

2011 Polaris ProR 800 pipe shootout/ port timing improvement

Casey Mulkins of Three Seas Marine Polaris (caseymulkins@gmail.com) in Mayville, NY was extremely successful this time with the same “shim” kit tested earlier here without any meaningful power increase. Casey’s “shim kit” consists of two base gaskets and a spacer that’s designed to make the port timing of the mild ProR 800 engine more closely match the port timing of his “trail modified” Dragon 800. Last time here, Casey picked up 10 CFM airflow and gained zero HP. But this time Casey made big power gains, and has ordered many of these cylinder-raising shims to sell to dealers and consumers who desire added horsepower. Here’s how the test session unfolded....

Since we were able to acquire aftermarket exhausts from Aaen, BMP, DynoPort and SLP, Casey was hoping that one or all of those pipes would allow the improved port timing to work, and to make more HP. So he brought another bone stock machine, this one with 70 hours on it (well-past the “breakin” mode). For all of the testing, we used E10 93 octane gasoline.

The plan was first to establish baseline airflow and HP, and then test all five exhaust systems and create Power Commander maps for each. Then Casey would install his shim kit and a stock head cut to nearly match the thickness of the shim and extra base gasket, and we would go through all the pipes once more. When testing components like this, it’s important to maintain consistent A/F ratio. We did this in every case, tuning fuel flow to match airflow difference % with a Power Commander V, plus or minus compared to stock. In observing the following data, note that the airflow CFM readings from the dyno cold air system are smooth and accurate, but our fuel flow readings and mechanical A/F readings (determined by the dyno computer subtracting the bypassed fuel from the gross fuel flow from the pump) are a bit less smooth due in part to the tiny bypass regulator surging a bit which is common on all sleds with bypass systems. But in every case we were able to adjust the stock fuel to closely match the change in airflow CFM thanks the PCV being programmed to add or subtract fuel based upon a percentage.

Note that our BSFC, even when smoothed out, often is in the mid .50’s. This seems to be very acceptable on this engine since even on some extended 40 second dyno tests there were zero clicks of detonation.

And with Casey monitoring all of the engine data, we were able to test every component with identical coolant and pipe center section temperature (1000F plus), resulting in tests that repeated perfectly, within less than ½%. Each test shown was approximately 20 seconds at WOT.

After we did our stock engine pipe testing, and tested the pipes once more on the shimmed engine, we decided to install a .020” offset timing key and see what would happen. Casey had noted that while observing the factory timing curve on the ProR 800 with our Digital Wrench software, it appeared to be more conservative than the timing curve of the Dragon 800 (which in testing is usually optimal for best HP). Incredibly, adding the .020” timing key piled on a lot more HP from midrange to the HP peak! It

made a huge difference with the stock pipe, and surely would have made the difference last time Casey was here. Next time we get a bone stock machine here, we'll try advancing the timing on it.

Since we have so much test data, I've opted to show each pipe's digital test data stock, then with shimmed cylinders *and* the added timing together, but with only the graphs showing shim kit w/o timing. Pipe data is shown in alphabetical order.

Here's our stock ProR 800.

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	DegF	psig
6500	98.1	79.3	0.677	66.5	11.89	172.6	26.4	63.9
6600	100.5	80.0	0.675	67.9	11.84	175.6	26.3	63.8
6700	103.1	80.8	0.716	73.9	11.24	181.4	26.2	63.6
6800	106.8	82.5	0.706	75.5	11.32	186.7	26.1	63.5
6900	110.3	84.0	0.698	77.0	11.43	192.3	26.0	63.5
7000	113.9	85.5	0.680	77.6	11.64	197.4	25.8	63.4
7100	117.0	86.5	0.675	79.1	11.68	201.7	25.7	63.4
7200	120.4	87.8	0.680	82.0	11.54	206.9	25.6	63.3
7300	124.9	89.8	0.683	85.4	11.32	211.3	25.5	63.2
7400	130.3	92.5	0.660	86.1	11.46	215.5	25.4	63.2
7500	135.0	94.6	0.640	86.6	11.54	218.3	25.2	63.1
7600	138.9	96.0	0.658	91.6	11.05	221.1	25.1	63.1
7700	142.2	97.0	0.644	91.8	11.14	223.4	25.0	63.1
7800	144.8	97.5	0.629	91.3	11.29	225.1	24.9	63.1
7900	146.6	97.5	0.600	88.2	11.75	226.4	24.8	63.1
8000	148.5	97.5	0.601	89.4	11.63	227.2	24.7	63.2
8100	150.1	97.3	0.578	87.1	11.97	227.6	24.6	63.2
8200	150.8	96.6	0.568	85.9	12.14	227.9	24.5	63.2
8300	151.4	95.8	0.552	83.8	12.45	227.9	24.4	63.2
8400	150.5	94.1	0.556	84.0	12.39	227.3	24.3	63.2
8500	147.0	90.9	0.574	84.7	12.22	226.0	24.2	63.1
8600	142.9	87.2	0.578	82.9	12.40	224.5	24.2	63.3

Here is the Aaen single pipe fitted to the stock engine with stock muffler. The pipe's bolt-on torque power was the best of the bunch on the stock engine, and required extra mid and top end fuel added to match the higher airflow. Unfortunately, this was the worst fitting pipe, requiring a great deal of hammering to create room under the crossbar. But we made it fit so we could test it, and here is the data.

