

Adding a Cooling Fan to The “Big Red Pig” (BRP)

As many XR650R owners are aware, the bike comes from the factory very restricted in terms of jetting and airflow. This needs to be corrected both for proper starting, running and power of the bike, as well as to help the bike run cool. That subject has been covered well before, but there’s a part of that issue that became important to my BRP and me and also spurred the topic of this article, the addition of a cooling fan.

I did all the modifications to my BRP to “uncork” it, except one: moving the needle clip in the carburetor. Why? I guess I was reluctant to open up the top of the carb since the bike seemed to be running OK, and I knew from BRP owner’s discussions on the eGroup that the o-ring on the carb cap was potentially a real pain to get back together. So, I left it alone. Well, long story short, on a ride late last year in the same conditions, same speed, same everything as two other BRPs, mine overheated and theirs did not. The **only** difference between the bikes? That needle clip position.

After thinking about it it DOES make sense that the bike could overheat with the clip in the stock position. Sure, the pilot jet was changed to a 68s and the screw backed out. Fine for near idle. And the main jet was changed to a 172. Great for ¾ throttle and up. However, I didn’t do a damn thing for the bike in the 1/8-3/4 throttle area, where I ride it most! That’s where the needle clip position has the most effect. Anyway, I overheated in some tight stuff. We normally ride dualsport where there’s plenty of speed (read: airflow) to cool the pig. Well, the overheating in the tight was a real pain in the ass. Ruined my day, because even once I filled ‘er with water from my backpack and we got out of the tight stuff and back into higher speeds where there was plenty of airflow, I never trusted the bike again for the rest of the day, and only wanted to get back to camp as soon as possible in case it got hot again. Not fun at all, especially when it’s a long drive to get to that riding area, and you’re only on day 1 of a 2-day ride. I’m sure the other guys riding weren’t happy that we had to leave the tight stuff they were enjoying, either. So, the moral of the story is: move that needle clip from the stock 2nd position from the top to the richer 4th position from the top. The

other two BRPs I was with that day have never overheated, and they have that change. (Now I do, too).

Being that it’s winter in Michigan and the bike’s just getting maintenance work until spring, I decided that adding a cooling fan would be pretty easy to do and pretty cheap as well, and would also give me some good “insurance” against overheating happening again. Even though I’m sure the needle clip was the problem, for a few bucks I could have a cooling fan, too, just in case. Belt and suspenders...why not!

COOLING FAN

I found a cooling fan at Newark Electronics online that looked like it’d fill the bill. It’d physically fit, wouldn’t pull much current, had good airflow, and was cheap, too! I can’t say yet how long she’ll last, but at only \$20 total including shipping I can replace it every season if I have to! (Thanks to “Tommy” from the Yahoo group for the pointer to check out Newark). In the photo below, there’s a connector and wiring protector/conduit on it. I added that myself. The fan comes with 22-gauge leads.



Figure 1 - 55CFM Cooling Fan

MOUNTING SYSTEM

I planned on mounting the fan on the RH radiator, because it has “tangs” on it already for California bikes that have an Pulse Secondary

Air Injection (PAIR) Control Valve mounted there. (I think most CA riders end up removing that valve as part of the uncorking, so these instructions should work for them, too).

PS: Note that the radiator shown in this picture and all the rest is one that's "sprung" a little bit from getting poked hard with a big branch; it's been replaced (you should see the front!). So, it's a little "wavy" looking, but you'll get the idea!

Note also in the picture that one of the tangs has what's called a "J-nut" on it. This is what I used as the nut for mounting the fan bracket, as you'll see later.



Figure 2 – J-nut and screw



Figure 3 - Radiator Mounting Tangs

FAN "SUB-MOUNT"

Now, the fan can't mount directly to the tangs for a couple of reasons. First, the holes in the fan don't line up right (not surprising). Also, the fan

needs to be mounted such that the face of it is no more than 1/8" away from the radiator itself. If you don't do this, the fan will suck air from "around the edges", rather than through the radiator itself. So, we've gotta make a mount for the fan that will both allow us to position it fore/aft so it's close to the radiator core, and also so it'll fit the tangs. I used a material called G10 fiberglass, 1/16" thick. (I work for a hobby rocket company in the evenings, and they use G10 for the rocket fins.) Think "electronic circuit board material" and that's pretty much it.

