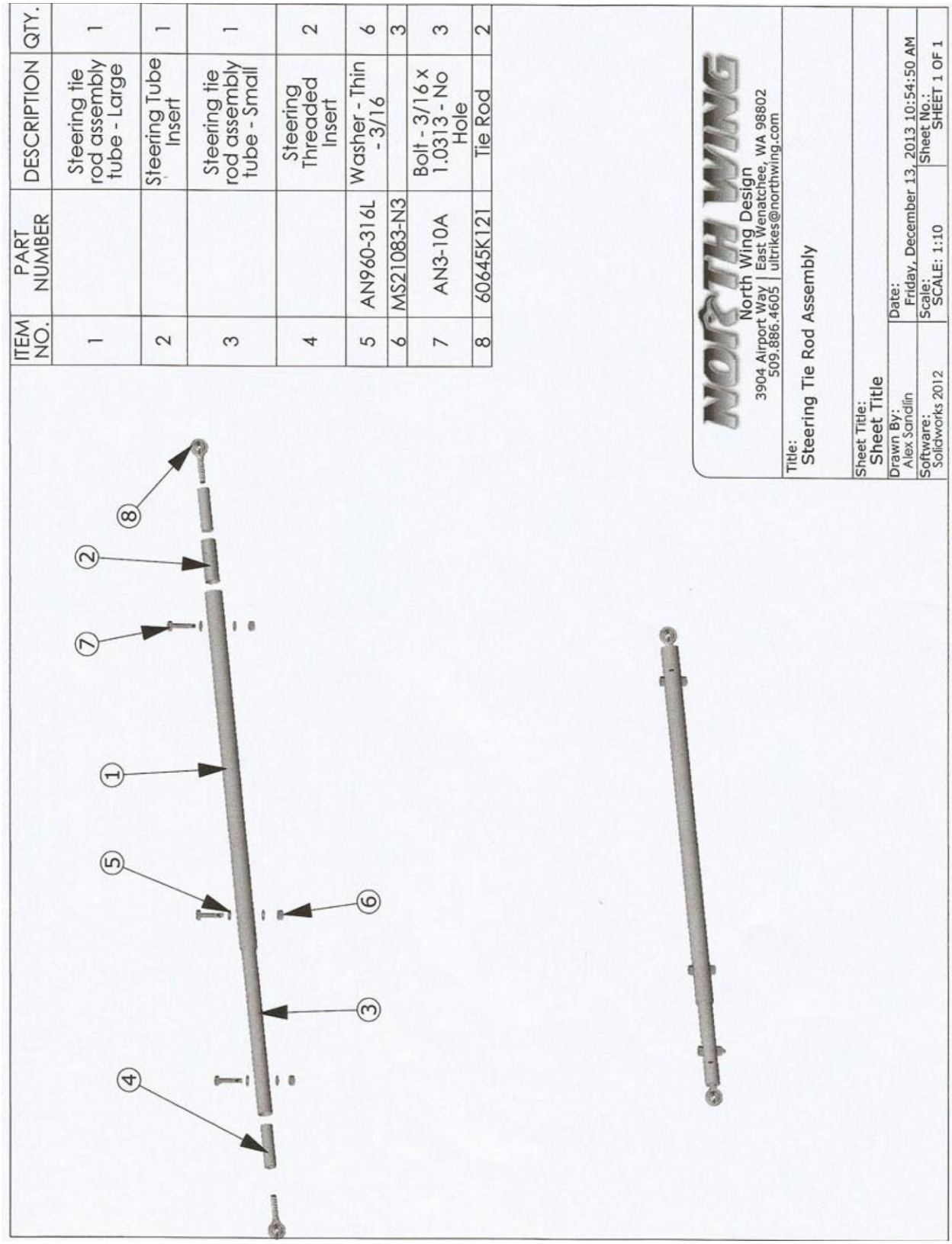
Sheet Title: Sheet Title

Drawn By: Alex Sandlin
Date: Monday, June 02, 2014 4:27:04 PM
Software: Solidworks 2012
Scale: SCALE: 1:10
Sheet No.: SHEET 1 OF 1

