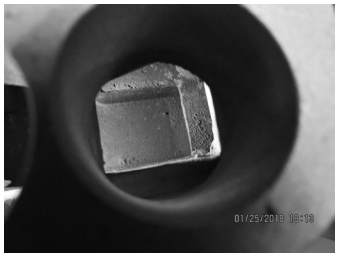
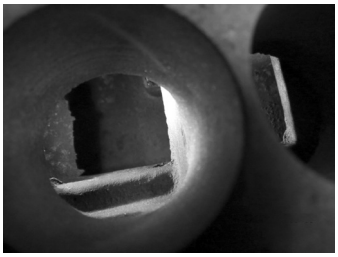
3x2 Dyno Tests - Edelbrock VS Offenhauser

By Joe Craine

I was very disappointed by an article written in Hot Rod Magazine about a Y Block build that did not make one horsepower per cubic inch, and it had ported Mummert aluminum heads, high compression, and EFI on an Offenhauser 3 x 2 intake manifold. I remember the article from the early '70s where the Y Block used that same intake, and did miserably in that magazine test, also. I decided to find out if the problem with those builds was the Offenhauser intake manifold, since I have seen the Y Block respond amazingly well to ported heads, high compression, and ported intake manifolds. I posted a want ad in the classifieds, and was able to buy an Offenhauser intake in fair condition for $250.00 plus shipping. My plan was to compare a stock Offenhauser to a stock Edelbrock 573 on my SF-600 Flow Bench, and then port both to see just how much improvement could be achieved with each. I already had two Edelbrock 573 intakes, and one was ported just about to the maximum I thought feasible. At the same time Ted Eaton had located another stock Offenhauser, so a plan emerged to dyno test the two stock intakes, and the two ported intakes on an engine that would stress the intakes so see where the shortcomings are, if any.

Inspecting the Offenhauser, I found it had rectangular ports with right turns into ports, with no continuity, and terrible slag deposits in the ports. The plenum area just dropped down at a right angle to the floor with no ramps, or taper, and the throttle bores were partially blocked by molding lines at the rear of the manifold. It is essentially a single plane intake with dividers in the last 3 inches of the ports going to the heads. After many years of flowing intakes and heads I have found that the ports need walls that are as parallel as possible, and a slight taper to the port exit to speed up flow. Air does not turn easily around sharp corners and needs as large a radius as possible for best flow.



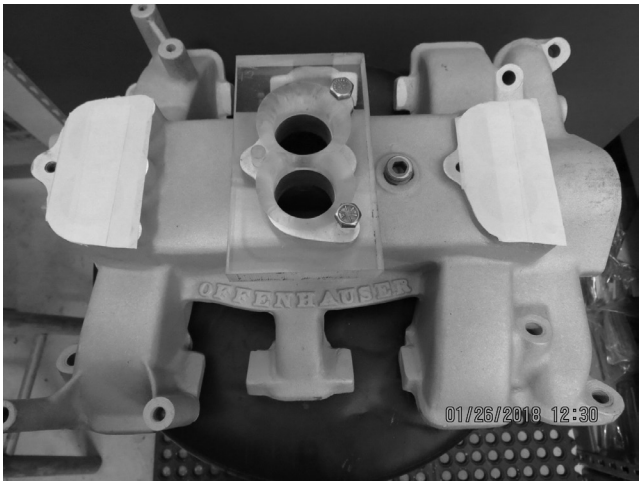


(Continues on next page)

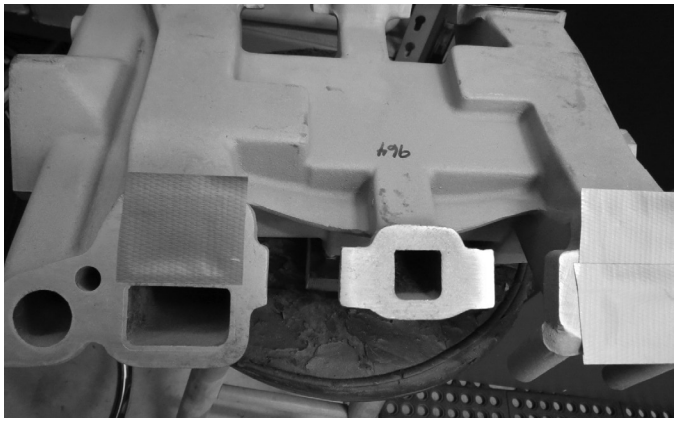
(Continued from previous page)

