NEW V FORCE REED CAGES FOR POLARIS ENGINES

Steve Tassinari of Moto Tassinari sent DTR new Vforce3 reed cages that fit the Polaris CFI twins, and asked us to do a back-to-back comparison of stock vs. new Vforce3 on a ProR 800 CFI2 engine.

I had recently discussed these new carbon fiber reed sets with Polaris engineer Darren Hedlund. Darren told me that their field-testing was showing excellent durability with these new reeds—upwards of 450 hours per test sled. Why the sudden improvement in durability compared to earlier versions? Moto Tassinari has created a new system of rubber dampener seals on the sides and tips of each rectangular reed window that are said to seal better *and* dampen out harmful impacts/ vibrations that can lead to eventual fracturing and chipping of the petals after extended use. And if the sealing is more precise and improved, could that improve net airflow? Reed petals surely live a brutal life—going from wide open against the reed stops as the piston rises toward TDC, then slamming closed against the solid reed cages as the piston descends on the power-stroke 133 times per second at 8000 RPM! So it would seem logical that the reed petals would be brutalized by that high frequency slamming action. And if they do bounce, then some small portion of the intake air charge would be sent back out of the crankcase, through the reed cages and throttle bodies, creating those entertaining air/fuel fog clouds ("standoff") that we often see on reed-inducted mods at full throttle on the dyno! So instead of being forced up through the transfer ports to make HP, some of the air/ fuel mixture is forced back out through the throttle bodies/ carbs to make a mess of the airboxes/ chassis'.

So after installing these new Vforce3 reeds on a stock, mildly port timed Polaris ProR 800, we enjoyed a 2.5% increase in airflow, and a bit more than 3% increase in HP at peak revs! The half-point difference in the two is very likely the leaning out of the A/F mixture due to fixed EFI fuel flow. There's no change in midrange HP, and everything is piled on from torque peak to HP peak and beyond. If the airflow increase was due to some new cage shape/ petal material, wouldn't we see airflow/ HP improvement at low revs and midrange, WOT, too? The midrange appears identical to stock, and the meaningful airflow/ HP increase begins around 7500 RPM (around 125 reed cycles/ second) and higher. Could 125 cycles/ second be where the reeds normally would begin to bounce? Just surmisin'!

Rethinking A/F ratio for maximum HP

The "Max HP = 13/1 A/F ratio" theorem (13 pounds of air for each pound of fuel) has been with us at C&H Dyno Service and now DynoTech Research for the 28 years that we've been dyno testing and tuning racing motorcycle, ATV and snowmobile engines. To generalize over the past 28 years, any time we reduced fuel flow much leaner than 13/1 we seemed to not gain HP, and usually lost HP. This has been usually the case with all two-stroke and four-stroke race engines using high RVP gasoline (low RVP gasoline can vaporize poorly, needing one or more points richer measured mixture to net 13/1 burning fuel in the combustion chambers!). So when we tune trail engines, we like to be

at 12/1 or even richer to prevent deto under severe conditions (high engine coolant and intake temperatures and low octane). The extra, unburned fuel in the combustion chambers absorbs heat as it vaporizes, reducing peak combustion chamber temperature and helping avoid knock. The vaporized extra fuel also takes up space, displacing oxygen, reducing HP accordingly. But it also contributes greatly to unburned hydrocarbon (HC) emissions—something that must be avoided if the EPA is to let us continue enjoy the light weight/ high HP of our two-stroke sled engines!

But we've been assuming that at 12/1 A/F ratio EVERY pound of fuel going through engine is mixed with 12 pounds of air. That has surely been the case for 28 years with carbureted engines and earlier versions of EFI engines. With carbs, fuel is continually spewed into the intake air and mixed thoroughly in the crankcase before it makes it into the combustion chambers. Early EFI engines also spewed fuel, helter-skelter into the intake area, and those systems delivered a similarly homogenized mixture through (and out of) the engines. So every 12 pounds of "short circuited" air (air that sneaks out through the transfer ports and exhaust port that is NOT trapped and consumed) probably has ONE POUND of unburned fuel with it, negatively impacting an engine's HC "score" (see Ryan Hayes' article posted here on 6/30/2011).

SkiDoo, Arctic Cat and Polaris now seem to be able to be more precise with the fuel that gets injected into the engines. They know that earliest portion of the air going up the transfer ports during X degrees of crank rotation will be short-circuited—so why not try to keep fuel *out* of that particular portion of the airflow? They now seem to be using large injectors, timed perfectly to squirt the necessary fuel into just that portion of the airflow that they KNOW will be trapped in the combustion chamber and converted to heat and HP!