Stock ProR 800, Aaen single pipe

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	Psig
6500	100.9	81.6	0.681	69.0	11.62	175.2	24.7	64.0
6600	102.8	81.8	0.680	70.2	11.67	178.9	24.6	64.0
6700	104.8	82.1	0.689	72.5	11.45	181.4	24.5	64.0
6800	108.1	83.5	0.734	79.6	10.97	190.8	24.4	63.7
6900	112.4	85.6	0.719	81.2	11.07	196.3	24.3	63.7

7000	118.5	88.9	0.692	82.5	11.34	204.2	24.1	63.6
7100	122.6	90.7	0.691	85.1	11.19	208.1	24.0	63.5
7200	127.2	92.8	0.682	87.2	11.22	213.7	23.9	63.4
7300	131.7	94.8	0.672	88.9	11.18	217.2	23.8	63.4
7400	137.8	97.8	0.622	86.2	11.78	221.7	23.7	63.3
7500	142.5	99.8	0.615	88.1	11.66	224.4	23.6	63.3
7600	147.1	101.7	0.619	91.5	11.37	227.2	23.5	63.2
7700	150.7	102.8	0.604	91.5	11.49	229.5	23.4	63.2
7800	153.2	103.2	0.581	89.6	11.85	231.9	23.3	63.2
7900	155.0	103.1	0.583	91.0	11.75	233.4	23.2	63.3
8000	155.9	102.3	0.573	89.9	11.94	234.5	23.2	63.3
8100	156.2	101.3	0.557	87.5	12.29	234.8	23.1	63.3
8200	155.3	99.5	0.556	86.8	12.34	234.1	23.0	63.4
8300	151.5	95.8	0.564	85.9	12.35	231.8	22.9	63.4

Here is the data from the ceramic coated Bikeman single pipe and stock muffler. This one was a snug fit, but needed no massaging to clear the frame. Note on the following graph that the HP curve was nearly identical to the SLP pipe, but with a bit higher airflow.

Stock ProR 800, BMP pipe

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	Psig
6500	98.3	79.4	0.687	67.6	11.97	176.8	26.4	64.0
6600	100.3	79.8	0.680	68.3	12.07	180.1	26.3	64.0
6700	102.2	80.1	0.693	70.9	11.87	183.8	26.2	63.9
6800	106.7	82.4	0.734	78.4	11.24	192.6	26.1	63.6
6900	110.8	84.3	0.741	82.3	11.00	197.6	26.0	63.6
7000	115.3	86.5	0.731	84.5	11.00	203.0	25.9	63.5
7100	119.0	88.0	0.711	84.7	11.24	208.0	25.9	63.5
7200	122.8	89.6	0.679	83.5	11.62	212.0	25.8	63.4
7300	127.0	91.4	0.676	86.0	11.57	217.3	25.7	63.3
7400	131.9	93.6	0.663	87.6	11.53	220.6	25.6	63.3
7500	137.1	96.0	0.649	89.2	11.53	224.5	25.5	63.2
7600	141.6	97.9	0.630	89.5	11.61	226.9	25.4	63.2
7700	145.7	99.4	0.612	89.3	11.76	229.4	25.4	63.2
7800	148.7	100.1	0.598	89.2	11.86	231.1	25.3	63.1
7900	150.7	100.2	0.583	88.1	12.07	232.2	25.2	63.2
8000	152.2	99.9	0.577	88.0	12.12	232.8	25.1	63.3
8100	153.4	99.5	0.554	85.1	12.53	233.1	25.1	63.3
8200	154.4	98.9	0.548	84.8	12.58	233.2	25.0	63.3
8300	154.4	97.7	0.561	86.9	12.25	232.7	25.0	63.3
8400	153.0	95.7	0.566	86.9	12.21	231.8	24.9	63.3
8500	146.9	90.8	0.575	84.7	12.40	229.4	24.9	63.6

Next is the DynoPort single. Since Rich was out of stock, I was able to commandeer this one from Vince at Bibbens Polaris in Weedsport, NY last Saturday. The DynoPort pipe is also complimented by what Dynoport Rich says is a higher flowing Dynoport Y pipe, but the one Vince thought he had in stock was instead for an Etec800, so the Y pipe will have to be tested on another day. Here's the DynoPort single, with stock Y pipe. Since airflow was the same as stock, stock fueling was adequate with stock engine.

Stock ProR 800, DynoPort pipe

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	Psig
6500	98.1	79.3	0.628	61.8	12.70	171.4	25.3	64.1
6600	100.1	79.6	0.625	62.7	12.76	174.9	25.2	64.0
6700	102.0	80.0	0.648	66.2	12.24	177.0	25.2	63.9
6800	104.5	80.7	0.711	74.5	11.19	182.1	25.1	63.7
6900	108.0	82.2	0.707	76.6	11.10	185.6	25.0	63.6
7000	111.8	83.9	0.734	82.3	10.63	191.1	24.9	63.5
7100	115.2	85.2	0.727	84.0	10.62	194.7	24.8	63.5
7200	119.1	86.9	0.717	85.7	10.71	200.4	24.8	63.5
7300	124.1	89.3	0.681	84.8	11.11	205.7	24.6	63.3
7400	128.5	91.2	0.656	84.5	11.38	210.0	24.5	63.3
7500	132.9	93.1	0.649	86.5	11.36	214.6	24.5	63.3
7600	137.0	94.7	0.643	88.3	11.31	218.1	24.4	63.2
7700	140.9	96.1	0.639	90.4	11.23	221.7	24.3	63.2
7800	144.7	97.4	0.624	90.5	11.34	224.3	24.2	63.2
7900	147.6	98.1	0.609	90.2	11.46	225.7	24.1	63.3
8000	150.0	98.5	0.579	87.3	11.89	226.6	24.0	63.3
8100	151.9	98.5	0.562	85.8	12.11	227.0	24.0	63.4
8200	153.4	98.3	0.568	87.5	11.89	227.3	23.9	63.4
8300	154.3	97.7	0.546	84.6	12.30	227.4	23.8	63.4
8400	153.7	96.1	0.550	85.0	12.24	227.2	23.7	63.4
8500	150.8	93.2	0.560	84.8	12.24	226.6	23.6	63.4
8600	146.1	89.2	0.551	80.8	12.77	225.4	23.6	63.5
8700	140.9	85.1	0.538	76.2	13.44	223.8	23.5	63.6