Another consideration is that you want the mount to interfere as little as possible with the normal airflow through the radiator. You don't want a big "plate" back there for the air flowing through to hit against as that might restrict airflow. So, the mount needs to be as small as possible, yet strong. (I've put a large rough sketch of this part as the last page of this document.)

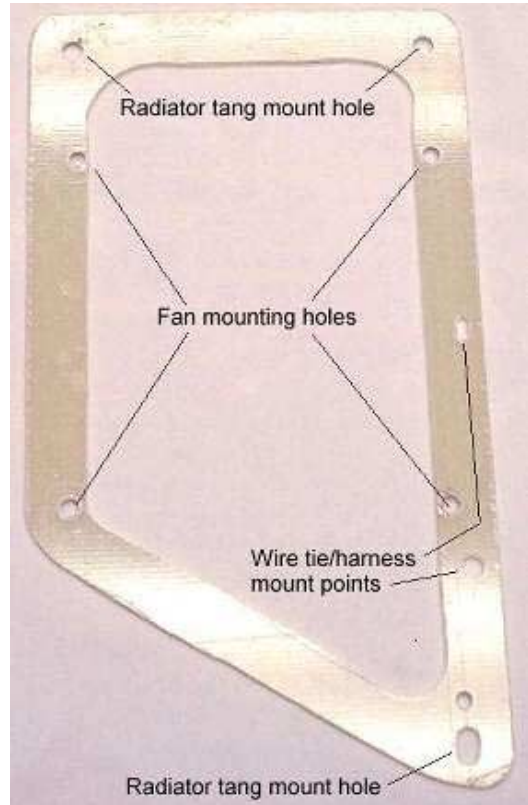


Figure 4 - 0.062" G10 Fan Bracket

Now, I'd mentioned we'd have to get the fan as close as possible to the face of the radiator itself so it pulls air *through* the radiator instead of just around the space between the fan and the face

of the radiator. I did this by using nylon spacers between the G10 bracket and the radiator tangs.

First, you need to mount the fan to the bracket. I did this using Nylok nuts; they're basically nuts that have plastic inserts that act like built-in lock washers so the nut doesn't move once you get it where you want it. I felt these were better in a vibrating environment like a BRP than traditional lock washers and nuts. So, here's a picture of the fan and some of the fasteners and the bracket:



Figure 5 - Fan and Fasteners

You can see the nylon spacers I was talking about for positioning the plate near the radiator face. Here's another picture for a better idea of where we're going with this:



Figure 6 - Nylon Spacers/Standoffs

OK. So now we have the fan mounted to the bracket for attaching it to the radiator tangs. Here's what it oughta look like, in general:



Figure 7 - Fan Mounted to G10 Bracket



Figure 8 - Fan Mounted to G10 Bracket #2

MOUNTING FAN TO BIKE

ELECTRICAL SYSTEM

OK, now we're ready to put the thing on the BRP. I haven't covered the electrical system on the bike itself, mostly because it's pretty darn simple (and because I didn't take any digital pictures while I was doing it a few days ago!).

If you're considering adding a fan to your BRP, you're fairly handy to begin with. You've had the tank off and the seat off, and you've seen how wiring is connected and routed from the front of

the bike back to the underseat area. Well, same thing with the fan wiring. My bike has a Baja Designs dual-sport kit on it, so I used the battery connections to connect the fan, but even stock bikes should be able to use the fan, though you'll have to decide where and how to connect into the system. (Maybe the headlight feed? Fan only takes 4 watts, and the headlight's a lot more than that, so I think you could safely get the fan power from the headlight circuit on a "no-battery" bike).

Below is a quick drawing of a little jumper harness I made to be able to easily connect the new wiring into the existing bullet connectors on the pig's electrical system. (Don't have a part number for you on the bullet connectors I used, but I'm sure Radio Shack will have something that'll work for you).