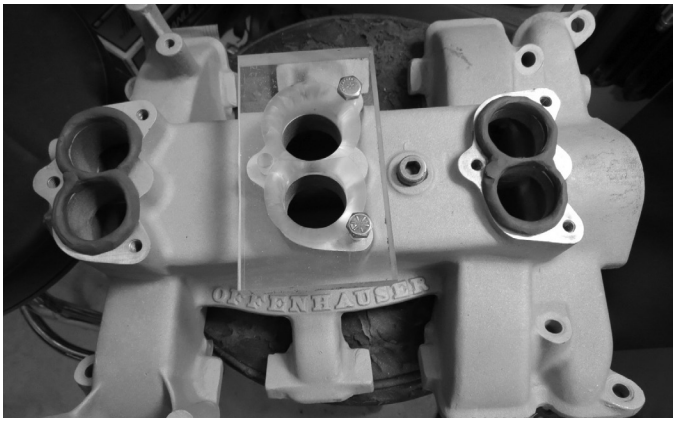
The Offenhauser intake does not have any of those characteristics for improved flow. The Edelbrock 573 on the other hand is a true dual plane intake, with larger ports, and continuous runners to the head openings. Looking at the Offenhauser, I cannot understand what the designer was thinking, or what they were trying to accomplish since the name Offenhauser has been synonymous with winning for many years at Indianapolis. Anyway, on to the actual statistics for the intakes.

When I flow any intake manifold, I use a carb spacer with a radius for each throttle bore, and I tape over all the ports except the one being flow tested. I also plug any vacuum ports so that the only airflow is coming through the throttle bores alone. I remove the tape and check each port individually for all cylinders. On multiple carburetor intake manifolds, I will use two carb spacers just like the single carb. On a 3 x 2 intake, I tape the two end carb pads, and flow the center carb first.



Then I remove the tape and flow all six throttle bores through each port to see where each manifold's weakness is located. Many times the center carb will not flow enough air to match the flow of the cylinder head, and the Offenhauser is a prime example of that. Even with all six throttle bores open, the manifold does not flow enough air to match a good -G or 113 port.



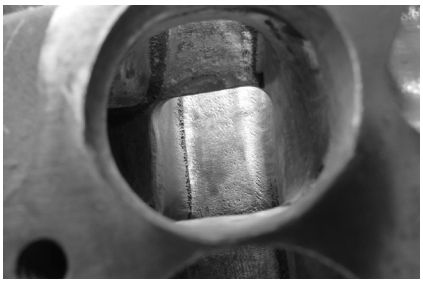


After I get a good flow sheet established, I begin porting the manifold to see just how much improvement can be made. I also try to balance the flow between ports as much as possible within reason.

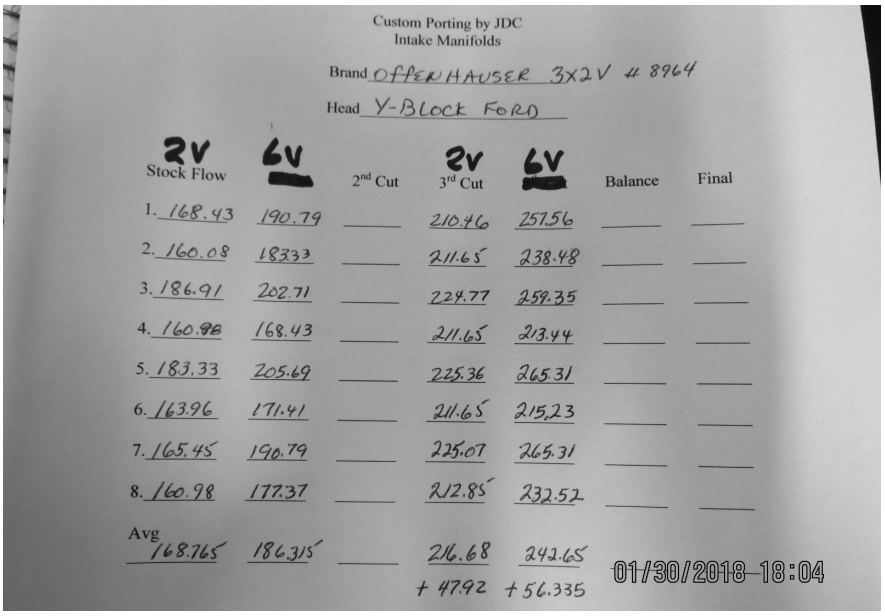
(Continued on next page)

(Continued from previous page)

As you can see the manifold in stock form was a true bottleneck at 168.43 cfm possible in port #4. After porting the flow only came up to 213.44 cfm. Overall the average improved 56.335 cfm.