Here's the SLP pipe and muffler combo. This is the only way it's sold, and the outlet pipe is too short to be fit to the stock muffler (although a short extension could be fabricated for those who want to run the stock muffler). The SLP muffler is nearly as quiet as stock, thanks to the pipe's internal stinger that takes sound energy that normally escapes out the pipe and uses that energy, ostensibly to increase the supercharging effect of the returning sound wave, and usually increases airflow as a result! The Aaen and BMP pipes also have internal stingers. The DynoPort does not. We were able to compare the SLP muffler to stock by using baling wire, and the stock muffler made nearly identical airflow and HP, with the stock muffler having a slight HP advantage at peak RPM. Also the ceramic SLP pipe has its own perfectly fitting insulated stamped aluminum heat shield.

Stock ProR 800, SLP pipe and muffler

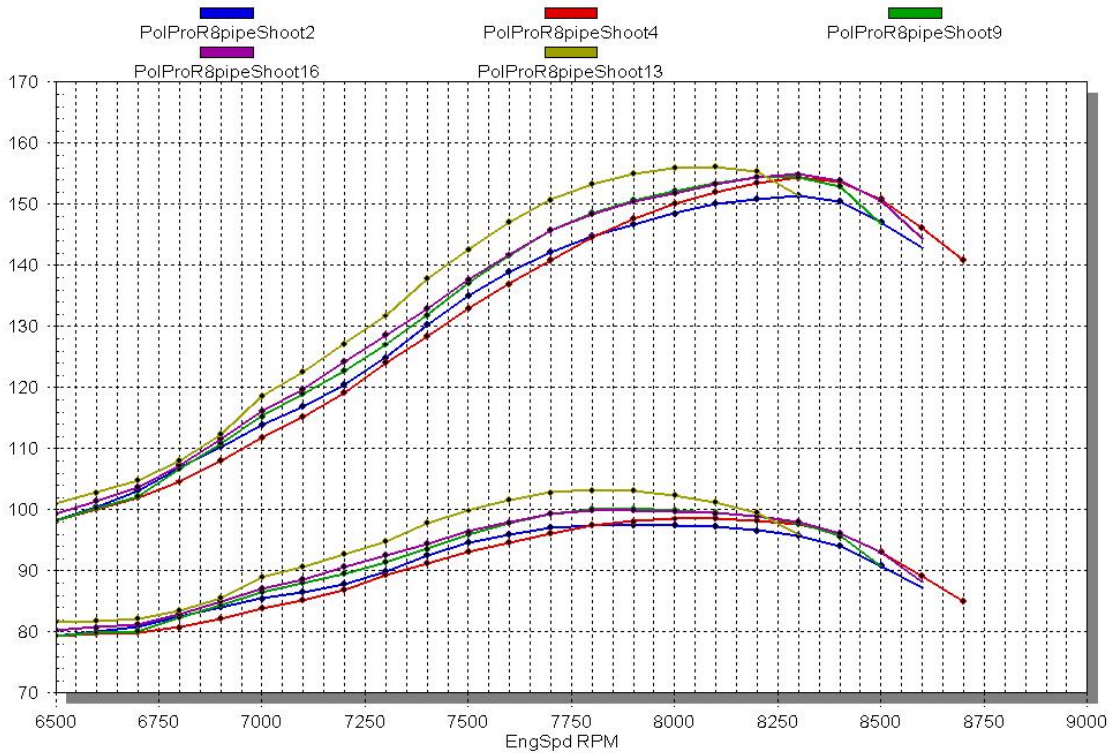
EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
--------	--------	--------	--------	--------	--------	--------	--------	--------

RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	DegF	psig
6500	99.3	80.3	0.674	67.2	11.99	175.9	24.8	64.2
6600	101.5	80.7	0.666	67.8	12.04	178.4	24.8	64.1
6700	103.7	81.3	0.700	72.9	11.49	182.9	24.7	63.9
6800	107.3	82.9	0.704	75.8	11.39	188.7	24.6	63.8
6900	111.7	85.0	0.717	80.4	11.05	194.0	24.5	63.7
7000	116.1	87.1	0.690	80.4	11.33	199.1	24.4	63.7
7100	119.7	88.6	0.691	83.1	11.19	203.3	24.3	63.6
7200	124.2	90.6	0.672	83.9	11.39	208.6	24.2	63.5
7300	128.6	92.5	0.658	85.0	11.49	213.2	24.1	63.4
7400	133.0	94.4	0.636	84.9	11.71	217.3	24.0	63.4
7500	137.7	96.4	0.634	87.7	11.55	221.3	23.9	63.4
7600	141.7	97.9	0.606	86.3	11.89	224.1	23.8	63.4
7700	145.7	99.4	0.601	88.0	11.79	226.7	23.7	63.3
7800	148.4	99.9	0.598	89.2	11.72	228.3	23.7	63.3
7900	150.4	100.0	0.586	88.6	11.87	229.6	23.6	63.3
8000	151.9	99.7	0.576	88.0	11.99	230.5	23.5	63.4
8100	153.3	99.4	0.575	88.6	11.93	230.9	23.5	63.4
8200	154.4	98.9	0.572	88.8	11.90	230.8	23.4	63.4
8300	154.9	98.0	0.564	87.8	12.02	230.5	23.3	63.4
8400	153.8	96.2	0.563	87.1	12.08	229.8	23.3	63.5
8500	150.6	93.0	0.569	86.1	12.15	228.6	23.2	63.5
8600	144.4	88.2	0.589	85.6	12.13	226.6	23.1	63.5

