1st Gen RX-7

# Mods Made Simple...

## a pictorial guide to the most requested mods

*hosted by*



Mechanic skill provided by

**Rx7Carl**

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**pratch**

# Chapter Two:
# Creating and Installing an Insulated Cold-Air Intake

## Introduction

First things first - we know you all are going to be wondering why the hell nobody on the market sells in insulated CAI, and why we are only covering creation/installation of an insulated device. We'll answer the easy part first: the theories covered in the ICAI are identical to any CAI you create - feel free to use this with appropriate substitution of parts to create an non-insulated CAI. Now, with that being said, when Carl first designed this creature, he went with a standard CAI - nobody sells one with insulation, so it must not be important, right? After checking intake charge temp in standard stoplight conditions, he was shocked to discover that it would often take 5-10 minutes before the charge dropped after sitting at idle! Even worse, the charge itself was maintaining a relatively high intake temp. Standard physics state that intake charge temperature and density have a direct effect on horsepower, and if your CAI is a heat-sink, you're losing what should be free horsepower!

Most people will now dismiss us as heretics, zealots or even madmen. To you naysayers, we say "NAY!" It is imperative that you trust us and accordingly, here are some nice hard numbers to chew upon...

During a nice, hot Florida summer when the temperatures reach 90° or higher, we have noticed a few things. The ICAI design gave us an intake charge which was approximately 50° cooler than an non-insulated CAI when waiting at a stoplight for 1 minute. Further, the standard CAI took 5-10 minutes to return the intake charge back down to ambient after a stoplight where our ICAI design took merely 10 seconds to accomplish the same feat. We would plot a nice graph with pretty visuals and nice numbers, but currently we've only seen 80 degrees on New Years Day, and as I write this - it is 52°.

So for now you'll have to trust us that there really is a difference from insulating the CAI, and it makes a huge difference in the time it takes the intake charge to drop back to ambient. Come this summer, we'll update this tutorial with more than enough evidence to bring you around to our way of thinking - honest! Until that time, feel free to mock us, throw tomatoes, or simply point and laugh behind our backs - we don't care because we know that we're right and the heat soaking issue is all but removed with our methods.

## Section One: The Shopping List

Most of these items are common hardware store parts. You should be pretty well off but as before - order early if you are in doubt.

| | |
|---|---|
| 1 | 4" plastic elbow (90°) duct |
| 1 | 4" plastic elbow joiner |
| 1 | Silicon or other high-strength adhesive |
| 2 | 4-4 1/2" hose clamps |
| 1 | 2-3' insulated A/C flex ducting * |
| 1 | 3 sq/ft of insulated fiberglass blanket material* |
| 1 | Aluminum plate for relocation of radiator reservoir tank. (approx 5"x6" at 1/8" thick) |

Gasket Sealant (preferably hylomar)

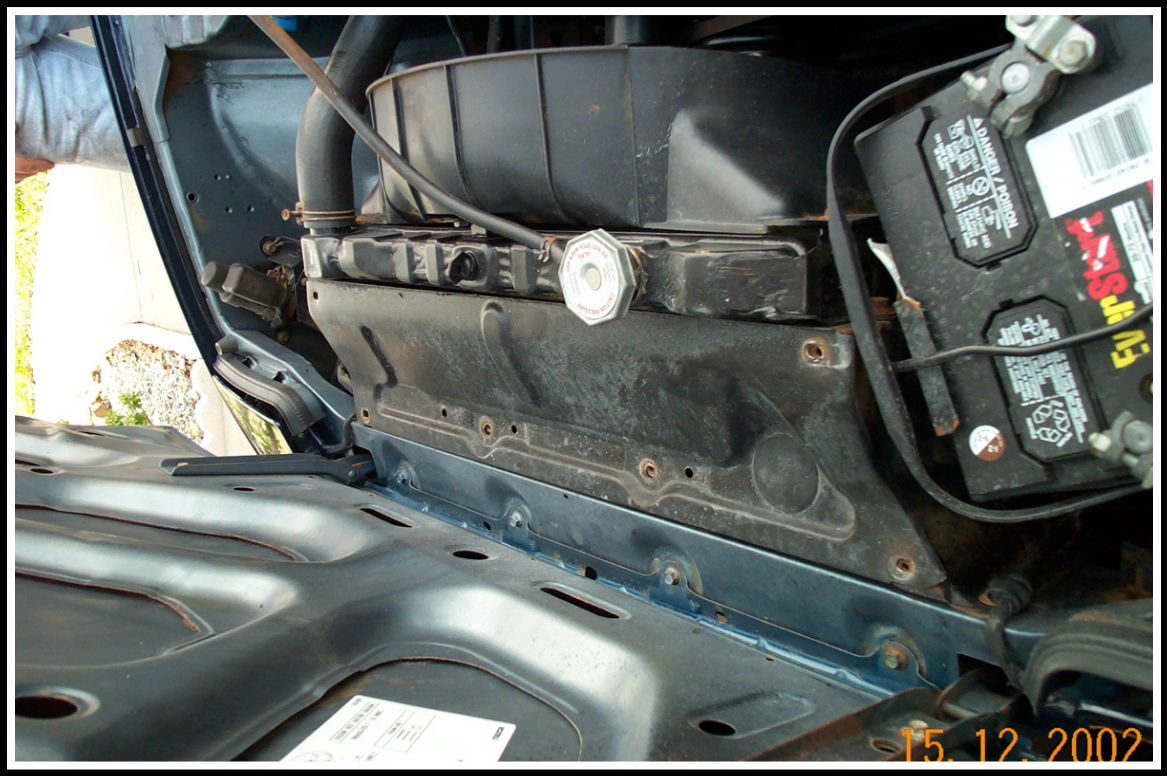
*If you can't find the A/C flex duct, 4" dryer duct will be suitable if you insulte it with fiberglass blanket material.

## Section Two: An Ounce of Prevention...

Okay, now that you've assembled everything, time for some disclaiming. 1st the method being described may not be legal in all racing classes. Please consult your rules before heading into this tutorial. Don't get us wrong - there are some racing classes and divisions where what we outline is perfectly legal. That being said, we aren't going to research it for every division and hold your hand should your division/class not support it.

