Sunbeam Tiger / Alpine Ram Air Instructional Packet

Giving your Tiger a Cool Gulp of Fresh Air with …
Functional Ram Air

We have all heard that the LAT-79 option fiberglass hood was intended as a competition option to improve the "performance" of the Tiger by permitting cool air to enter the engine bay through the scoop while also permitting Hot air to exit via the rear ducts. The fact is that the hood design is largely ineffective due to the lack of any actual cool air being directed to the carburetor.

What is required to increase power is to effectively seal the carburetor air intake to the open hood scoop and take advantage of the cooler outside air available. It is my understanding that gains of around 1 HP can be attained for every 10-degree drop in the intake air temperature. This is due to the differential air density as compared to under hood air by drawing air from outside of the engine bay. Assuming no Ram Air effect at all this would provide for a cooling of the intake charge of about 100 degrees on an 80-degree day assuming an under hood temperature of only 180-degrees resulting in a theoretical potential increase of about 10 HP. The Ram Air effect needs to be measured with a manometer and at this point I have not secured one for testing to determine the actual pressure increase if in fact there is one. While I have not yet had an opportunity to empirically test whether the system provides more power it would seem to be a reasonable assumption that a marginal gain of some degree is to be realized. Anecdotally it takes much longer to warm the engine up and the car tends to "cold stumble" until the car is fully at operating temperature for a significantly longer duration of time during driving than it did with the factory assembly. I may in fact choose to run without the air box in the cooler weather for this reason.

How to build it!

Materials required:

One 2 foot by 4 foot sheet of eighth inch aluminum sheet
2 inches of 5/8th inch OD thick wall aluminum tubing
4 inches of 5/16th inch OD thick wall aluminum tubing
2 - 1 inch hole grommets
Length of seal for vertical edge of filter assembly (I used 2001 Jaguar Van Den Plas lower front bumper splash shield seal cause it was free)
14 inch Length of SOFT closed cell foam seal 1 inch tall by ¾ inch wide

Tools required:

Jig Saw and an electric Drill
1 inch hole saw & a 5 inch hole saw
5/16th drill bit
5/8th drill bit
Bastard File
Access to TIG welder
Access to sheet metal break
Depth ruler (Home depot)

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The Base *(Roughly 6 hours to make template and 3 hours to make the part)*

I started by fabricating a template out of thick cardboard and created a rough shape, which I then transferred to a thin card board template that I used as a pattern for the eighth inch aluminum box itself.

Given both the rarity and the historical value of the Tiger air filter components I decided that I did not want to modify the original parts. By simply replacing the air box base with the original Tiger lower air filter base the air box disappears and the Tiger air filter assembly is restored to it's original configuration. The point was to retain the original lid of the filter but eliminate the original base. By doing this I gained an extra half-inch of much needed hood clearance providing me with the ability to run a 2-inch tall filter under the stock hood while retaining the original air filter lid. A standard 14-inch diameter K&N filter easily fits into the stock lid and they are available in a variety of heights. It is important to note that my motor mounts have been through-bolted to eliminate the normal engine twist of the motor that occurs under power due to the soft and stretchy motor mounts. If your mounts are not bolted through you might only want to increase air filter height by 3 eighths of an inch.

As I fabricated the base I discovered some interference issues. Specifically, the carburetor float adjustment bolts were in the way on my 750 DP as well as the heater hose on the passenger side, the heater hose on the driver's side as well as the distributor cap.
To clear the float adjustment nuts I decided that a 1-inch hole would suffice with a rubber hole grommet to be inserted later as a way of preventing the assembly from rotating like the original unit does. This constant movement of the assembly irritated me as I had to constantly straighten the assembly every time I showed the car as I like the filter assembly to be perfectly parallel to the firewall. The only other option was to crank the retaining screw down so tight it threatened to deform my chrome restored lid, not a desirable solution for me. Having the base orient or register on the fuel bowl adjustment nuts solved this 'walking' issue for me.

