



<u>Process</u>
Fit Mount to Firewall
Fit Mount to Engine
Fit Mount & Engine to Firewall
Fit Air Filter Box
Cabin Heat Mixer Box
Battery Support
Oil Recovery Bottle
Firewall Fuel System
Regulator & Solenoid
Ram Air Cooling Ducts
Control Cable Termination
Choke Cable
Throttle Cable
Oil Cooling System
Cowls
Propeller
Spinner

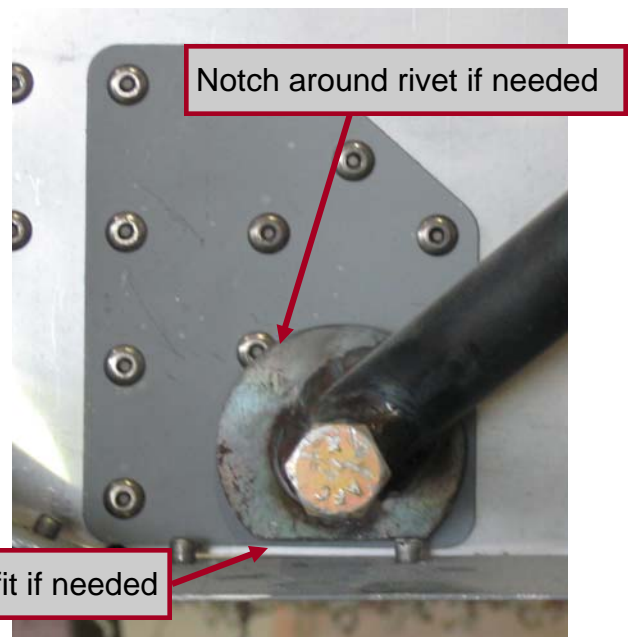
List sequence above is a logical build order but certainly is not the only sequence that will work. Builders can mix and match as desired. The manual procedures are only a general guide to the proper installation of a Jabiru engine and firewall forward system and are not represented as mandatory or required procedures.. Each builder should become familiar with standard aircraft practice as outlined in various FAA Advisory Circulars, books by Tony Bingelis (available from EAA) Bob Nuckolls (Aeroelectric Connection) and others and continue installing a firewall forward system only after fully understanding the basic principles involved.

The engine mount will have to be trimmed so that the mount pads that contact the firewall will fit correctly on the firewall. These pads may have to be trimmed to match their firewall, avoid rivets and to allow room to make a good fit with the nose wheel support

1. Place the nose leg support weldment in place on the firewall and insert firewall side bolts through firewall. Bolt heads on the cockpit side of firewall.
2. Position the engine mount over the nose wheel support and on to the firewall. Hold the mount in place by installing common jam nuts over the mount bolts. Since the mount will come off again (maybe more than once) do not use the AN363 metal locking nuts at this time..



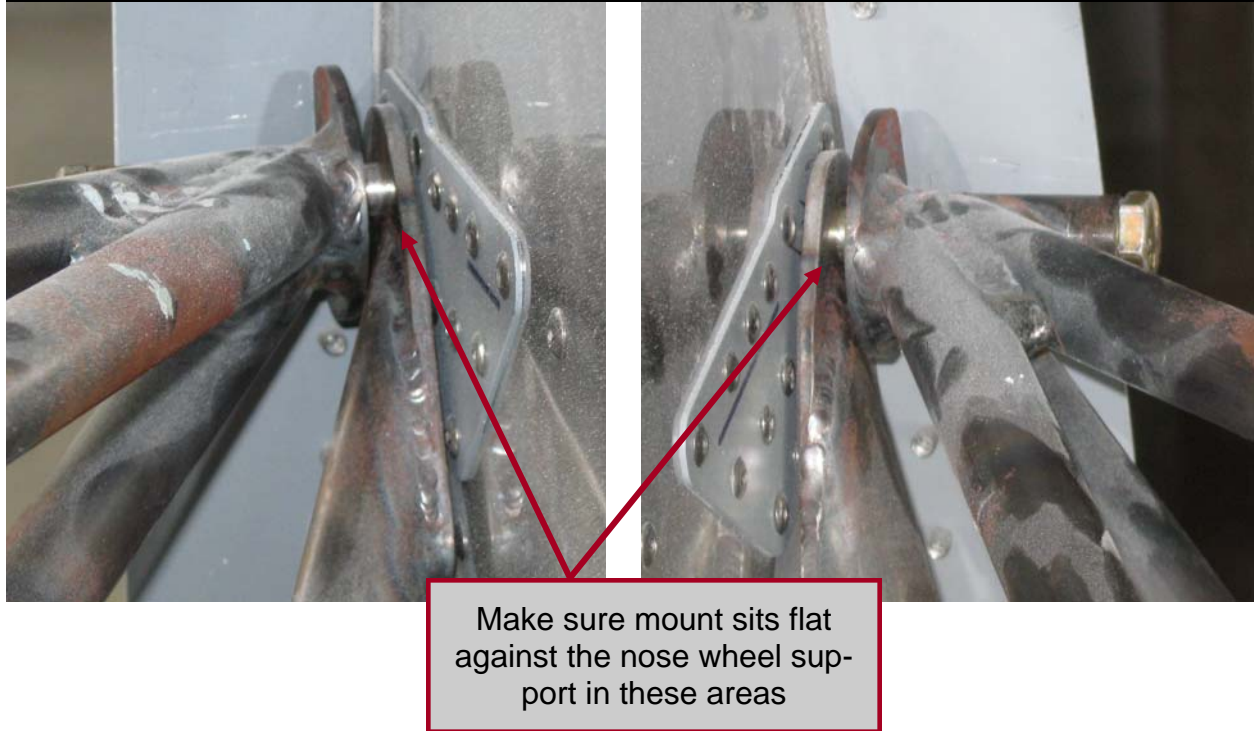
3. Position the lower two mount pads in the correct position and mark for trimming so that the pads fit above the fuselage bottom skin. You may have to notch out the mount pad to avoid a rivet in the firewall reinforcement pad. Most mounts will fit with no trim but make sure the mount pad does not lie over a rivet head.



5. Check the fit of the top engine mount pads against the nose wheel support. Trim to fit if needed. Newer mounts are fabricated with smaller mounting pads than these that are pictured and should require little or no trimming. Just make sure the mount pad sits flat against the nose wheel support.

Take care not to stretch the mount itself as it is possible to distort the mount so that the mount will not fit the engine.





8. Prep & Paint Mount

Clean all manufacturing oils or oxidation from the steel tubes of the mount. Use steel wool and a solvent to loosen deposits. Wipe clean and dry with a soft cloth.

Prime the mount with a good self etching primer (available at most auto stores).

Top coat with a good spray enamel like Rustoleum Hi Performance. We suggest a light color like white or light gray as it makes it easier to spot any cracks that might occur during the life of the mount.

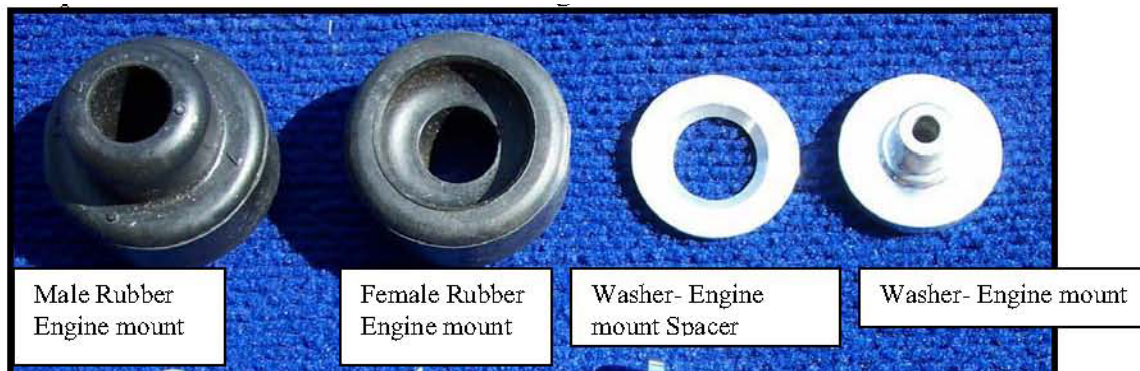
9. When satisfied with the mount fit remove mount and go on to step two: Fit Mount to Engine.

10. If building with the single throttle system be sure to install the throttle arm extension onto the carb. Much easier to install before engine is on mount or on the airplane.

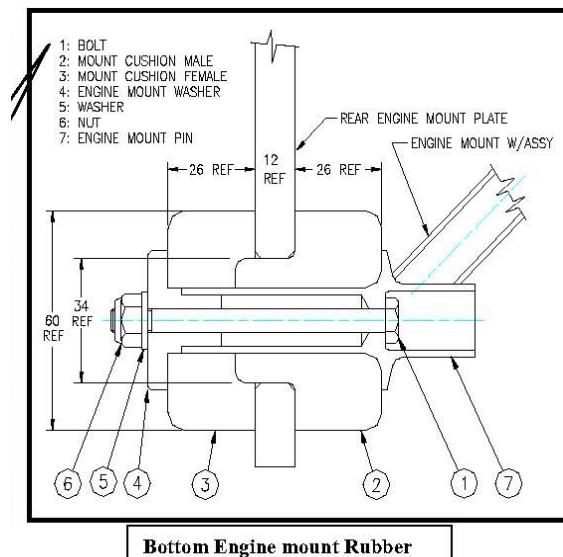
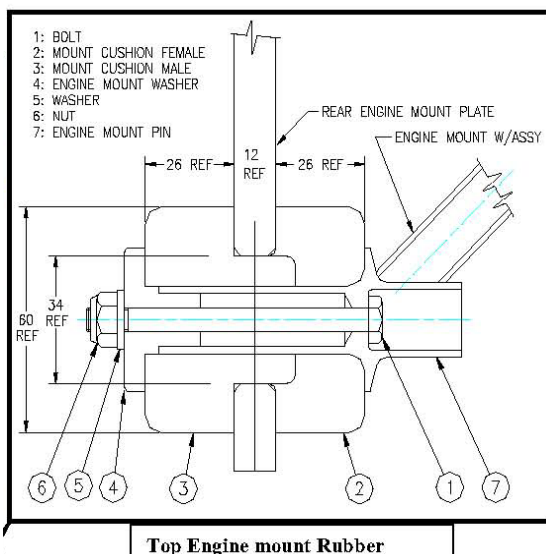
Builders may find it easier to mount the engine to the engine mount and then mount the assembly to the firewall. However, it is not necessary to attach mount to engine first and the mount can be attached to the firewall if the builder prefers.

There are a few procedures that are easier to do before the engine is mounted to the firewall, though. Attaching the throttle arm extension and drilling a new hole for the cable end adjuster installing and attaching the throttle cable is easier to do with the carb off the engine and on the bench. See the instructions for those procedures.

1. Locate the engine mount cushions and hardware in photo 1 that came with the Jabiru engine is the accessory bag. Also find the engine mount bolts, washers, and nuts from the FWF kit.



2. Refer to the mount cushion assembly drawings below.
3. Install the female half of the mount cushion on the top mount pins.
4. Install the male half of the mount cushion on the bottom mount pins.
5. Stand the engine up on its prop flange.

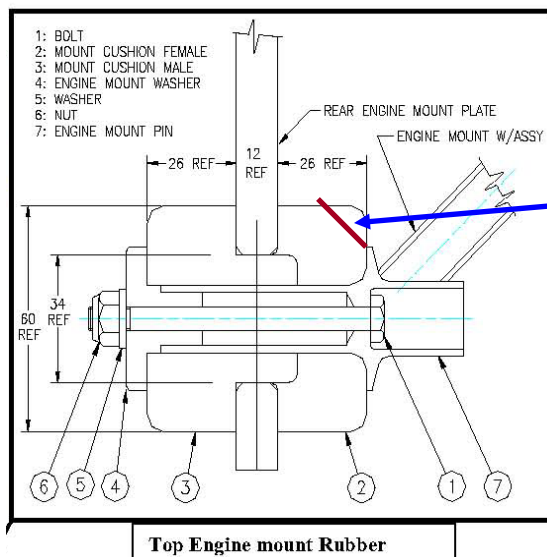
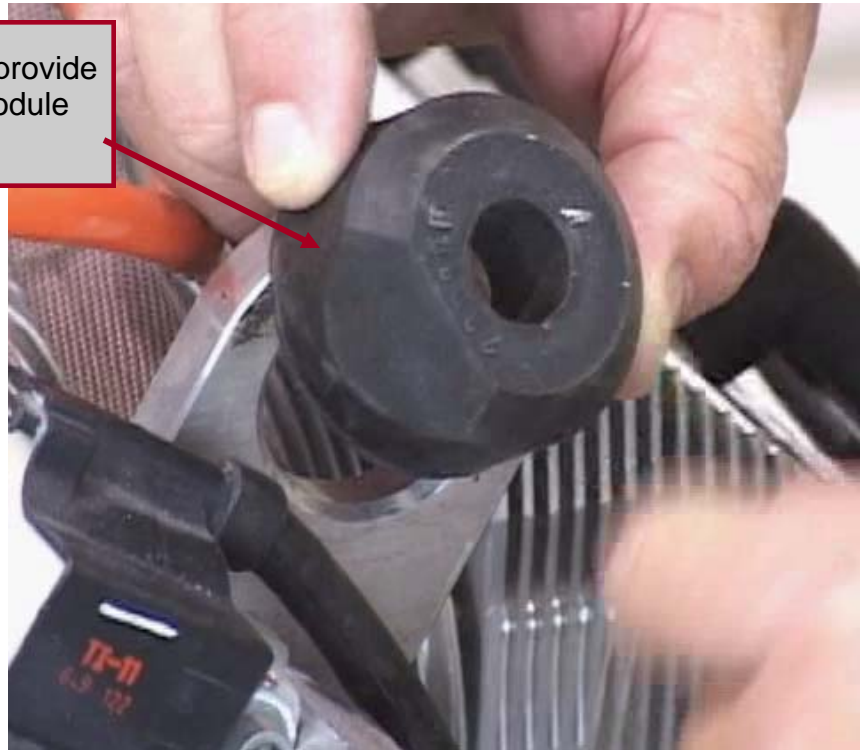


Trim Female Cushion

The female mount cushion that will go on the upper right side of the engine must be trimmed a bit to provide clearance for the ignition module. This is most easily accomplished on a band saw but a hack saw or similar tool will do the job as well.

Complete this job as you trial fit engine to engine mount

Trim female cushion to provide clearance for ignition module and lead wire.



Remove rubber shoulder with a bevel cut. Rotate cushion so that the beveled area is over the ignition module lead. Remove enough so that the cushion does not interfere with or contact the module or lead. Remove only in an area just large enough to provide clearance for the module and lead. Do not bevel the entire radius of the cushion!

6. Lower the mount down onto the engine, inserting the male cushions into the engine back plate.
7. Insert the AN4-31A mount bolt in the top mount pins
8. Install the male half of the cushion onto the engine mount pin and into the engine back plate.
9. Install the mount washer into the end of the mount cushion and engine mount pin.
10. Using an extended length socket to hold the bolt in place, compress the mount cushion and mount washer until the mount bolt extends far enough through the mount washer to get the washer and AN363-428 nut started. See photo below.
11. Tighten the nut until the mount washer bottoms on the engine mount pin. There should be about two threads showing on the mount bolt.
12. Repeat for other mount bolts.



Builders may find it easier to mount the engine to the engine mount and then mount the assembly to the firewall. There are a few procedures that may be easier if done before final engine installation:

Single throttle carb throttle lever extension is easier to install before engine is on the plane (not needed for dual throttle option)
Female mount cushion for the upper right mount should be beveled for ignition module clearance

Once those tasks are complete and the engine is on the mount use an engine hoist (or a few strong helpers) to lift the engine and mount into position for a temporary fit up. Install the bolts and jam nuts in all firewall mounting holes and lightly snug up the bolts.

Typically a builder would temporarily hang the engine and then locate the positions of other accessories on the firewall. Using the photos and instructions in other sections of this manual locate the accessories by holding in place and marking their perimeter



or mounting hole locations with a Sharpie marker.

See page four for list of items to locate on the firewall



Guide engine onto mount to install top mount locations first.



After top mount bolts are secure and the engine back plate is centered on the male mount cushions, lower the engine hoist and let the weight of the engine help compress the bottom mount cushions



Once the engine has been temporarily mounted the firewall mounted accessories must be located. Each of these items has its own section. Please refer to those sections for instructions.

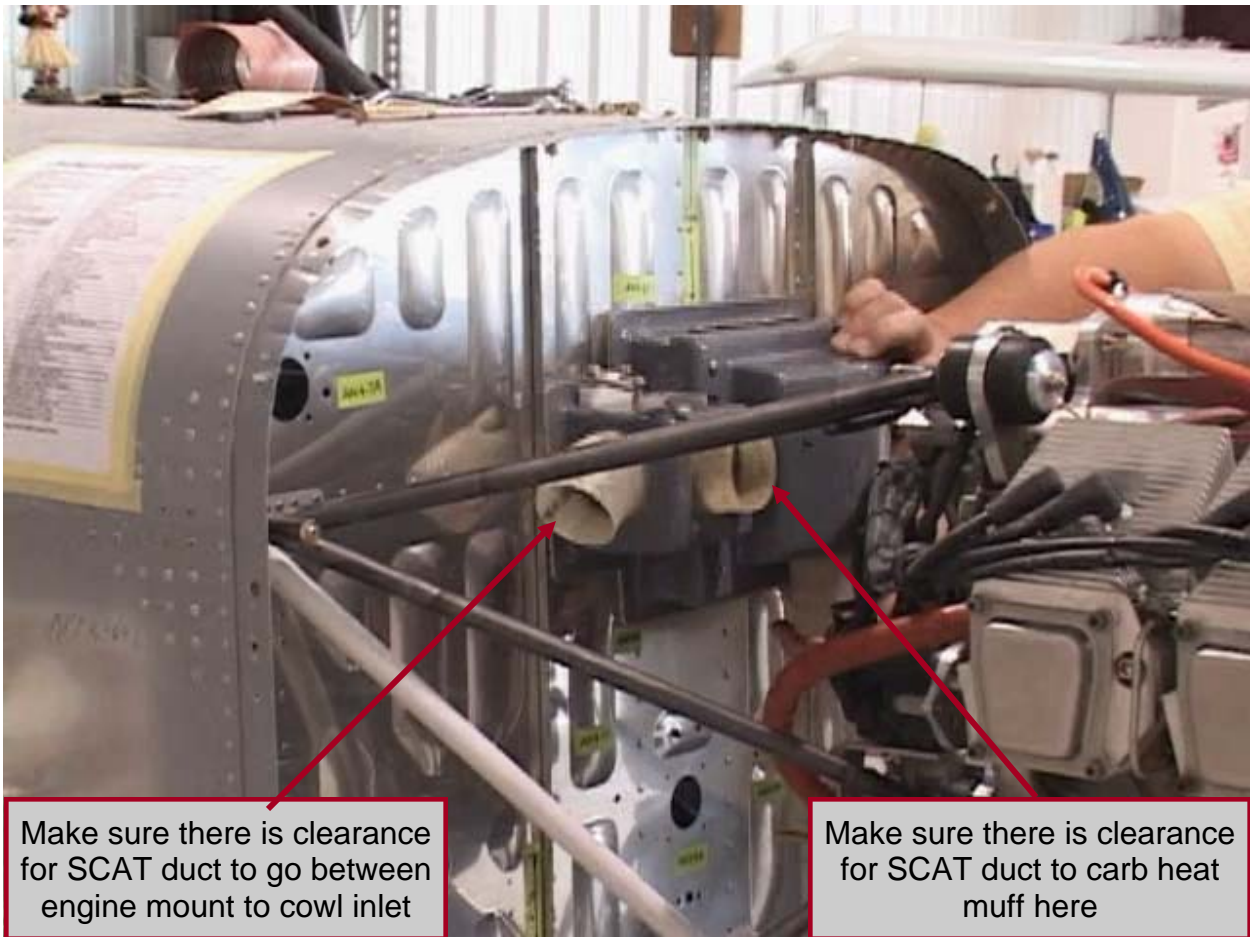
Airbox
Cabin Heat Mixer Box (optional)
Battery Support & Clamp
Oil Recovery Bottle
Fuel fitting
Starter Solenoid
Regulator

After firewall items are located it may be easier to remove engine to permanently install those items that are on the firewall.