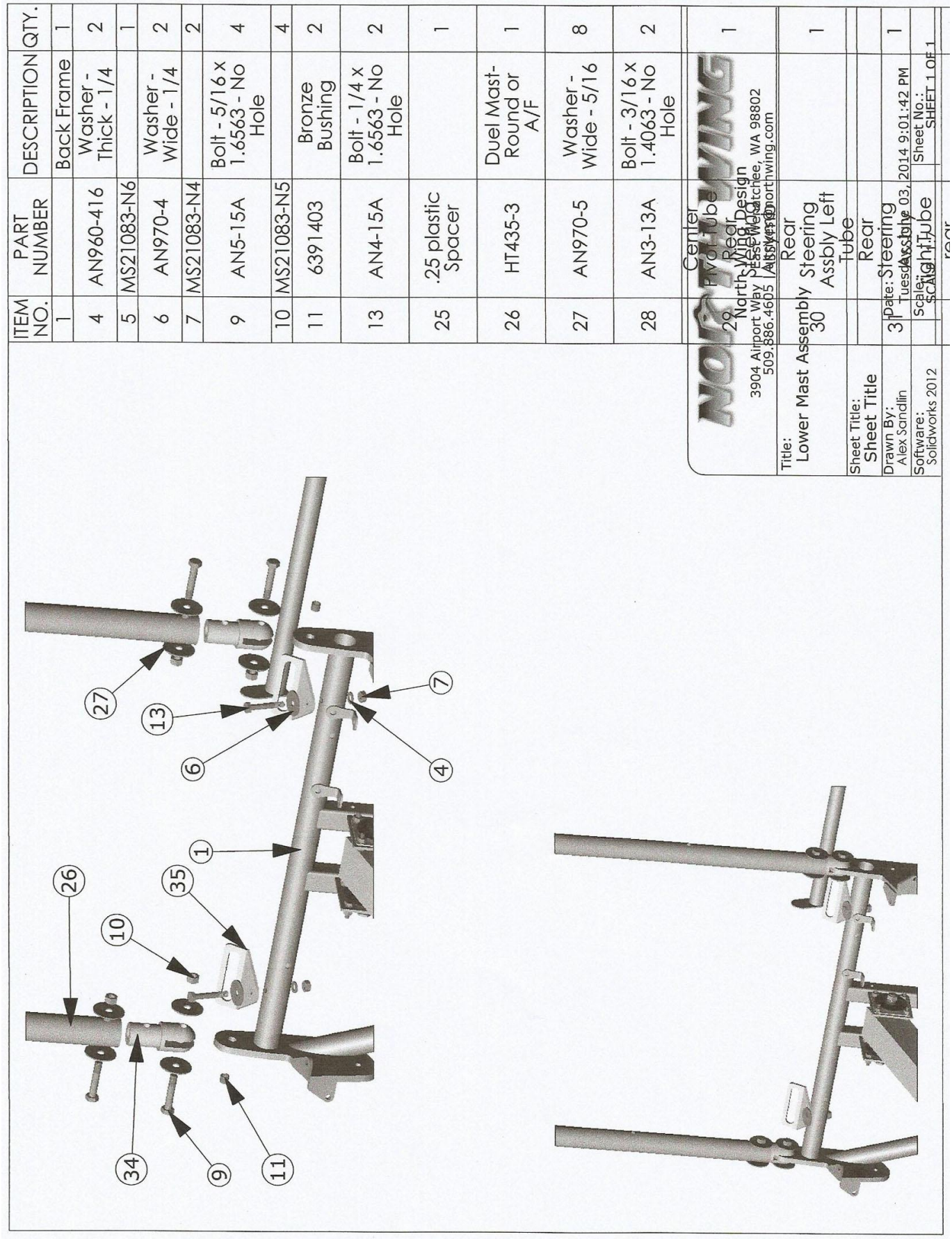
Rear Steering and Rear Throttle Assembly - parts diagram



Steering Tie Rod Assembly - parts diagram



Lower Mast Assembly - parts diagram



Upper Mast Assembly - parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H1129	Apex Stainless Steel Channel Bracket	1
2	AN970-5	Washer - Wide - 5/16	1
3	AN960-516	Washer - Thick - 5/16	1
4	AN970-5T		1
5	AN5-25A	Bolt - 5/16 x 2.6563 - No Hole	1
6	AN365-524A	Nut - Nylon - 5/16 x Thick	1
7	6338K416	Flange Bearing	2
8		Limiter Tube Assembly	1
9	AN4-16A	Bolt - 1/4 x 1.7813 - No Hole	1
10	MS21083-N4		1
11	94807A029		1
15	AN310-4	Nut - Castellated - 1/4	1
16		SafetyPin Leash Assembly	2
17	AN4-17A	Bolt - 1/4 x 1.9063 - No Hole	1
18	AN5 - 40	HBOLT 0.3125-24x3.75x0.875-N	1
19	AN310-5	Nut - Castellated - 5/16	1
19	HT435-3	Duel Mast-Round or A/F	1
20	HT436	Alum.Insert sleeve-Mast	1
21	HT426	Fitting-Limiter Tube	1