Horsepower is top graph, torque is lower graph:

Compare all pipes on stock ProR 800

BLUE stock, GOLD Aaen, GREEN BMP, RED DynoPort, PURPLE SLP



03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

10/29/02

Next Casey installed his shim kit and modified stock head on the ProR 800 engine. We ran through all the pipe combos (that session shown in graphs only). Then after we installed the .020" offset key to advance the flywheel. Sean Ray reminded me that if the Polaris mag end taper is smaller diameter than the Cat taper that the key was made for, the degrees advance may be greater than 2! Here is the final test data, beginning with the stock exhaust showing and incredible 10 HP increase for the price of Casey's shim kit and a Power Commander V!

ProR 800 w/ Casey's shim kit, added timing, and stock pipe and added fuel (remember this combination gave us no extra power with stock timing!)

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	Air_1s SCFM	AirInT degF	FulPrA Psig
6500	98.6	79.7	0.613	60.9	12.91	171.8	23.2	64.5
6600	100.6	80.1	0.650	65.9	12.18	175.2	23.1	64.4
6700	103.0	80.7	0.680	70.6	11.62	179.1	23.1	64.2
6800	105.4	81.4	0.692	73.5	11.45	183.8	23.0	64.1
6900	108.5	82.6	0.689	75.4	11.50	189.5	22.9	64.0
7000	111.9	84.0	0.678	76.5	11.69	195.2	22.9	63.9
7100	115.2	85.2	0.684	79.5	11.53	200.1	22.8	63.9
7200	121.3	88.5	0.684	83.6	11.41	208.5	22.7	63.8
7300	126.5	91.0	0.668	85.3	11.43	212.9	22.6	63.7
7400	133.5	94.7	0.663	89.3	11.21	218.7	22.6	63.6

7500	139.6	97.8	0.634	89.3	11.44	223.1	22.5	63.5
7600	145.2	100.4	0.631	92.4	11.26	227.2	22.4	63.4
7700	148.8	101.5	0.621	93.2	11.29	229.8	22.3	63.4
7800	152.2	102.5	0.608	93.3	11.42	232.9	22.3	63.3
7900	155.5	103.4	0.580	91.1	11.81	234.9	22.2	63.5
8000	158.2	103.9	0.580	92.6	11.69	236.5	22.1	63.5
8100	160.3	103.9	0.561	90.8	11.97	237.6	22.1	63.5
8200	161.6	103.5	0.557	90.9	12.01	238.5	22.0	63.4
8300	161.2	102.0	0.545	88.7	12.34	238.9	22.0	63.4
8400	158.2	98.9	0.566	90.4	12.07	238.3	22.0	63.4
8500	148.1	91.5	0.611	91.4	11.81	235.7	21.9	63.7

Here's the shimmed and keyed engine with the Aaen pipe. As you can see in the following graphs, the torque Aaen pipe didn't benefit quite as much, with a bit less peak power added than the other pipes. Since it's tuned best for the stock engine at lower RPM, the added timing didn't seem to help this pipe as much as it did the others. But having 164.6 HP with 106 lb/ft of torque is not a bad thing—especially with the trail-friendly stock muffler!

ProR 800 shimmed and keyed, Aaen single pipe

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	Psig
6500	101.2	81.8	0.626	63.9	12.27	171.2	23.1	64.4
6600	103.3	82.2	0.624	65.0	12.22	173.6	23.0	64.4
6700	105.7	82.9	0.657	70.1	11.78	180.4	22.9	64.1
6800	108.4	83.7	0.672	73.5	11.54	185.3	22.8	64.0
6900	112.7	85.8	0.684	77.7	11.42	193.9	22.6	63.9
7000	116.0	87.0	0.692	81.0	11.20	198.1	22.5	63.8
7100	121.8	90.1	0.681	83.6	11.26	205.7	22.4	63.7
7200	125.8	91.8	0.682	86.6	11.05	209.1	22.3	63.6
7300	132.2	95.1	0.652	87.0	11.33	215.3	22.1	63.5
7400	137.3	97.4	0.646	89.6	11.19	218.9	22.0	63.5
7500	144.0	100.8	0.658	95.7	10.70	223.5	21.8	63.4
7600	150.0	103.7	0.643	97.4	10.67	226.9	21.7	63.2
7700	154.1	105.1	0.630	98.0	10.73	229.8	21.5	63.1
7800	157.4	106.0	0.628	99.8	10.66	232.5	21.4	63.1
7900	159.8	106.2	0.603	97.4	11.05	235.1	21.3	63.2
8000	161.6	106.1	0.583	95.3	11.42	237.7	21.1	63.3
8100	163.3	105.9	0.567	93.6	11.71	239.2	21.0	63.3
8200	164.5	105.3	0.552	91.8	11.97	239.9	20.9	63.3
8300	164.6	104.1	0.547	91.1	12.06	240.0	20.8	63.5
8400	161.5	101.0	0.529	86.4	12.66	238.9	20.7	63.5

Here's the same engine setup, this time with the BMP single pipe. Now with the increase port timing/ ignition timing the BMP makes slightly better top end HP than the Aaen pipe, but not as much midrange HP.