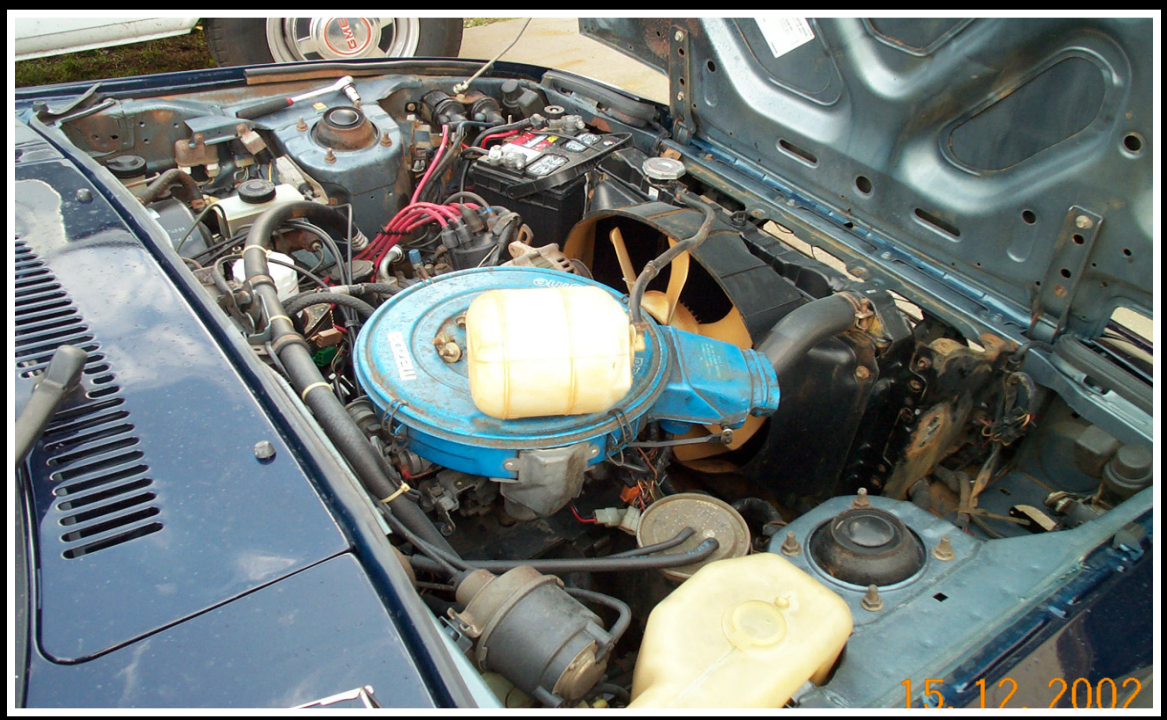
## Section Three: Scalpel, Clamps, Blotter...

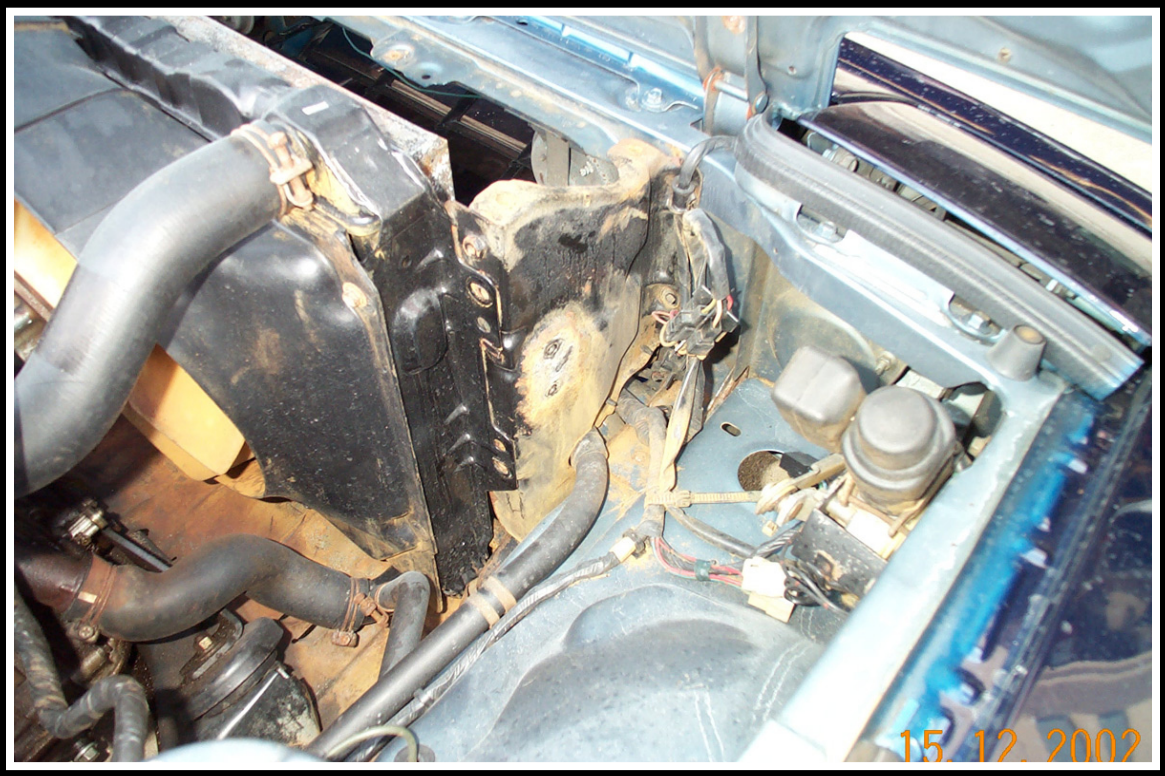
There are remarkably less steps to this task than gutting the emissions. This should come as no surprise to anyone as the rats nest is a fine piece of over-engineering.