Remember we measure every CFM/ pound of air and every pound of fuel, assuming that all is mixed and homogenized. Today our stock Polaris 800 is deto-free while delivering an AVERAGE of 13.3/1 at WOT measured (both mechanically with fuel and air flowmeters, and by wideband O2 sensor measuring the average indicated A/F of the exhaust gases). I would submit that the combustion chamber mixture should still be 12/1. Then, doing the math (12 divided by 13.3 = 90%) suggests that at 217 CFM of total airflow only 195 CFM is trapped and consumed along with 73 lb/hr of fuel. The other 10% of airflow, in a perfect world, gets short circuited out the pipe with no unburned fuel mixed with it. In reality, there's surely some short-circuited fuel but way less than we had just a few years ago!

All of this means that with modern emissions-compliant EFI two strokes, A/F ratio numbers (and BSFC numbers) can read higher (and lower, respectively) than ever before. And that also might explain why increasing gross airflow on an engine that's already "too lean" at 13.3/1 can actually increase HP.

STOCK VS NEW VFORCE REEDS

We had three different ECU's with "breakin" mode gone—a 2012, 2013 and 2014 to compare fuel flow numbers and see how each would work with the higher-flowing Vforce3 reeds. As we will see, the 2012 calibration delivers a flat, fairly rich fuel curve from curve with over 80 lb/hr fuel flow from 7250-8500 RPM. The 2013 and 2014 fuel curves have similar fuel flow to the 2012 up to 7500, but then tail off dramatically to the HP peak and beyond. The 2014 calibration appears slightly leaner than 2013. Could Polaris have created the precise, emissions friendly fuel delivery system after 2012? Then if they had good results with the leaner 2013 calibration could they have leaned it out even more for 2014?

With each year ECU we created a different fuel map with a Power Commander V for the higher airflow of the Vforce3 reeds. With the 2012 calibration, we were able to lean out the fuel curve, even with the higher flowing Vforce reeds, and pick up HP. We created flat fuel curves for 2013 and 2014—getting rid of the heavy load of WOT midrange fuel, then added some at peak revs to bring indicated A/F down to 13/1. According to Darren Hedlund, they have been testing the new Vforce reeds on 800s with 2014 calibration with no ill effects.

Here is Norm Ahron's 2013 ProR 800 with 2500 miles on it. We show redundant A/F readings—AFRA_B is the Air/Fuel ratio measured mechanically combining airflow measured at the inlet of the airbox and the gross fuel flow (A) from in-tank pump to the fuel rail minus the bypass flow (B) returning back to the tank. Then LamAF1 is the reading from the LM1 dyno wideband measuring the exhaust gas coming out of the muffler. LM1 readings can sometimes be skewed by midrange reversion, allowing air outside the muffler to be ingested by engine pulsations—causing leaner-than-actual readings.

2012 calibration stock reeds:

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	LamAF1	Air_1s
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	Ratio	SCFM
5500	76.3	72.9	0.667	49.6	13.57	13.67	145.8
5600	77.4	72.6	0.641	48.3	14.10	13.65	147.5
5700	79.2	73.0	0.620	47.8	14.39	13.71	149.1
5800	81.3	73.6	0.614	48.6	14.35	13.82	151.2
5900	83.5	74.3	0.609	49.5	14.28	13.89	153.1
6000	86.0	75.3	0.600	50.3	14.36	13.98	156.4
6100	88.3	76.0	0.587	50.5	14.54	14.03	159.1
6200	90.6	76.7	0.574	50.7	14.73	14.07	161.7
6300	93.2	77.7	0.568	51.5	14.75	14.05	164.7
6400	95.5	78.4	0.574	53.3	14.45	13.98	167.1
6500	97.7	78.9	0.577	54.9	14.25	13.89	169.6
6600	100.1	79.6	0.594	57.8	13.82	13.83	173.3
6700	102.3	80.2	0.617	61.5	13.27	13.77	176.9
6800	105.1	81.2	0.642	65.6	12.75	13.56	181.4
6900	109.7	83.5	0.656	70.0	12.39	13.05	188.1
7000	114.0	85.5	0.651	72.2	12.3	12.71	192.6
7100	117.8	87.1	0.653	74.9	12.12	12.53	197.0