Then I needed to address the heater hose clearance. On the passenger side I notched the base to clear the hose and made the diameter slightly larger than the actual hose to permit the installation of an extra sheath of hose over the heater hose to act as a chafe guard against the aluminum. On the drivers side I decreased the external radius used for the box base plate assembly slightly to provide "just enough" clearance between the firewall and the Ram Air box so that the hose comfortably fits between the two without any concern of chafing.

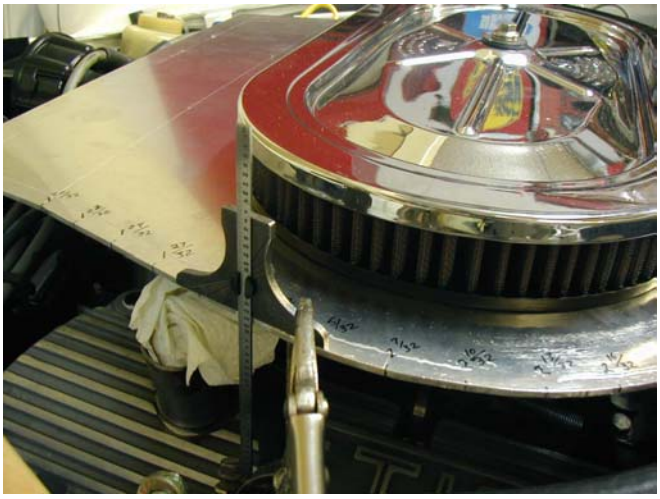
With the rear clearance issues handled I now had to deal with the distributor cap as the front of the assembly ran smack into it. I resolved this by putting a double bend into the base

template to allow for the distributor cap to clear the base plate with a margin of safety. ***(On the template I have available for others I traced the actual base bend side profile for reference.)***

Once I had a rough template I transferred the pattern to stiff cardboard for a final template that was suitable for a cutting pattern using exact measurements from the rough template. With this template I hand cut out the eighth inch aluminum sheet with a jigsaw and finished the pieces by hand. I used a 5-inch hole saw for the center carburetor hole and a 1-inch hole saw for the float adjustment holes. I roughly cut the heater clearance hole out and carefully finished it with a die grinder. This completed the base assembly.

The Vertical Baffle *(Roughly 6 hours to make template and 6 hours to make the part)*

Creating the vertical section was a painstaking job as there is no access to the underside with the hood closed and I thought about how to do this for a LOOOOOOONNNNG time. Unlike those that hack a hole in a steel hood, with a fiberglass hood you do not have the advantage of working from the to topside to measure and fabricate the vertical section to seal to the hood. Instead I had to work blind and used a small machinist's depth ruler that worked out exceedingly well.



First I measured out 1-inch increments the entire distance around the perimeter of the base. On each one of these reference marks I clamped the depth ruler and pulled it out such that as I closed the hood onto it, it would contact the hood and slid down and remain at the lowest measure as I gently latched the hood closed. This careful measurement gave me the exact distance from the hood to the base plate at each point that I did this. This process took a couple of nights to complete and was the most difficult and time-consuming part of the process.

Once I had the height measurements I used a long piece of cardstock and graduated the bottom edge of it in 1-inch increments and transferred the height distances to the card stock <u>less the half inch I desired as clearance from the airbox to the hood</u>. I used a series of dots at the measured points at each 1-inch interval and then simply connected the dots to create my template and cut line. Once the cardboard template was finalized I test fit it to the base with duct tape and mounted it to the car as a check and then cut it out of eighth inch aluminum as well.

On the vertical piece I transferred all of the 1 inch indexing marks along the lower edge and used these as reference points to bend the vertical piece to shape. Being an old bodyman I am used to using what is at hand as a tool, so the corner of my garage door frame

became my English wheel. I worked 1 inch at a time starting in the middle at the back working out towards each side, one side completed at a time. With constant referencing to the base to check for curvature you can ensure that your progress is in fact positive. By using the 1-inch marks as your reference you can bend right where you need to and move to the next bend zone as you complete each one. I am not a burly guy and was able to hand bend the aluminum quite easily and the result you see is all hand formed with the exception of the base bends for the distributor clearance.