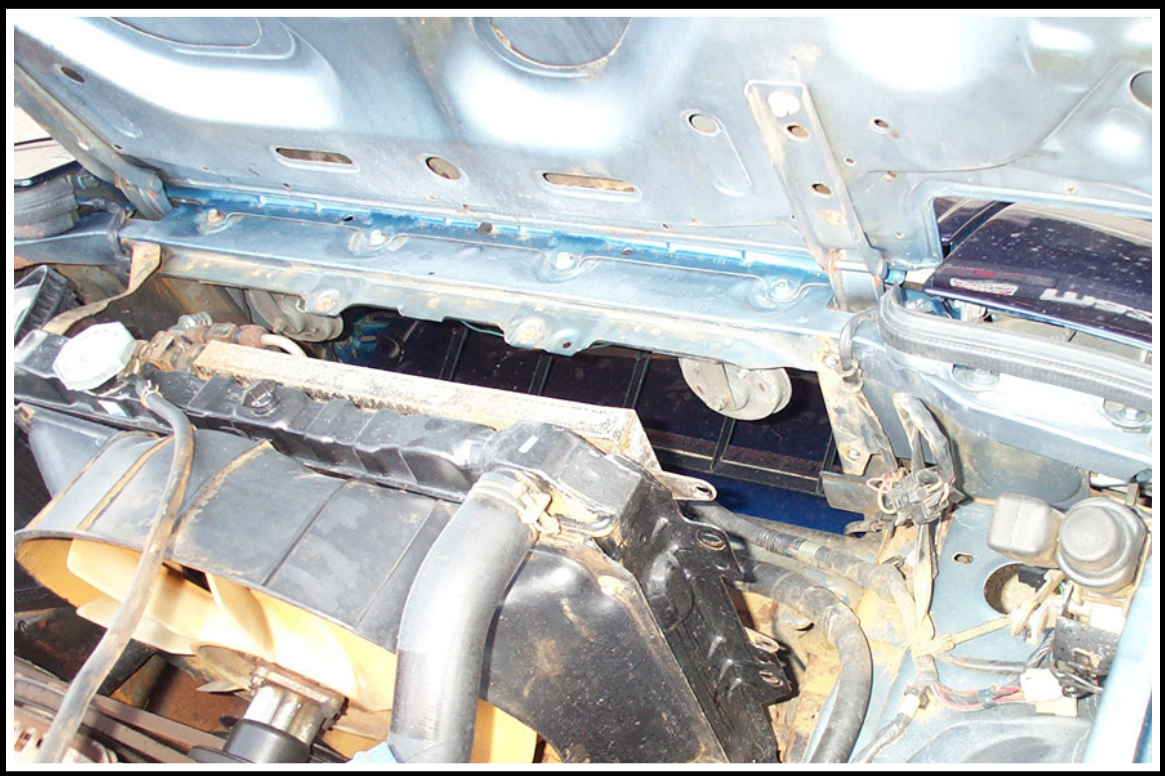

Remove the top radiator shroud. ( 6 10mm bolts)

then remove the coolant overflow reservoir.






Now we turn our attention to the right radiator support and remove it my taking out the 4 10mm bolts.

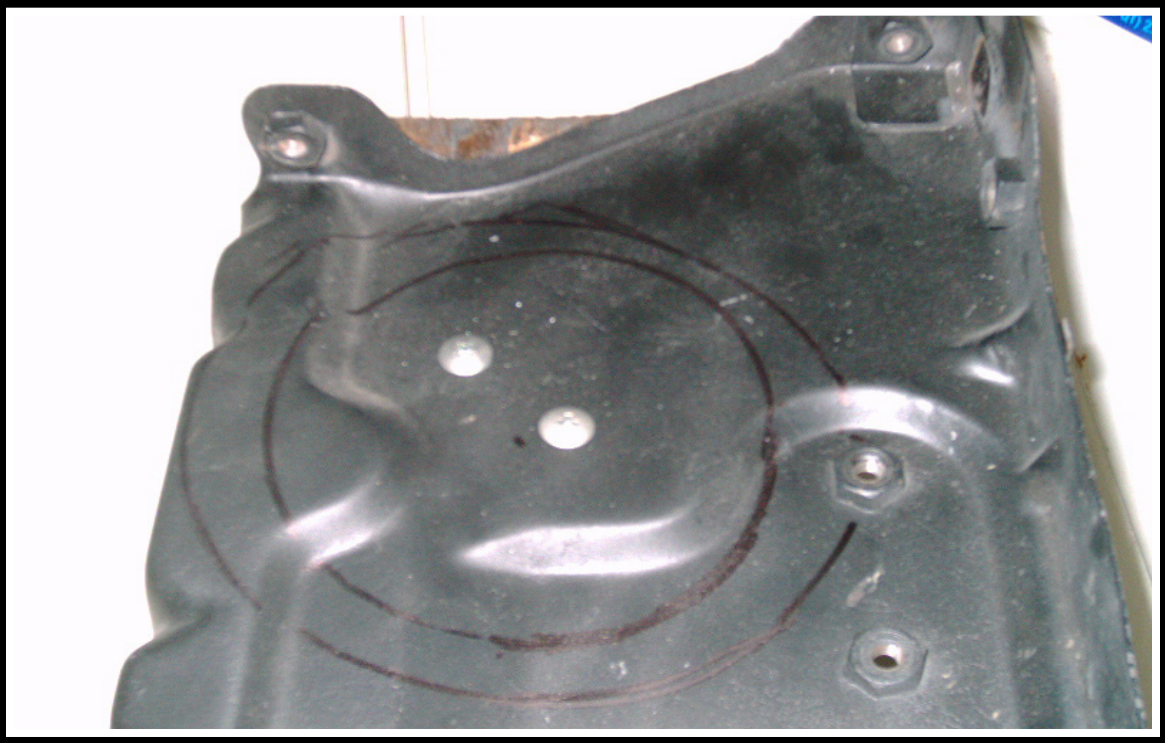


Here we are with top and right supports removed and the coolant overflow reservoir moved out of the way.