ProR 800 shimmed and keyed, BMP single pipe

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	Lb/hph	lbs/hr	Ratio	SCFM	degF	Psig
6500	99.8	80.6	0.613	61.8	12.60	170.1	21.2	64.4
6600	101.8	81.0	0.634	65.2	12.12	172.7	21.1	64.4
6700	103.8	81.4	0.680	71.4	11.33	176.6	21.0	64.3
6800	105.7	81.6	0.688	73.5	11.25	180.7	20.9	64.1
6900	108.6	82.6	0.689	75.6	11.43	188.8	20.8	64.0
7000	111.8	83.9	0.690	78.0	11.40	194.3	20.7	63.9
7100	116.6	86.2	0.687	81.0	11.38	201.2	20.5	63.8
7200	120.4	87.8	0.690	84.0	11.21	205.7	20.4	63.6
7300	127.2	91.5	0.657	84.6	11.55	213.3	20.3	63.6
7400	132.9	94.3	0.649	87.3	11.44	218.1	20.2	63.5
7500	140.9	98.6	0.636	90.7	11.31	224.2	20.0	63.4
7600	146.9	101.5	0.620	92.1	11.33	228.0	19.9	63.4
7700	152.1	103.7	0.597	91.8	11.55	231.7	19.7	63.4
7800	156.2	105.2	0.581	91.8	11.71	234.8	19.6	63.4
7900	159.9	106.3	0.567	91.8	11.85	237.7	19.5	63.4
8000	162.4	106.6	0.555	91.3	12.00	239.3	19.4	63.4
8100	164.4	106.6	0.545	90.8	12.13	240.6	19.3	63.4
8200	165.4	106.0	0.539	90.3	12.25	241.7	19.2	63.4
8300	164.5	104.1	0.546	91.1	12.16	241.9	19.1	63.4

The DynoPort single pipe/ stock muffler benefited greatly from the increased port/ ignition timing. Now we needed to add fuel with PCV to keep up with the added airflow. We'll be interested to see how the DynoPort Y pipe effects this combination.

ProR 800 shimmed and keyed, DynoPort single pipe/ stock Y pipe

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	DenAlt
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	Feet
6500	97.9	79.1	0.657	64.6	11.86	167.4	25.5	-1466
6600	99.8	79.4	0.653	65.5	11.85	169.5	25.5	-1470
6700	101.7	79.7	0.689	70.4	11.20	172.3	25.4	-1476
6800	103.4	79.8	0.716	74.4	10.76	174.7	25.4	-1479
6900	105.0	79.9	0.741	78.3	10.44	178.4	25.3	-1482
7000	109.0	81.8	0.759	83.1	10.14	184.1	25.3	-1488
7100	111.9	82.7	0.74	83.2	10.34	188.0	25.2	-1491
7200	119.1	86.9	0.715	85.6	10.55	197.3	25.1	-1498
7300	123.5	88.9	0.710	88.1	10.49	201.9	25.1	-1502
7400	131.3	93.2	0.657	86.8	11.04	209.2	25.0	-1509
7500	136.9	95.9	0.638	87.8	11.21	215.1	24.9	-1513
7600	143.0	98.8	0.623	89.5	11.25	220.0	24.9	-1520
7700	148.5	101.3	0.618	92.2	11.15	224.6	24.8	-1525
7800	153.2	103.1	0.592	91.2	11.43	227.6	24.7	-1531

7900	156.7	104.2	0.572	90.1	11.67	229.7	24.7	-1535
8000	159.4	104.7	0.553	88.7	11.93	231.1	24.6	-1539
8100	162.0	105.0	0.547	89.1	11.95	232.7	24.6	-1542
8200	164.3	105.2	0.537	88.7	12.09	234.2	24.6	-1546
8300	165.6	104.8	0.527	87.7	12.29	235.4	24.5	-1549
8400	164.9	103.1	0.535	88.8	12.17	236.0	24.5	-1552
8500	162.8	100.6	0.539	88.3	12.21	235.5	24.4	-1555
8600	156.3	95.4	0.553	87.0	12.30	233.7	24.4	-1557

