4G63

Sheet Metal

Intake Manifold

Testing

Background: Once I decided it was time to purchase a Sheet Metal Intake Manifold (SMIM) for my DSM, I did what most of us would do these days. I searched the internet for data, reviews, and test results of the available SMIM's on the market. I found tons of reviews and discussions on which was best, most of which were peoples opinions. There were some dyno sheets, none of which were from back to back testing, or by any unbiased party. I found absolutely no flow numbers available for ANY of the SMIM's made either. So I had to make a decision based on what information was available. I purchased one of the more popular SMIM's that many others in the DSM community were using.

I have a part time job at a race engine shop that specializes in porting and flow testing. Since I have a flow bench at my disposal, I decided to verify that the part I purchased was going to be good for my car. What I have learned from working at this shop in regards to intake manifolds is that having even flow was crucial. If one runner flows 5% more air than the rest, it will require 5% more fuel to that cylinder to achieve the same Air/Fuel ratio as the other cylinders. Without that extra fuel, that cylinder will run lean, which is obviously not good. Also, most of the engine management systems DSMers are using does not allow for per cylinder fuel adjustments. So even if the user was to use a EGT probe or WBo2 on each runner of their exhaust manifold to determine the Air/Fuel Ratio per cylinder, most of us would not be able to compensate.

Needless to say, I was less than happy with the way my manifold performed. I decided to call all of the SMIM manufactures, and ask for the flow information. I thought that maybe I had a bad one, or just needed to switch to a different manufactures part. To my shock, only one of the companies I called had ever put their manifolds on a flow bench! And that one company refused to release that information to me, as they felt it was proprietary. I couldn't believe that these companies had never flow tested their parts.

So I decided that I was not going to spend any more of my money without first knowing what I was buying. I also wanted to make all my findings public to the DSM community. I have gotten tons of good information from other hobbyists like myself that has saved me time, money, or frustration. I felt this was a good opportunity to give back. I posted up on my local DSM forum my situation, and asked if any of the members would be willing to lend me their SMIM's, in order for me to flow test them. The response was impressive. There was an immediate response from the members expressing their interest in what I was doing. Within 10 days; I had 5 manifolds to test, and commitments for many more.

As this idea grew, more ideas were thrown out there. I was asked to test a few stock style manifolds to establish a base line which made sense. I also came in contact with a vendor or two that expressed interest in participating as well by shipping me manifolds to test and include in these results. I also assume once this gets circulated around the DSM community, I will have a few more manifolds to test that were not available to me locally, so I will continue to add to this as more information becomes available.

Test Information All of the flow testing was conducted on a Super Flow 600 Flow bench. Every manifold tested was flanged for a 6-boltstyle cylinder head. All manifolds were also tested with a 1st gen style throttle body flange. If the donated intake was made for a larger throttle body, an adapter plate was used to reduce the size back to the 1st gen opening. Any manifolds that this was used on will be noted in the test result below. A clay radius was also applied to each manifold's throttle body flange.

The design testing was much simpler. The runner lengths were measured from the outside of the head flange to the top most part of the runner or velocity stack. The Plenum volume was checked by sealing off the throttle body flange, and filling the plenum with fluid from the head flange. The manifold was filled up to the start of the runners. I also added some additional comments to a few manifolds for things that I noticed during testing.

PLEASE READ THIS FIRST BEFORE YOU LOOK AT THE RESULTS!

I am a completely unbiased, uninfluenced party conducting this test. I was not contracted in any way to do this.

All intakes were tested as received. No changes or modifications were made to the design or functionality of the manifold.

In no way is this an attempt to deface or devalue any of these parts, or the companies that make them. Obviously all of these are an improvement over their stock counterparts. I believe that any company that is willing to produce parts for the relatively small DSM community should be applauded. And as our numbers will undoubtedly will dwindle as our cars become older and harder to find, we can only hope that these manufactures will continue to support our platform. I sincerely hope that everybody who views this will understand that.

For these reasons, I **WILL NOT** draw any conclusions in this article. The purpose of this is to simply publish the test data I have collected, and allow the readers to draw their own conclusions from it. Please do not ask me, "Which intake is the best?" That is for you to decide.

Also, I am sure that there will be future revisions to these manifolds, as well as others developed in the future. So in order to keep this as useful to everybody as possible, I will continue to grow this database as long as I am able to do so. I also invite any of the manufactures to contact me if they would like to submit any present or future designs to be included in this.

The Manifolds: Below are all the actual manifolds that were tested.