The Offenhauser actually flows nearly identical to the Ed 573 through the center 2V, but when all 6 venturi are open, the difference is phenomenal in stock form. The stock Ed 573 flows 74.675 cfm better than the stock Offenhauser, and 18.34 cfm better than the fully ported Offenhauser!



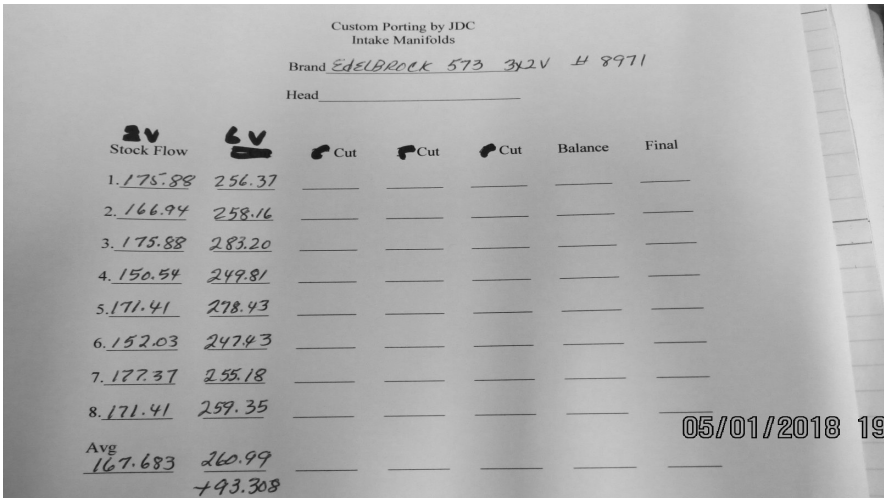
Custom Porting by JDC
Intake Manifolds

Brand OFFENHAUSER 3X2V # 8964

Head Y-BLOCK FORD

	2V Stock Flow	6V	2nd Cut	2V 3rd Cut	6V	Balance	Final
1.	168.43	190.79		210.46	257.56		
2.	160.08	183.33		211.65	238.48		
3.	186.91	202.71		224.77	259.35		
4.	160.98	168.43		211.65	213.44		
5.	183.33	205.69		225.36	265.31		
6.	163.96	171.41		211.65	215.23		
7.	165.45	190.79		225.07	265.31		
8.	160.98	177.37		212.85	232.52		
Avg	168.765	186.315		216.68	242.65		
				+ 47.92	+ 56.335		

01/30/2018 18:04



Custom Porting by JDC
Intake Manifolds

Brand EDELBROCK 573 3X2V # 8971

Head

	2V Stock Flow	6V	Cut	Cut	Cut	Balance	Final
1.	175.88	256.37					
2.	166.94	258.16					
3.	175.88	283.20					
4.	150.54	249.81					
5.	171.41	278.43					
6.	152.03	247.43					
7.	177.37	255.18					
8.	171.41	259.35					
Avg	167.683	260.99					
		+93.308					

05/01/2018 19

I was able to check the flow sheets of several iron heads that had been ported by Ted, John, and a couple of other folks. The iron heads that I checked the flow on came in at an average of 230 cfm in the upper ports, and 212 cfm in the lower ports. The Mummert aluminum heads as cast flow ~243/241 cfm @ .550". The CNC Mummert heads I have flowed usually flow 280/270ish @ .750". So right away, you can see that the stock Offenhauser cannot possibly supply enough air for any performance build. We will come back to that in the dyno testing.