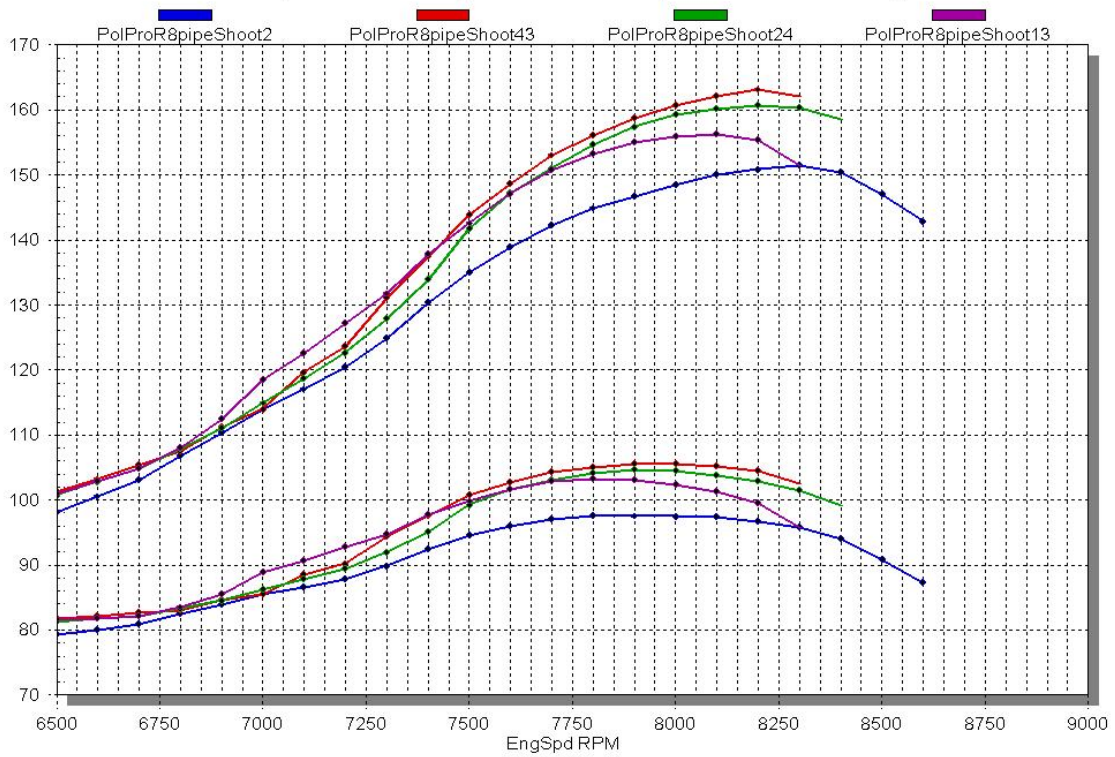
Finally, here is the SLP pipe/ can, and this made our highest HP with a still-manageable 106 lb/ft of torque. It seems like these engines have detonation sensitivity any time they get near 110 lb/ft. So making big power at higher revs is beneficial in staving off knock.

ProR 800, shimmed and keyed, SLP exhaust

EngSpd	STPPwr	STPTRq	BSFA_B	FulA_B	AFRA_B	Air_1s	AirInT	FulPrA
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	SCFM	degF	psig
6500	100.0	80.8	0.640	64.4	12.11	170.5	23.5	64.5
6600	102.2	81.3	0.632	65.1	12.16	172.9	23.5	64.4
6700	104.2	81.7	0.674	70.8	11.42	176.5	23.4	64.2
6800	106.3	82.1	0.689	73.8	11.17	180.1	23.3	64.0
6900	109.0	83.0	0.696	76.5	11.11	185.6	23.2	63.9
7000	112.1	84.1	0.698	78.9	11.01	189.8	23.2	63.9
7100	115.5	85.4	0.690	80.4	11.17	196.2	23.1	63.7
7200	121.6	88.7	0.657	80.5	11.52	202.7	23.0	63.6
7300	126.7	91.2	0.673	86.0	11.14	209.3	22.9	63.5
7400	133.1	94.5	0.642	86.2	11.43	215.2	22.8	63.5
7500	140.3	98.3	0.630	89.1	11.39	221.8	22.7	63.5
7600	145.7	100.7	0.619	91.0	11.37	225.9	22.6	63.4
7700	150.4	102.6	0.619	93.9	11.19	229.5	22.6	63.3
7800	154.5	104.1	0.599	93.4	11.39	232.5	22.5	63.3
7900	158.1	105.1	0.583	93.1	11.55	234.8	22.4	63.4
8000	161.5	106.0	0.554	90.3	12.00	236.6	22.3	63.4
8100	163.9	106.3	0.550	90.9	11.98	238.0	22.3	63.4
8200	165.9	106.3	0.549	91.9	11.91	239.1	22.2	63.4
8300	167.2	105.8	0.544	91.8	11.95	239.8	22.2	63.4
8400	167.2	104.5	0.531	89.6	12.25	239.9	22.1	63.4
8500	165.3	102.2	0.544	90.8	12.03	238.7	22.1	63.2
8600	158.2	96.6	0.555	88.6	12.18	235.8	22.0	63.4

11 ProR 800 w/ Aaen single pipe, stock muffler HP and TQ

BLUE all stock, PURPLE stock Aaen, GREEN shimmer Aaen, RED shimmed Aaen + 2 degrees



