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FF-1207 Cooling Shroud Modification

11-19-10

Background: Rotax requires (among other items) that the RV-12 engine mount allen screws be checked for tightness at regular intervals (see the Rotax Line Maintenance Manual Sections 5-20 and 12-20).

If you have not yet complied with all Rotax maintenance requirements, this should be done before further flight.

Currently the FF-1207 Cooling Shroud interferes with access to the upper left M10X30 engine mount allen screw. This instruction details an in-place modification of the shroud which, when completed, will allow sufficient access.

Required Tools List:

8mm ball end allen wrench

12" long #30 drill bit

Hand drill and other misc. common tools

Shop vacuum

Sand paper (approx. 80 grit)

Small scraps of fiberglass cloth (approx. 8 oz. / Sq. yd weight)

Epoxy resin and hardener.

Scissors

Misc. tools for mixing and applying epoxy resin.

Duct tape

Step 1: Remove the Left Hand induction manifold from cylinders 2 & 4 by removing the 4 M6 Allen screws. See Figure 1.

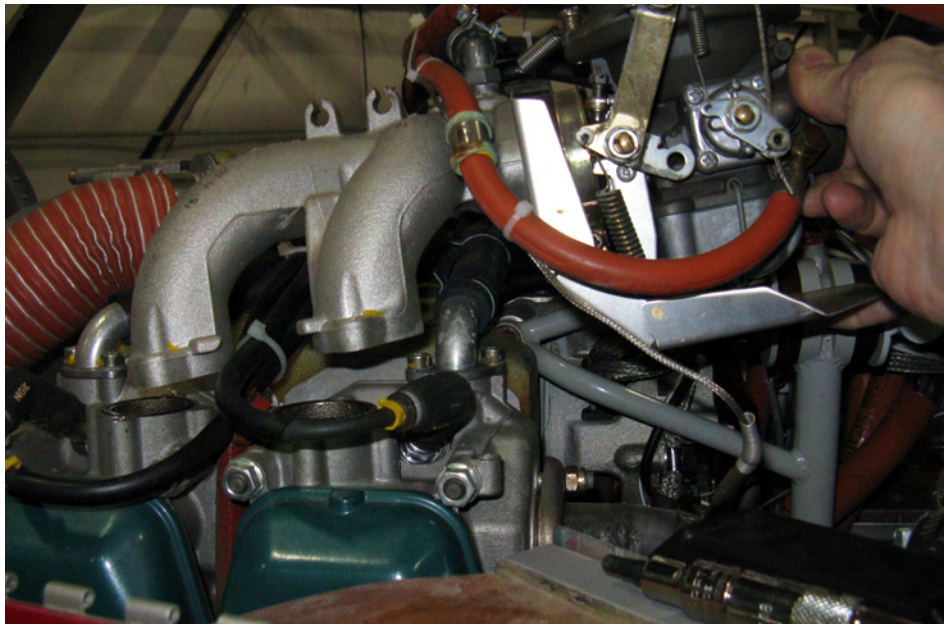


Figure 1: Remove Left Hand Induction Manifold

Step 2: Carefully mask off the induction holes in the engine cylinders. See Figure 2.



Figure 2: Cover Induction Holes

Step 3: Mark the cooling shroud at the aft LH corner for a cutout. Sight the centerline of the upper LH engine mount ring allen screw and draw a line with a marker angling slightly aft to clear the coolant elbow flange. From this centerline mark a 5/8" wide by 1" long zone to be removed.

NOTE: A 12" long #30 drill bit will work to remove most of the material around the perimeter. Clean up edges with 80 grit sandpaper.

Step 4: Drill straight down along the outboard edge of the cut-out zone (use caution to only let the drill penetrate through the shroud no more than 1/4" or so to prevent hitting any part of the cyl.).

Now enter these holes from the left side (the manifold may be pulled up and out of the way), by tilting/angling the drill bit downward as you run the drill. Angle the drill so that the bit will exit the shroud near the bottom of the allen screw head. Drill a close pattern of several holes in the inboard end of the shroud approximating the arc of the screw head (sight down the length of the drill bit to approximate the exit point on the shroud). See Figure 3.