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Title: Upper Mast Assembly

Sheet Title: Sheet Title

Drawn By: Alex Sandlin

Date: Tuesday, June 03, 2014 9:58:41 PM

Software: Solidworks 2012

Scale: SCALE: 1:50

Sheet No.: SHEET 1 OF 1

Upper Mast – Pivot Block Assembly - parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	AN960-616	Washer - Thick - 3/8	2
2	AN310-6	Nut - Castellated - 3/8	1
3		PivotBlockSpacer	2
5		1/16 Cotter Pin	1
8		UChannel Block	1
9		CR-FHM1 0.25-20x1x1-N	6
10	AN6-40	Bolt - 3/8 x 4.078 - Shank Hole	1
26	HT435-3	Duel Mast-Round or A/F	1
27	HT436	Alum.Insert sleeve-Mast	1
28	HT426	Fitting-Limiter Tube	1

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Title: Upper Mast w/ Pivot Block

Sheet Title: Sheet Title

Drawn By: Alex Sandlin

Date: Wednesday, June 04, 2014 1:38:52 PM

Software: Solidworks 2012

Scale: SCALE: 1:3

Sheet No.: SHEET 1 OF 1

Limiter Tube – Center Assembly - parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1		Lower Limiter Tube	1
2		Limiter Connector	1
3		Upper Limiter Tube	1
4	AN960-416	Washer - Thick - 1/4	2
5	AN4-16A	Bolt - 1/4 x 1.7813 - No Hole	2
6	MS21083-N4		1
7	94807A029		1
8	AN310-4	Nut - Castellated - 1/4	1
9		SafetyPin Leash Assembly	1

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Title: Limiter Tube Center Assembly

Sheet Title: Sheet Title

Drawn By: Alex Sandlin | Date: Friday, December 13, 2013 10:47:11 AM

Software: Solidworks 2012. | Scale: SCALE: 1:20 | Sheet No.: SHEET 1 OF 1

Front Seat Back Support Assembly – parts diagram

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	HT485A	Back Rest Mounting Tube - Lower	1
2	HT485	Back Rest Mounting Tube - Upper	1
3	14lw	Lock Washer	5
4	HBOLT 0.2500-20x1x0.75-C		2
5	HBOLT 0.2500-20x1.5x0.75-C		1
6	AN4-15A	Bolt - 1/4 x 1.6563 - No Hole	1
7	MS21083-N4		1
8		Cover- Back rest	1
9	90975A027	T Nut -1/4"	3
10	HT485W	Wood-back rest	1

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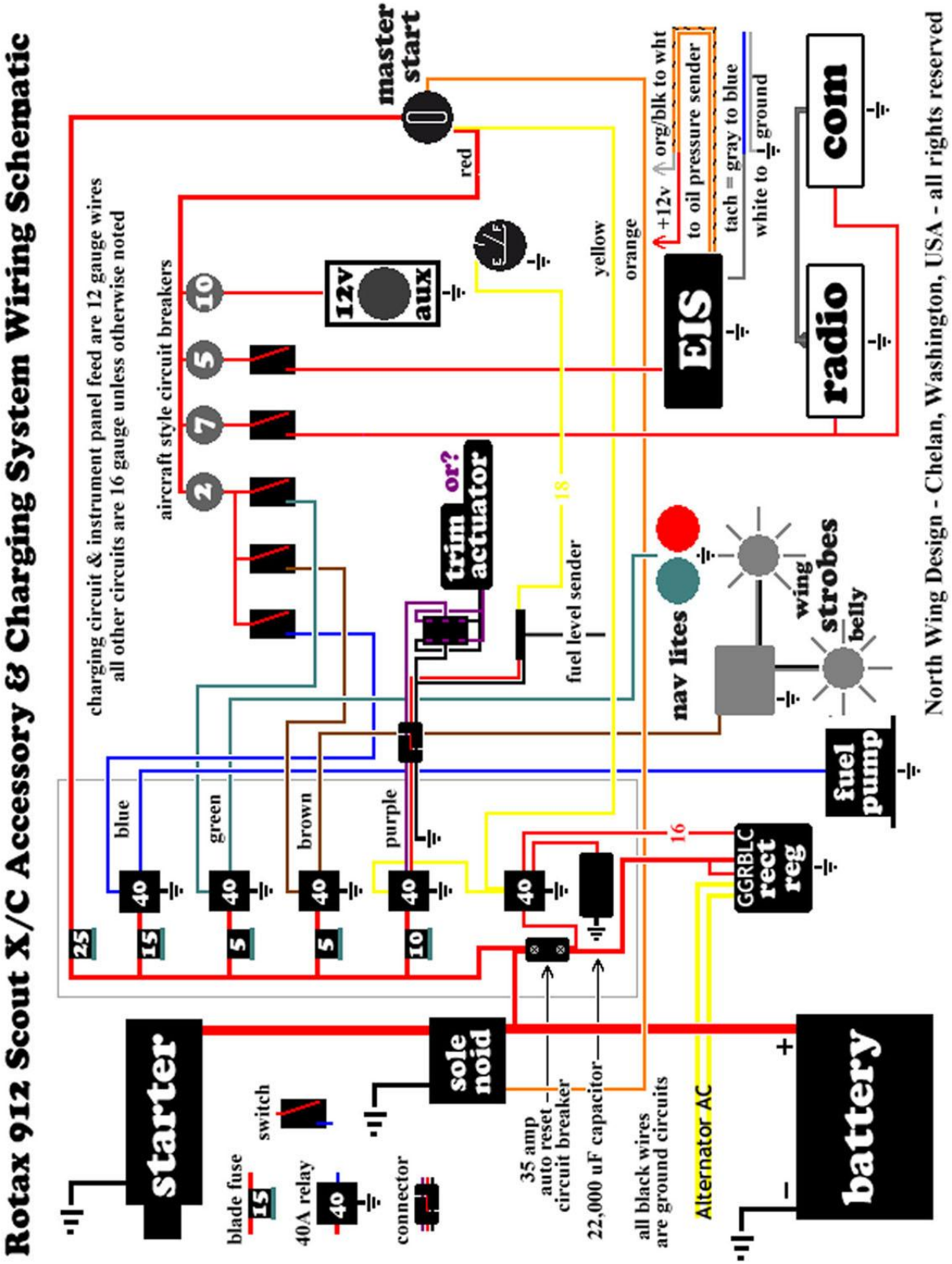
Title: Back Support Assembly

