

Building a Better Profile

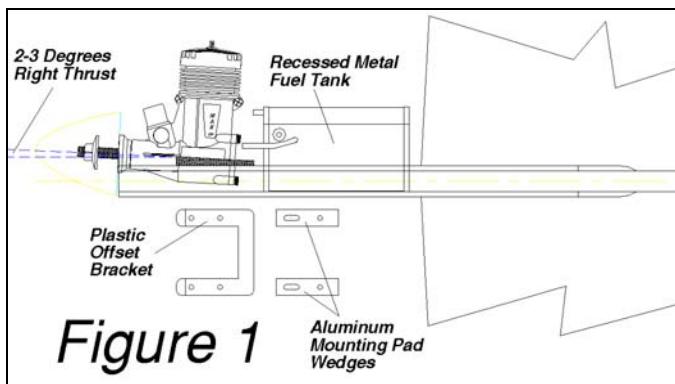
Part 4 - Engine and Fuel Tank Mounting



Doug Carson's lovely profile Shoestring

Engine Mounting

The importance of profile nose construction to quality of engine run has been emphasized. Engine mounting is another critical factor.



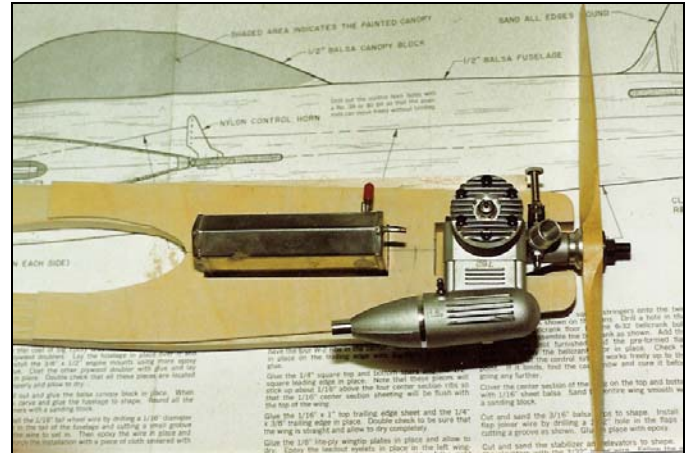
Engine mounting pads are strongly recommended. 2- or 3-degrees of outboard engine thrust work well on most profile stunters. Pre-drilled aluminum mounting pad wedges or U-shaped filled-plastic engine offset brackets (Figure 1) are available. I have also used flat aluminum pads with excellent results.

Loads are distributed over a large surface area by engine mounting pads, which minimizes damage to the outboard doubler surface.

By contrast, shimming the engine with washers concentrates loads in small areas - all too often the result is added vibration, chewed up wood and metal surfaces, and even broken engine bolts.

Precision Fitting the Engine

Drill engine mounting holes after the profile fuselage nose has been assembled and glued. Fit and align the engine on its mounting pads, using direct measurement to mark the holes. Be sure to take into account the type of spinner used: metal and plastic spinners have different clearance fits!



Prefitting the engine

Hex-head 1" long 4-40 engine bolts are ideal for most profiles. To mark engine holes **exactly**, locate a long (4") finish nail whose diameter just fits the holes in the engine. Cut off the nail head and chuck it into a hand drill. Holding the engine and pad in place, accurately mark each engine hole by "drilling" it lightly with this nail. If your engine pads are not pre-drilled, use this method to mark and drill them first, then repeat the process to mark the nose holes.



Precision drilling engine mounting holes

If at all possible, use a drill press for the actual engine holes. These holes need to be perfectly perpendicular to the engine mount, regardless of outboard thrust adjustments. For improved accuracy, drill a smaller "pilot" hole prior to the actual finished hole. The proper size for a 4-40 body drill is #33 (.113"). Resist any temptation to egg out or enlarge engine mounting bolt holes: accurately drilled holes of the correct size are superior for maintaining engine alignment and reducing vibration.

Hiding Engine Mounting Blind Nuts

One could simply mount 4-40 blind nuts on the inboard doubler and be done. (Figure 2). This works well when a balsa inboard tripler sheet will be added to cover the whole affair.

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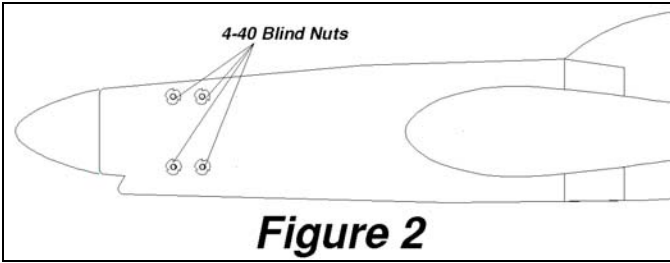


Figure 2

When no inboard tripler is used, with more effort you can do it the Cowboy Way, with blind nuts recessed and hidden (Figure 3).