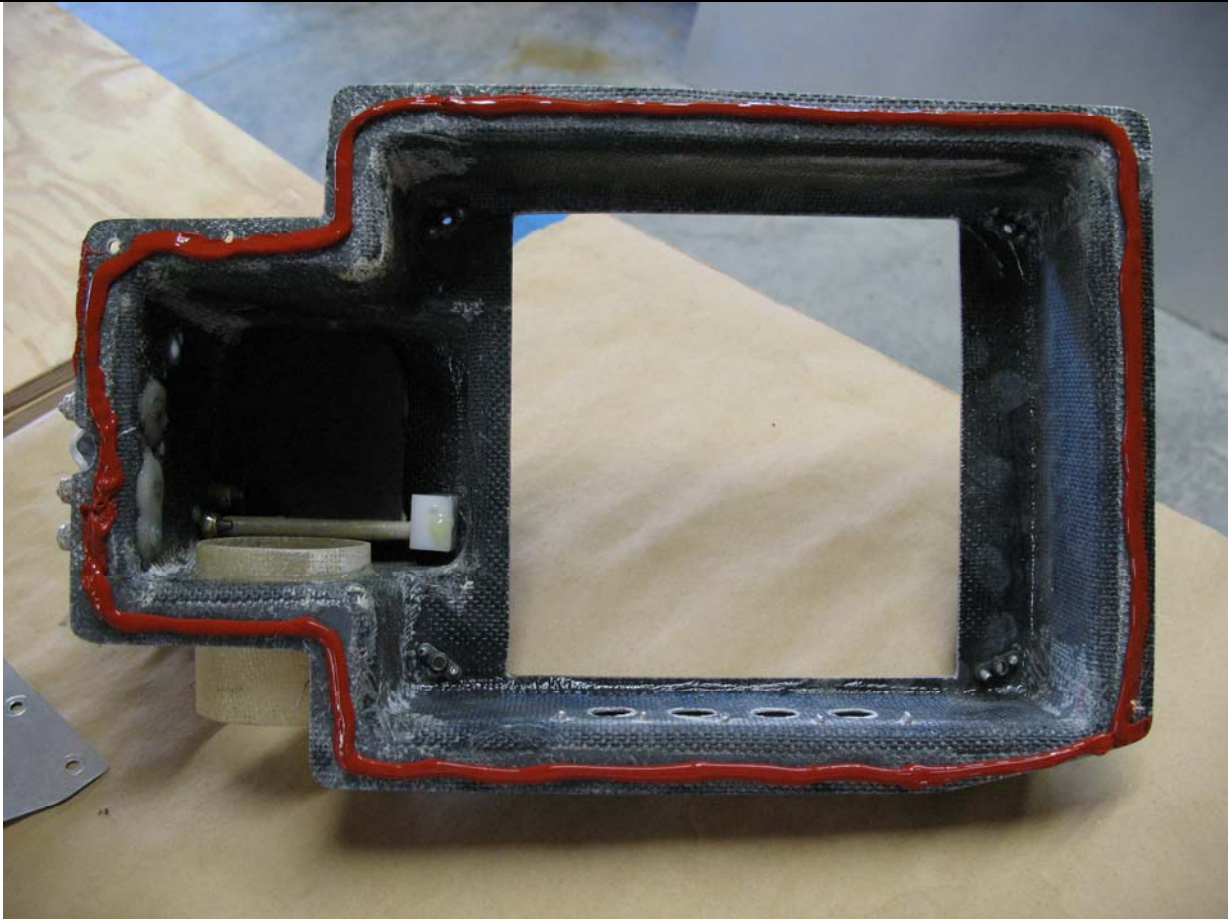
Final engine installation then is accomplished by installing all bolts and tightening to the appropriate torque for aircraft AN bolts.

1. Remove the airbox top from the airbox base
2. Position the base per your previous markings on the firewall
3. Drill one hole in each corner of the base and one additional hole in the center of the long side of the base through the airbox flange and through the firewall with a 1/8 inch drill.
4. Temporarily secure the airbox in place with Cleco's.
5. Finalize the drilling by drilling one hole in each corner of the base and one additional hole in the center of the long side of the base.
6. Remove base, scuff the flange and coat edge with silicone sealant
7. Reinstall base with 6 x 1/8 dome head rivets.
8. Insert K&N air filter
9. Replace airbox top and screw to base with the #8 screws provided.





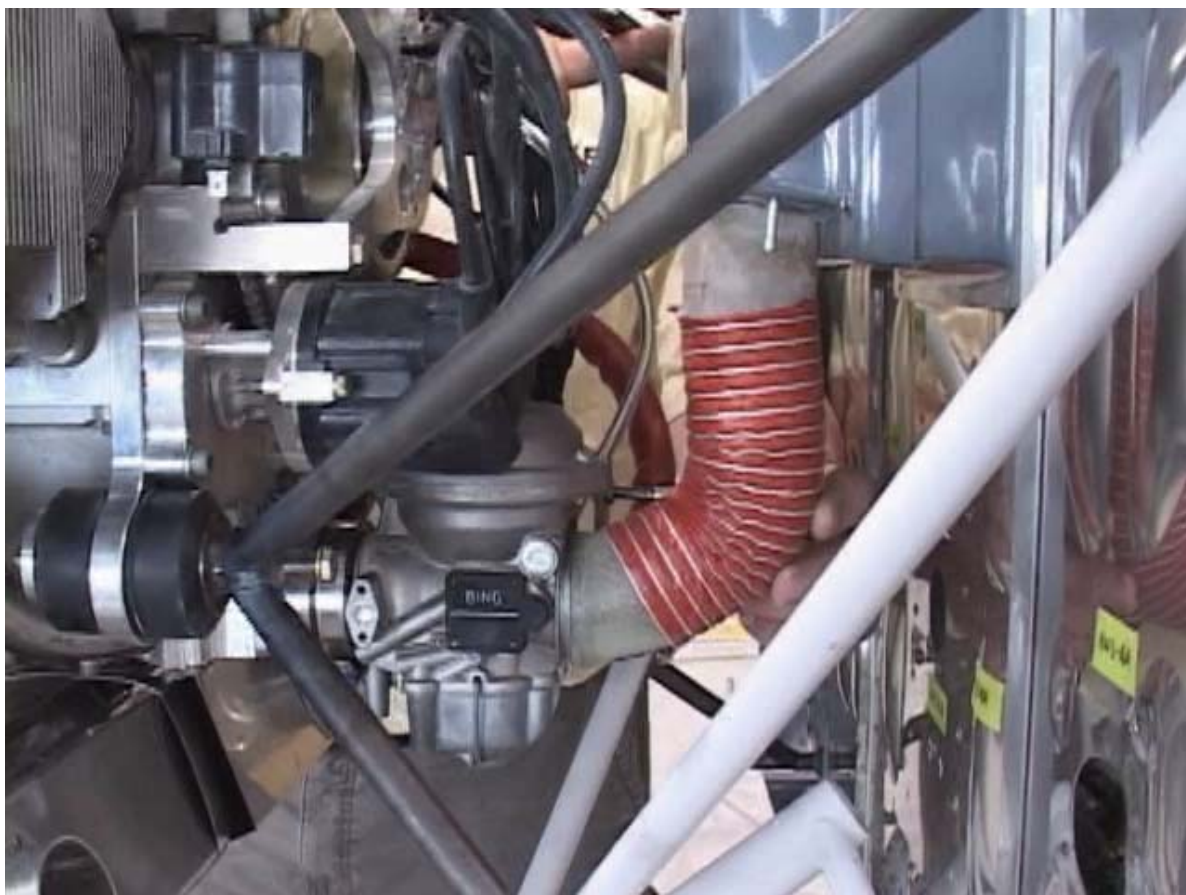
The dimension that worked for us on the S-19 we built is 4.875 inches from top of the airbox to the fuselage skin is



Run a small bead of hi temp rtv around the edge of the airbox bottom. Then close the bottom of the airbox with the aluminum sheet provided.

Once the bottom has been closed the airbox bottom can be riveted to the fire-wall with the 3/16 rivets in the airbox component sub kit. Make sure you rivet into the bumps in the fire-wall.





Once airbox is installed put filter in to airbox and connect SCAT duct to the carb as pictured above.

Cabin Heat Mixer Box

With a 2" hole saw cut a hole in the firewall on the lower pilots side for the cabin heat mixer box

The mixer box will sit on three of the bumps in the firewall and those bumps will have to be flattened out (see photo)

Deburr hole

Install box with 4 x 1/8 inch rivets

The location is flexible but this position worked for us on our S-19. The stiffener bumps on the firewall stainless do add to the challenge of locating the mixer box.

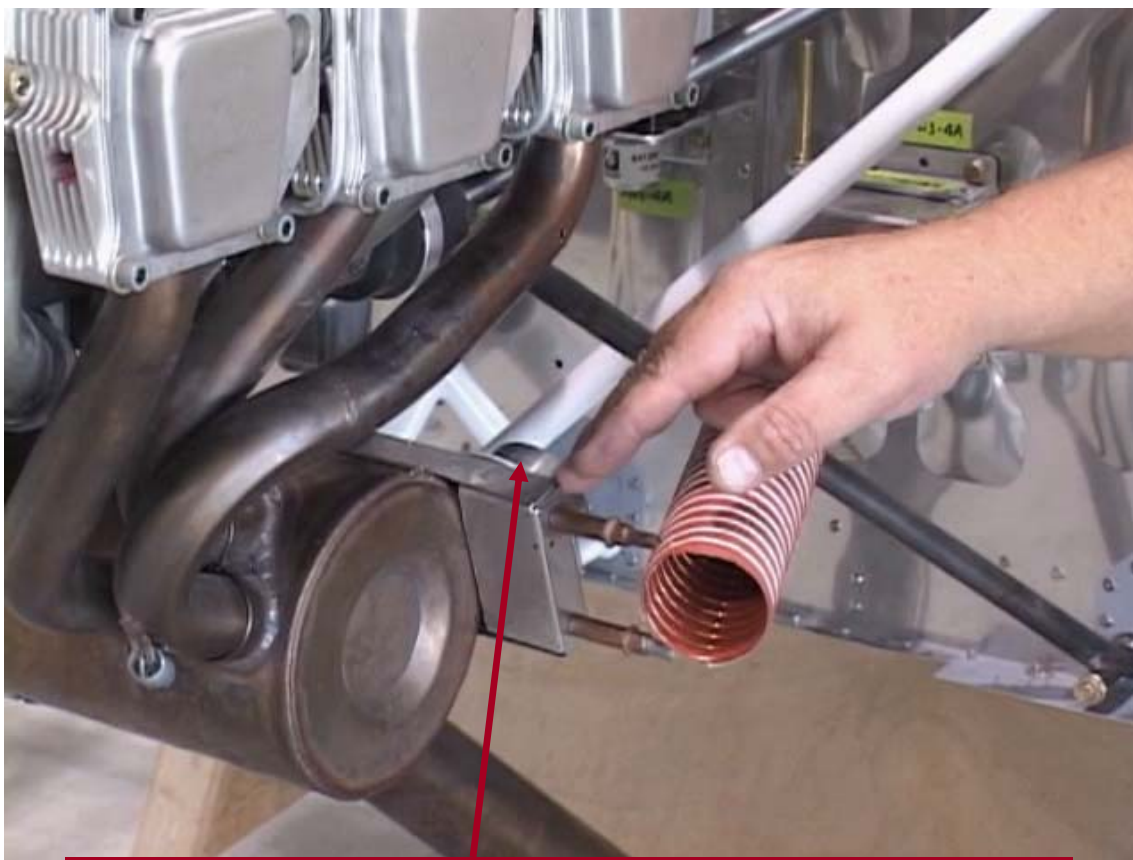


Many builders choose to fabricate a bell crank to reverse the direction of the cabin heat box flapper door. This may be easier than running the actuator cable up from the bottom. See photos below for details. Scrap aluminum from the airframe kit can be used.



Rivet the mixer box in place making sure the rubber gasket seals completely around the mixer box base.

Attach a length of 2" SCAT to the mixer box.



Attach forward end of SCAT to the muffler heat muff using the clamps provided



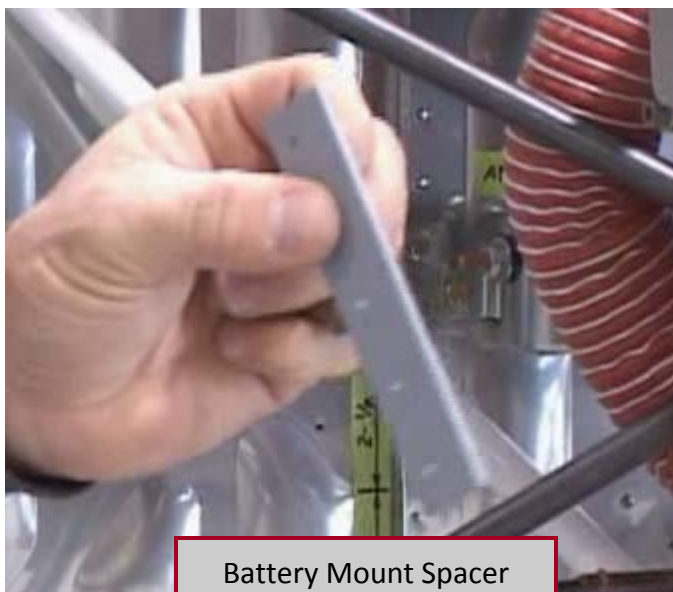


Battery Support & Clamp

The battery installation on the S-19 is a bit more involved than some of our other FWF installations because of the stiffener bumps on the Rans firewall. However, the battery support and clamp is very straight forward in all other ways. The builder simply rivets an aluminum angle support to the firewall and then fabricates and installs an aluminum clamp that hinges to the firewall.

First locate the battery support (angle aluminum) on the firewall so that the bottom of the support is just above the row of rivets already installed in the firewall. Lay out and drill for four 1/8 blind rivets. Then fabricate a spacer from the 1/8 inch thick flat aluminum stock and match drill to the aluminum angle battery support.

A battery is not supplied with the firewall forward kit. We recommend an Odyssey PC680 battery. It is available on line at the lowest price. Try Googling for Odyssey PC680 or try www.batteries4everything.com as one source.



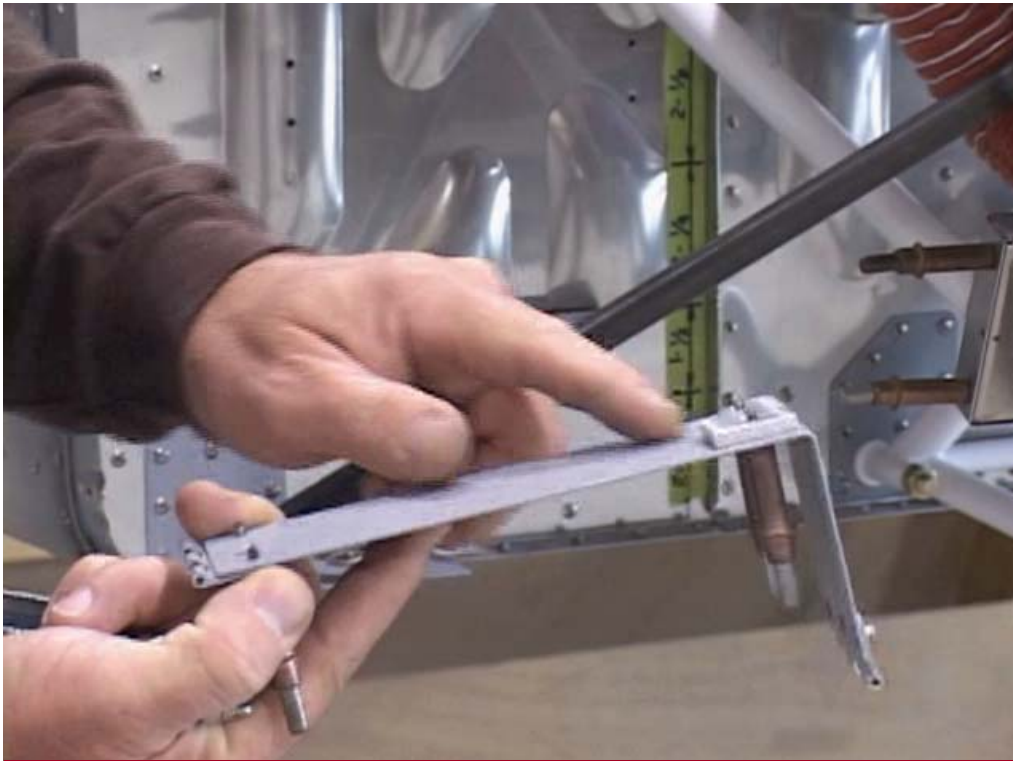
Battery Mount Spacer



Cleco support &
Spacer to firewall



Fabricate battery clamp as shown
from aluminum flat stock and piano
hinge stock.



The starboard side of battery clamp will be riveted directly to the firewall on top of one of the stiffener bumps. The inboard side requires a spacer as shown as the inboard side rivets to a flat spot in the firewall.



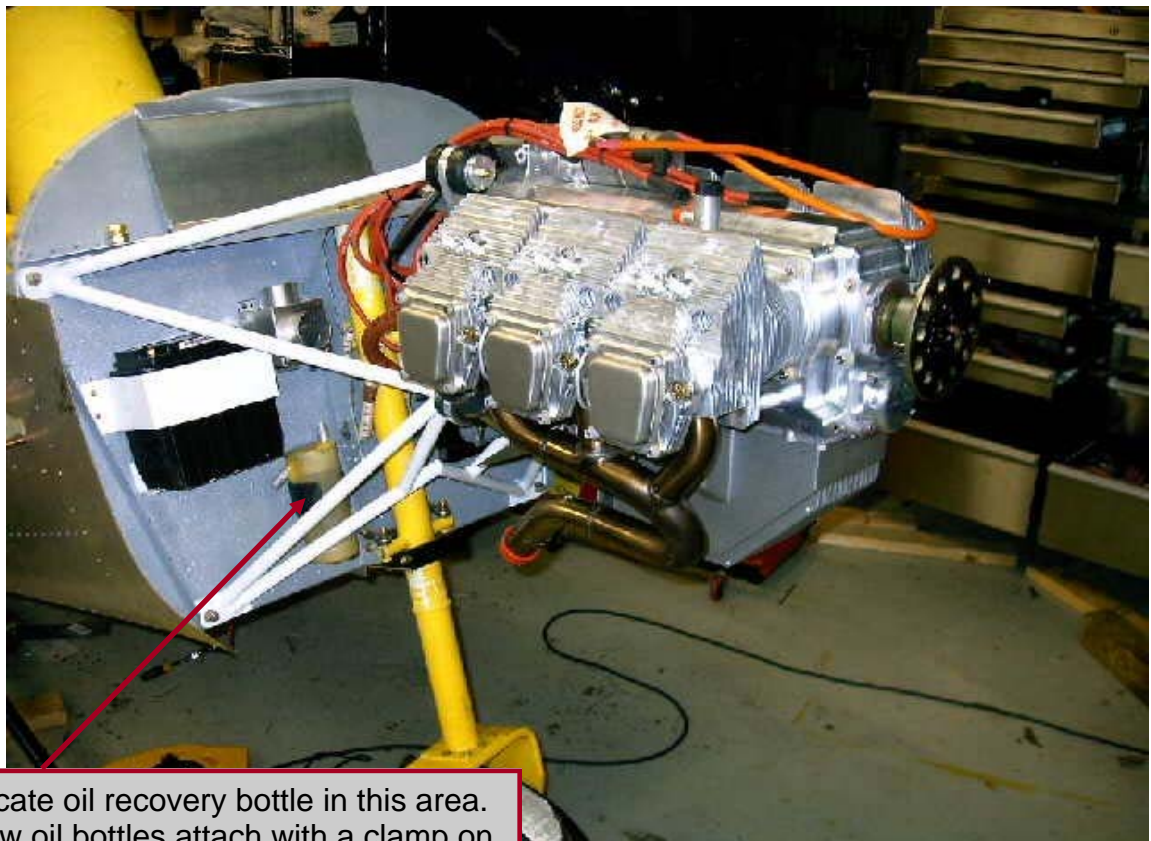
Rivet the support and clamp assembly to the firewall. Put a slight bend in the hinge pins so that the pin will not work itself out.



NOTE: From this point on, the Rans S-19 manual utilizes pages and photos from the Zenith CH750 firewall-forward manual. After this point in the engine installation, the steps are the same for both types of aircraft.