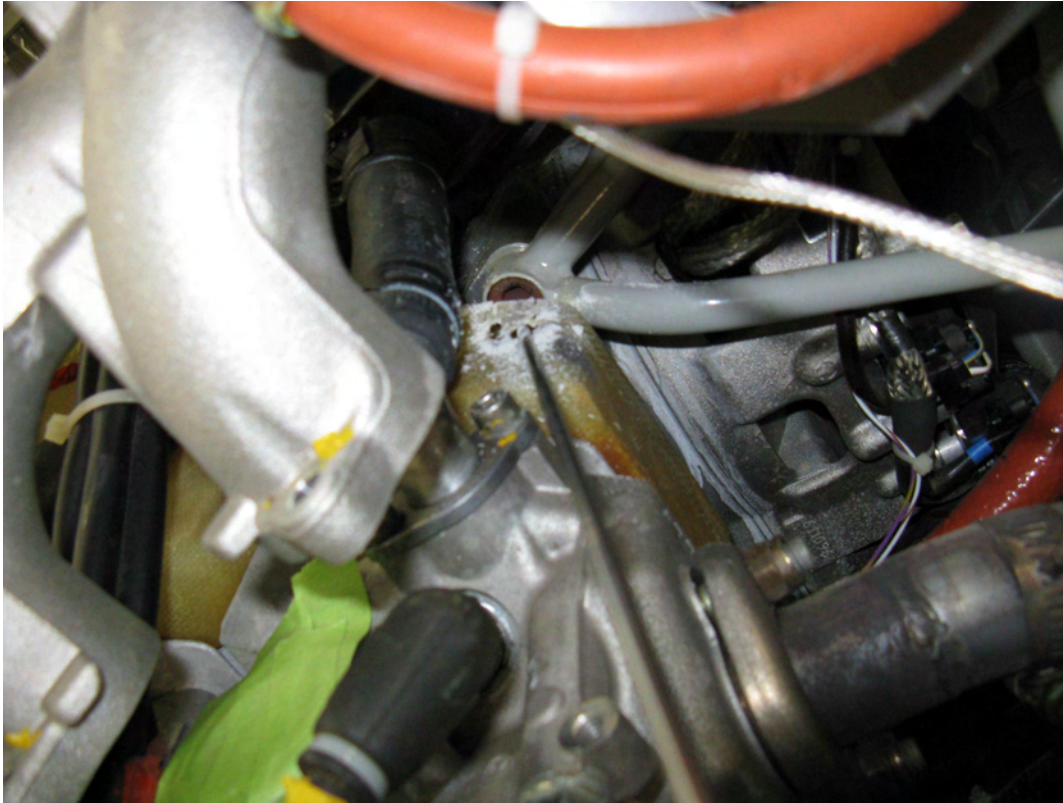


Figure 3: Drill Cooling Shroud Cut-Out

Step 5: Drill or cut with a hacksaw blade along the front and aft sides of the cut-out zone. See Figure 4.

Step 6: Break out the remaining material using a needle nose pliers, and sand the edges smooth. (Sandpaper can be glued to / wrapped around a round object when finishing the shape of the opening). See Figures 5 and 6.