Sheet Title: Sheet Title

Drawn By:	Date:
Alex Sandlin	Tuesday, June 03, 2014 10:06:45 PM
Software: Solidworks 2012	Scale: SCALE: 1:10
	Sheet No.: SHEET 1 OF 1

Electrical Wiring Schematic

Rotax 912 – Scout XC Apache – Accessory & Charging System Wiring Schematic



Trike Photos with Close-up Views

Photo: Trike Mast with Pivot Block – Mounted to Mustang 3 Wing

Photo: View under Adjustable Front Seat

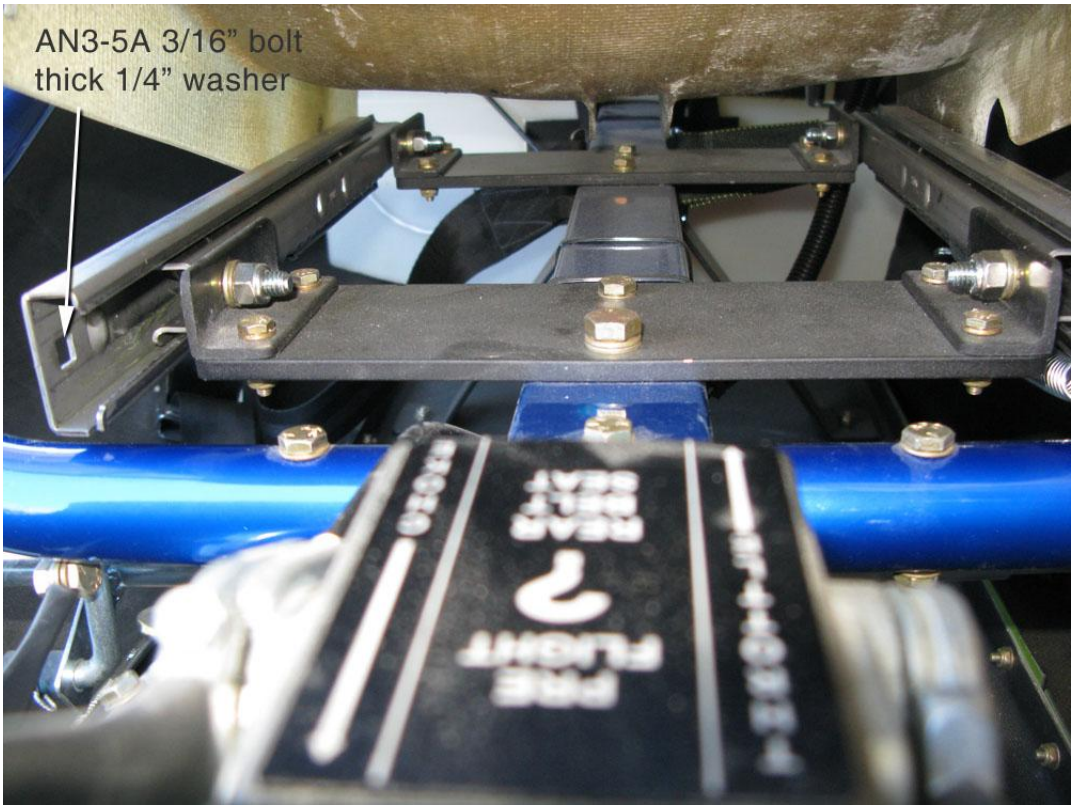


Photo: View 2 under Adjustable Front Seat

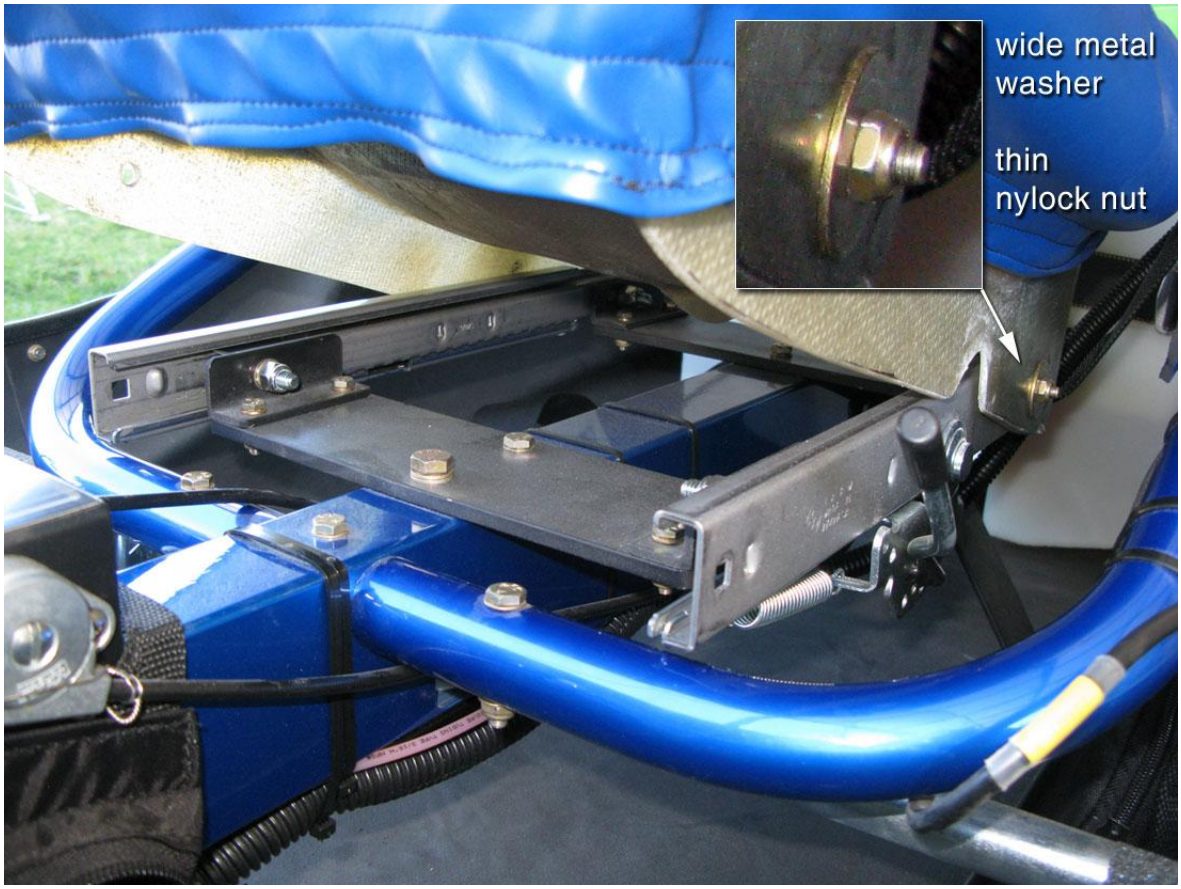


Photo: Fuse Box location behind seats