Oil Recovery Bottle

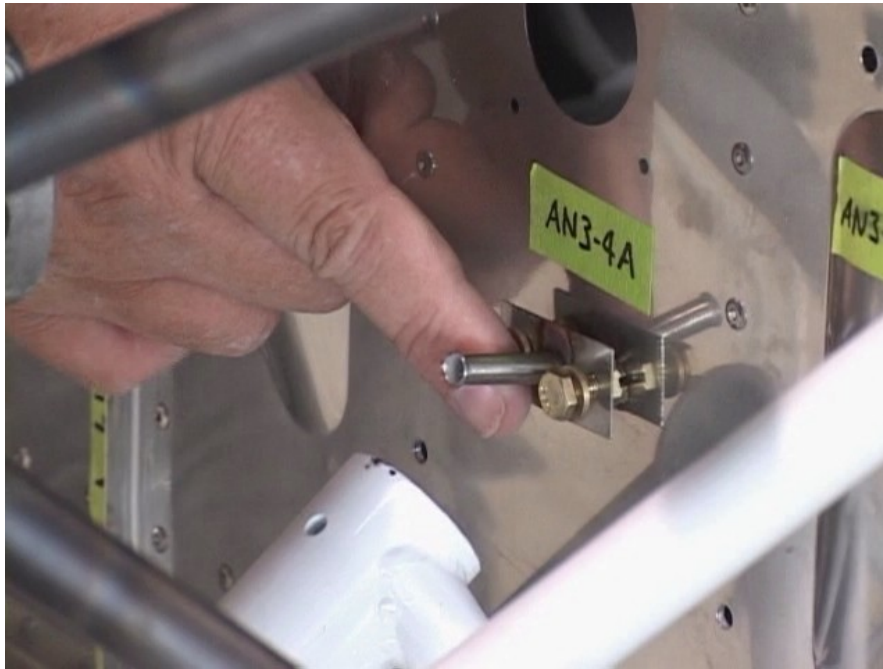
1. Locate the Oil Recovery Bottle in an open space on the right side of the firewall where it does not conflict with cabin heat or battery. The bottle does not have to be vertical but can be slanted to help with the fit.
2. Mark the outline of the bottle.
3. Predrill two 3/16 holes through the oil bottle clamp evenly spaced on the flat part of the clamp.
4. Place the clamp on your mark and drill through the predrilled holes and on through the firewall.
5. Using the 3/16 rivets, secure the clamp to the firewall.
6. Slip the bottle into the clamp.



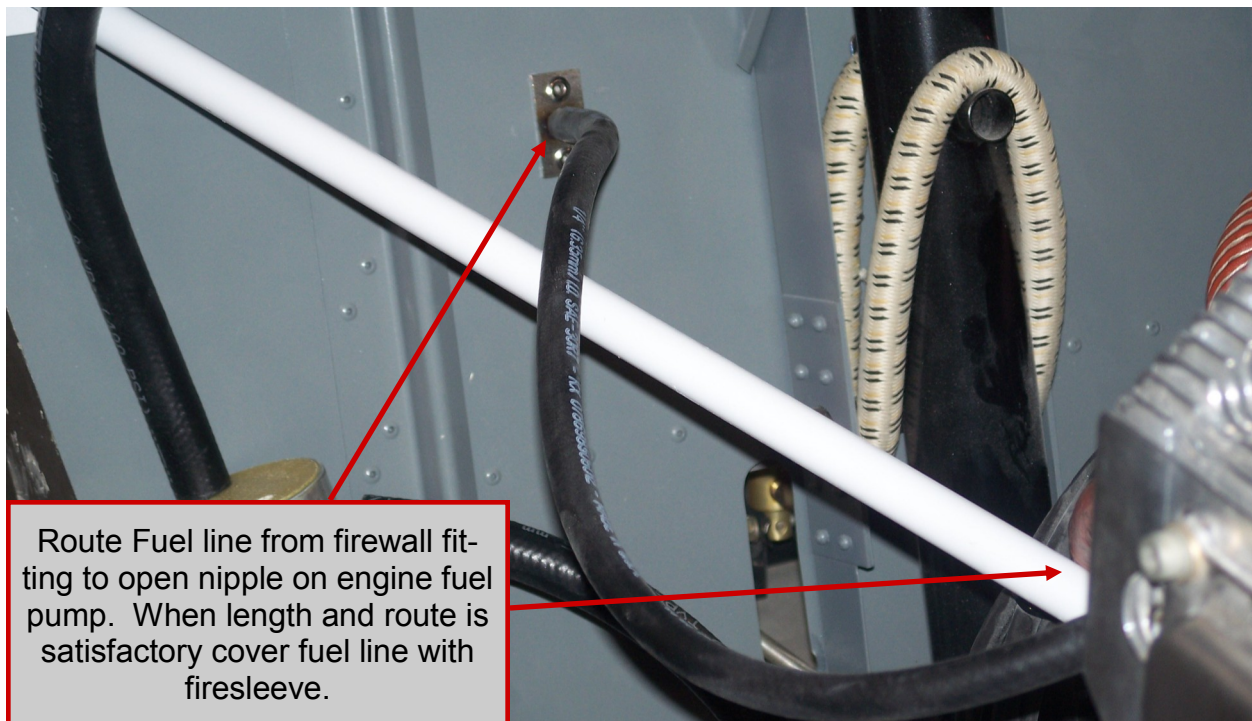
Locate oil recovery bottle in this area. New oil bottles attach with a clamp on top and bottom. Bottle may optionally be mounted to engine mount with cushioned clamps.

Locate Fuel Fitting on Firewall

Locate the fuel fitting on the firewall in an open area. Take note in locating the fitting that there is sufficient clearance on the cabin side of the firewall so that the fuel line



running to the fitting does not interfere with the rudder pedals. See photos for general position. Bolt the fitting in place with AN3-4A hardware.





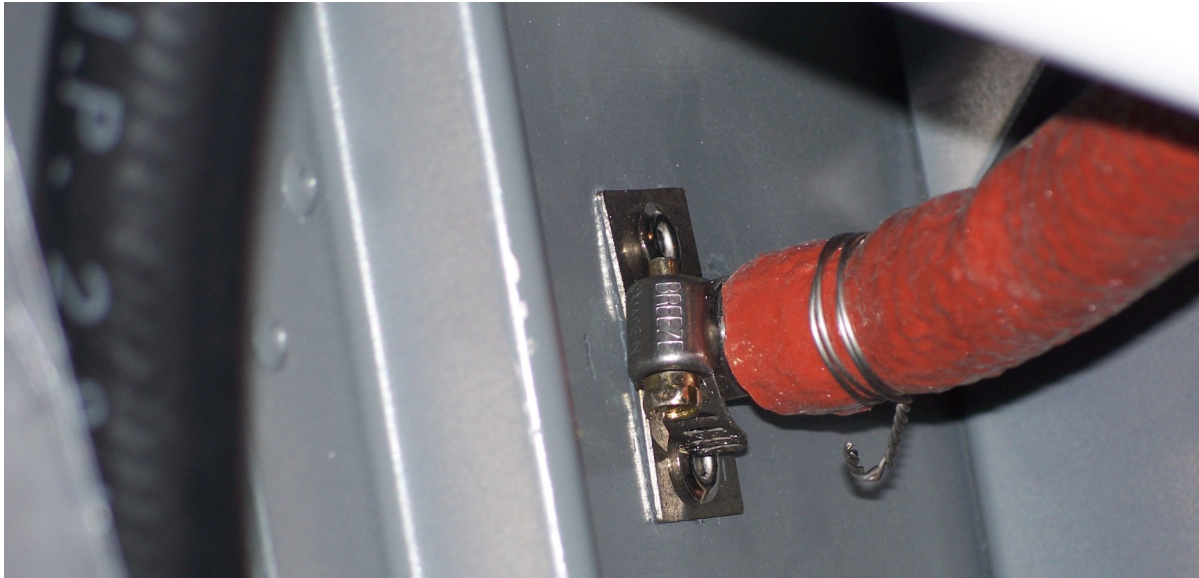
This photo shows the cockpit side of the firewall fitting installed and angling toward the area where the fuel line will come from.



Measure the fuel line to length for routing to the fuel pump on the rear right side of the engine.

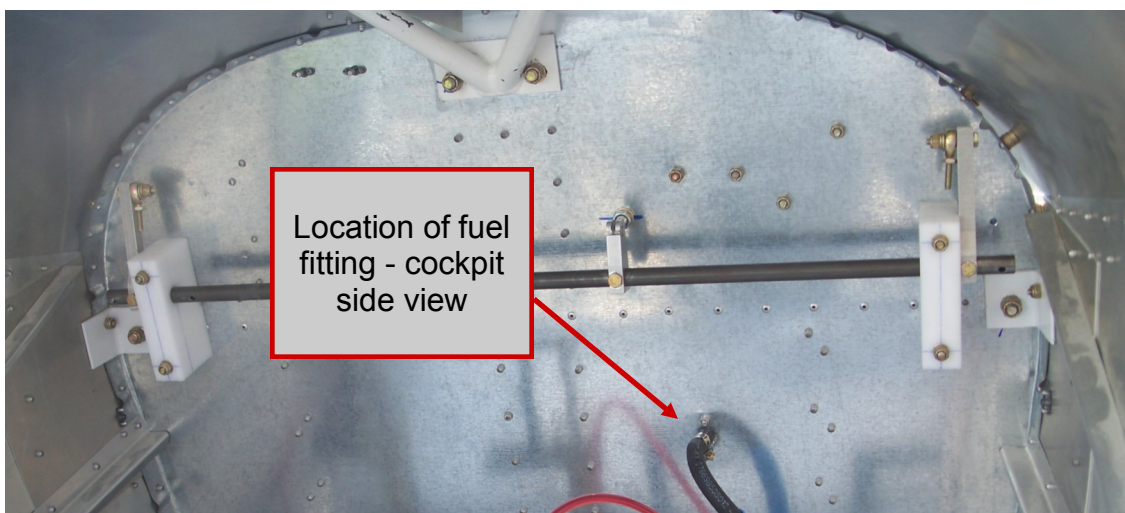
Install firesleeve over the fuel line completely covering the rubber line right up to the fittings at firewall and fuel pump.

Secure the ends of the firesleeve with a few wraps of safety wire.
Clamp the ends of the fuel line to the fitting and the fuel pump with the worm drive clamps provided.



Secure the fuel line to an engine mount member with cushioned clamps or other straps.

See photo below of the cabin side of the firewall fuel fitting.



Starter Solenoid

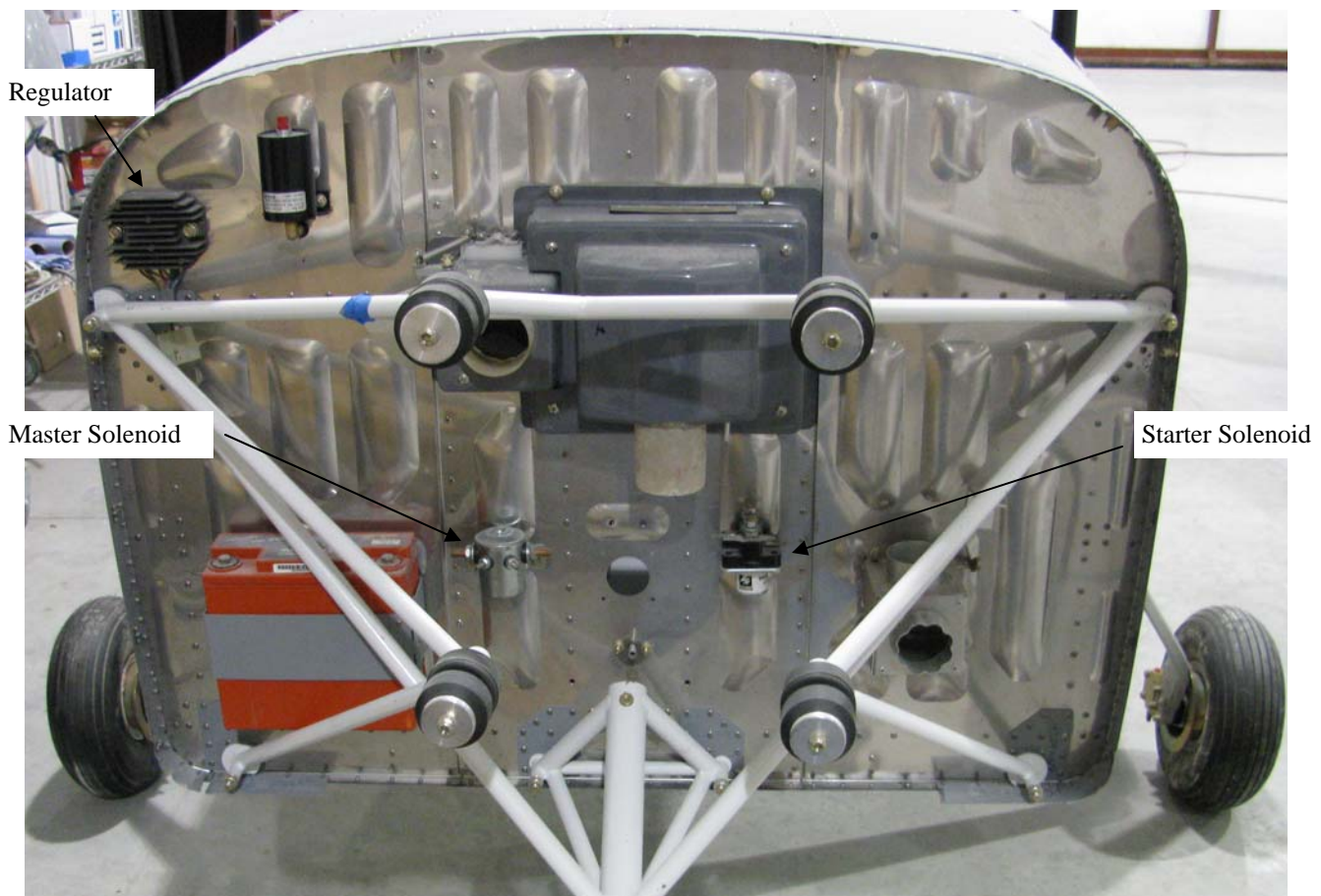
Make sure you mount it within reach of the starter cable on the engine. Bolt in place with spare AN3 bolts. Make sure the base of the solenoid is grounded (should be no problem with the all metal S-19 – just make sure firewall is grounded to battery).

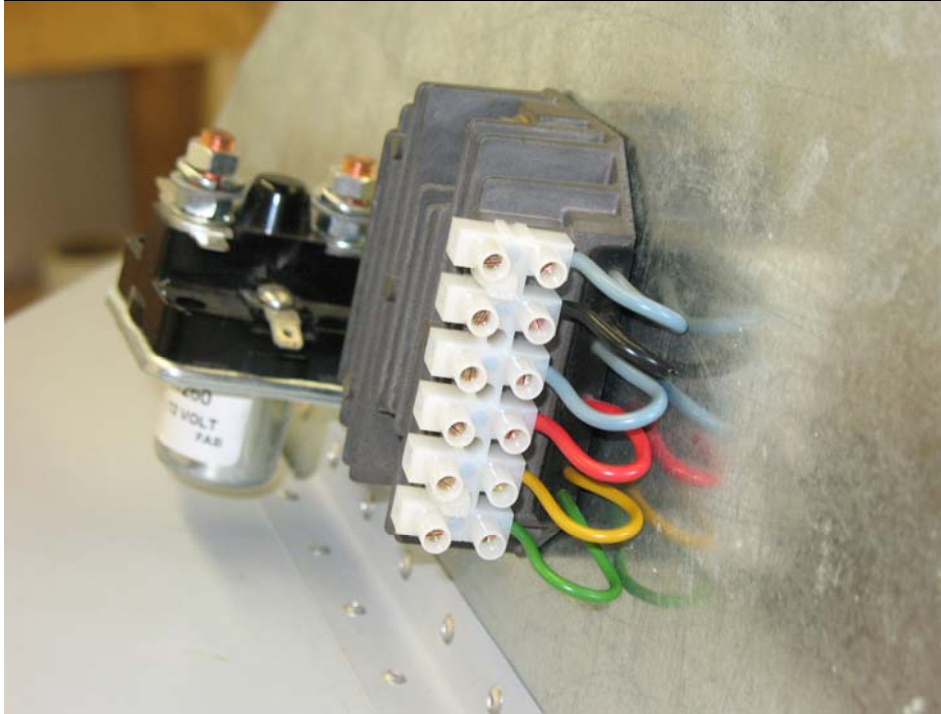
Regulator

Mount the regulator on the firewall somewhere near the battery. Bolt to the firewall with spare AN3 hardware.

Wiring instructions are in the installation manual on the CD that came with your engine.

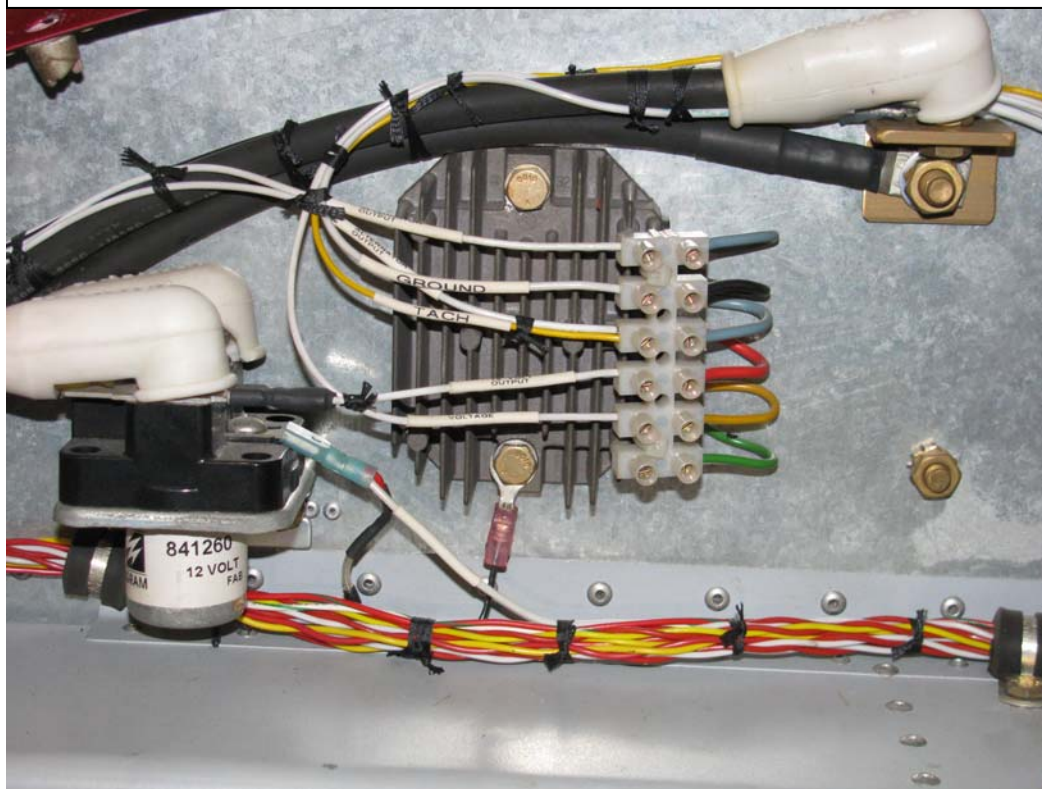
The installation manuals are also found in the “MANUALS” section of Jabiru’s website: www.jabiru.net.au



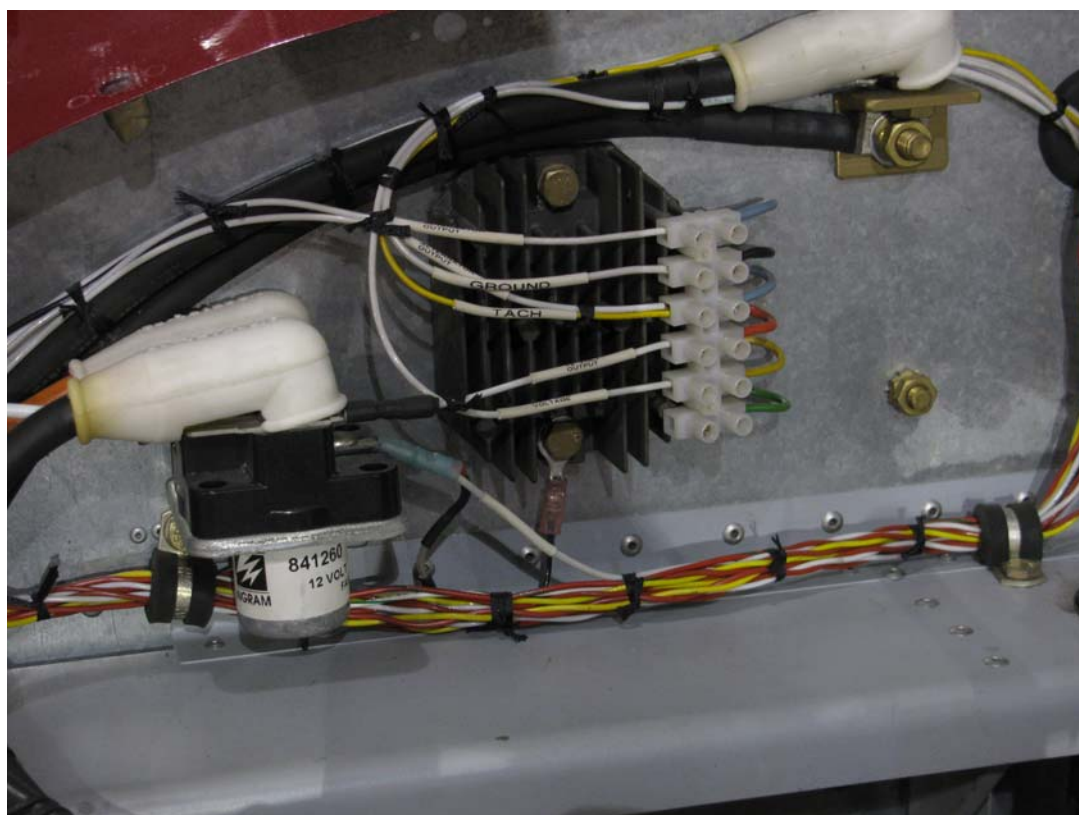


This photo shows the electrical connector. A small hole is drilled into the regulator fins to accommodate a small plastic cable tie at each end. The connector is then zip tied to the regulator.