Figure 4: Cooling Shroud Cut-Out

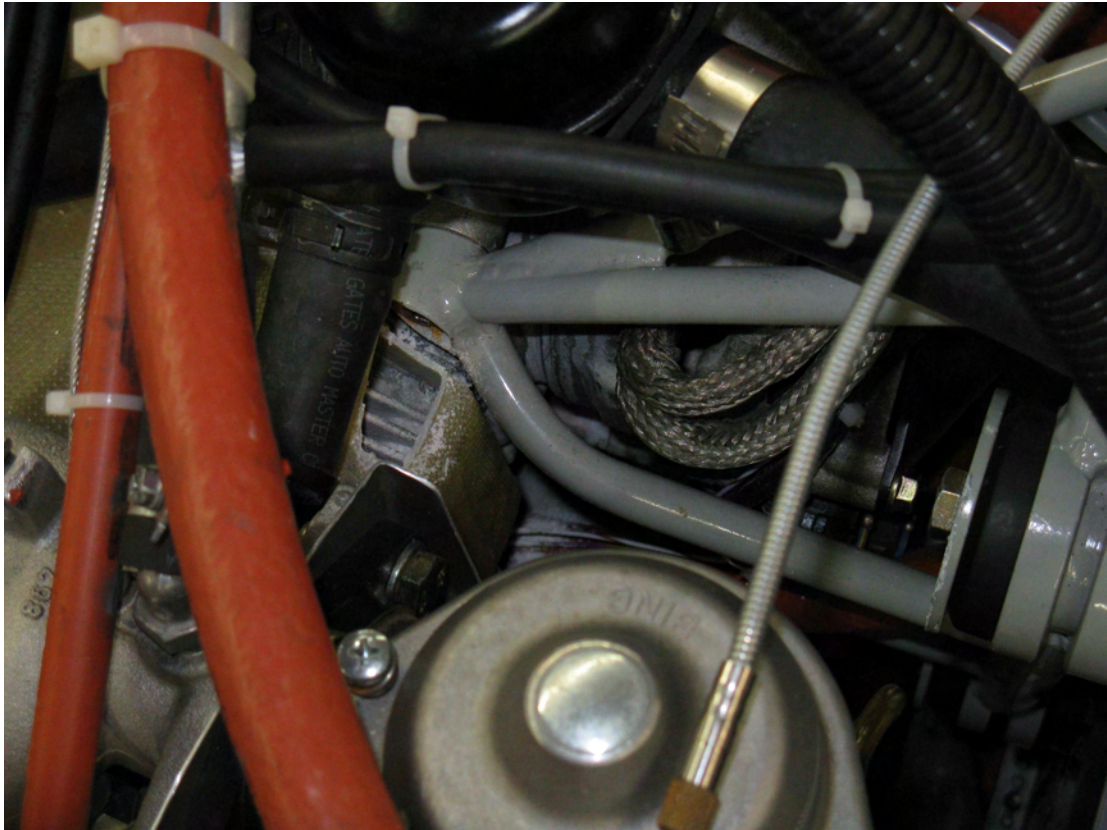


Figure 5: Cooling Shroud Cut-Out

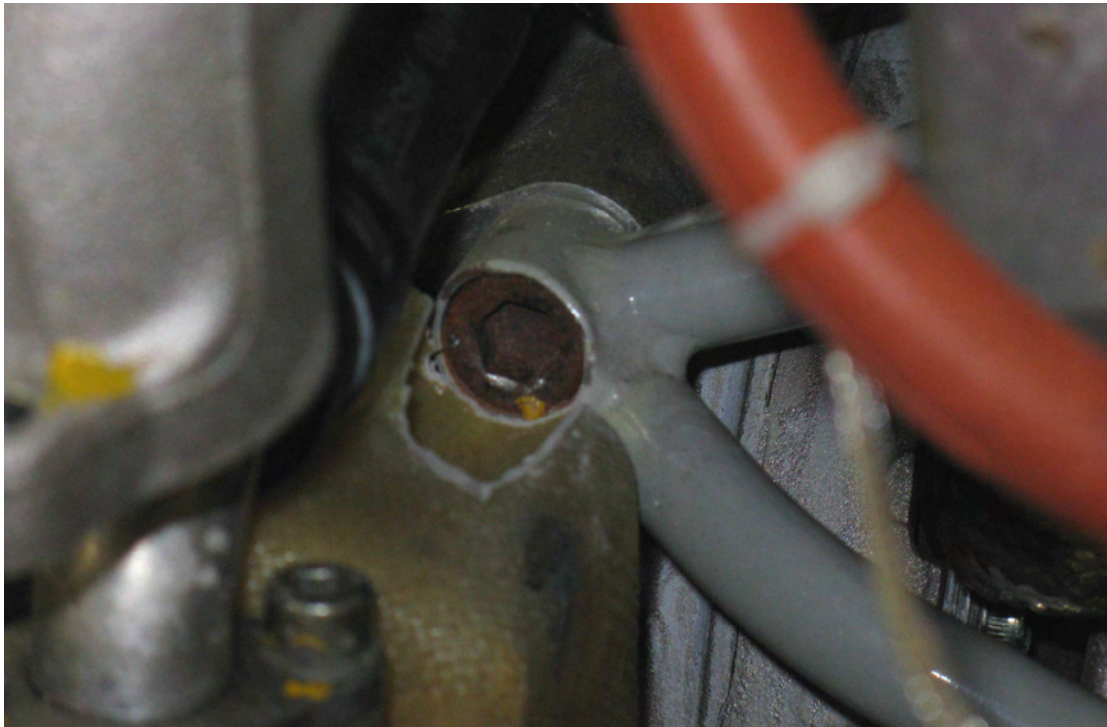


Figure 6: Cooling Shroud Cut-Out Detail View

Step 7: Check the final hole size and location by inserting your 8mm ball end allen wrench into the engine mount allen screw to ensure that the hole is sized big enough and lined up properly to allow for both a small range of motion and clearance for the fiberglass build up. Remove additional material from shroud if/as required and proceed when satisfied with the fit of the tool.