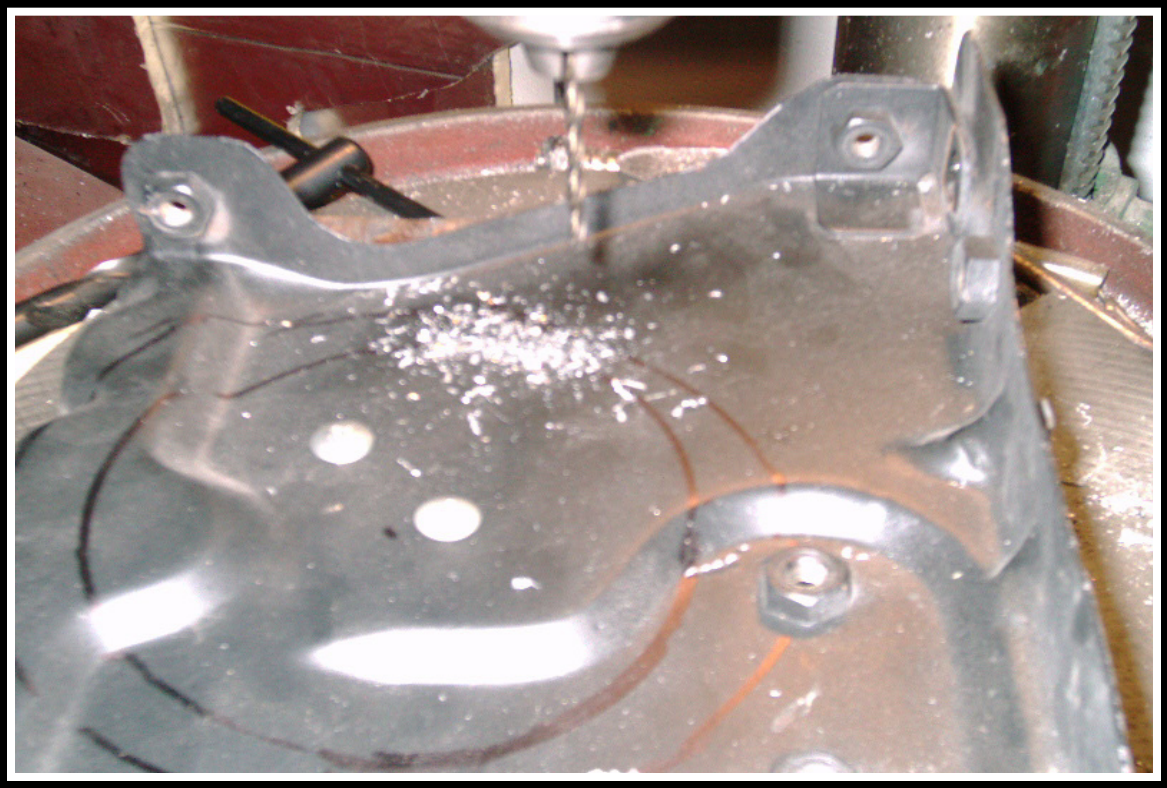
# Section Four:  Minor Fabrication...

For once we actually have some work to do because we're cutting through the radiator support.  The method we're outlining will do fine with multiple holes being drilled, but use whatever tools you have at your disposal to make this easy for you.  Below are the two parts.  Notice the 4" diameter of the connector and that the flange on it is 4 1/2".


With the connector placed on the radiator support, outline the tube (the outer line is from the 90° piece to reference the width of the flange).



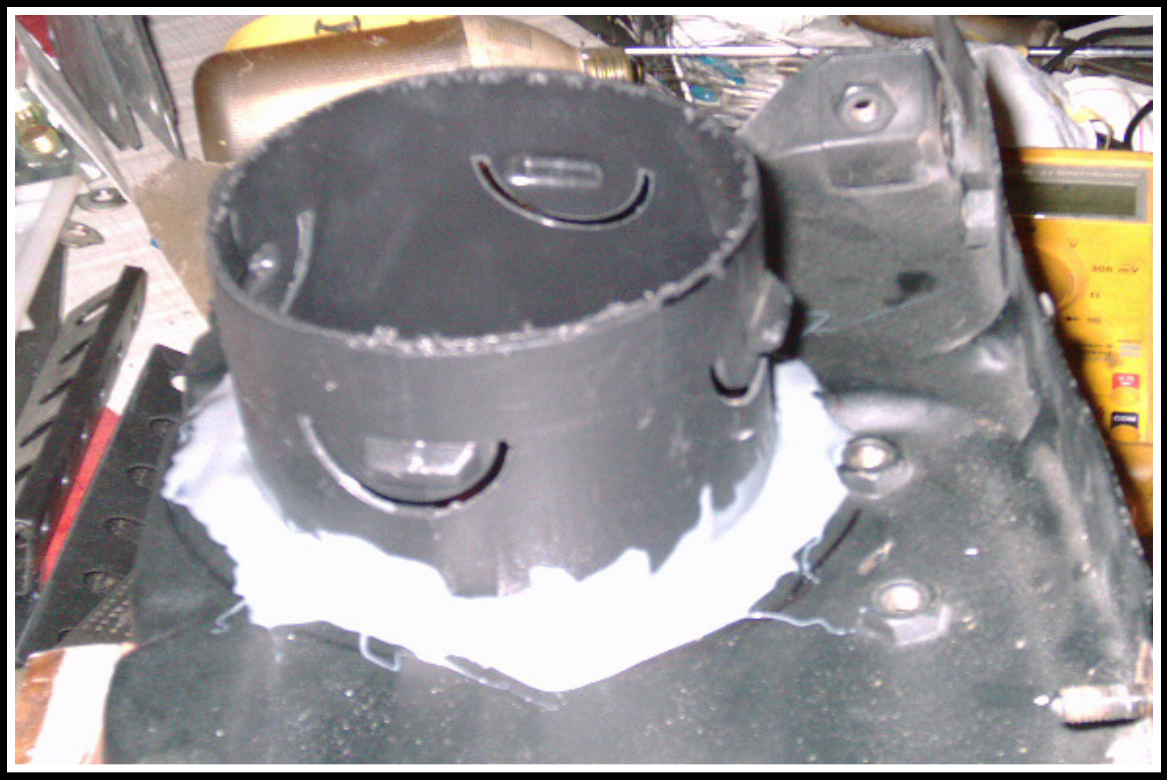
When you're done you'll have the inner mark, and the outer mark if you decide to outline both (recommended since you'll know where things will mount).