< Manifold Pictures have been removed from this to keep the file size down>

Flow Testing Data Below is all the data collected on the flow bench. The percentage under each runner's cfm rating is the amount of difference from the highest flowing runner on that manifold.

Remember, that this percentage is the amount of fuel that would need to be reduced at that cylinder in order to keep it from running richer than the cylinders getting the higher air flow numbers. This works both ways as well. If the cylinders that are receiving the lower air flow amounts were running at the optimal air fuel ratio, than cylinders receiving the higher airflow would be running lean.

I also included some notes or comments we wrote down as we were testing each manifold. All of the tests were done at 28" water.

Sheet Metal Intake Manifold	Runner #1	Runner #2	Runner #3	Runner #4	Notes
Venom	422cfm	418cfm	418cfm	431cfm	
	-2.1%	-3.1%	-3.1%		
Magnus Street w/ velocity stacks	399cfm	436cfm	449cfm	449cfm	Had some turbulance, most notably on #4 runner
	-11.1%	-2.9%			
JM Fabrications Race (Old Style)	377cfm	390cfm	404cfm	381cfm	Had slight turbulance
	-6.7%	-4.5%		-6.7%	
JM Fabrications Race (New Style)	440cfm	445cfm	445cfm	422cfm	Had major tubulance on #4 runner
	-1.1%			-5.1%	
R.E.E.F. Prototype (Street)	440cfm	445cfm	445cfm	445cfm	
	-1.1%				
Magnus Street (old style)	368cfm	431cfm	454cfm	445cfm	Had some turbulance, most notably on #4 runner
	-18.9%	-5.1%		-2.0%	
JM Fabrications Drag	445cfm	449cfm	436cfm	427cfm	Had some turbulance on #3, Major on #4 runners
	-0.9%		-2.9%	-4.9%	
Beyond Redline	436cfm	436cfm	418cfm	431cfm	Some turbulance on runners #1 and #2, Major turbulance on runner #3
			-4.1%	-1.1%	
Stock 1st Gen.	336cfm	345cfm	354cfm	345cfm	
	-5.1%	-2.5%		-2.5%	
R.E.E.F. Prototype (Race)	449cfm	449cfm	449cfm	449cfm	

Design Testing and Notes

Sheet Metal Intake Manifold	Runner Length	Plenum Volume	Date Tested
Venom	6"	4600cc	12/16/08
Magnus Street w/ velocity stacks	6.75"	1200cc	12/16/08
JM Fabrications Race (Old Style)	6"	3000cc	12/16/08
JM Fabrications Race (New Style)	6"	3200cc	12/16/08
R.E.E.F. Prototype (Street)	6"	3600cc	12/16/08
Magnus Street (old Style)	6"	1300cc	12/22/08
JM Fabrications Drag	6"	4800cc	12/22/08
Beyond Redline	6.25"	5100cc	12/23/08
Stock 1st Gen	12"	1100cc	12/23/08
R.E.E.F. Prototype (Race)	5.75"	4200cc	12/30/08

Additional Notes These are just some extra comments or notes that I felt were important to note for people looking at any of these manifolds, and may not have the ability to get their hands on one before purchasing it.

Venom Performance: I have read that this manifold is not good for boost levels above 25psi, as it is due to failures above the pressure level. Although I have not tested this it is defiantly a thinner material than compared to its competitors. Also, the vacuum ports are located on the firewall side of the manifold, versus the underside like most others. Manifold looks to be nicely welded.

REEF Prototypes: Remember these are prototypes, and at the time of testing, not available for sale. I have talked to its designer, and he plans top make some revisions as well as pretty it up a bit. If this manifold becomes available to the public, I will do my best to retest it and add the information to this page.

UPDATE TO REEF--- These manifolds never made production. However, 3 or 4 were hand made by the designer.

JMF Drag: The turbulence on #4 was enough to shake the entire flow fixture. However, we were able to make a modification to this manifold that not only fixed the turbulence, but also equalized the flow to 3 and 4.

Thank You!!! There is no way I could have done this without a lot of help and participation from the DSM community. Thank you to Halon, Blageo23,

95talonracer and Pushit2.0 from Mitsustyle forums for donating their manifolds for testing. Also thanks to Swifty1638 from the same forum for helping me to get this going.

I also owe a special thanks to my boss, as he allowed me to waste my and his time and materials at the shop to make this all possible. This defiantly would not have happened without him.

If you would like to contact me in regards to this testing, would like to participate in this test, or would like to inquire about our research and design or flow services, please contact me at irocgsx@gmail.com