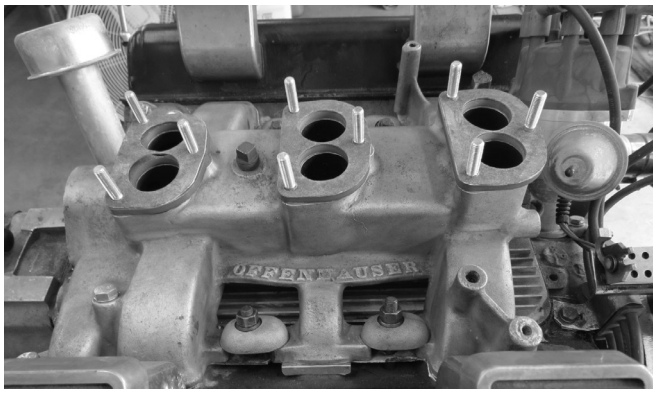
I bought a set of Ford 94 carburetors that had been rebuilt/kitted, and I set them up on my manifold with a 1/4" phenolic spacer to reduce head transfer. I had to open up the spacers to match the intake manifold after porting and match the Ford carburetor throttle bores.

Ted and I talked about using his 300hp dyno mule, but we decided that for this test, a stronger engine was needed to stress the intakes a bit more to find their full potential. He had a 314 CI Y that had been a "loaner" for different projects that made 401 hp when it had first been built. It is a 292 +.060" w/312 crankshaft cut to 292 mains, and ported iron heads with a BT manifold that had been ported back in 2012,

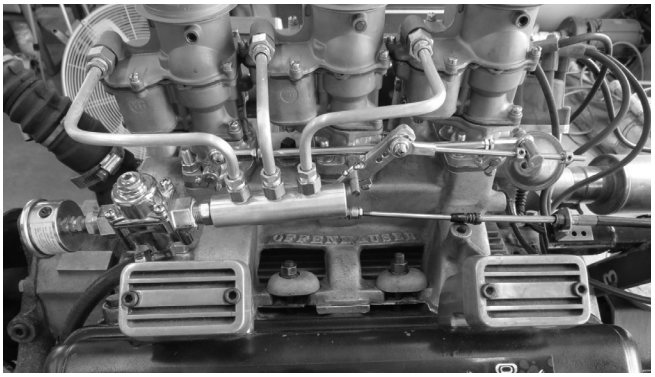
(Continues on next page)

(Continued from previous page)

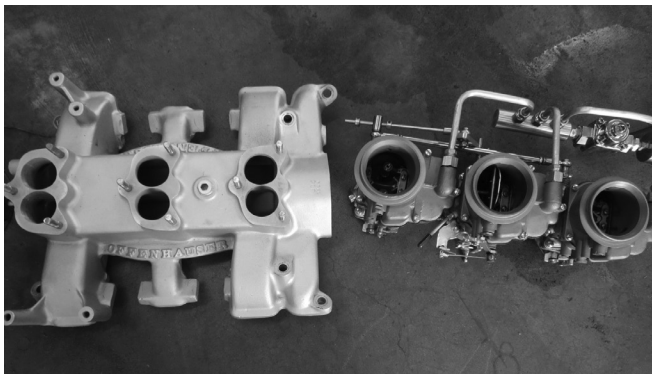
and Ted's Holley 750VS carb. We felt that would be a good test for these intakes, since everyone who read the magazine article thought the 327 Y should have made over 400 hp with the ported Mummert heads and high compression. So it was pulled out and mounted to the dyno for a couple of pulls to check the health of the engine. After making a couple of warm-up pulls and jetting change, it came in at 381.5 hp and 344.8 lbft. Ted deemed it ready to test the other intakes and carbs.