We decided to drill a series of 1/8" holes (use smaller if you want, but we don't recommend larger) around the inner circle - almost creating a perforation.

Here we used a metal routing bit to cut out the hole, but you can use a hacksaw blade if you want.

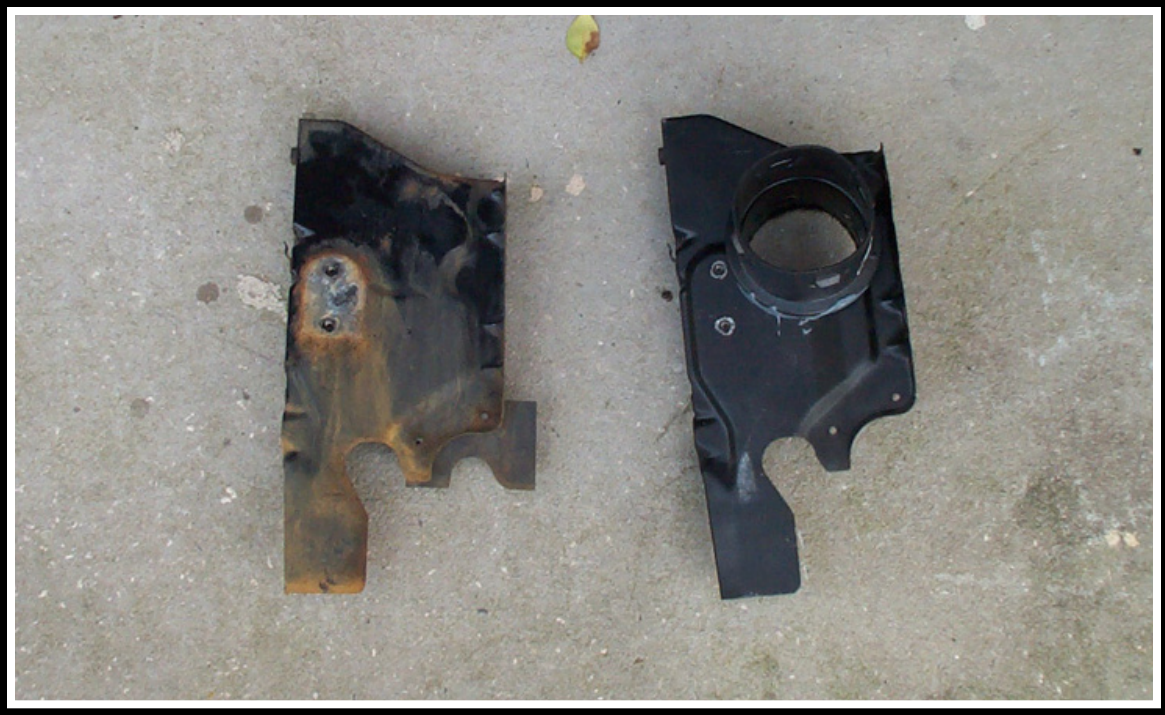

Here we are test-fitting the sleeve, 90° bend and the radiator cover. Once satisfied, use epoxy to glue the sleeve into the radiator support.



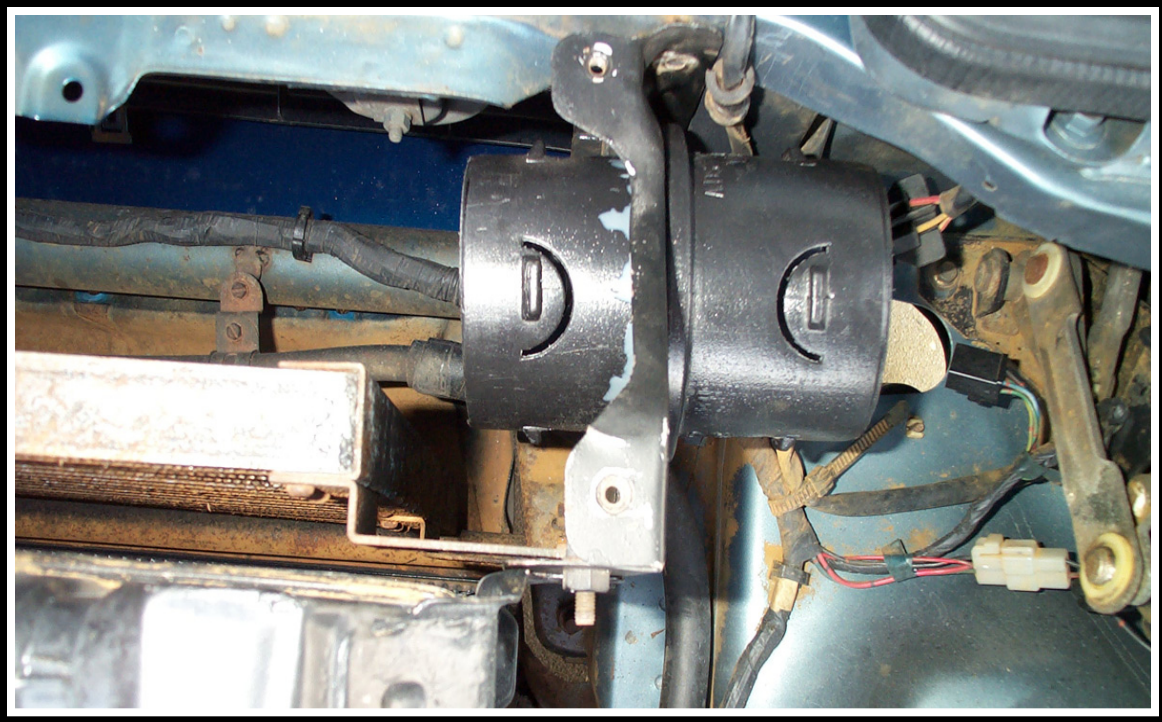
After drying, fit the elbow onto the sleeve - in our application we had to remove 1/4" off of the end to get the elbow to lock in place. Below you can see the fitted and attached apparatus. Notice the downward angle on the elbow This is where the cold air will enter this system. Future revisions may include a megaphone-style scoop if it indeed proves beneficial - Bernoulli seems to suggest it should.