The electrical connector pictured is a neat way to connect the regulator to the various input and output wires involved in the charging system. This connector is available at most Radio Shack stores or other similar retail outlets.



Photos shown are an example of a neatly installed and neatly wired charging system typical of what can be done on S-19 and Zenith aircraft (Zenith shown here).



RamAir Cooling Ducts

The RamAir ducts will have to be fitted to the engine. An airdam and additional deflector are already installed inside the ducts to assure adequate cooling.

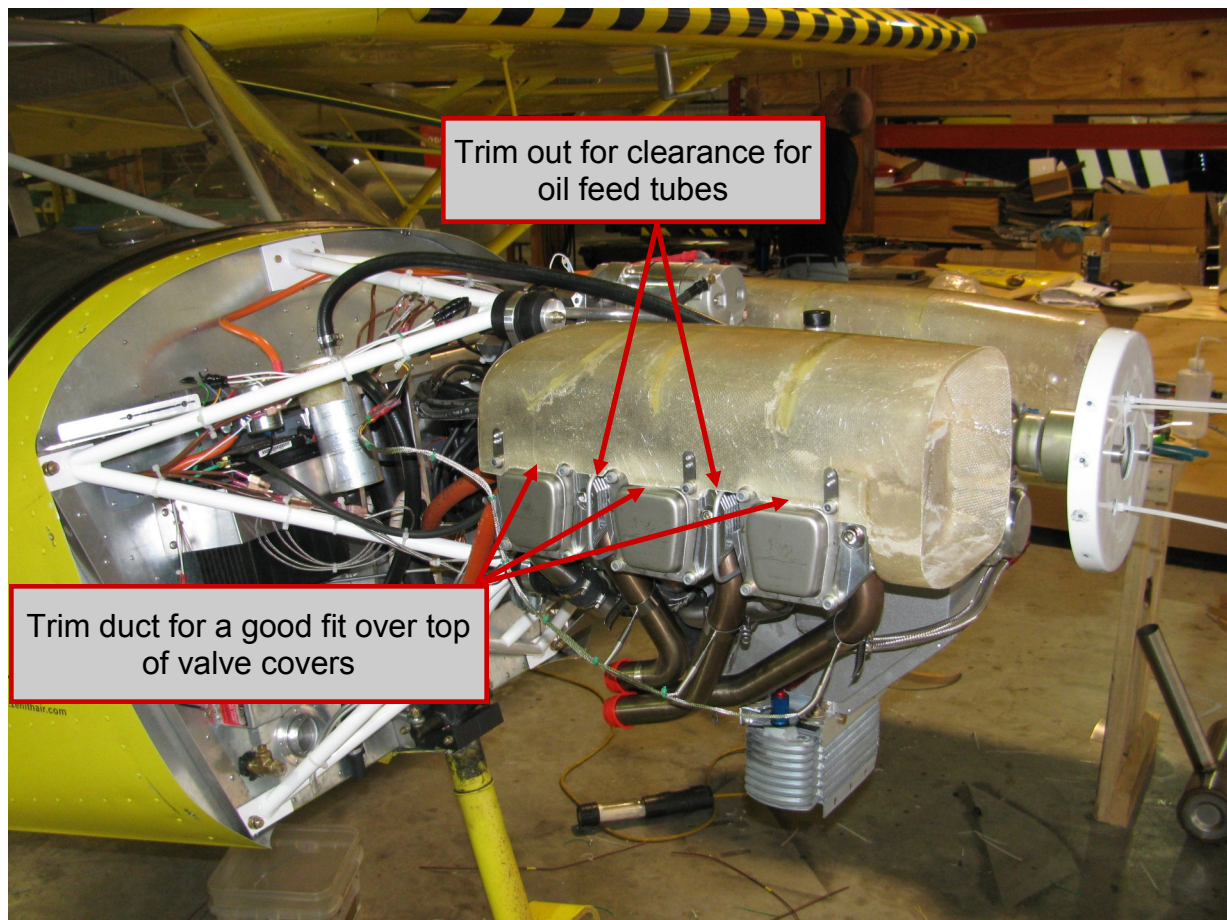
Remove the forward top valve cover cap screw on cylinders 1 and 3. Remove the top rear screw on #5.

Remove the spark plug leads and lay them down out of the way for now.

Place the duct in position over the heads so that the outside edge extends down over the holes where you removed the rocker cover cap screws. You may have to trim the duct a bit around the rocker covers to get it to sit down correctly.

When satisfied that the duct sits down on the rocker covers drill through the duct with a $\frac{1}{4}$ inch drill at the location of the rocker cover cap screws that you removed.

Loosely reinstall the cap screws.



The inside edge of the duct should extend just past the inside edge of the gull wing baffle and nest between 5th and 6th barrel fins.

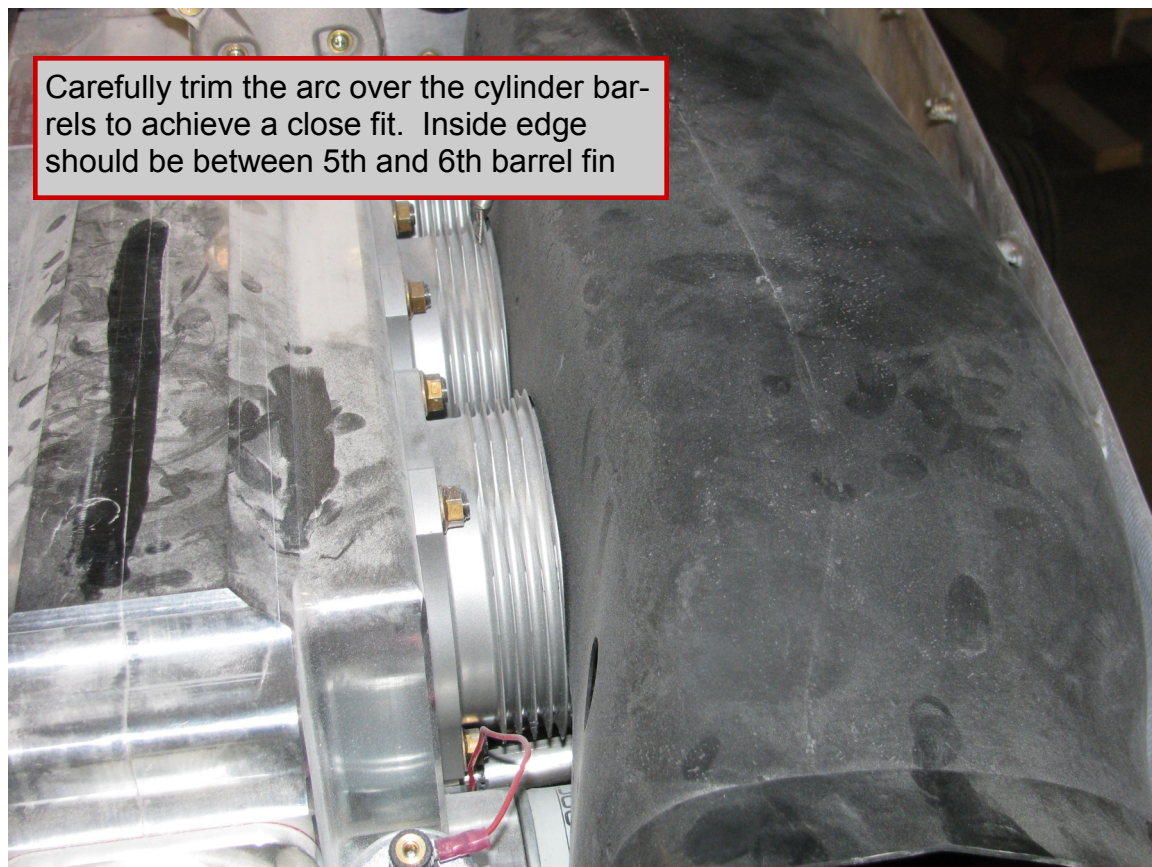
Attach the small angle spring support to the top of the duct.

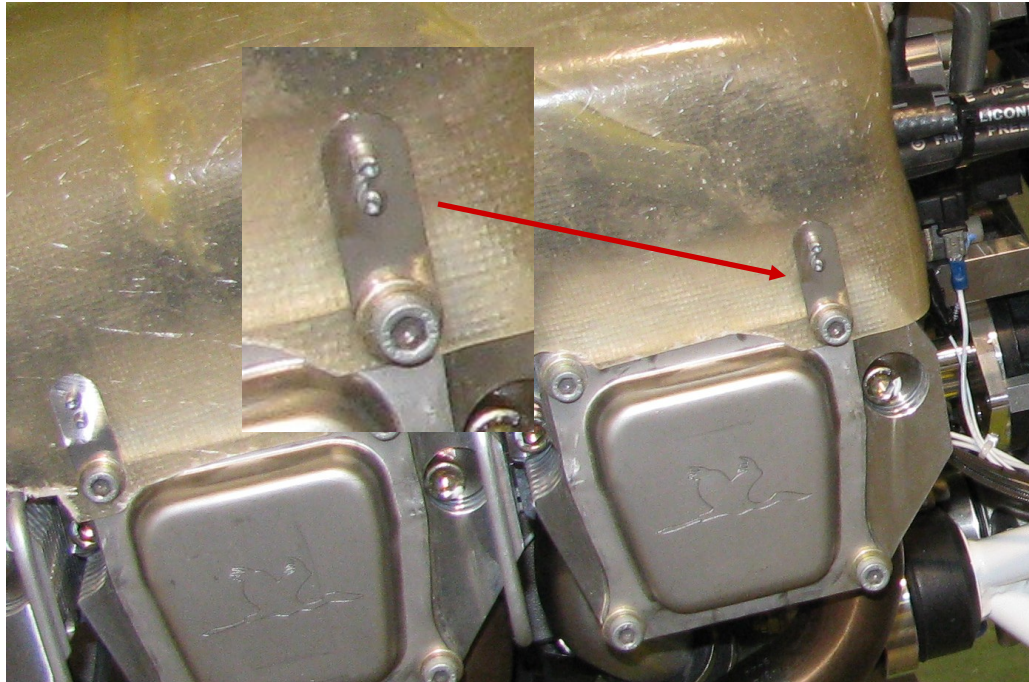
Install the small spring between angle spring support and the loop of safety wire around the middle cylinder. Angles, springs and rivets are in the engine accessory kit that came with the engine.

Small deflectors are installed in the top of the duct over the forward edge of the middle cylinder. This deflector is positioned perpendicular to the air flow and extend vertically down from the top of the duct about 1/2 inch. This deflector may have to be trimmed back during flight testing to achieve even cooling.

Repeat for the other duct.

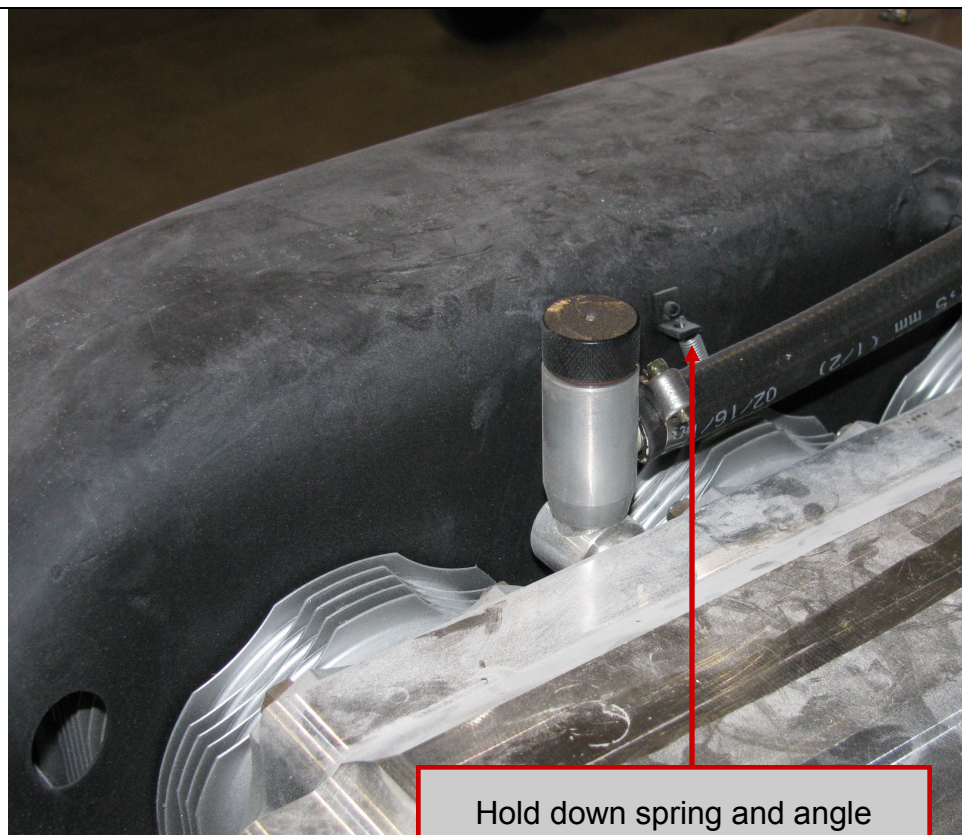
Make sure there is a one inch hole in the inside top of the duct near the front so some air will bleed over the top of the engine and flush away heat build up from the top of the crankcase.



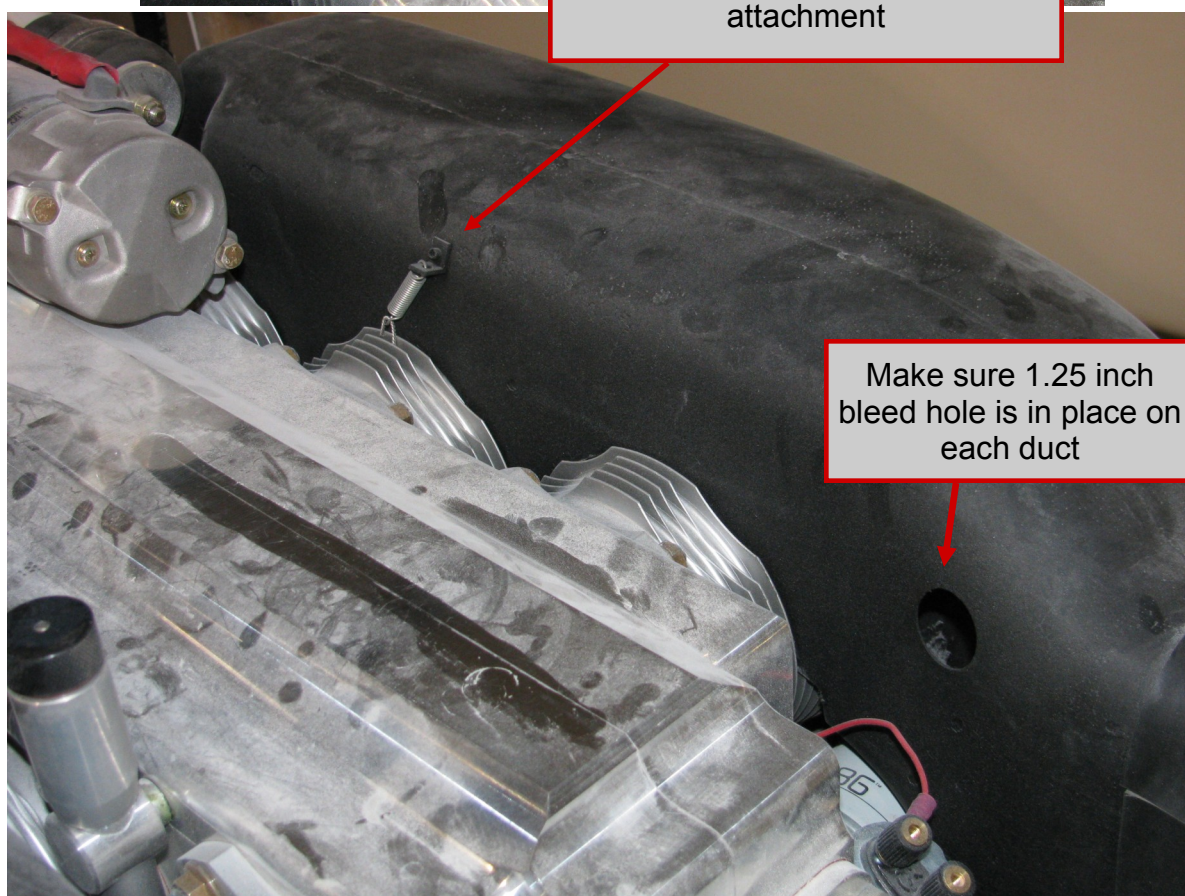


Some builders have fabricated metal reinforcements for the attachment holes in the air ducts. Make these from scrap aluminum from airframe kit trimmings and rivet to the airducts if you want to use them. Over time the fiberglass will degrade from heat and from the process of removing and reinstalling for inspections. The reinforcements will help maintain the integrity of the attachment.

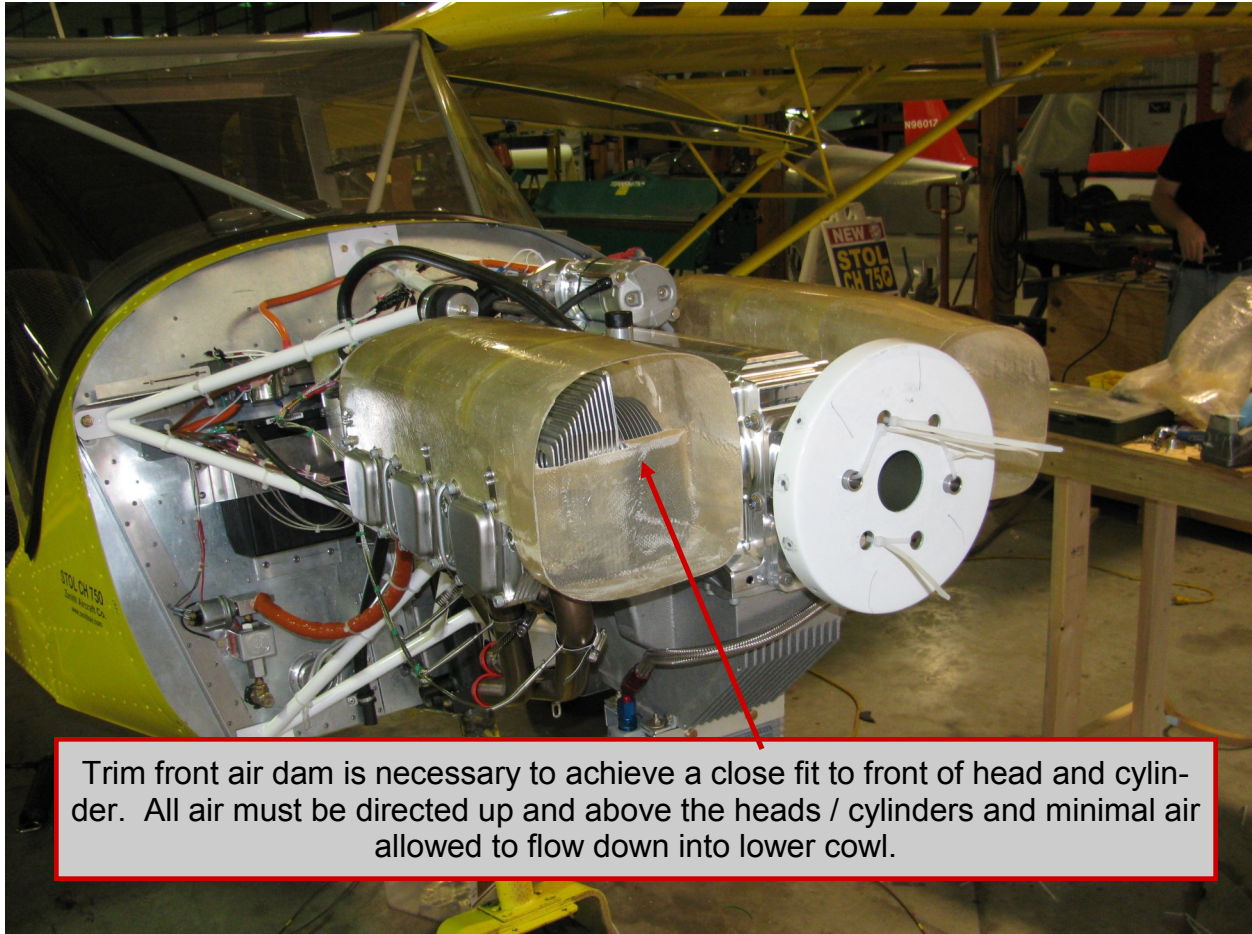




Hold down spring and angle
attachment



Make sure 1.25 inch
bleed hole is in place on
each duct



For additional information about creating and adjusting the air ducts, see “Jabiru USA Tips on Air Duct Installation” on the Engine Tech Tips page of our website, www.usjabiru.com.