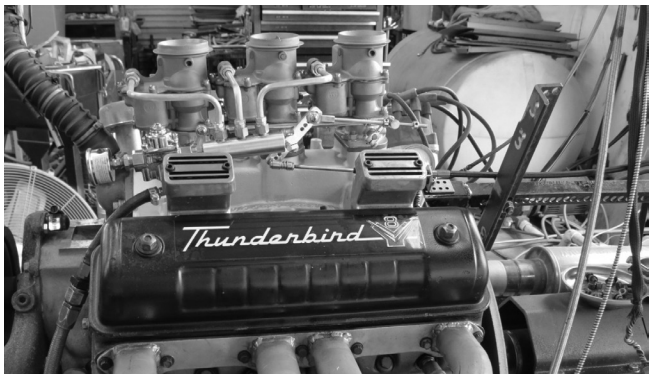


I had asked Ted if it would be possible to test a couple of different combinations just to get a feel for how well the different intakes and carbs would compare to the Offenhauser. He was very receptive to the idea, so next we tested an "out of the box" Summit 750VS to compare it to his "famous" Holley 750 VS dyno carb. The Summit 750VS made 375.2 hp/334.8 tq, and we moved on to an "out of the box" Summit 500VS which made 367.9 hp/335.0 tq. For those of you who worry about sizing a carb for the Y Block, there was only an eight horsepower difference between these two carburetors. There may be a little gained by jetting changes, but we didn't want to take the time to make changes to these new carbs, just see what anyone could expect in performance right "out of the box."



On to the reason for all this work, the stock Offenhauser with the Ford 94 carbs. We had trouble getting the idle to stabilize, and had to keep the idle speed up so the engine would keep running with the performance camshaft. Ted said that the Ford 94 carbs typically do not like to idle until you enrichen the



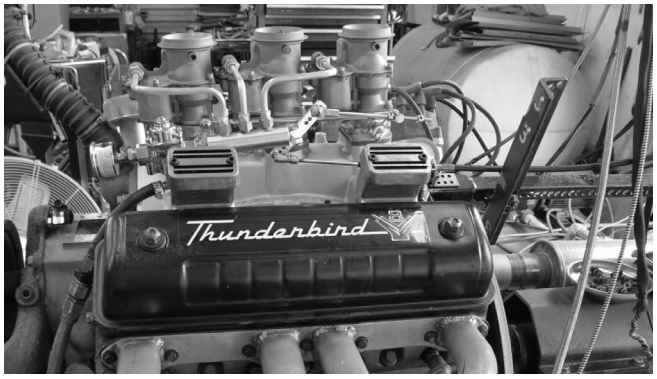


idle circuits, and a quick test to block the circuit some proved to help. We then made a couple of pulls to see if the carbs would actually work at wide open throttle, and came up with a pull of 295.2 hp/321.7 tq, and did another pull at 296.3 hp/320.3 tq, for a LOSS of 85.2 hp and 24.5 lbft torque. I was stunned, but Ted just grinned, and said it mirrored his findings in the 3 X 2 testing he did a few years ago.

Next up was the ported Offenhauser which I felt would really make a huge difference since the

(Continues on next page)

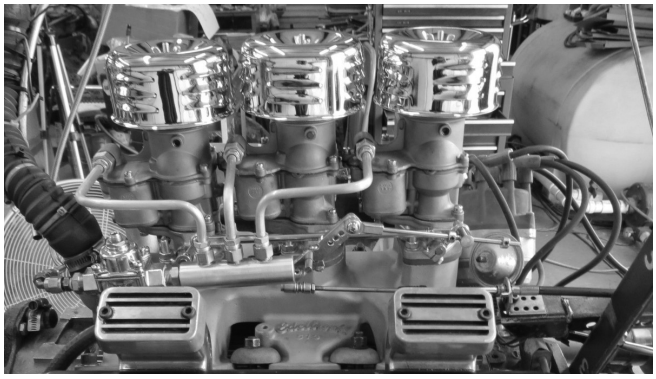
(Continued from previous page)



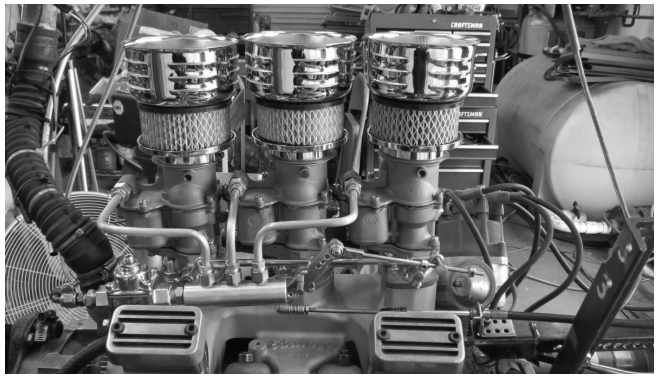
average cfm was 56.335 better than the stock intake. Everything was changed over to the ported Offenhauser intake that had been used on the stock Offenhauser intake.