# INTERMISSION

Since this is the first tutorial with fabrication, we thought you might like to take a break to enjoy your accomplishments so far. There isn't too much left to do, but all of it will take place in your car. This is as good a place as any to rest on your laurels if the day has gotten late and it's suddenly darker than you planned. Of course, that's why God created Halogen shop lights, right?

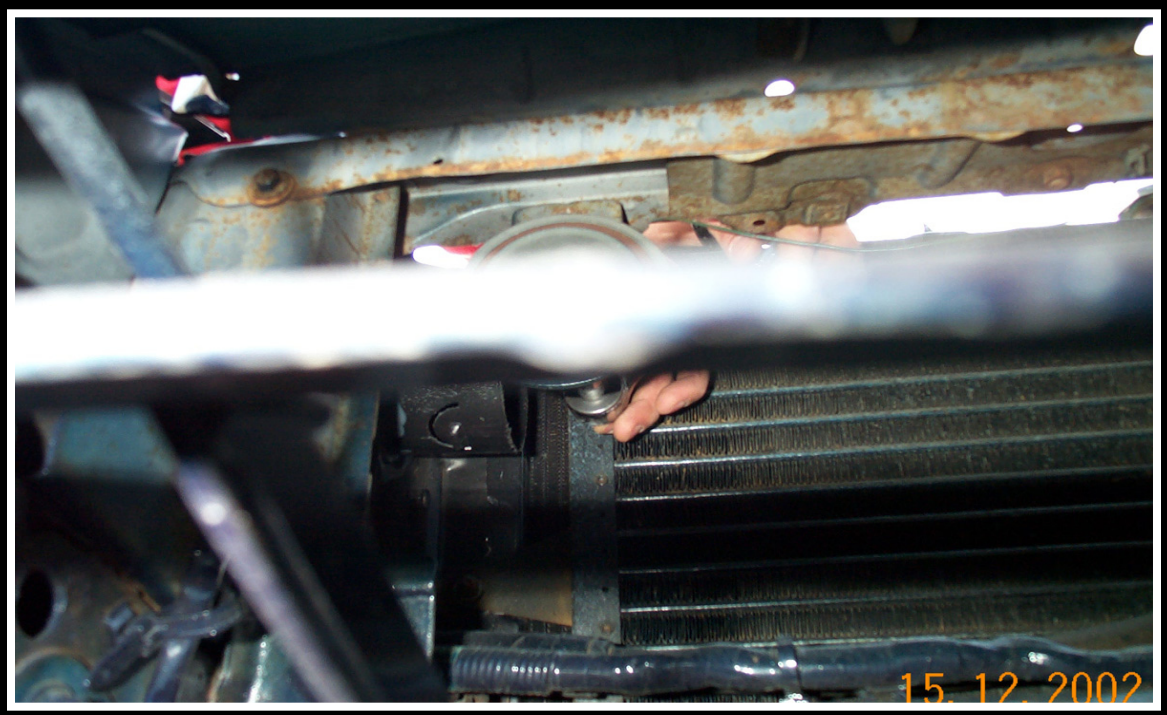


Not everyone will have the benefit of a parts car, but here we can show a nice before and after shot.

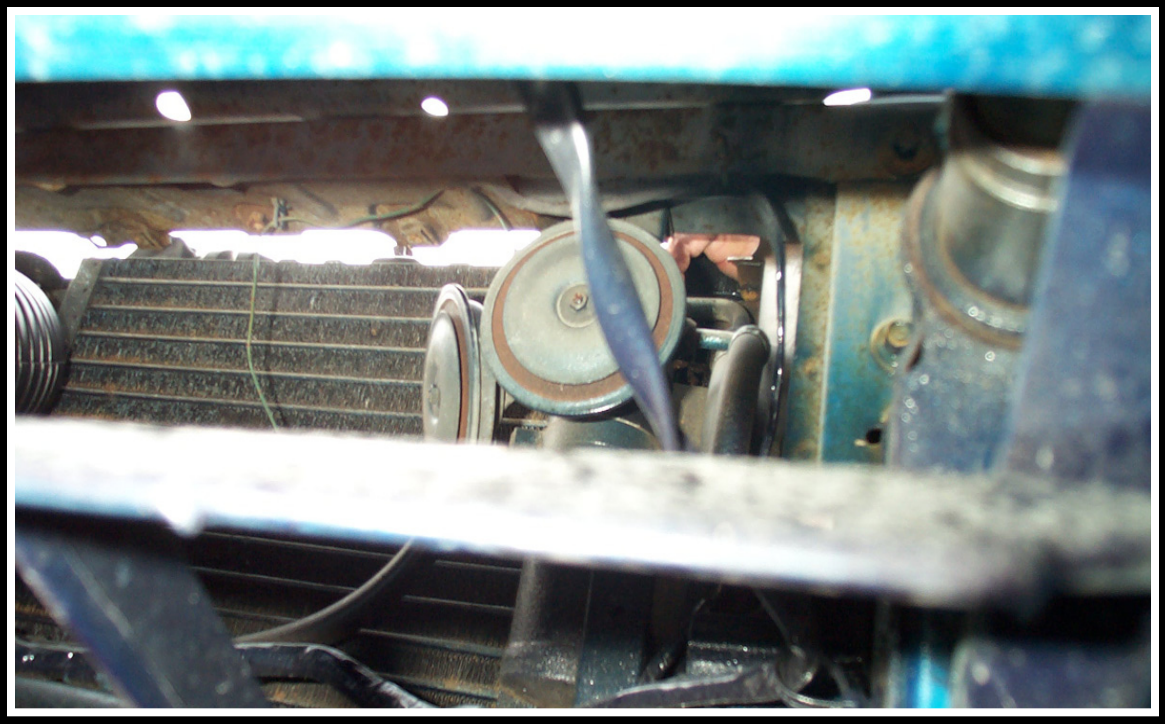


Here we have placed the right radiator support back in place. From experience, we would recommend that you put the 90° bend on first, or at a minimum, place it in front of the radiator to install once the support is in place. Trust us - we've been here and done that.