Control Cable Terminations

Starting in 2011 Jabiru USA has suggested an improved method for terminating and attaching the Choke, Carb Heat and Cabin Heat (optional) control cables to their respective appliances. The procedure involves fabricating a loop at the end of the control cable wire and fabricating the appropriate hardware to create a free swiveling end on the wire cable.

Fabricate form block.

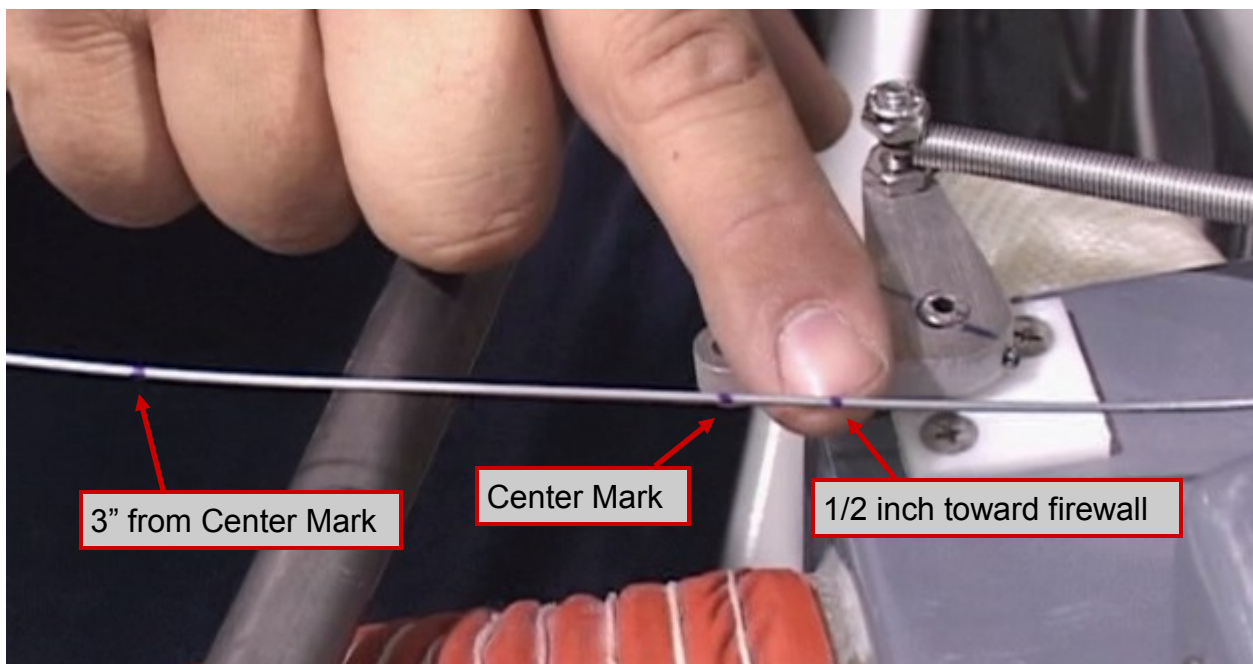
From the piece of nylon stock fabricate a turning block as shown in the photos below.



Locate & Mark Cable

Install the cable (choke, carb heat or cabin heat) in the panel and extend cable through the firewall. Mark cable sheath to length, pull wire back out of sheath and then cut sheath to proper length. For carb heat (pictured) cut the sheath about 3/4 inch from the clamp. Secure sheath in the clamp and reinsert the cable wire.

Rotate the air box cam so that the hole in the cam is rotated away from the firewall. Route the wire over the hole in the cam and mark the wire. Make another mark 1/2 inch toward the firewall from the center mark. Then make one more mark 3 inches farther away from the firewall from the first mark.

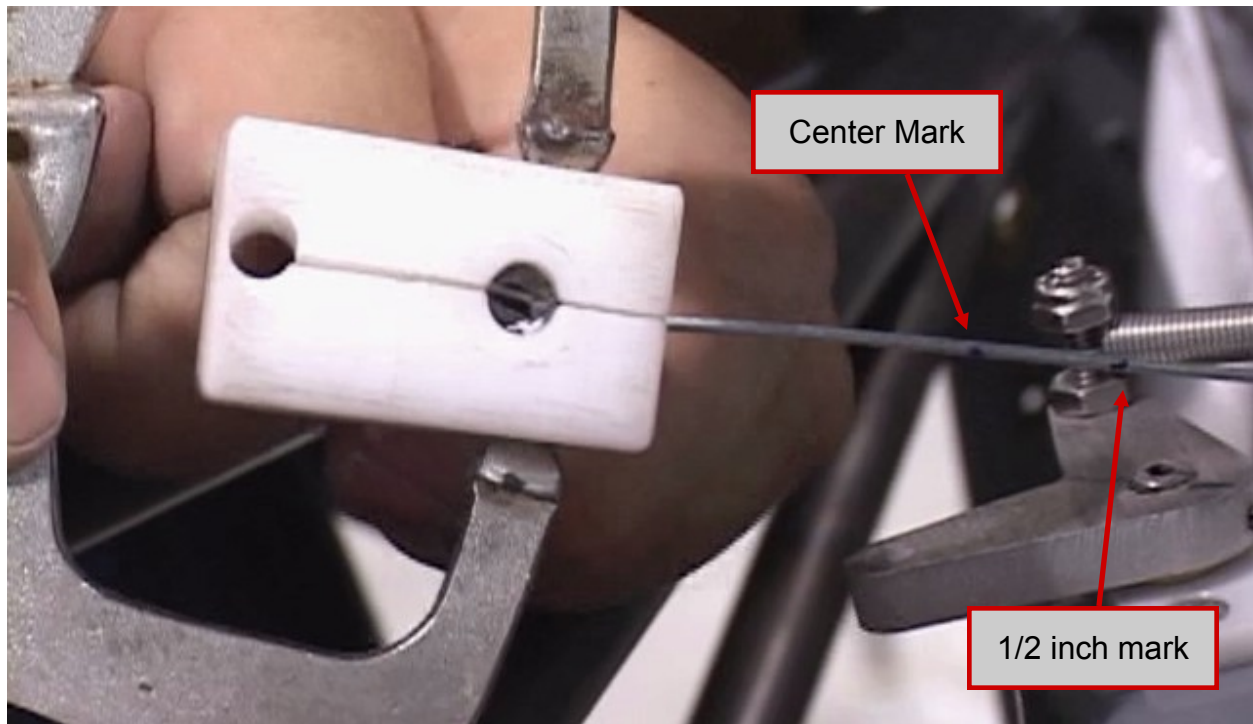


Cut off wire at the three inch mark

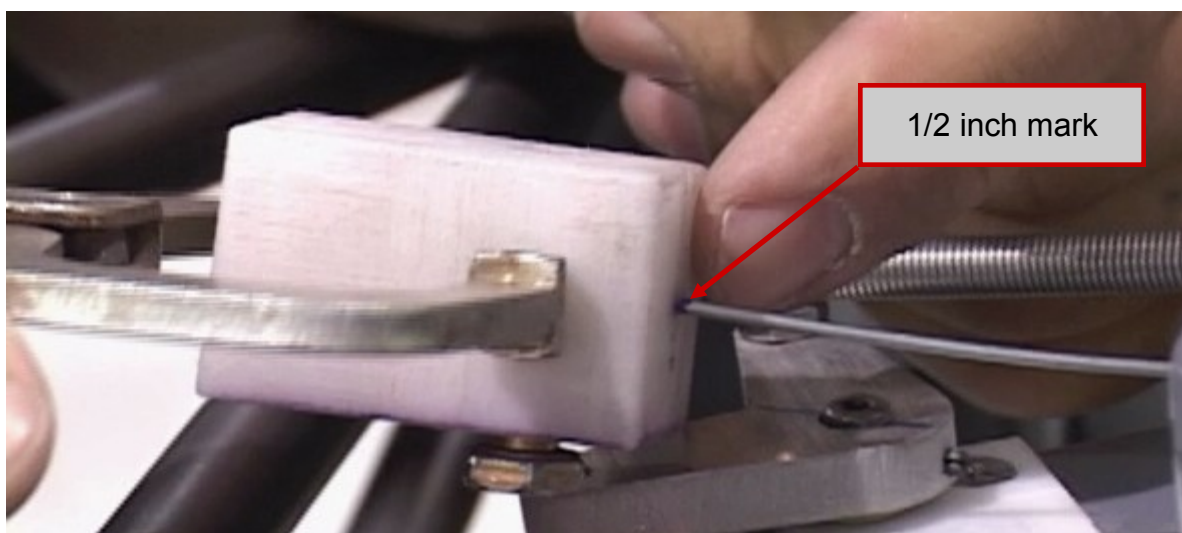


Cut slot into AN4 bolt—slot needs to be large enough to fit the cable wire—so that the cable wire can slide into the slot in the bolt. Slot should be 1/4—3/8 inch deep. Slot can be made with hack saw or Dremel with cut-off wheel.

Insert slotted bolt into nylon block and then insert wire into the hole in the end of the block so that it goes into the slot in the AN4 bolt. Do not let the end of the wire extend past the AN4 bolt.



Using a 7/16 socket and ratchet turn the slotted bolt clockwise to create a spiral winding around the AN4 slotted bolt. Continue turning until the 1/2 inch mark is at the edge of the nylon block.

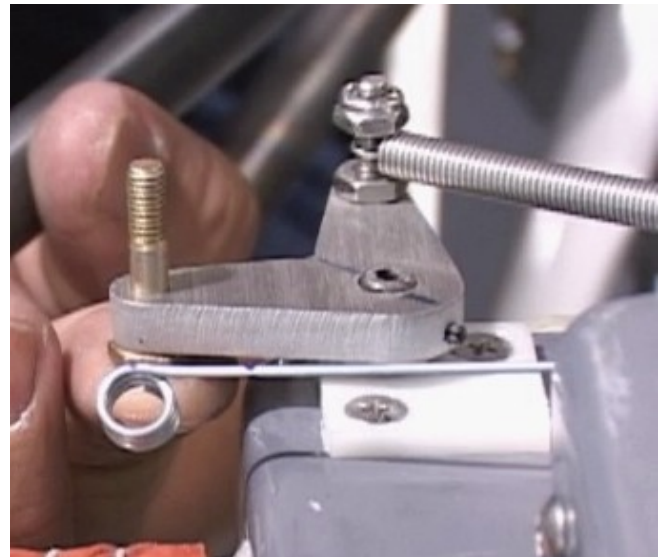


Slide the spiral wound wire out of the nylon block and slotted bolt. The result should look like the wire in the photo at right

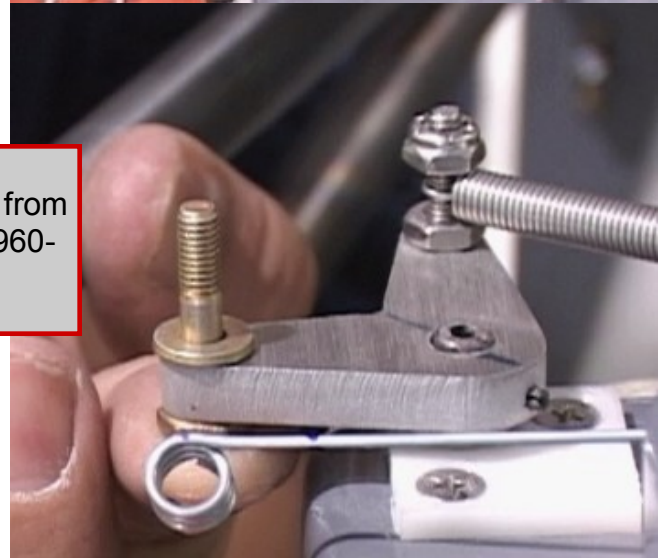


From the length of 1/4 OD tubing provided cut off a 3/8 inch piece. Debur the ends and make sure it will rotate freely on a AN3 bolt. Ream with a 3/16 drill if necessary.

Insert a AN3-7A bolt from bottom up.



AN3-7A bolt inserted from bottom with one AN960-10 Washer





Install short piece of tubing over AN3 bolt. Then slide the wound wire over the tubing followed by another AN960-10 washer.



Finally—install a AN363-1032 metal locking nut on the bolt and tighten down. Take care not to tighten so much that the tension prevents the tubular bushing from rotating freely.



This outlines the basic procedure we use to terminate wire control cables. It creates a positive connection that freely rotates as the cable is operated. Use this method to terminate Choke, carb heat and cabin heat control cables.

Be mindful of the direction that you need to turn the slotted bolt to form the spiral. Wind it so that the cable remains in as straight a line as possible from the cable clamp to the bushing. Some installations may require a counter clockwise winding to accomplish that.

Choke Cable Installation

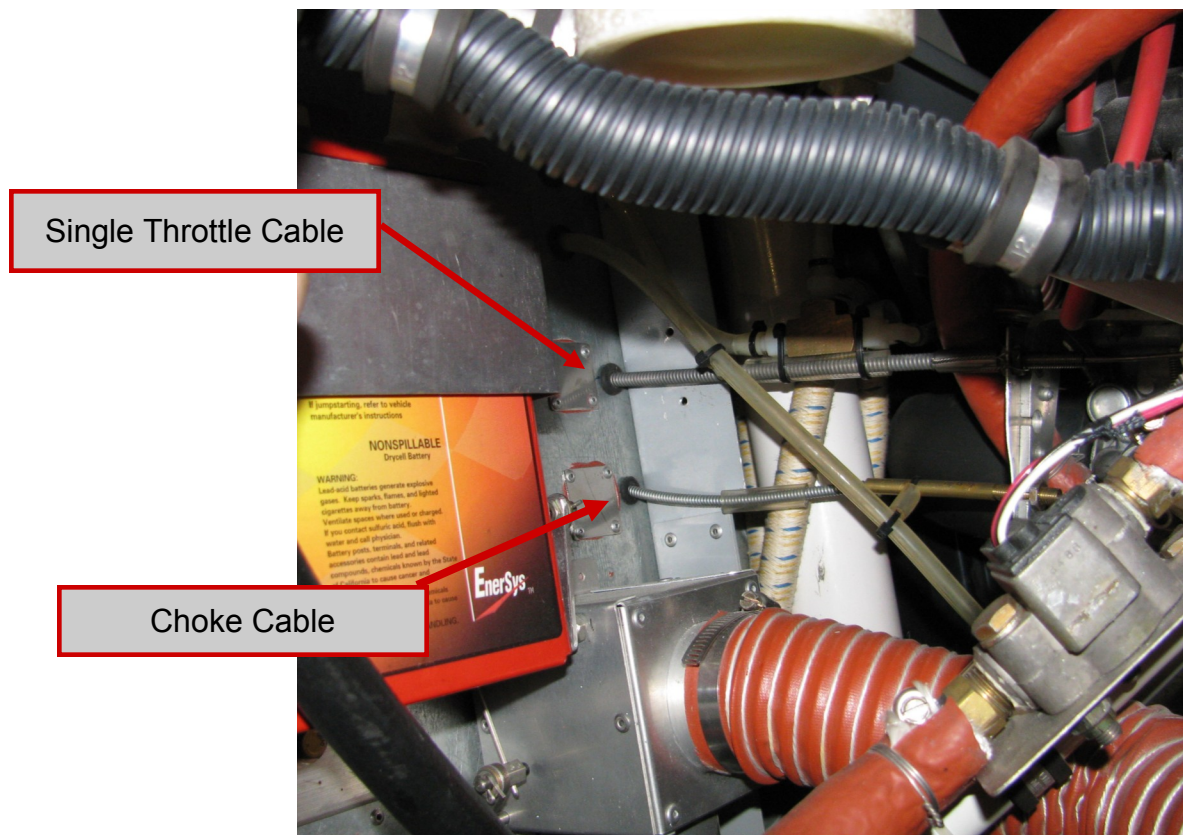
The choke cable must be routed from your panel, through the firewall, and to the carb cable bracket.

Locate a spot for a hole through the firewall that will be directly aft of the lower hole in the carb bracket and very close to the starboard side of the nose leg channel.

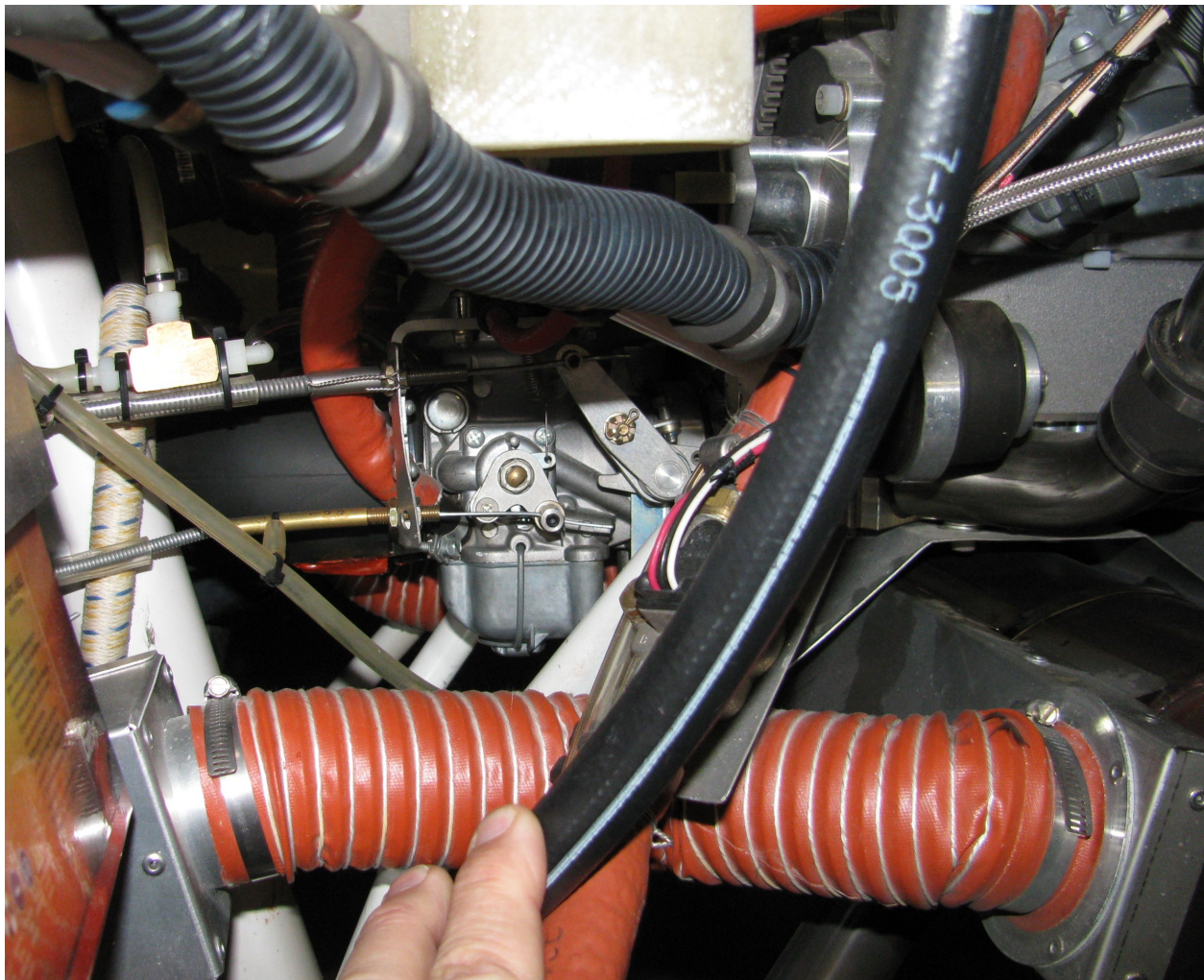
Drill 3/8 through the firewall.