It sounded good on the pull, but the print out would tell the truth. What a shock! The intakes were identical at 4300 rpm! 259.8/259.7 hp, and 317.3/317.2 tq. The ported intake then pulled ahead to 312.6 hp @ 6400, for an increase of 16.3 hp. I was a bit disappointed, thinking the 56.335 increase in cfm should have made a larger increase in horsepower. We checked and double checked everything, and nothing was amiss. The Offenhauser IS WHAT IT IS, and we decided to move on to the Edelbrock 573 intakes to see if there is truly a difference in the quality of performance between the manufacturers.

The spacing is different between the intakes. The Edelbrock 573 end carburetor placement is about ~ .250" further away from the center carb than the Offenhauser. That required reconfiguring the throttle arm linkages and opening rate for the end carbs. On to the dyno engine, and our first pull with the stock Ed 573. Another stunner! The stock Ed 573 with same carbs made more horsepower than the ported Offenhauser, 343.1 hp/334.1 tq for an increase of 30.5 hp, and 13 lbft torque, and it was 46.8 hp better than the stock Offenhauser.



With this stock intake, we also decided to test the louvered air cleaner bonnets to see if they were a restriction. Hot Rod Engine Masters did a test of 19 different air filters and housings on a BBC, and found that an airflow restriction shows up at certain horsepower levels with each different type of air filter and housing. I was curious if the bonnets would hinder or help, so we did pulls without the filters first to see how the intake would compare to the Offenhauser. Man, what a surprise!



The horsepower fell to 330.6, and the torque was down to 332.2. Next we turned the bonnets upside down to see if the louvers were the problem, and the horsepower came back up to 334.6 and torque of 337.6, but still down from no air filter.

You can buy flat air filter lids to fit the small air filters. The chrome bonnets with their louvers look "cool", but they are a definite restriction whenever you cross over a certain horsepower level.

Next was the best surprise of all for me, and made all the work worthwhile. We changed the stock Edelbrock 573 for my fully ported 573. Instead of running the Ford 94s on this intake, I wanted to try something new, and so I brought my Stromberg 97 Big Bore carbs which flow a true 250 cfm each. The

(Continues on next page)

(Continued from previous page)

Ford 94s used were at the 155 cfm size, so this would be a big increase in flow potential. I hope you will forgive me for not testing the ported 573 with the Ford 94s, but both Ted and I felt we had found the issue with the poor performance with the Offenhauser intakes from the magazine articles, and our dyno testing. I was very interested in comparing a ported Edelbrock 573 with a true 750 cfm against a ported aluminum 4V and 750 cfm carb. The Stromberg 97 Big Bore carbs are available as a complete assembly from Summit, and so are the linkage kits, and fuel line kits. The only problem with fitting everything to the Y Block intake was the spacing for the fuel lines that were stainless steel, and the secondary carb accelerator linkage rod had to be shortened one inch. I had to cut the two end lines, and take out ~ 5/8" to fit the Ed 573 intake carburetor spacing. The Stromberg carburetor linkage worked so smoothly, it felt almost like jewelry compared to the Ford 94s.

We made the intitial adjustments, and the engine seemed to like the added airflow. The first pull resulted in 370 hp, and 348.8 lbft torque. I was elated, but there had been an issue with the MSD box, and Ted changed over to an alternate box, and another pull was made. The figures were down, and then Ted remembered that you MUST ALWAYS re-check the timing when changing a MSD box. The timing was 4* less, and we set it back to the 36* from previous testing, and made another pull. The horsepower was back to 372.3, and 350.8 lbft torque. Now that was nearly identical to the peak horsepower on the pull we had made earlier with the out of the box Summit 750VS, but the torque was up quite a bit. Upon comparing the two dyno sheets, the Edelbrock 573 and Stromberg 97 Big Bore carbs were much better up to 6200 rpm. The dyno sheets for these two pulls show that the average hp and torque for the Stromberg 97 Big Bore carbs was 301hp/333.9 lbft torque, and the 750 VS was 289.3 hp/318.8 lbft torque. For the street, this 3 X 2 intake and carbs would be much more powerful.