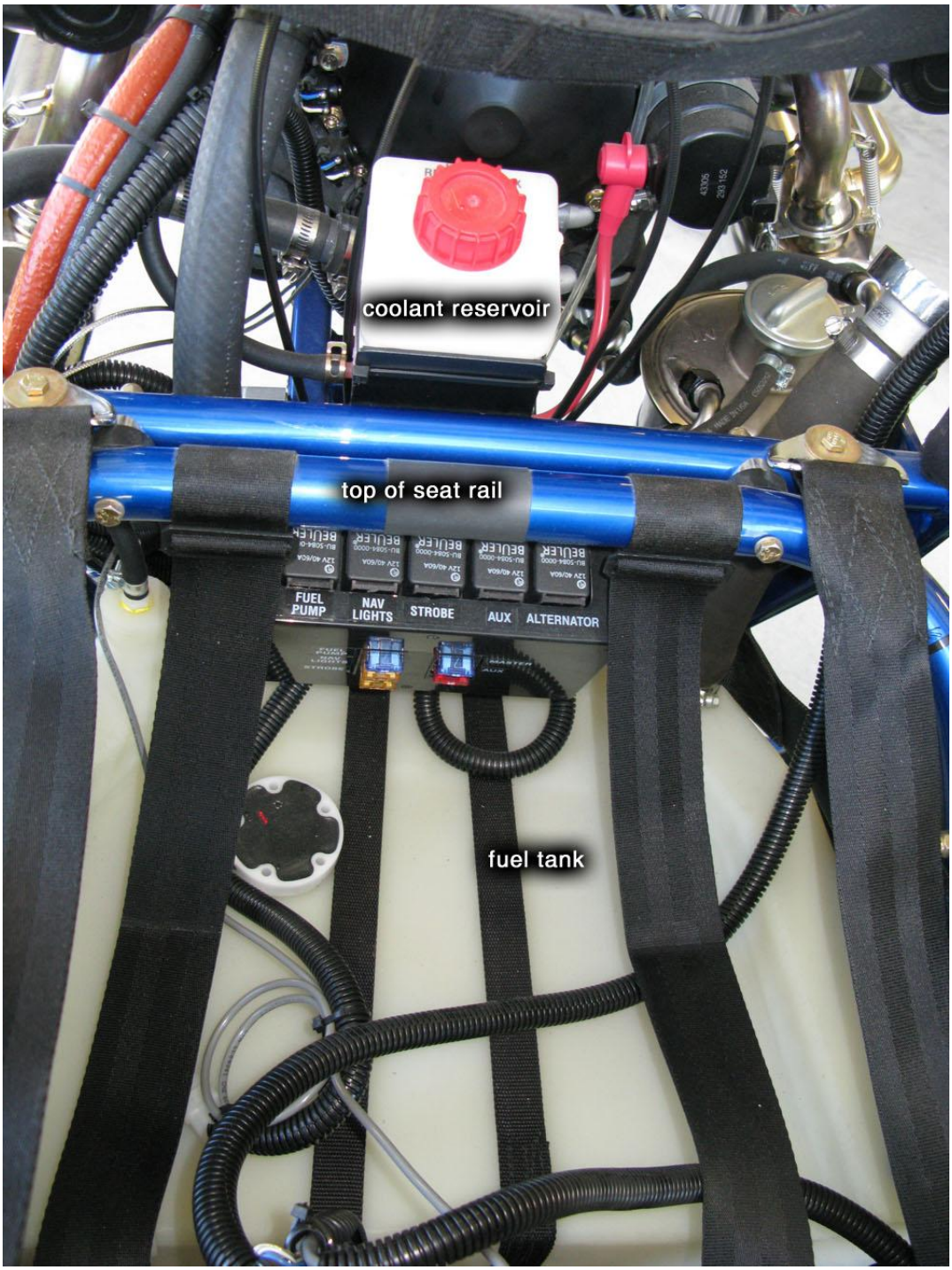


Photo: bolt assembly for Adjustable Front Seat to slider

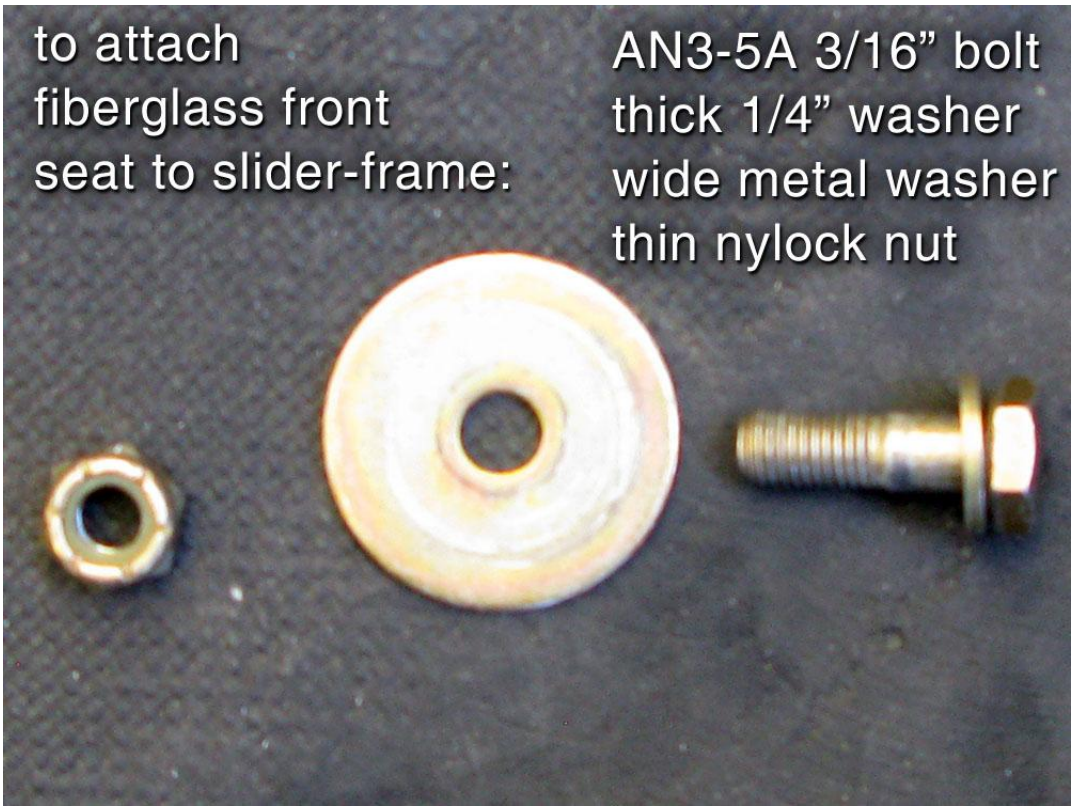


Photo: Coolant Reservoir bracket

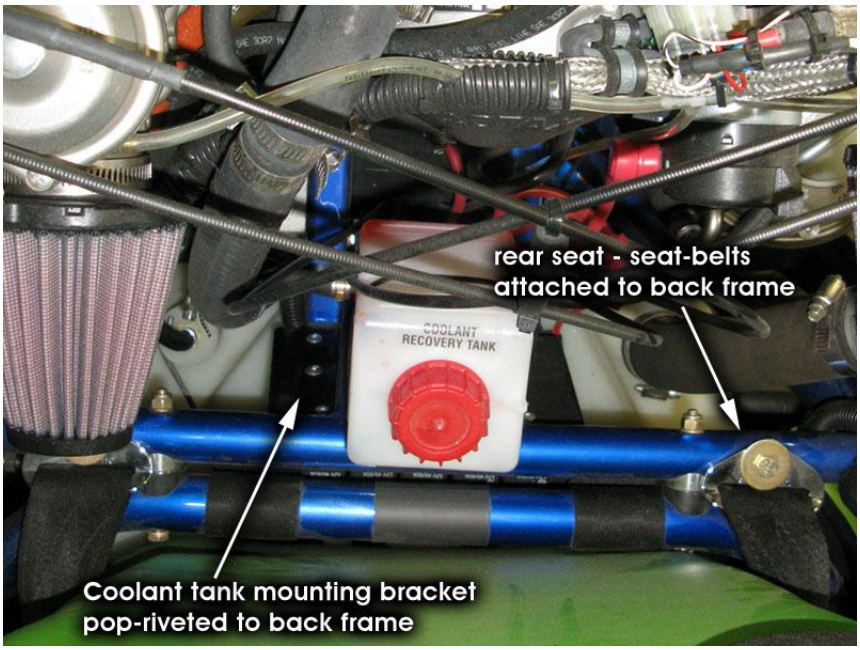