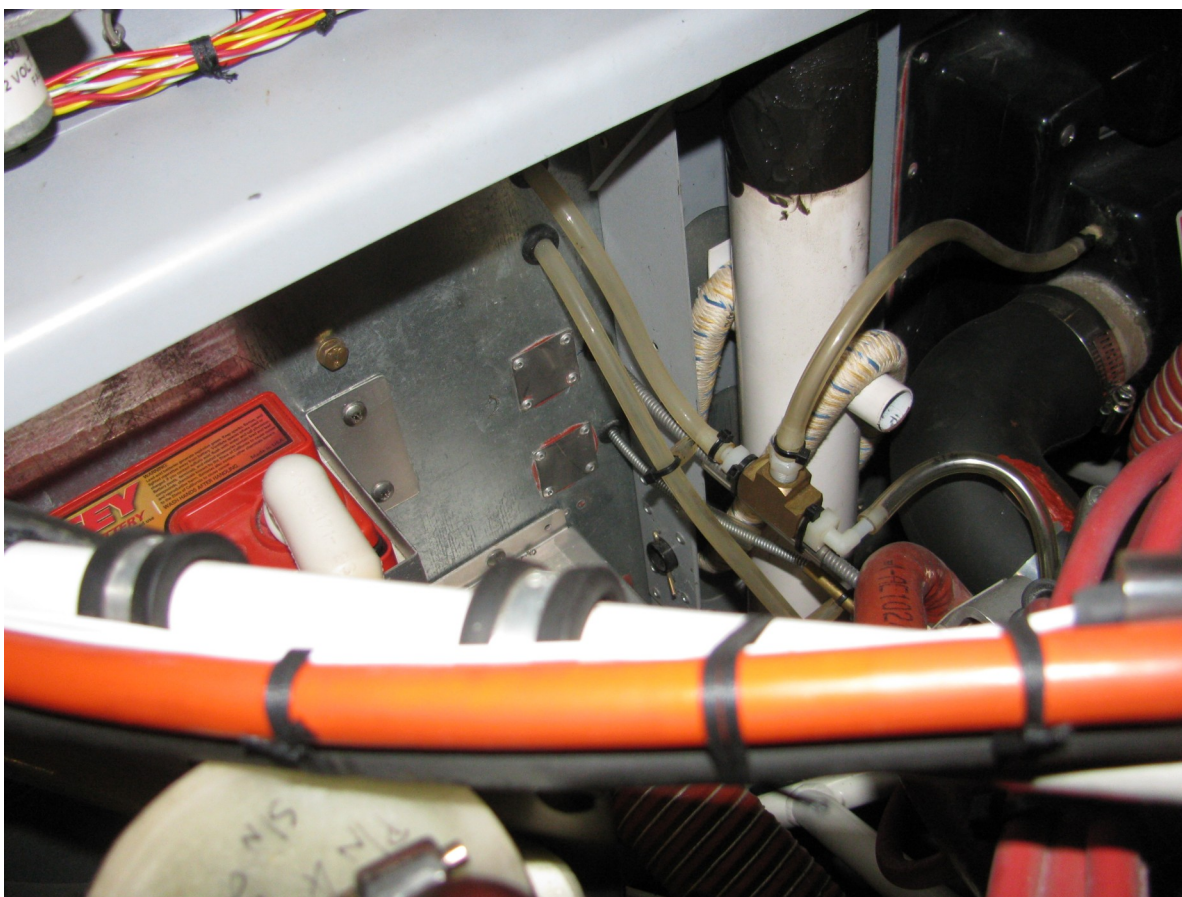
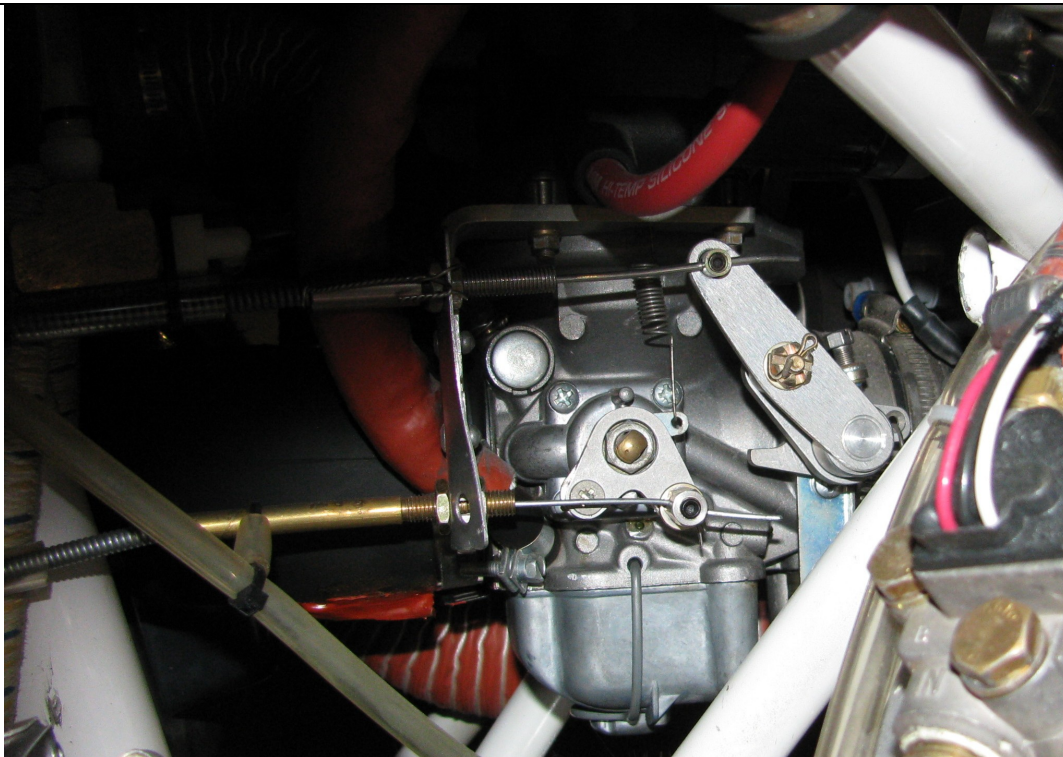
Insert a 3/8 grommet in the hole.

Route choke cable from panel, through grommet, and through the bottom hole in the carb bracket.



Hold the cable end adjuster up to the cable to mark where the cable should be cut off.
Pull wire back through the sheath and cut off spiral sheath.
Clean up the end of the sheath.
Insert cable end adjuster on the end of the sheath
Swage the adjuster on to the end of the sheath
Insert adjuster into bracket and install jam nuts on either side of bracket.
Push the choke wire back through the sheath to the fully closed position.
Follow cable termination procedure from Section 11 to attach choke cable wire to carb choke arm
Adjust jam nuts so that the choke knob on the panel is all the way in when the choke is closed.
Check for full travel and rotation of choke arm and adjust if necessary.





Attach throttle arm extension if not already done. (see section 4.0)

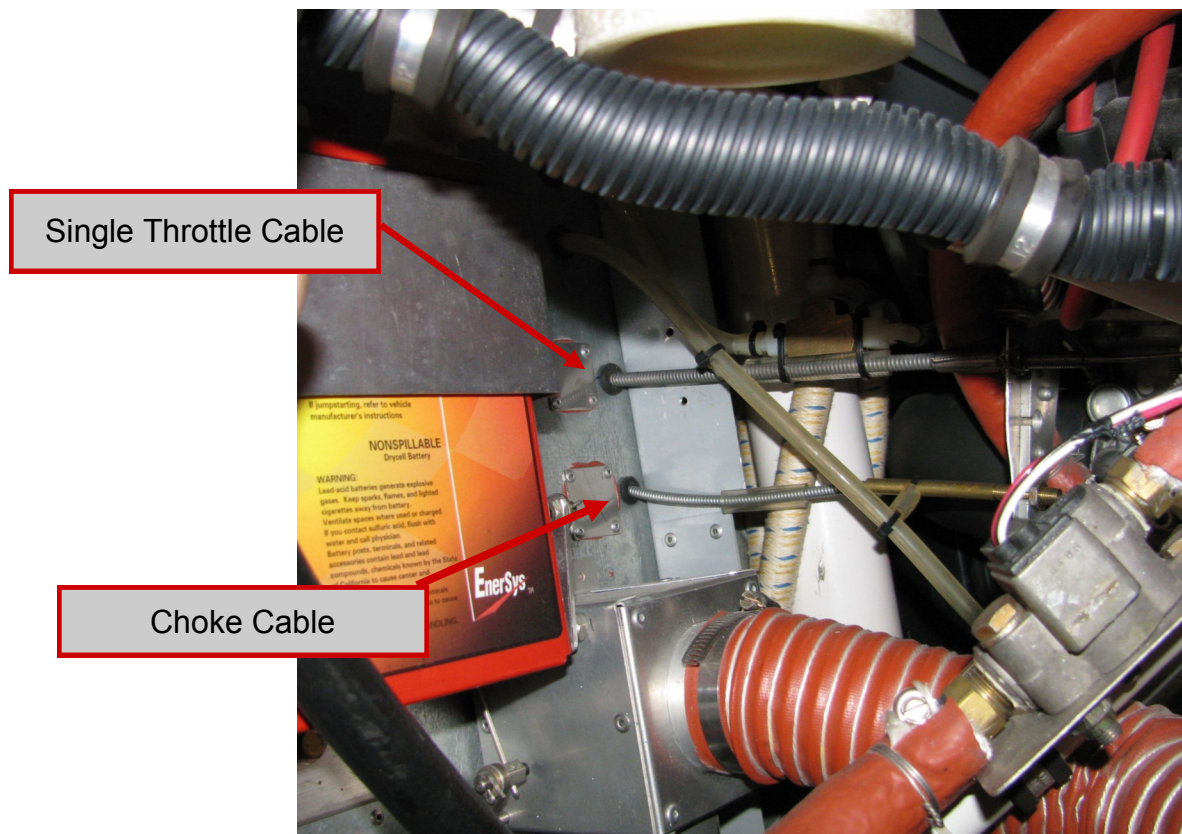
Route throttle from panel forward through firewall. The cable should exit the firewall very close to the nose wheel mount directly behind the top hole in the carb bracket. Install a grommet or cable safe (not supplied) in the firewall.

With the throttle cable in place, mark the length needed for the installation. With the cable in place this mark should be $\frac{3}{4}$ inch behind the carb bracket. Do not cut too short!

Remove the cable from the panel and firewall. Remove the center wire from the throttle cable sheath. Cut the sheath to length.

Clean up the cut end so that the spiral winding does not interfere with the center wire.

Install the 5/16 cable end adjuster and crimp on to the cable sheath with a swage tool. Swage on two places. Insert the center wire while swaging and crimp until a slight restriction is felt in the center wire. Release swage tool and the restriction should go away. The cable end adjuster needs to be crimped firmly to the sheath but not so tight as to bind the center wire. Reinstall cable through panel and firewall. Install one 5/16 jam nut on the cable end adjuster.



Insert adjuster into carb bracket and install the second jam nut.

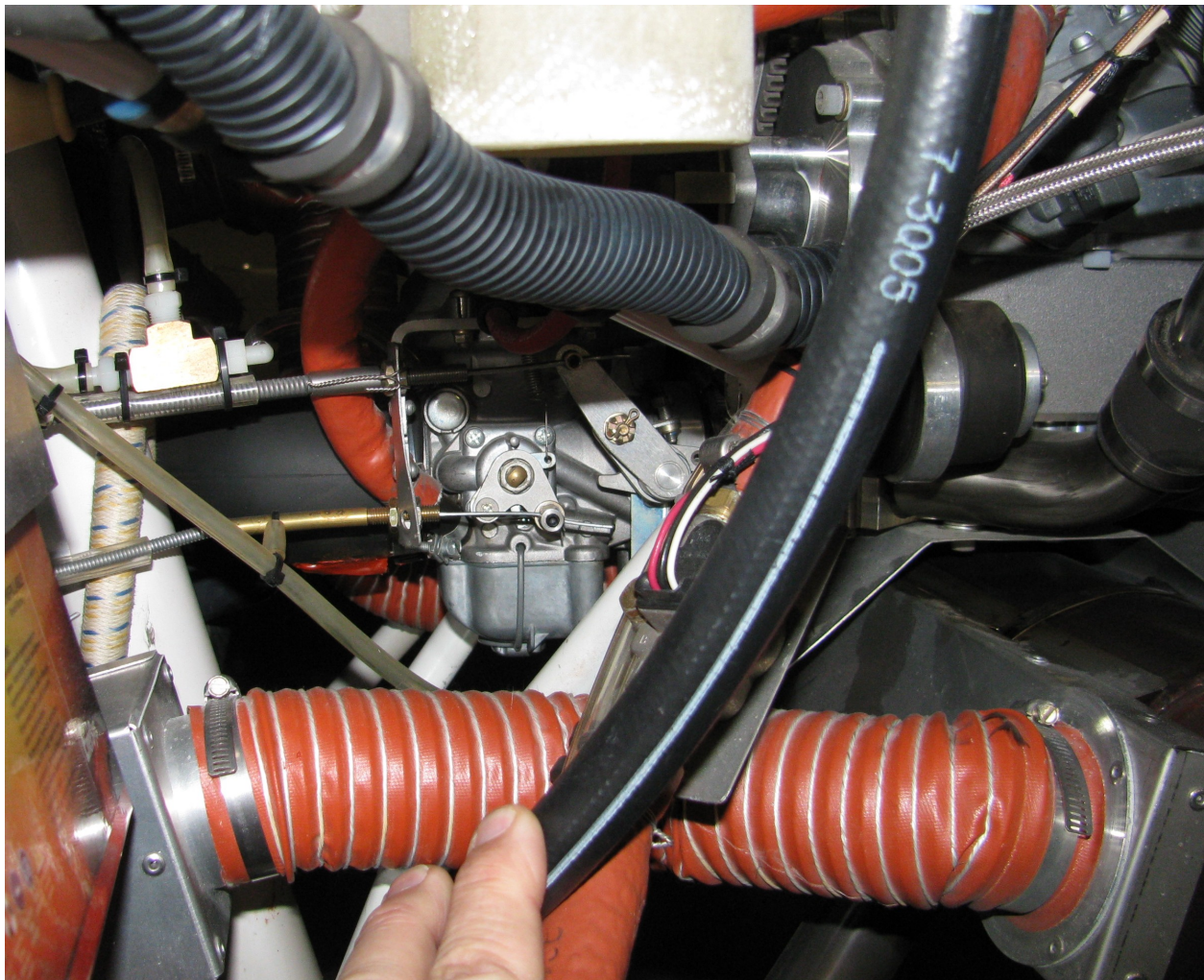
Feed center wire through the sheath.

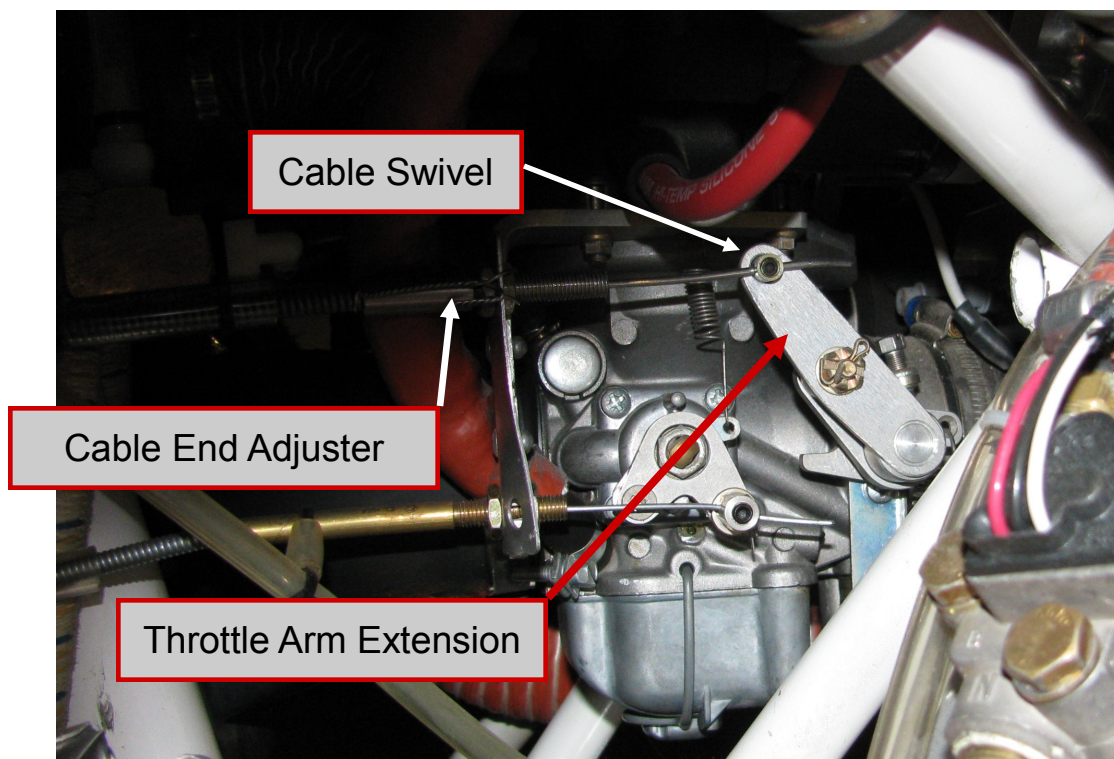
Install the ¼ inch cable swivel into the throttle arm.

Feed cable wire through the swivel.

Tighten the allen screws in the swivel from both sides.

Trim off extra throttle wire length.





Rans S-19 Firewall Forward Oil Cooler Installation

- 1 – Oil Cooler
- 8 – AN363-1032 Nut
- 8 – AN970-3 Washer
- 4 – AN3-7A Bolt
- 4 – AN3-5A Bolt
- 2 – AN4-42A Bolt
- 2 – AN363-428 Nut
- 2 – Aluminum Tubing 3-½" long ¼" ID
- 2 – Aluminum Angle 1"x1"x1/8"x4"
- 2 – Aluminum Angle 1"x1"x1/8"x6-1/2"
- 4 – Grommet 9/16" OD
- 1 – Braided Oil Line 2' long
- 3 – 050-FCM-1012 AN6 Straight Hose Fitting
- 1 – 050-FCM-4022 AN6 45 Degree Hose Fitting
- 2 – 050 FCM-2003 1/8 NPT – AN6 Adapter
- 2 – 050 FCM-???? 3/8 NPT – 45 Degree AN6 Adapter

Step 1. On the two 6 ½" aluminum angles mark two holes one inch in from each edge. When marking these holes make sure that you take into account the OD of the aluminum tubing spacers. If you make the holes too far on the bottom edge of the angle then the spacers will hit the top of the oil cooler. Drill these holes out to 1/8".