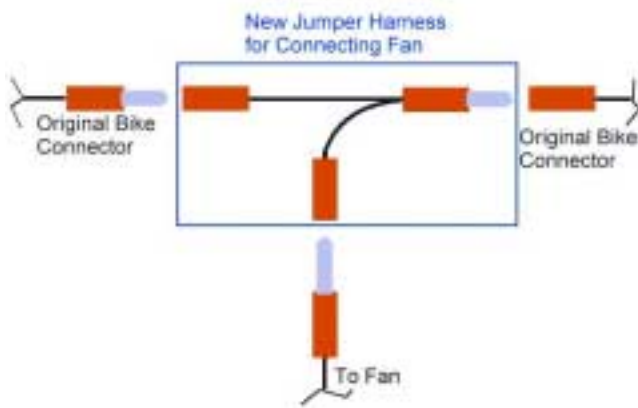


Figure 9 - Jumper Harnesses to Connect Wiring

Anyway, I used a Radio Shack Part No. 270-025 "2 Conductor Automotive DC Accessory Cable" to do the bike wiring. It has an inline fuse holder (I used a 5-amp fuse since the package said the harness was rated for 5 amps) and two-way connector already built in, so it was perfect, and for \$2.49 it was the right price, too! (Remember, the fan's only 4 watts and comes prewired with only 22 gauge wire, so you don't need any honkin' thick wire to run it!). I had to add about 2 feet of wire in the middle of the Radio Shack harness to make it reach properly, but it's still a good deal at \$2.49 since you get the connector and fuse holder you need anyway.

So, run the wiring up to a switch and over to the RH radiator. Be sure to use some wiring conduit to protect the whole wiring system against rubbing. Make sure you set up the length over to

the radiator area so there's plenty of slack for the handlebars to be turned to full lock in both directions.

I used an automotive 12-volt toggle switch available at any Pep Boys, Murray's, K-Mart, etc. Nothing special here...just a 12-volt automotive toggle switch (mine's a Calterm PN 41720 if you must know). I mounted my switch with a G10 piece again, using one of the handlebar mounting bolts. I'd recommend a stout switch (i.e. metal), since you're probably going to be flipping it while moving, so you don't want any cheap plastic to break if you hit a bump while you're flipping it.



Figure 10 - Fan Switch Near Handlebars

You may choose to use a thermost switch (a switch that's plumbed into the cooling system, so when it sees a certain temperature it switches on the circuit), but as I'd mentioned, I don't necessarily know as I'm gonna need the fan as it is, so I'm not going to get into drilling and tapping my thermostat housing for a thermost switch just yet. If I do decide I want/need one next riding season, I'll update these instructions and post it.

MOUNTING FAN TO THE PIG

Not a lot left to do at this point. The fan wiring/connector from the switch is down to the radiator area:



Figure 11 - Wiring Ready On Bike

Here's a photo of how the whole thing will look mounted up.

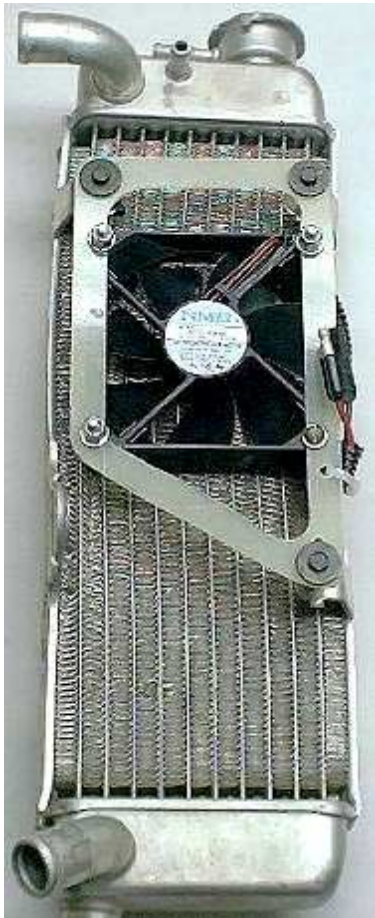


Figure 12 - Fan Assembly On Radiator

So, at this point there's nothing much to do but push the 3 J-nuts onto the radiator tangs, and mount the fan/bracket assembly to the radiator. Now, remember you need to make sure the fan's very close to the radiator core, but not touching. Mine ended up needing about 3/8" nylon spacers to do so, but you'll have to test-fit and adjust yours to match what you're using.

Also, I don't have a picture of it, but I put some of those little self-adhesive felt discs on the screw heads that attached the fan to the G10, where they are near the radiator. I wanted some kind of buffer between the screw head and the radiator. They'll probably fall off the first time they get good and hot <grin>, but they make me feel good for now that I have something protecting those screw heads from digging at the radiator if somehow they get too close.