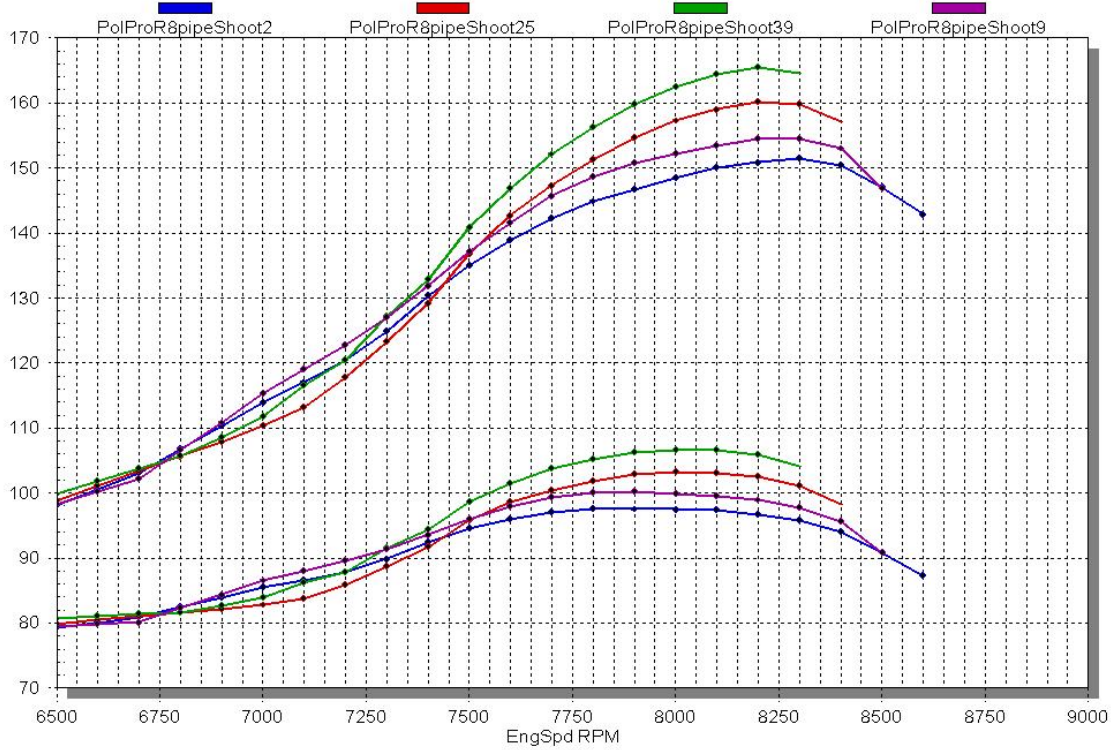
03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

10:14:42

11 ProR 800 w/ BMP single pipe, stock muffler HP and TQ

BLUE all stock, PURPLE stock BMP, RED shimmed BMP, GREEN shimmed BMP + 2 degrees



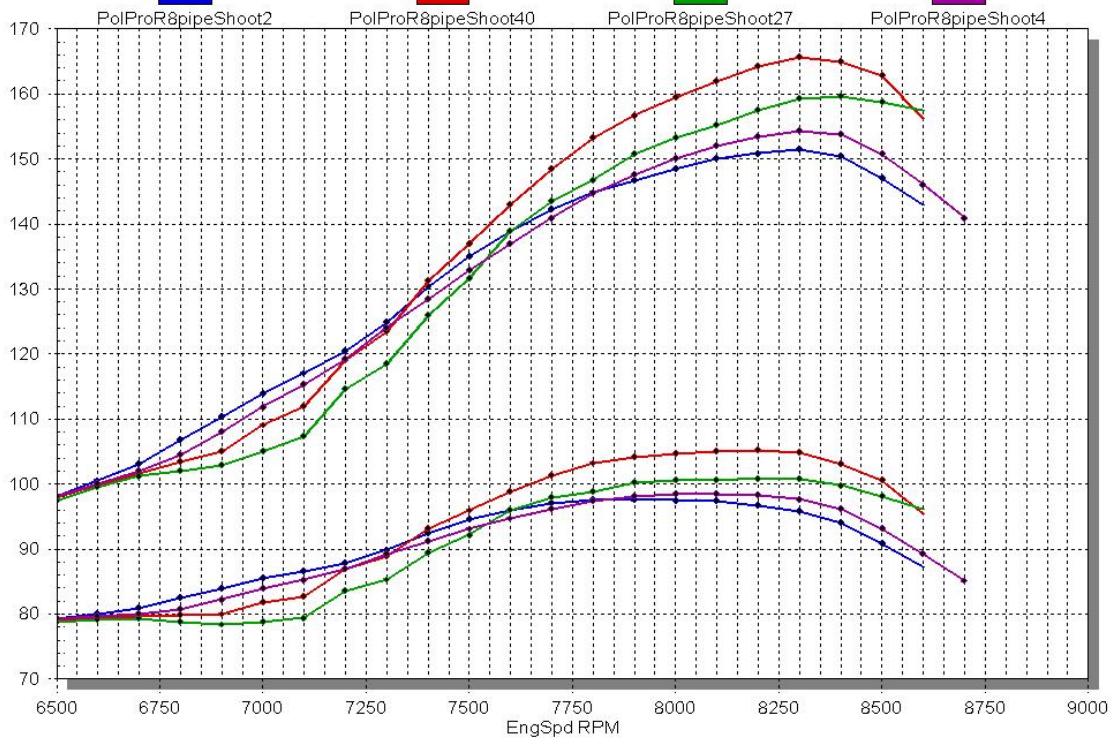
03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

09:59:21

11 ProR 800 w/ DynoPort pipe, stock muffler HP and TQ

BLUE all stock, PURPLE stock w/ DynoPort, GREEN shimmed DynoPort, RED shimmed DynoPort + 2 degrees