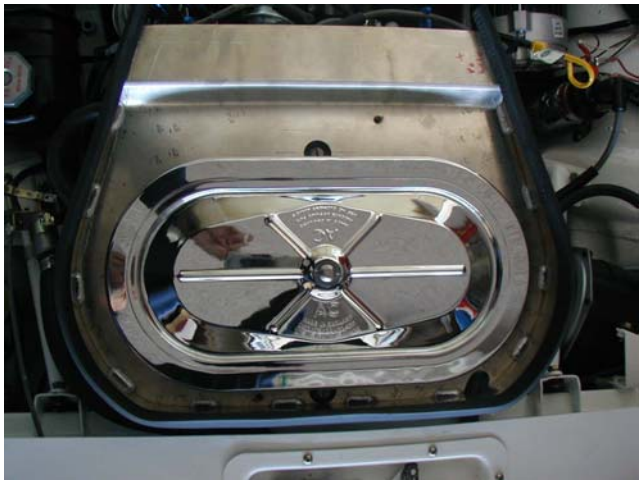
Once the vertical wall is complete test fit it to the base with some duct tape to ensure that everything clears, as you would like. If the fit of the vertical section is satisfactory, move on to fabricating the reinforcements for the base leading edge. A simple wedge of aluminum will suffice and provide an extra measure of stability. Now drill 2 - 5/16th holes for drain tubes, one in the front and one in the rear, as well as the 5/8th inch hole for the breather tube hose on the drivers valve cover.

With all of the pieces made and test fitted take everything out to a specialist and get them welded. About $80-$100 is a reasonable amount for quality work. I had Rod at **Twisted Metal Motor Cycle Fabrication** in Lake Forest, CA weld mine and he did an absolutely SUPERB job. Be sure to have the outside continuously welded with several stitches on the inside to minimize cracking due to flexing of the part. Having a pro do it makes all the difference in the appearance of the welds.

NOTE: DO NOT WELD THE INSIDE AT THE SIDES OVER THE DISTRIBUTOR AREA AS THIS IS THE EDGE THE HOOD SEAL NEEDS TO ATTACH TO AND WELDS WILL GET IN THE WAY!

Once the base is completely welded be sure to test fit everything to be sure that all areas of clearance concern are satisfactory. Specifically, look at the area around the pass heater hose and de-burr the opening to ensure you minimize chafing and install another layer of heater hose over the exposed hose. Also check to ensure that the filter lid fits correctly and that the base clamps securely to the carburetor. Install the crankcase vent hose and ensure that you are happy with the fit of the assembly. Install the edge seal of your choosing and close the hood carefully for a test fit. If the fit is too tight then use masking tape to tape out a line along the upper edge of the assembly and remove only one sixteenth of an inch at a time until you obtain the clearance desired.

This would be a good time to install the hood seal and attach the closed cell foam along the front edge of the lower base. If you are not able to find the Jaguar seal I used Larry Paulick has had good success with his Cowl Induction version in using a section of Tiger trunk seal.



Now that the base is done you need to build some aluminum filler pieces for the underside of the hood at the front and the rear of the scoop area to create a flat sealing surface area for the air box to register against.

Hood Baffle *(Roughly 6 hours to make template and 3 hours to make the part)*

Fabricating the hood filler pieces require using cardboard freehand in creating templates by trial and error. I used eighth inch aluminum here as well to minimize deflection. I then simply glued the pieces to the hood with 3M-8115 adhesive. This adhesive is intended to glue quarter panels and door skins to cars and is a PERMANENT way to attach the pieces. After it cures it can be sanded and painted if desired.

If you look carefully in the photo you can see where the corners of the airbox sit in relation to the scoop sealing plate.

I was able to draw these reference marks with a sharpie taped to a steel ruler on an angle poked through the scoop opening. I did this before the plate was installed and used a flashlight to see what I was doing. This is necessary to ensure that you mount the scoop extension in the correct location.

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