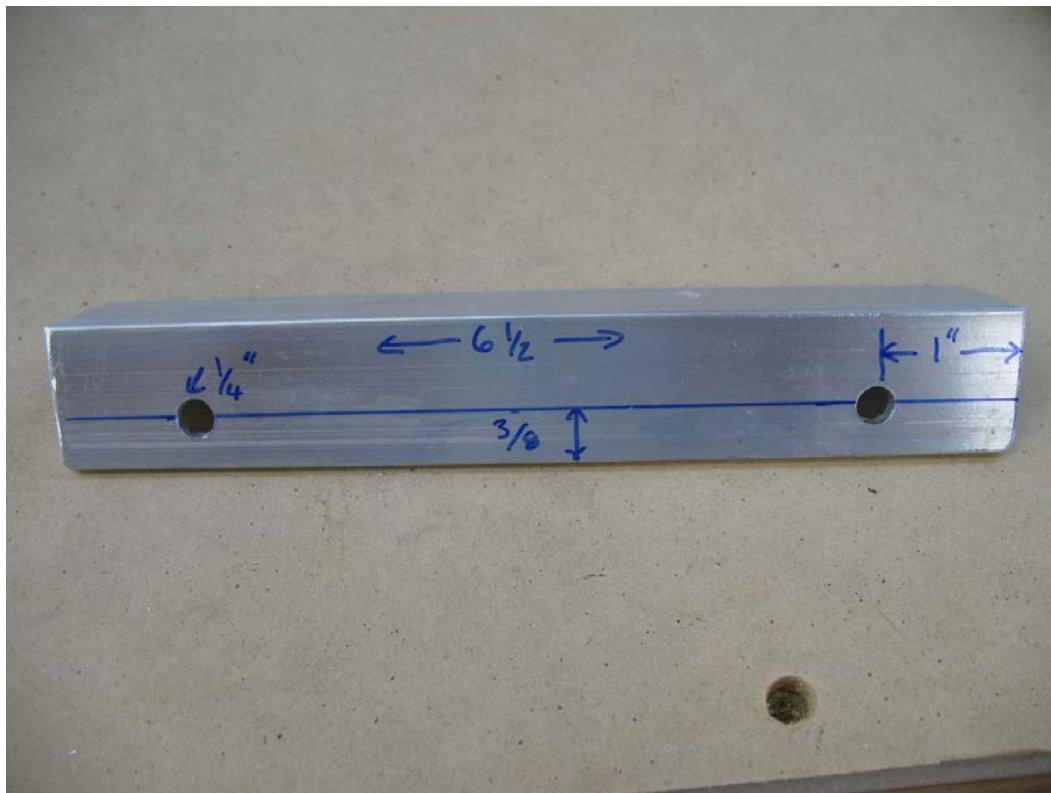


Figure 1

Step 2. Center the 6-1/2" aluminum angle on the top flange of the oil cooler with the bottom of the angle flush with the bottom of the oil cooler flange. The top of the angle goes towards the center of the oil cooler. Back drill through the angle into the oil cooler flange. Drill out to 1/4". Repeat for the other angle



Figure 2



Figure 3

Step 3. Trim the 1/4" ID aluminum tubing spacers as needed to fit between the oil cooler flanges



Figure 4

Step 4. On the 4" aluminum angle:

1. On one face of the angle trim off $3/8$ " of material leaving $5/8$ "



Figure 5

2. On the other face of the angle make a cutout $1\frac{1}{2}$ " wide by $5/8$ " deep to clear the oil cooler fittings



Figure 6

3. On the cutout side of the angle drill two 1/8" pilot holes 5/8" in from each side and centered on the angle

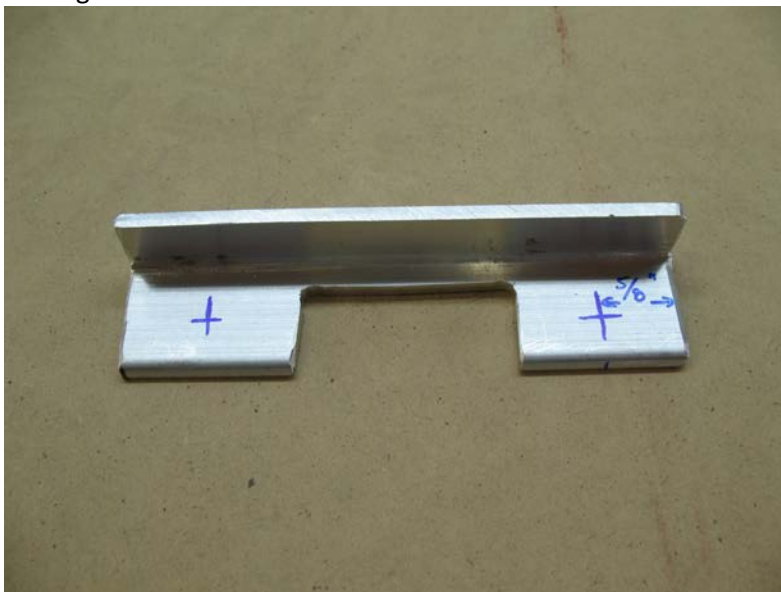


Figure 7

Step 4. Measure the distance between outer most oil pan fins. This measurement should be approximately 4-3/8". Transfer this measurement onto the 6-1/2" oil cooler brackets.

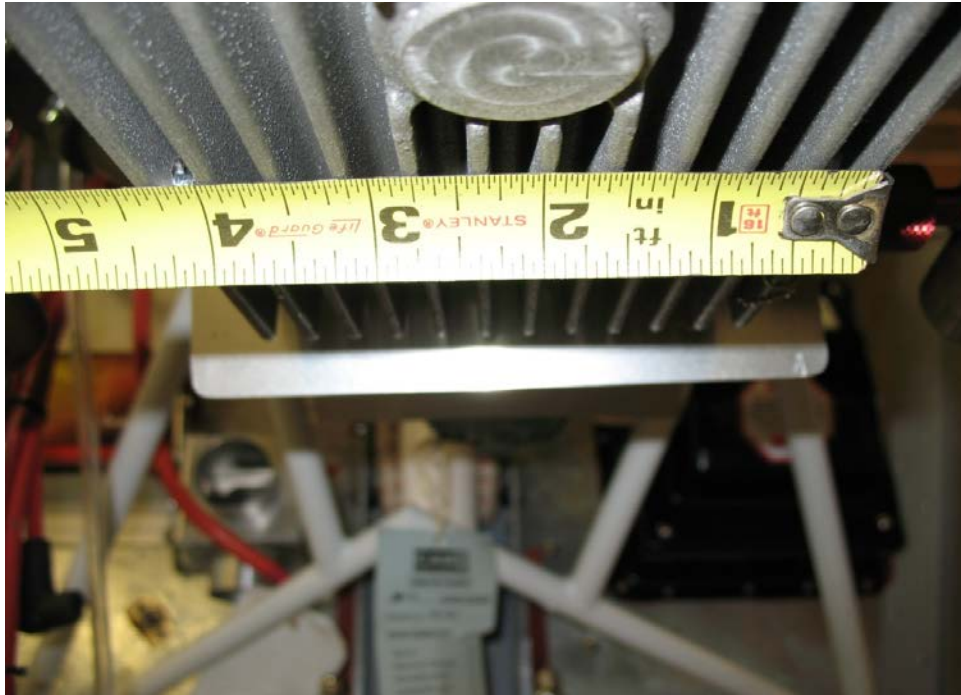


Figure 8



Figure 9

Step 5. Clamp the 4" angles to the oil cooler angles with the cutout clearing the cooler inlets and the inboard edge against the measurements you just made. Back drill through the pilot holes into the oil cooler angles. Before back drilling the second bracket clamp it in place and check the fit against the oil pan fins. Drill all holes out to 3/16" for the AN3-7A bolts.



Figure 10

Step 6. Mark two $\frac{1}{8}$ " holes on the $\frac{5}{8}$ " face of the 4" angles (see figure 11 next page). Mark these holes $\frac{1}{2}$ " in on each end of the angle. Carefully measure the height of the oil pan fins and take into account that you will be using a nut between the fins. If you drill too high on the fin then the nut will end up hitting the bottom of the oil pan and you will not be able to get a bolt through it.



Figure 11

Step 7. Place 4" bracket on the side of the oil pan. Line up the bottom front edge of the angle to the front edge of the oil pan. Back drill through 4" angles into oil pan fins. You will have to drill through two fins to make room for the correct length bolt.



Figure 12

Assembly

Step 1. Make sure all holes are de-burred and all sharp edges removed from the brackets.

Step2. Assemble oil pan brackets to oil pan using AN3-5A bolts and metal locknuts.

Step 3. Assemble oil cooler brackets to oil pan brackets using AN3-7A bolts, nuts and washers. Place grommet between oil pan bracket and oil cooler bracket. Finish with metal locknuts.

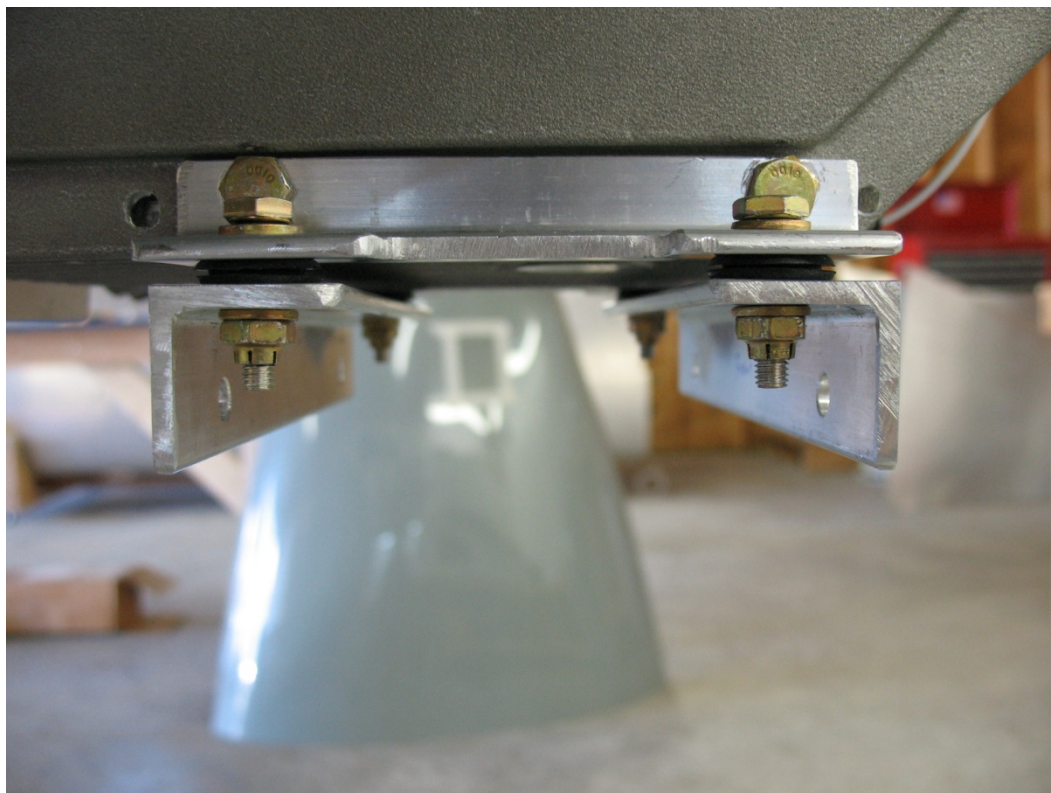


Figure 13

Step 4. Screw 3/8 NPT – 45 Degree AN6 Adapter fittings into oil cooler. Don't forget to use a thread sealant such as Permatex 2B.

Step 5. Temporarily bolt the oil cooler to the brackets using the AN4-42A bolts and spacers. Put the lower cowl in place and note the offset of the oil cooler in the cowl inlet. Remove cowl and oil cooler.



Figure 14

Step 6. Fabricate a mounting flange for the baffle material out of scrap L angle and aluminum from the Zenith kit.

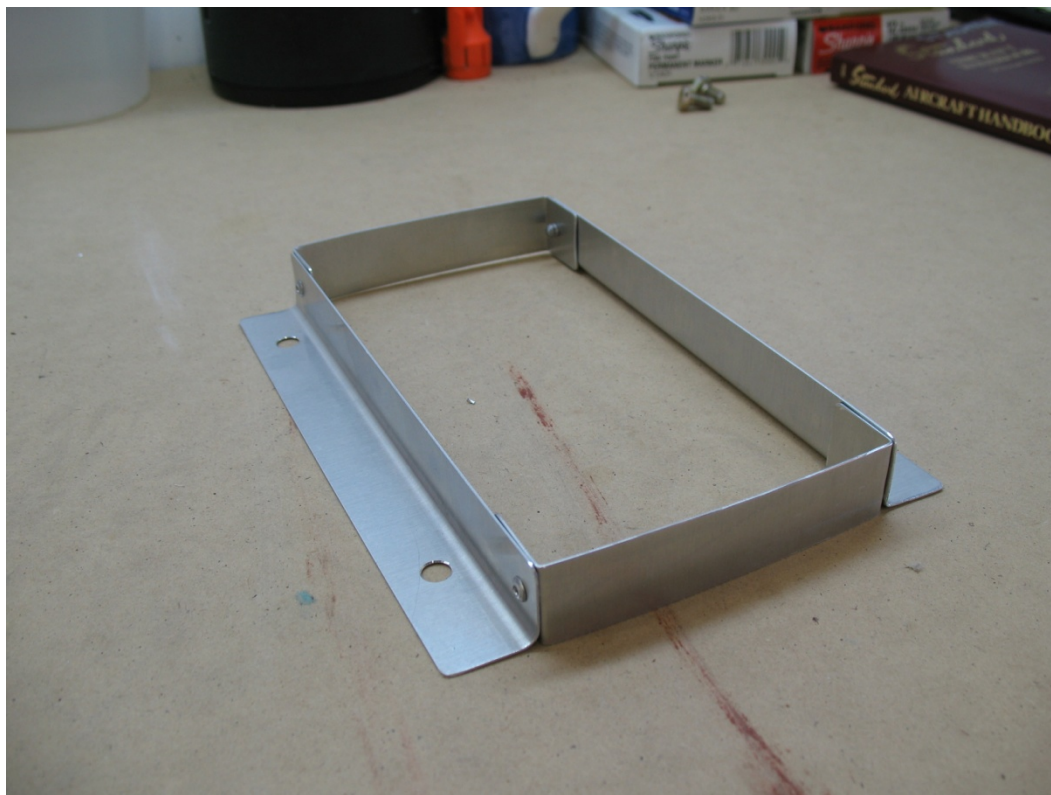


Figure 15



Figure 16

Note: Flange is offset to the left. This was done to center the baffle on the inlet in the cowl.



Figure 17

Sandwich the baffle material between the flange and pieces of scrap aluminum.



Figure 18

Step 7. Bolt oil cooler in place using AN4-42A bolts, spacers and metal locknuts.

Step 8. Locate oil cooler by-pass plate and oil filter extension fitting sent with the Jabiru engine. Remove the barb fitting from the by-pass plate and replace them with the 1/8 NPT – AN6 Adapter fittings.



Figure 19

Step 9. Remove the oil filter. Screw on the oil filter extension fitting and snug down.



Figure 20

Step 10. Lightly lubricate the oil ring on the oil cooler by-pass with engine oil. Slide the by-pass over the fitting and orient the plate so that the rear AN-6 fitting is pointing down. Re-install the oil filter.

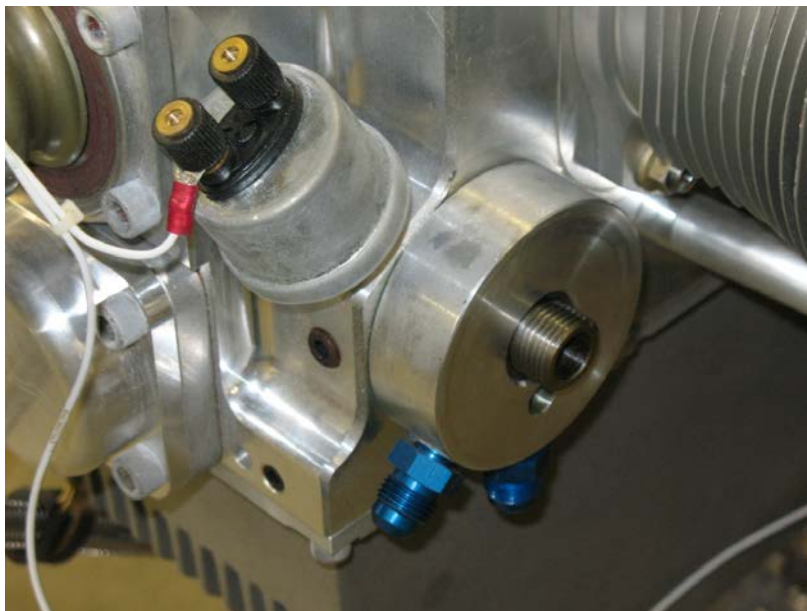


Figure 21

Step 11. Carefully measure and fabricate the oil lines. For instructions on fabricating the oil lines please visit <http://www.usjabiru.com/zenithch601installation-instructions.html> and download the “Stainless oil cooler line assembly” instructions. The oil line running straight down to the left (pilots) side of the oil cooler uses two straight fittings. The oil line that runs to the right side uses a 45-degree fitting at the oil filter and a straight fitting at the cooler.

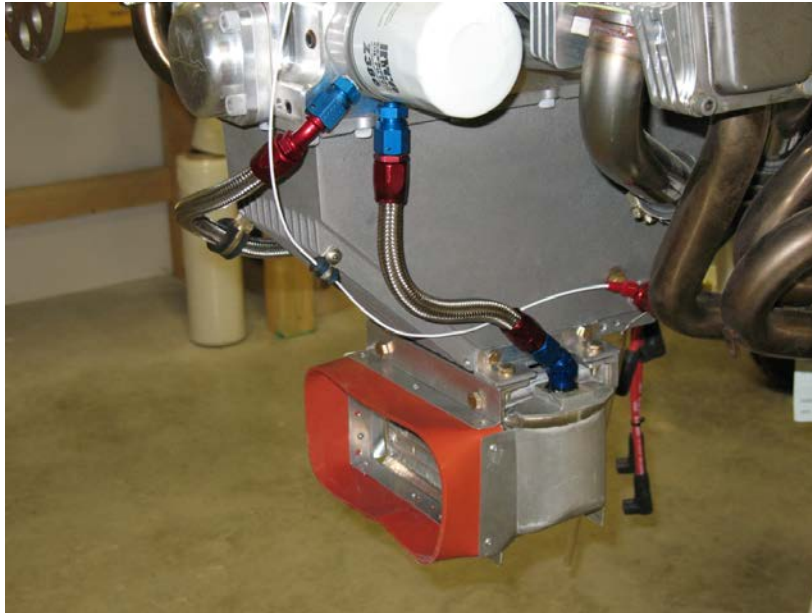


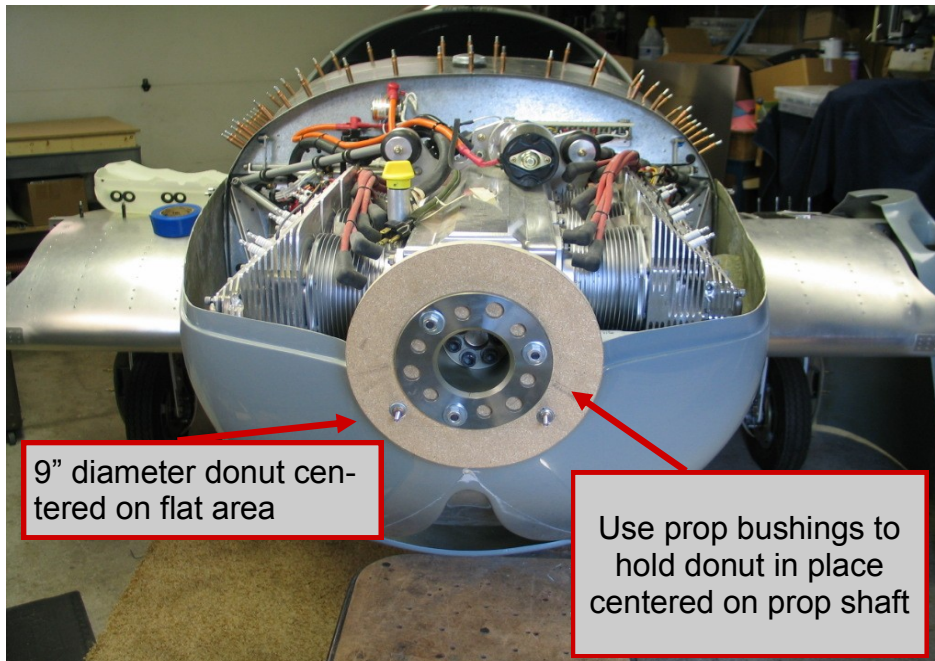
Figure 22

Secure the oil line as needed to minimize vibration.



Figure 23

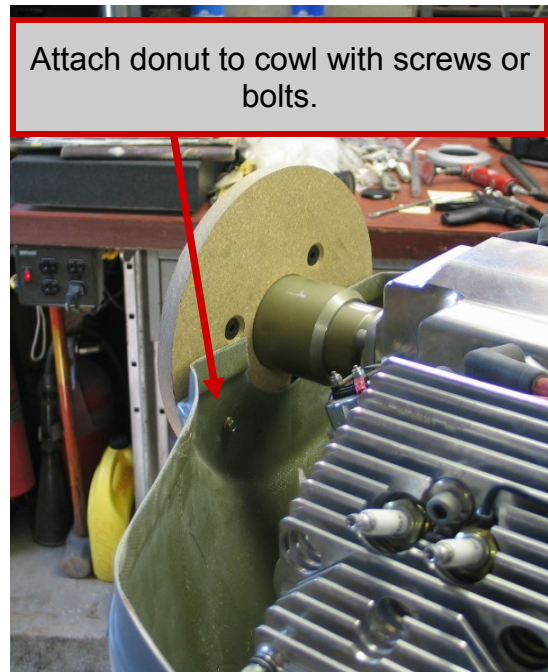
- 1.1 In simple terms, the cowls are installed by fitting the bottom cowl to the fuselage and attaching with screws to the fuselage and then fitting the top cowl and attaching it to the fuselage and bottom cowl with Camlocs.
- 1.2 One positioning jig will make installation much easier. Fabricate a “donut” from 3/4 inch thick chipboard or plywood. Cut the inside hole of the donut to 2.75 inches in diameter and make the donut 9 inches in diameter on the outside to match the spinner size.
- 1.3 Place the original prop hub that you removed from the crankshaft on the donut. Center the hub and with a 5/8 hole saw drill through three of the prop hub holes so you can insert the engine prop bushings later on.