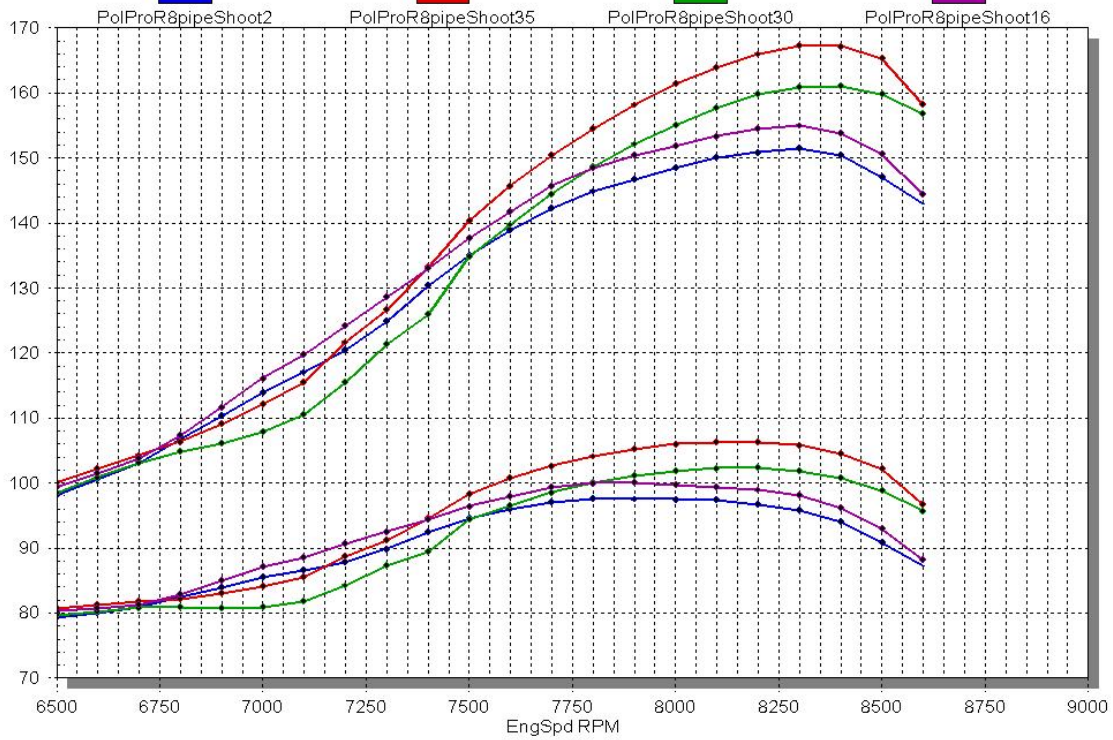
03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

09:17:03

11 ProR 800 w/ SLP pipe and SLP muffler HP and TQ

BLUE all stock, PURPLE stock SLP, GREEN shimmed SLP, RED shimmed SLP + 2 degrees



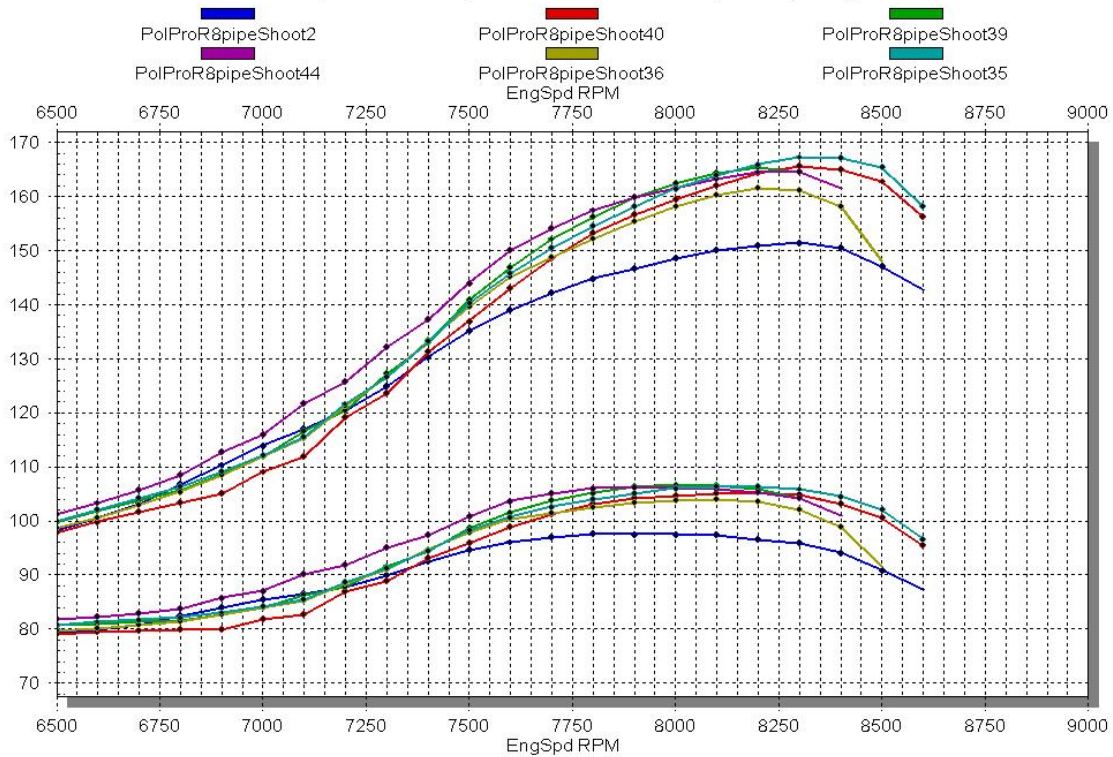
03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

10:19:55

Compare stock vs all pipes on shimmed engine with added timing

BLUE baseline stock, GOLD stock exh, PURPLE Aae, GREEN BMP, RED DynoPort, AQUA SLP



03/14/11

DynoTech Research
SuperFlow WinDyn™ V3.2

11:37:07