Step 8: Scuff sand the area around the hole for a good bond, then vacuum up all of the fiberglass debris.

Step 9: Cut out two pieces of fiberglass cloth in a trapezoid shape, 2 inch base, 2 inches tall, 1.25" wide at the top. See Figure 7. Cut the fiberglass cloth such that the fibers are oriented approximately as shown in Figure 7.

Wrap the allen wrench with two turns of duct tape.

Mix a small batch of epoxy resin, wet out and layer the fiberglass pieces on top of a 4" square of plastic food wrap (or similar) as shown in Figure 7.

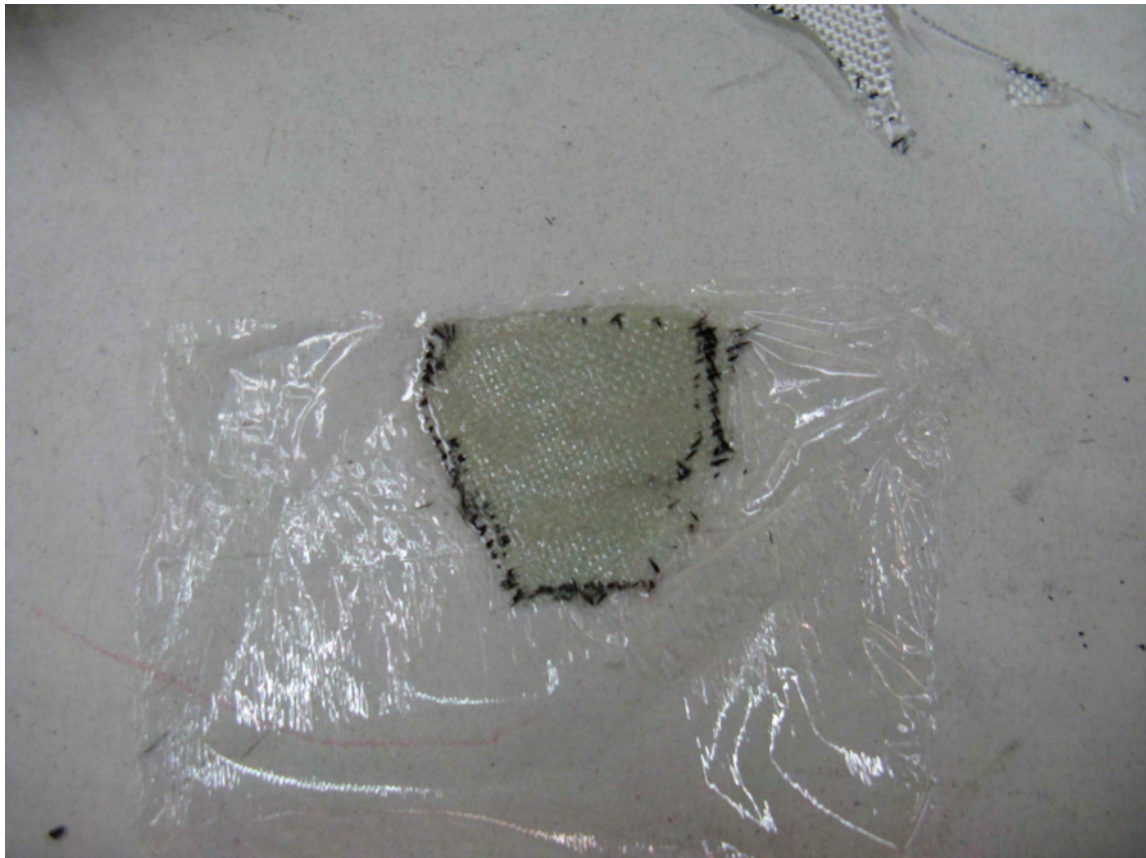


Figure 7: Fiberglass Cloth Lay-Up

Step 10: Place the wetted-out fiberglass and plastic wrap over the hole in the shroud. With the plastic wrap still in place, insert the allen wrench into the engine mount allen screw to hold the cloth in place. Push the cloth edges down flat onto the shroud (you may need to use a small tool to smooth down the cloth on the inboard surface of the shroud, below the allen screw). See Figure 8.



Figure 8: Fiberglass Cloth In-Place on Cooling Shroud

Step 11: When cured, remove the wrench and plastic wrap from the lay-up and remove sharp edges from patch by sanding as required.

CAUTION: Double check position and integrity of o-ring seals on cylinders when installing intake manifold.