- 1.4 Cut the donut in half (don't cut through the holes in the hub area.. Position one half against the upper cowl spinner flange (the flat area that falls just behind the spinner) and temporarily attach it to the upper cowl with a few self tapping screws inserted from the inside of the cowl into the wood block.
- 1.5 Attach the lower cowl to the other half of the donut in the same manner.

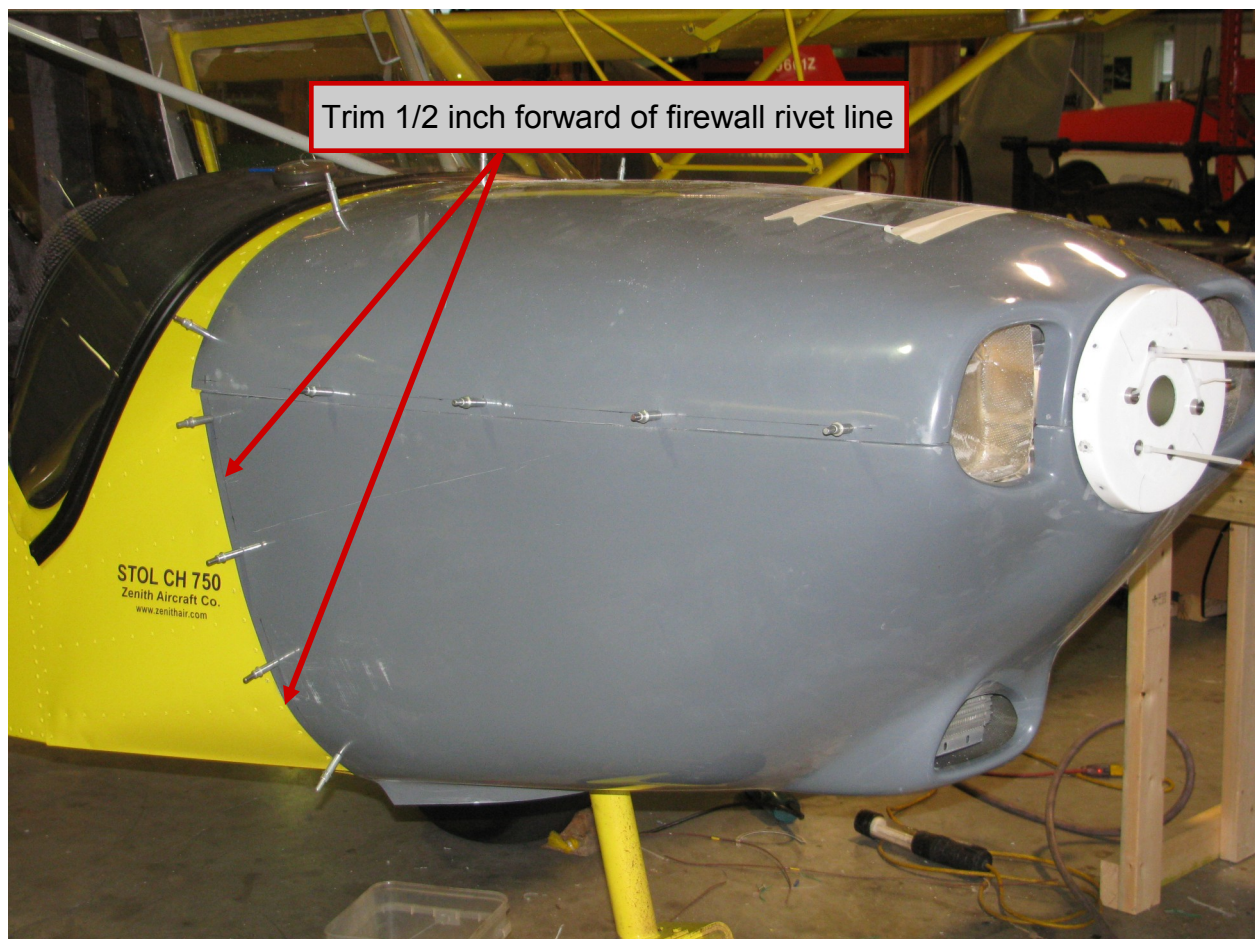
Please note—if using the round position jig but are planning on using an aluminum spinner, the thickness of the jig will have to increase by about 3/16 inch. This can be accomplished with spacer washers between aft side of prop flange and the cowl positioning jig.

Attach donut to cowl with screws or bolts.

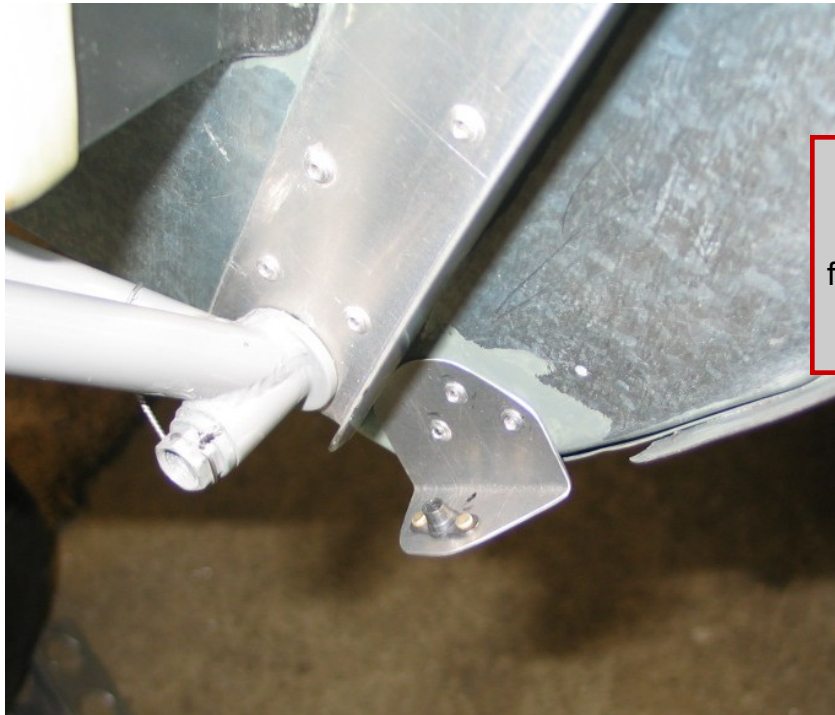


1.6 Bottom Cowl

- 1.6.1 Lift the lower cowl into place and secure the rear end in approximately the right place on the fuselage with tape. Position the front with the donut just behind the prop hub (on the prop hub extension) and secure with the prop bushings from the engine accessory pack and some temporary bolts or screws.
- 1.6.2 The inside radius of the donut should fit around the shaft of the prop hub extension and hold the front of the lower cowl in place.
- 1.6.3 Continue with the fitting of the rear of the cowl against the fuselage. Adjust the bottom cowl so that it is even on each side.
- 1.6.4 The rear of the cowl is made a bit long so that a builder can trim it to his liking. We would suggest trimming to about a half inch forward of the firewall rivet line.



- 1.6.5 Once the cowl is trimmed, drill three holes for temporary attachment of the cowl to the fuselage. Drill to 1/8 inch and cleco the cowl in place.
- 1.6.6 Fabricate a bottom attach bracket from some .032 aluminum scrap from the Zenith kit and attach to the firewall per the photo at left. Position the bracket so that the bent tab is in contact with the cowl. When happy with



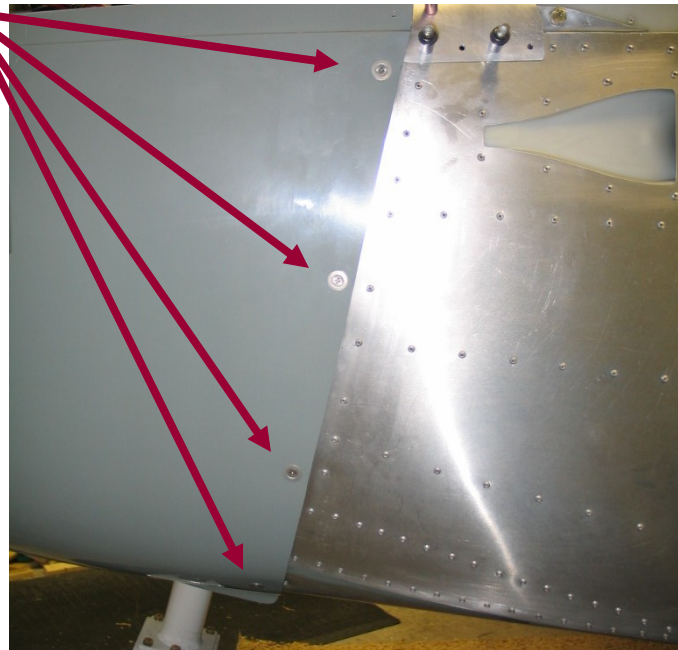
Optional bottom cowl attach bracket fabricated from spare or scrap aluminum sheet stock.

the fit, rivet to the firewall and then drill the final bottom cowl attach holes and cleco cowl in place.

- 1.6.7 To complete attachment of the bottom cowl, remove the cowl and drill the holes in the sides of the fuselage out to 5/32 inch and install the MK1000-8 nutplates behind the holes. Be sure to countersink or dimple the holes for the 3/32 flush rivets that attach the nutplates. Before final riveting of the nutplates, drill the hole out to 3/16 to give a bit more clearance to the #8 machine screw that will hold the cowl.

- 1.6.8 Using a stop countersink bit, countersink the holes that you drilled in the sides of the lower cowl so that the Tinnerman washer will fit flush with the surface.

Countersink cowls so that Tinnerman washers are flush with surface

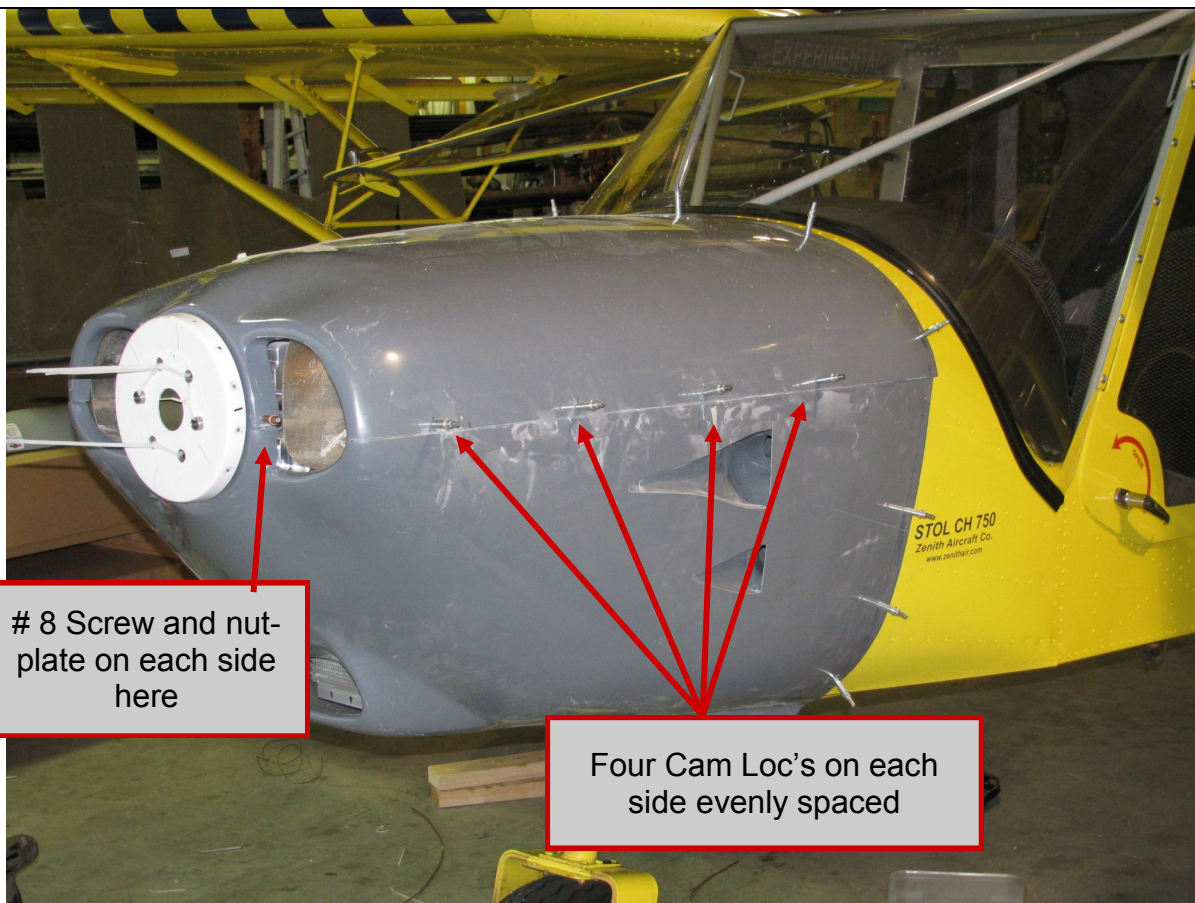


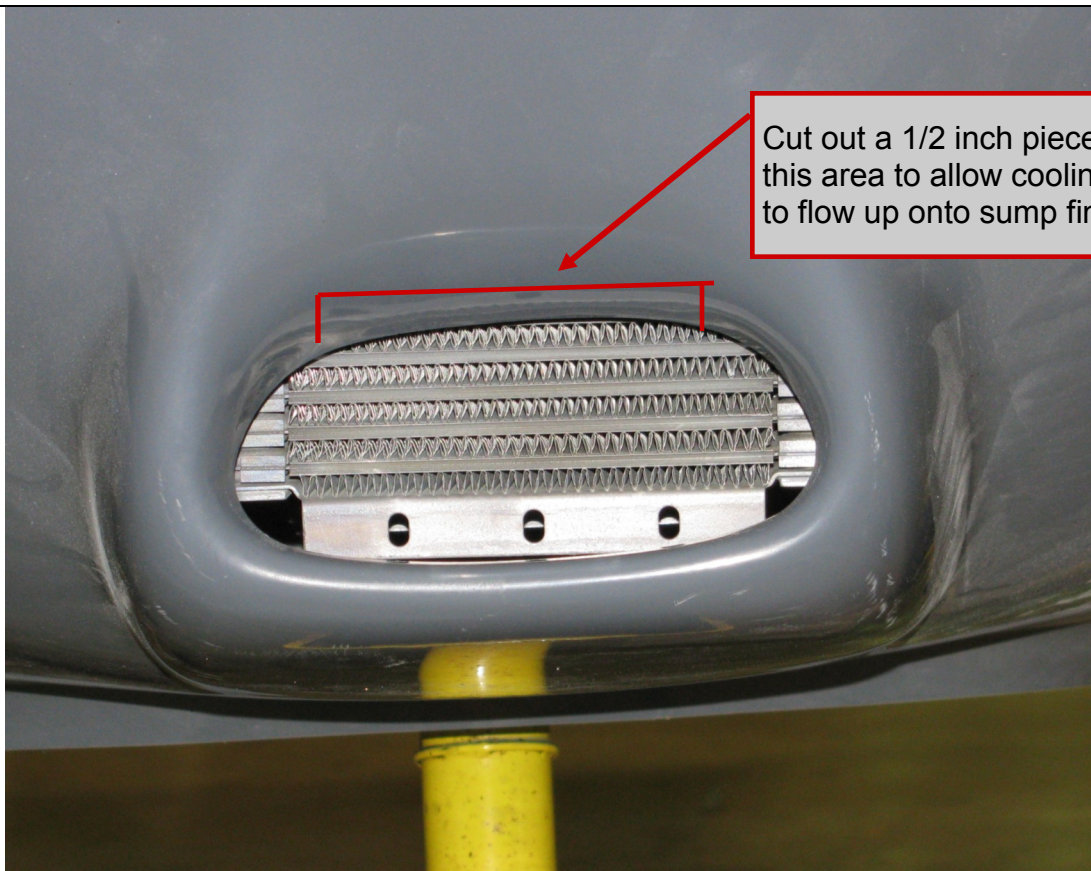
- 1.6.9 Reinstall the lower cowl using the donut in the front and the #8 taper head screws and Tinnerman washers in the rear.
- 1.6.10 Once the nutplates are in place, trim the side skin of the fuselage to suit using the photo as a guide.

1.7 Top Cowl

- 1.7.1 **Hint: One of the keys to good cowl fit is to pull the upper cowl tightly down around the fuselage at the rear of the upper cowl. Trimming need to be finished before the cowls can be pulled tightly together. Some gaps may appear at the rear of the top cowl if not pulled tightly down.**
- 1.7.2 If not already done attach the remaining half to the donut to the front of the top cowl in the same manner as the lower cowl. Place the upper cowl on the airframe and secure in the front at the donut and prop hub.
- 1.7.3 Center the top cowl on the fuselage and hold in place with tape at the rear upper end. Mark the rear of the upper cowl for trimming (it will be a bit long especially at the sides) and trim to suit. We would suggest matching the length at the sides with the lower cowl and then keeping a consistent distance from the firewall rivet line over the top.
- 1.7.4 The upper cowl will attach with 5 Camlocs on each side and two Camlocs over the top rear. The top cowl was molded just a bit oversize to allow for some variation in the size of the airframe that might occur in some cases and most likely may need some trimming along each side to fit snugly in the joggle joint.

- 1.7.5 When satisfied with the rear trim, again fasten the rear in place with tape. Try to center the upper cowl on the fuselage before taping. Using some more tape, pull the sides of the top cowl down over the lower cowl and mark for trimming for a good fit in the joggle joint. Trim with a long sanding block with 80 grit paper or a Permagrit abrasive block.
- 1.7.6 When cowl is trimmed to fit, installation of the Camlocs can begin. Use a 1/8 drill to initially drill the Camloc locations and clecos to fasten the top and bottom together. Start at the front and locate a Camloc about mid-way in the front flange. For the sake of symmetry, drill each side in the same location. Insert clecos to hold the cowls together.
- 1.7.7 Mark the sides of the cowl to evenly space 4 Camlocs on each side. Plan on locating the most forward Camloc about six to eight inches behind the bend at the front and the rear Camlocs about 5/8 inch forward of the trailing edge of the upper cowl. Locate the holes so that they are slightly below the center line of the joggle joint. Again, make each side the same. Drill to 1/8 inch and install clecos to hold the cowls together.
- 1.7.8 Finally, evenly space the two Camlocs on the top rear of the upper cowl. Drill to 1/8 and install clecos to hold the cowls in place.
- 1.7.9 Installation of the Camloc receptacles is next. Camloc receptacles are installed similar to nutplates. Drill the 1/8 holes in the lower cowl hole out to 5/16. Insert a 5/16 bolt into the hole and into a Camloc receptacle (the bolt keeps the Camloc centered in the hole) and use a 3/32 drill to backdrill the Camloc attach holes. Counter sink the Camloc attach holes so the 3/32 rivets will be flush and rivet the camloc body in place.
- 1.7.10 Drill a 1/4 inch hole in the upper cowl for the Camloc insert. Make a small notch in one side of the hole to allow the pin to fit through. On the sides of the cowl the Camloc receptacles are installed on the back side of the joggle joint and #6 Camloc inserts are used. At the top rear the bodies are riveted to the under side of the fuselage skin and #2 Camloc inserts are used.
- 1.7.11 When all camlocs are in place, reinstall the bottom cowl without the donut. Lower the top cowl in place and secure with the Camlocs.





Cut out a 1/2 inch piece from this area to allow cooling air to flow up onto sump fins.



Sensenich Wood Propeller

The Sensenich wood prop uses AN6 attachment bolts. Drill out the propeller drive bushings (supplied with the engine accessory kit) to 3/8 inch. Mount the bushings in a vice cushioned with wood (paint stir sticks work well), cloth or cardboard. These bushes are easy to drill – just keep drill straight.

Drill Prop Crush Plate to 3/8 inch. Drill only the six holes on the 4.375 inch diameter hole pattern.

Install an AN6-45A bolt in each prop drive bushing.

Insert bushings and bolts into prop hub from rear.

Slide spinner back plate over bolts & bushings.

Slide prop over bolts and bushings.

Install crush plate over bolts.

Install a AN960-616 washer over prop bolt.

Install two Belleville washers over each prop bolt. The washers go concave face to concave face.

Install AN360-624 nylock nuts.

Tighten to 18 ft lbs in a diagonal pattern – first torquing to 12 ft lbs and then to 18 ft lbs.

Refer to prop installation drawing (next page).

For the most up-to-date reference and propeller maintenance guides, visit Sensenich Wood Propeller at www.sensenichprop.com.

Cummins Polished Aluminum Spinner

The Cummins Polished aluminum spinner requires no trimming and no nut plate installation. It is ready to install right out of the box!

The advantage is that the spinner takes several hours less work than a fiberglass spinner and it is perfectly balanced and runs exactly true without adjustment. We think it looks better as well.

The disadvantage is that it costs a few hundred dollars more than a fiberglass spinner. We think it's worth it!