This picture is included in case you didn't believe us. If you have a front airdam installed (like me) then you'll find it difficult to remove the grille, and so...

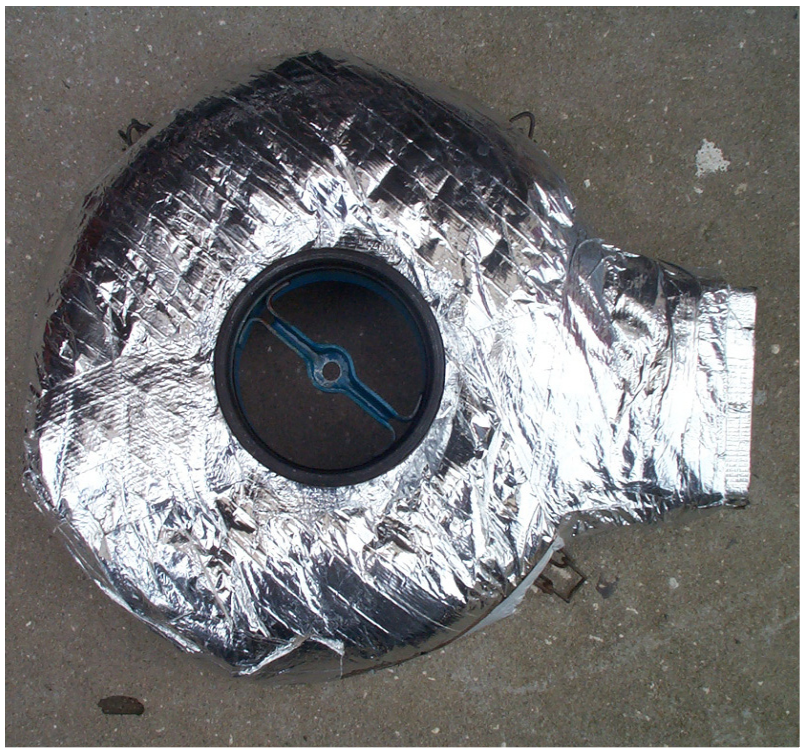



Here you can see the horn on the passenger side - it's in our way so we must relocate it. We're going to lump it right next to the drivers' side horn.



Here are the two horns mounted at a 90° angle to each other (okay, not quite 90°, but you get the idea). Below you can see where and how we accomplished this task. From here, everything gets a little easier, but don't relax yet!

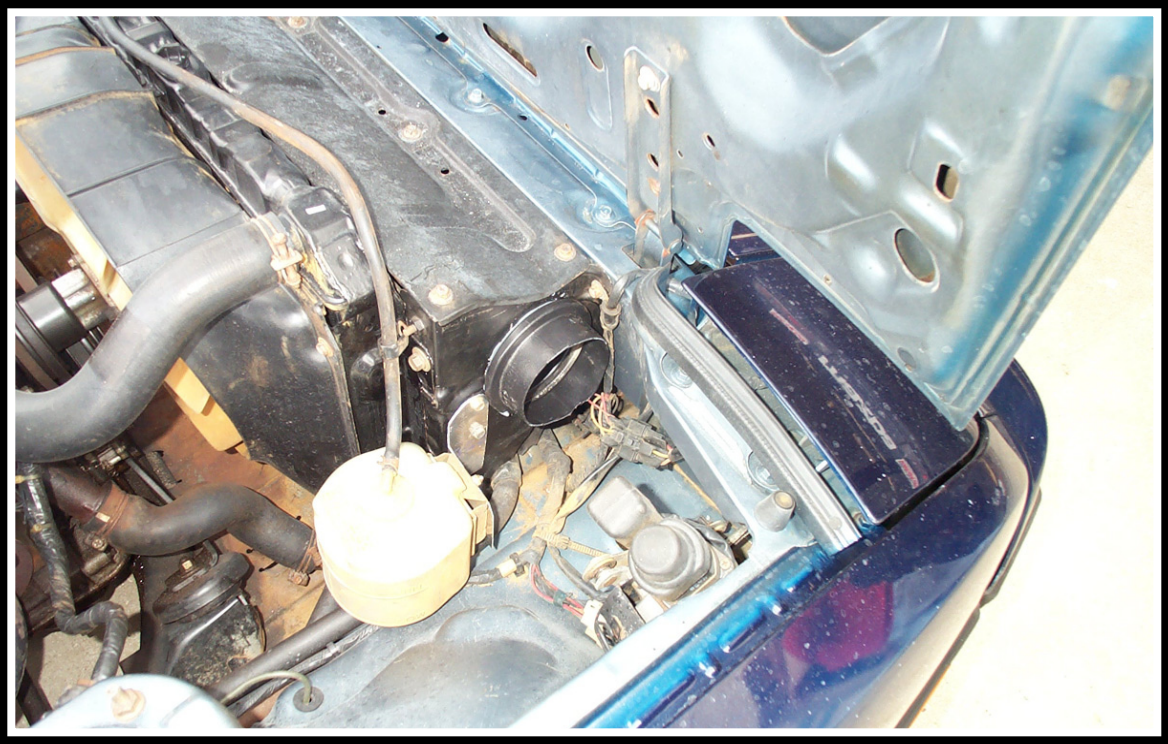
Here's the inlet to our CAI. Once you are satisfied with it, reinstall the top shroud, and put everything back together. Notice the overflow reservoir doesn't fit? So did we - hence the aluminum piece. Below should pretty well show the new placement of the reservoir. If this isn't self explanatory for you - let us know.