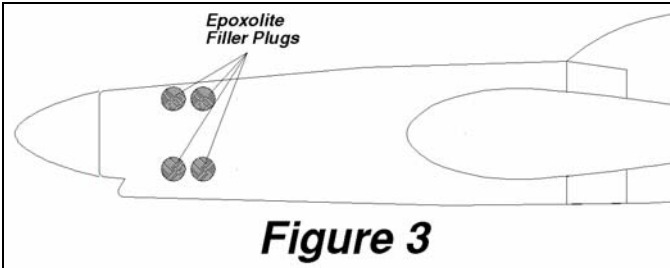
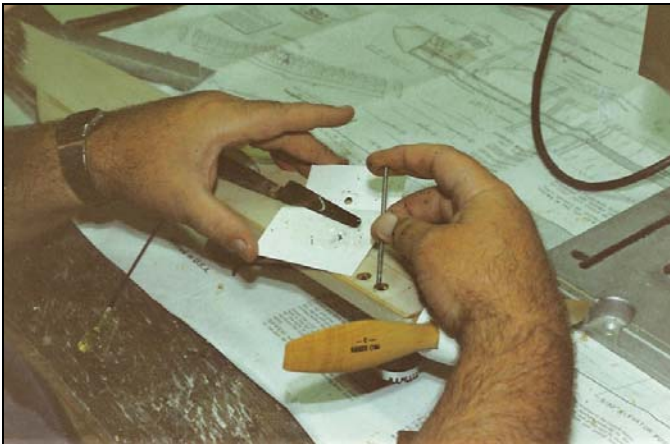


Figure 3

For the recess hole, use a 3/8" drill to a depth of slightly over 1/8" in the inboard doubler, just through the 1/8" thickness of plywood. Follow by a 1/8" drill to a depth for clearance for the blind nut body.

With engine, mounting pads, plain and lock washers all in place, install all four blind nuts. Carefully draw the bolts up in sequence, seating each of the four blind nuts. Glue the blind nuts in with 5-minute epoxy.



Gluing engine mount blind nuts with epoxy

After the epoxy has cured, gently remove engine bolts and reinstall them without washers and engine mounting pads, so that they extend perhaps 1/16" beyond their [normal] maximum depth. Add a tiny drop of light machine oil on the very end of each bolt, and wipe off any excess. Slightly overfill the blind nut holes with Epoxolite, and allow to cure overnight.

Gently unscrew the bolts, which may be quite stiff at first. They should release, thanks to the oil. Use a flat sanding block to level the surface of the filler with the inboard doubler.

If any holes develop, carefully replace the bolts and repair the holes with Epoxolite.



"Abracadabra", with hidden engine mounting blind nuts

Remember: **never** use longer engine bolts! With engine on mounting pads and washers in place, engine bolts should never extend deep enough to damage Epoxolite filler plugs..

Fuel Tank Modifications

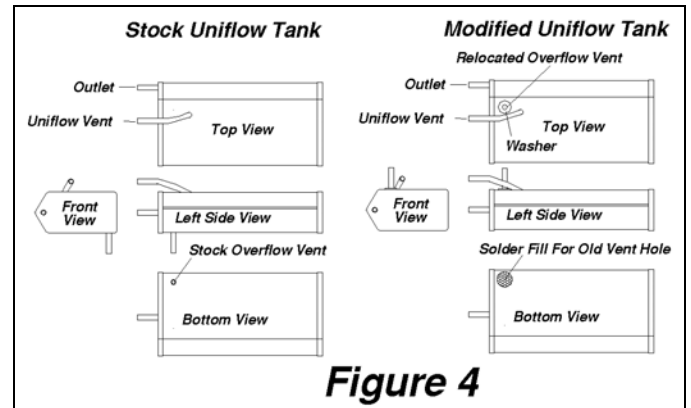


Figure 4

Earlier a standard Smith or Taffinder metal 3 to 4 ounce wedge tank, with uniflow vent was recommended. It will be necessary to move the fill overflow vent on this tank to allow the tank to be recessed into the profile fuselage nose. A Weller soldering gun, electrical (not acid core) solder, and soldering paste (Nokorode works well) are recommended for all metal tank work.

Figure 4 illustrates the simple modifications involved, which move the overflow to the top front side of the tank. Repair the hole for the removed vent by flowing solder into it. Use an ice pick or sharp nail to punch the hole for the new vent. Note that the new vent does not extend into the tank; a washer is used to strengthen the soldered joint. You'll find this location very convenient for monitoring overflow and recapping the vent. The uniflow vent is normally used for filling and for atmospheric or muffler pressure during flight.

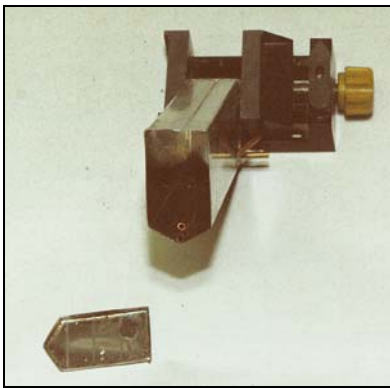
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Metal fuel tank modifications for recessed mount

While you are soldering on the tank, it might be a good time to pop off the rear panel and inspect the uniflow vent. You may decide to skip this step if you are not "skilled" in soldering!



After modifications, pressure test and clean your tank. Use a horse syringe to fill the tank completely with alcohol, cap the outlet and overflow tubes, and apply enough pressure to bulge the tank a bit. Empty the syringe, connect to the outlet, and rapidly withdraw the fuel. Repeat this several times with fresh alcohol to clean the tank.



Cleaning and pressure testing the modified fuel tank

Fuel Tank Mounting

The fuel tank should fit its hole fairly snugly - compressible Lite Ply shims above and below the tank are used with my recessed mount.

To help isolate the tank from vibration, you may wish to insert a thin sheet of rubber between the tank and the inboard doubler surface. An inexpensive source for such rubber is a flat sink stopper.

The fuel tank can eventually be mounted semi-permanently using small dabs of RTV adhesive. Or solder on brackets to attach the tank to the nose with small wood screws into the long engine mount beams.



Canadian youngsters with excellent Flite Streak

How do you feel about gouging out and repairing holes in your brand new fuselage? It's all part of doing good construction.

Next time I'll reveal a few more construction kinks, as we get down and dirty with Epoxolite, and more of the [labor intensive] Cowboy Way.

-Larry Cunningham