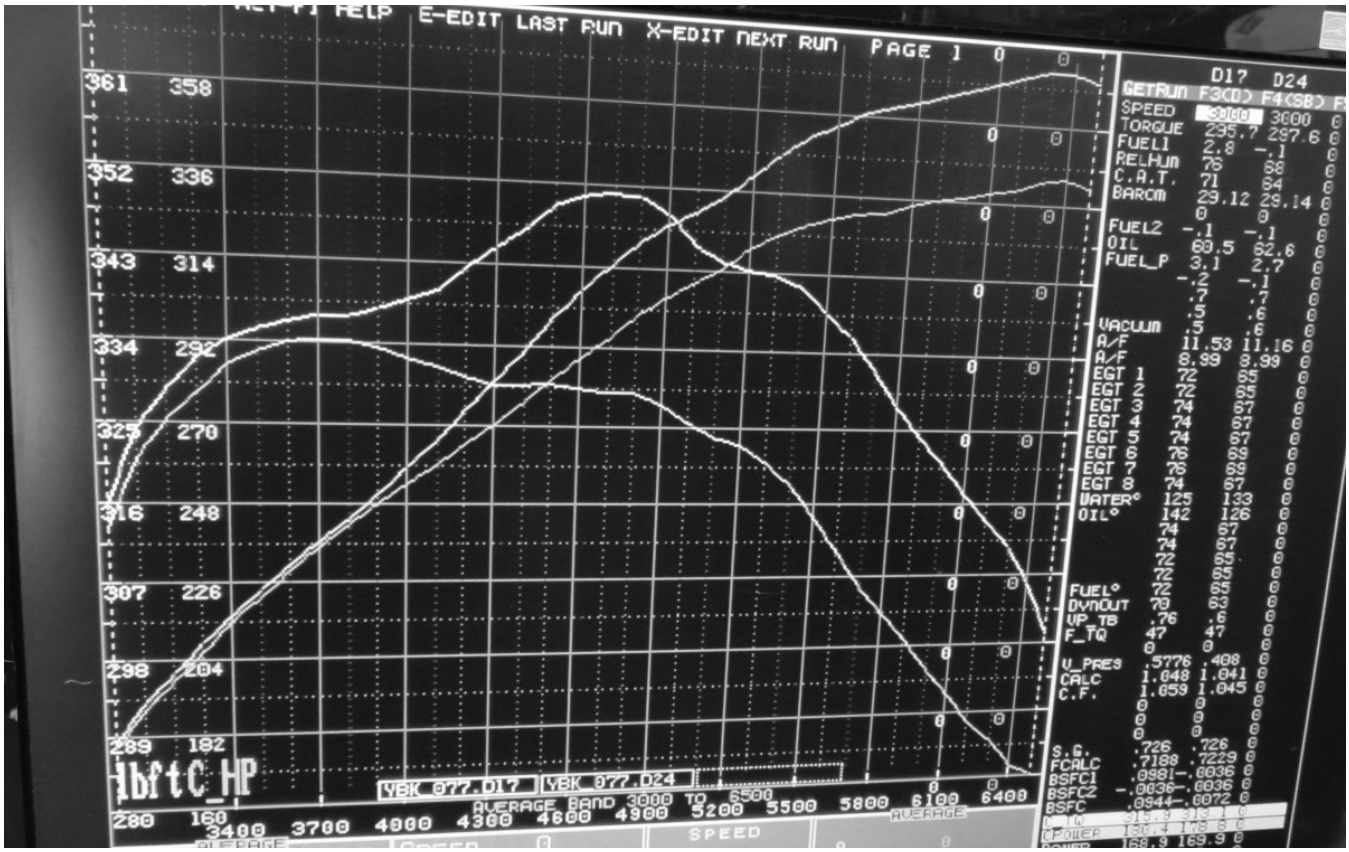
See next page for dyno sheets

Then just for grins, we added the air filters and bonnet air cleaners for a pull. Here is the biggest surprise of the whole two days of dyno testing for me. The horespower dropped to 320.0 and the torque was down to 322.5 lbft. That is a loss of 52.3 hp at the 375-380 hp level of this engine. It seems that those air cleaner bonnets can only work for an engine that makes in the area of 320-330 horsepower maximum.