At this point, we have our inlet, we have our entrance into the engine compartment - all that's left is to insulate the air cleaner housing (our steps presuppose you've followed chapter one and already killed your emissions), and to run the insulated ducting from entrance to the air cleaner housing. You'll want to remove all of the stub tubes - it's not necessary, but makes for a cleaner job. Remember - cleanliness is next to Godliness! Okay, once they are cut off, block them all. You can weld them shut, fiberglass them, JB weld them shut or use a quality metal tape to block them (you've seen our 1000mph tape before - get used to our undying affinity for it). We also suggest that you cut off and block the stub pipe for the heat riser hose. Remove the plastic air horn and the flapper valve and the linkages along with the bi-metal actuator. After that, you need to cut the inlet back to equal the cross-section of the 4" duct to prevent restricting the airflow on the way to the housing.

Mark around the inlet about 1/4" longer than the hole for the flapper valve axle - cut on this line then use pliers, or vise grips to flatten the inlet on the sides where the axle was. After that, insulate the air cleaner housing with the fiberglass blanket material. Obviously, we completed these steps prior to pictures, but we figured most of it to be self-explanatory seeing the "after" pics. As always - ask if you need assistance or pointers.

Here's the reinstalled INSULATED air cleaner housing. Simply insulating this would go a long ways towards preventing heatsoak - but why stop there?



Again, at this point, we have everything done but the ducting itself. Look to the next page for the details.

First, roll or push the insulation back to reveal the ducting itself. The end should appear fairly fragile, so we reinforced it with mylar duct tape.s Use whatever you have to make the end sturdy. As the inlet, you want it to be able to handle whatever speed air is thrown up through your intake.

Here we've attached the reinforced end to figure out how much additional ducting we'd need. Most stores don't sell the length you'd want, but around 2 feet seems to be the appropriate number. Better to have too much, than too little.

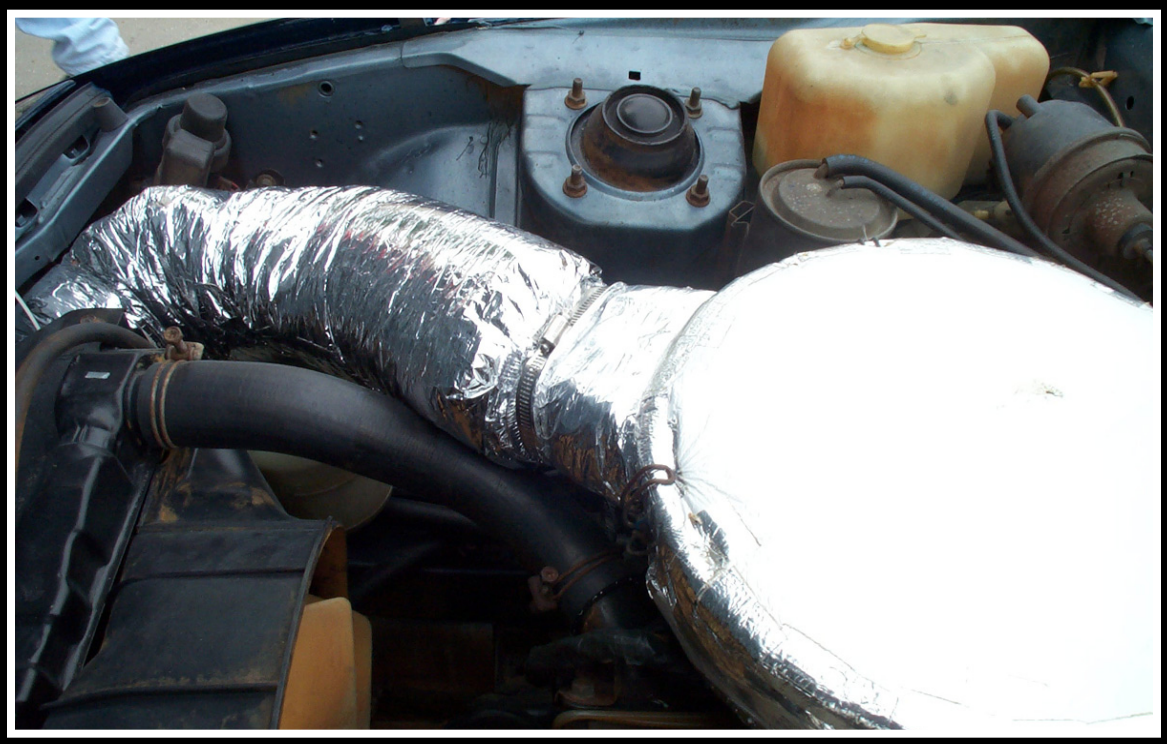
After trimming to proper length, take the newly exposed end, and reinforce it just like the other end. It would be a shame to lose cold air in the insulation should your ducting tear.

Here we're using the "pinch and roll" method of controlling the thickness of the ducting. Why let all that insulation be puffy when you can make it lean. Simply pinch the insulation down to the duct underneath, then fold, and tape down (again with the mylar duct tape). You'll be repeating this along the entire length.

When you've gotten to the end, you'll doubtlessly have "leftover" insulation at the end. Simply cut and remove this extraneous material, and consider yourself almost finished.

Here we have Carl and mylar tape again. He's cutting off pieces to secure the insulation and outer layer to the inner. (Sorry ladies, but this man is taken!)

Upon placing this end around the air cleaner housing, you'll find that it's not likely to hold on its own. Bring in the first 4 1/2" hose clamp!



Much better. Here you can see the oblong opening secured to the housing, and happily trailing to the entrance at the right of the radiator.

Secure this spot here with the 2nd 4 1/2" hose clamp, and now your Insulated Cold-Air Intake is complete. For additional heat soak protection, a heat shield over the intake manifold is a bonus. Enjoy your new, colder-fed engine!

## Time to Celebrate - Bring on the Dancing Women!

# Section Five: Jerry's Final Thoughts

This is currently version 1.0 of this tutorial. We reserve the right to go back at a later time to modify or update this at any time. As you can see we've put a fair amount of effort into this project, both mechanical and graphical. This project is free for now, and tips are welcome. PayPal donations may be given here. We may steer this to a hardbound book, but if you would like to print this up for your own use, we will provide a black text on white background version for a minimum donation. We are happy to share our knowledge, but ask that you respect our effort. Drop us a line and let us know how it turned out for you, and we'll let you know if we update this guide in any way.

- Tom and Carl

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