Photo: Rotax 912 Top View

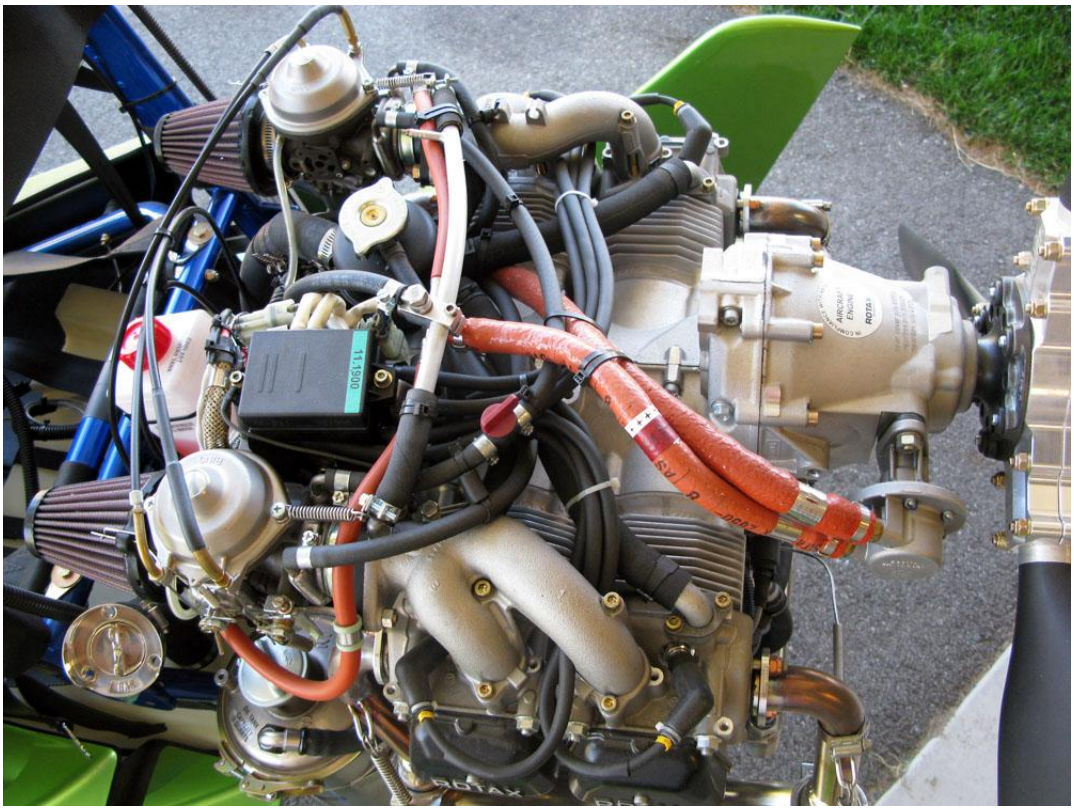


Photo: Strobe electronics mounted under rear seat

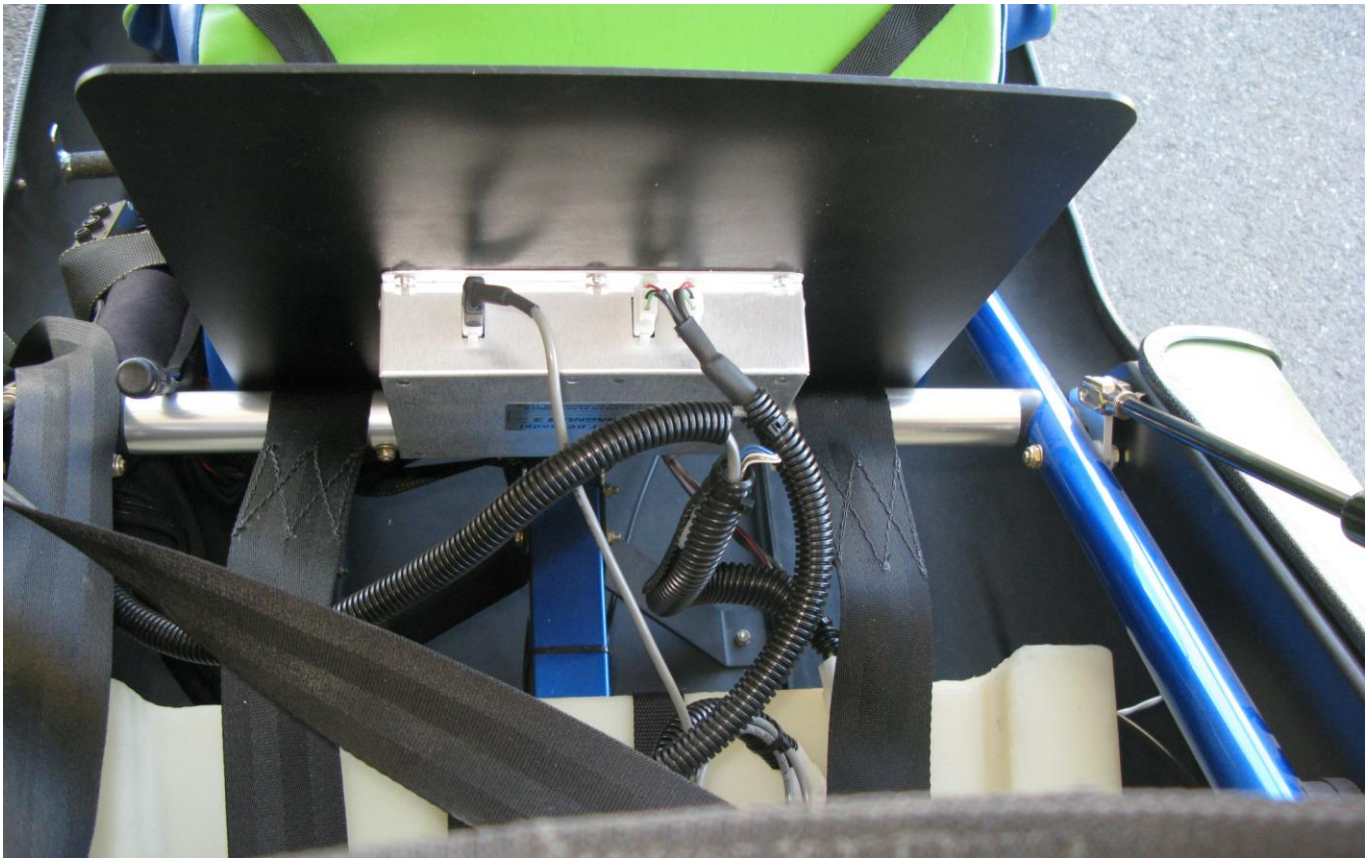


Photo: Rotax 912 – right side view