So, bolt the sucker up, connect the wiring, and tie wrap everything in place. Put the shroud back on and you're good to go! Hope this has helped you if you've decided you want a cooling fan on your BRP. I don't think I'll ever need it, but for the 30 bucks or so it cost me, its cheap peace of mind to know it's there!

Andy Waddell



Figure 13 - Finished Installation

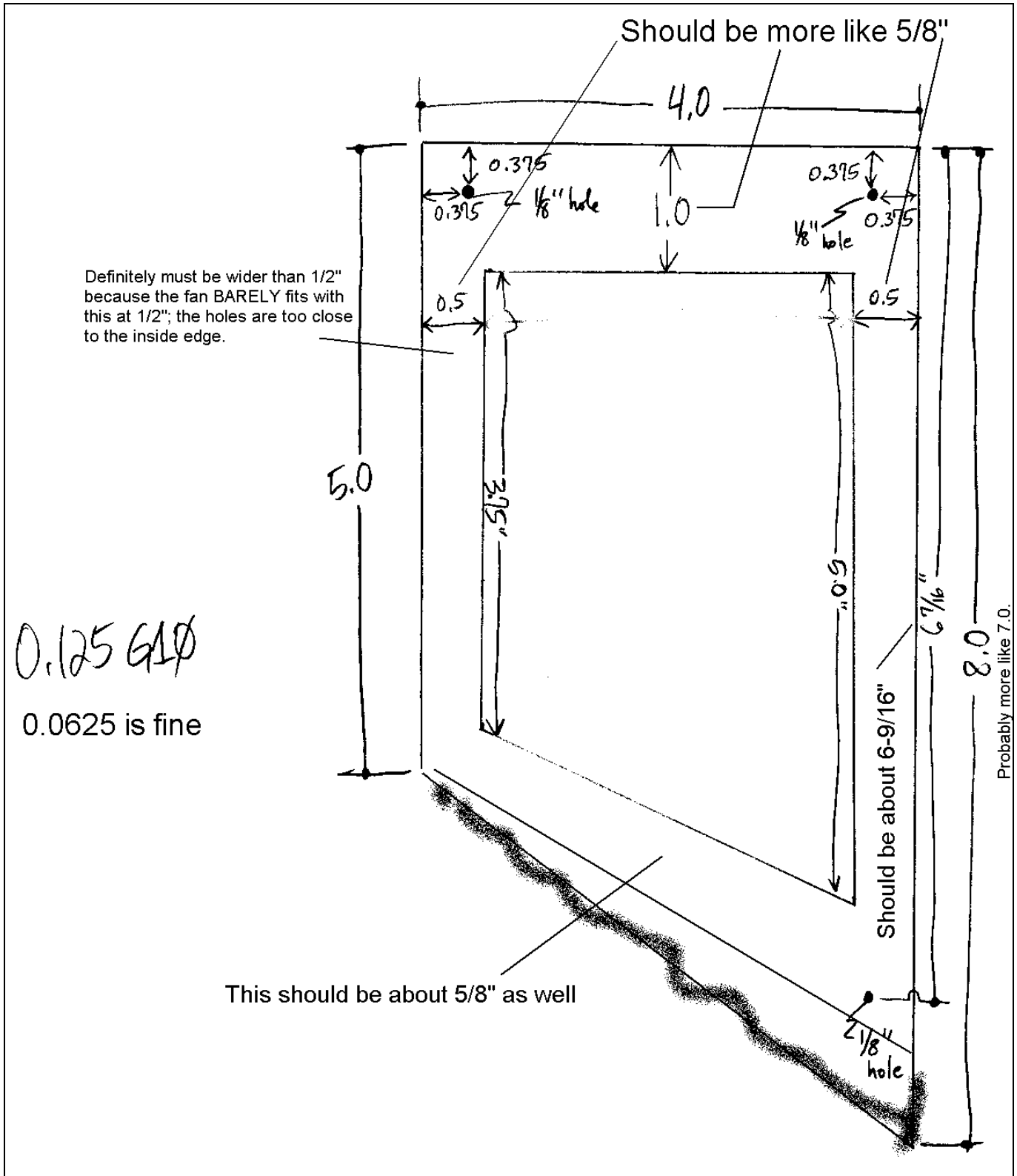


Figure 14 - Rough Sketch of G10 Fan Mount Bracket