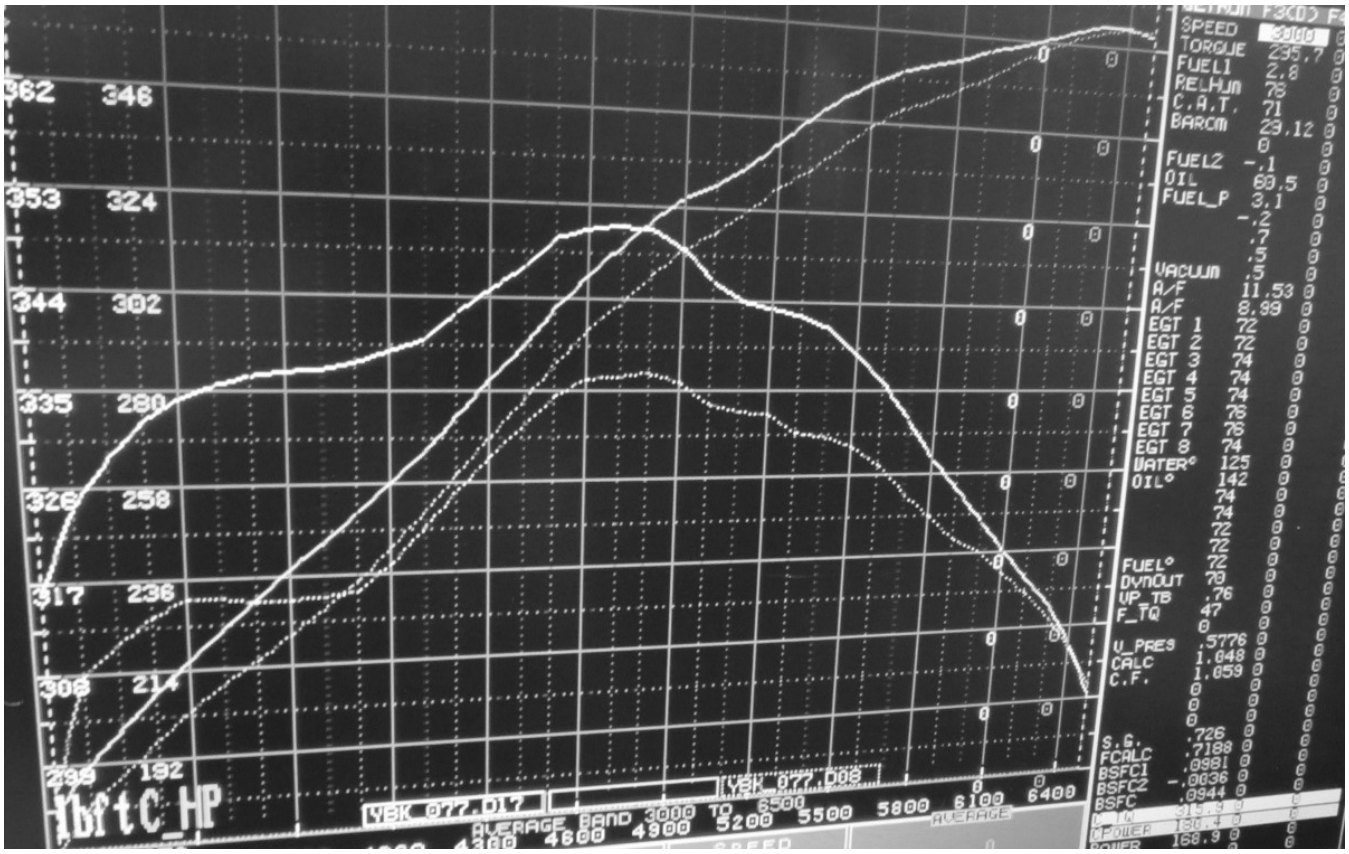
I want to thank Ted Eaton for his help, time, and patience to allow me to hopefully shed some more light on why the Offenhauser 3 X 2 intake for the Y Block is such a poor performer. Looking at all the pictures of the right angles, open plenum, slag, rectangular boxes for ports, it is obvious that it is not a good design for performance. For those of you who own this intake it seems the most you can expect from it is in the neighborhood of 290-310 horespower. Because of that, I have decided to call it the "Awful-hauser" intake from now on. Joe-JDC

(Continues on next page)

(Continued from previous page)



Stock Edelbrock 573 vs ported 573.



Stromberg 97 to Summit VS750