Step 12: Remove **masking tape from induction holes in cylinders**, double check the position and integrity of o-ring seals on cylinders, and reinstall intake manifold. Torque allen screws per Rotax Illustrated Parts Catalog specs and reinstall any tie-wraps that may have been removed.

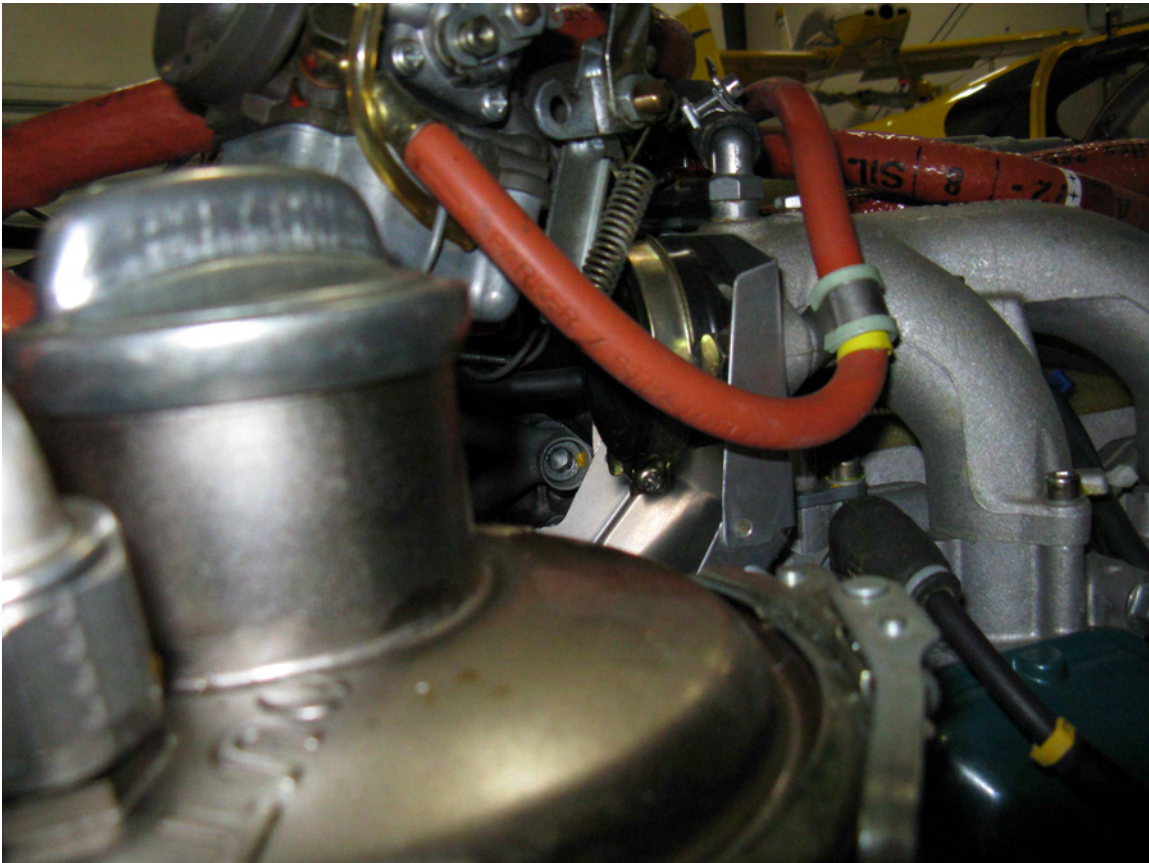
Accessing the Upper Right Engine Mount Screw

NOTE: When gaining access to the Upper Right Engine Mount Allen Screw the intake manifold, VA-205 drip pan, and rubber flange assembly may remain in place.

Step 1: Remove the air filter from the right carburetor.

Step 2: Unhook the small spring from the intake manifold that is attached to the top front of the carburetor.

Step 3: Loosen the screw in the hose clamp which secures the right carburetor to the rubber flange assembly, pull the carburetor out and lay it aside with the control cables still attached.



Step 4: Shorten an 8mm ball end allen wrench to 3.5 inches. (A cutting disk in an air powered die grinder works well for cutting the hardened steel wrench.)

The shortened allen wrench is then inserted into an 8mm or 5/16" socket for attachment to a torque wrench with various length extensions depending on which of the four engine mount allen screws need to be accessed.

Step 5: Check the engine mount allen screw torque per Rotax Illustrated Parts Catalog specifications.

Step 6: Reinstallation is reverse of removal.