7200	121.0	88.3	0.655	77.1	12.00	12.42	200.6
7300	124.8	89.8	0.652	79.2	11.95	12.32	205.2
7400	128.7	91.3	0.643	80.6	11.94	12.26	208.7
7500	133.1	93.2	0.641	83.0	11.79	12.22	212.2
7600	136.3	94.2	0.642	85.1	11.61	12.18	214.3
7700	138.4	94.4	0.639	86.0	11.55	12.12	215.5
7800	139.5	93.9	0.636	86.3	11.56	12.07	216.5
7900	140.1	93.1	0.630	85.8	11.67	12.07	217.2
8000	140.4	92.2	0.616	84.2	11.91	12.12	217.5
8100	139.9	90.7	0.606	82.5	12.14	12.17	217.4
8200	138.6	88.8	0.606	81.8	12.21	12.21	216.6
8300	136.2	86.2	0.615	81.4	12.20	12.22	215.5
8400	129.6	81.0	0.638	80.4	12.14	12.13	211.7

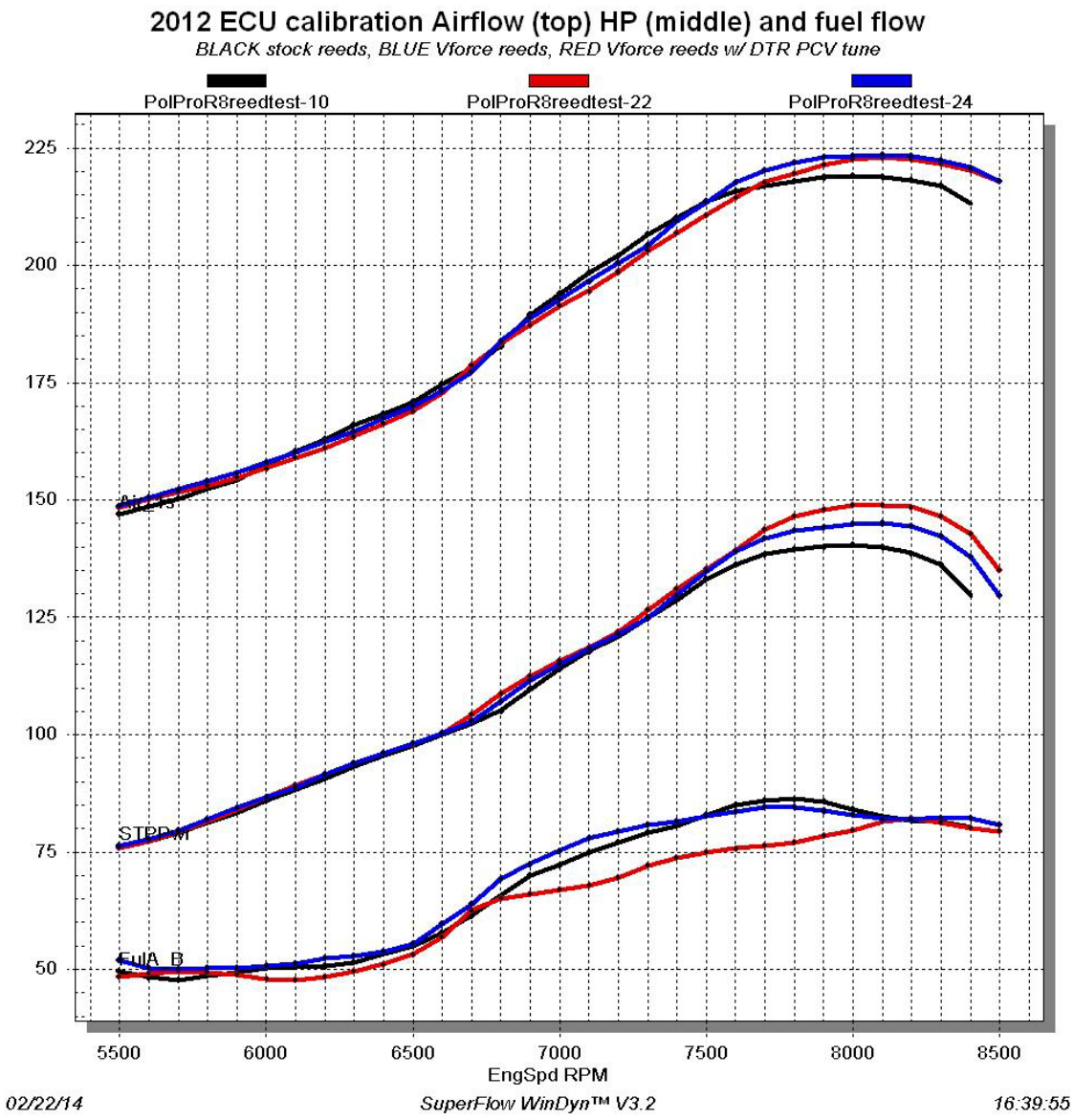
2012 calibration, new Vforce3 reeds:

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	LamAF1	Air_1s
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	Ratio	SCFM
5500	76.2	72.8	0.694	51.9	13.13	13.63	148.8
5600	77.7	72.9	0.661	50.4	13.68	13.69	150.5
5700	79.5	73.3	0.642	50.1	13.92	13.82	152.2
5800	82.0	74.3	0.625	50.3	14.02	13.99	154.1
5900	84.4	75.1	0.608	50.3	14.17	14.08	155.8
6000	86.6	75.8	0.596	50.6	14.29	14.14	158.1
6100	88.9	76.5	0.587	51.2	14.31	14.18	160.0
6200	91.5	77.5	0.583	52.4	14.22	14.23	162.6
6300	93.8	78.2	0.574	52.8	14.27	14.22	164.5
6400	96.2	78.9	0.571	53.9	14.22	14.12	167.4
6500	98.2	79.4	0.577	55.5	14.01	14.00	170.0
6600	100.3	79.8	0.607	59.7	13.29	13.92	173.3
6700	102.8	80.6	0.633	63.9	12.71	13.77	177.3
6800	107.1	82.7	0.659	69.2	12.16	13.28	183.9
6900	111.6	84.9	0.662	72.5	11.92	12.78	188.7
7000	115.2	86.4	0.667	75.3	11.72	12.54	192.8
7100	118.4	87.6	0.672	78.0	11.54	12.44	196.7
7200	121.4	88.6	0.668	79.5	11.55	12.37	200.4
7300	124.8	89.8	0.660	80.8	11.57	12.33	204.3
7400	129.8	92.1	0.641	81.6	11.75	12.32	209.4
7500	134.7	94.3	0.626	82.6	11.83	12.34	213.4
7600	139.0	96.0	0.614	83.7	11.91	12.36	217.6
7700	141.8	96.7	0.608	84.5	11.93	12.35	220.3
7800	143.5	96.6	0.602	84.6	12.00	12.35	221.9
7900	144.2	95.9	0.593	83.8	12.19	12.39	223.0
8000	144.9	95.2	0.583	82.8	12.34	12.44	223.4
8100	145.0	94.0	0.578	82.1	12.47	12.49	223.5
8200	144.3	92.4	0.580	82.0	12.47	12.50	223.2

8300	142.4	90.1	0.590	82.3	12.36	12.47	222.2
8400	137.9	86.2	0.609	82.3	12.28	12.35	220.8
8500	129.7	80.1	0.637	80.9	12.34	12.27	218.0

2012 calibration, Vforce3 reeds, PCV fuel map

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	LamAF1	Air_1s
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	Ratio	SCFM
5500	75.9	72.5	0.651	48.4	14.05	13.63	148.4
5600	77.3	72.5	0.648	49.0	14.02	13.68	150.2
5700	79.3	73.0	0.638	49.5	14.02	13.80	151.7
5800	81.5	73.8	0.619	49.4	14.20	13.96	153.1
5900	84.0	74.8	0.594	48.8	14.52	14.18	154.8
6000	86.7	75.9	0.566	48.0	14.94	14.43	156.7
6100	89.2	76.8	0.547	47.7	15.24	14.60	159.0
6200	91.5	77.5	0.541	48.5	15.22	14.67	161.1
6300	93.9	78.3	0.539	49.5	15.11	14.68	163.6
6400	96.1	78.9	0.543	51.1	14.89	14.62	166.2
6500	98.0	79.2	0.555	53.2	14.54	14.53	168.9
6600	100.3	79.8	0.580	56.9	13.90	14.38	172.9
6700	104.2	81.7	0.614	62.6	13.06	13.97	178.7
6800	108.7	83.9	0.612	65.0	12.91	13.48	183.3
6900	112.4	85.6	0.600	66.0	12.98	13.19	187.2
7000	115.7	86.8	0.592	67.0	13.08	13.20	191.3
7100	118.5	87.7	0.586	67.9	13.11	13.29	194.5
7200	121.8	88.8	0.584	69.6	13.06	13.33	198.5
7300	126.5	91.0	0.583	72.1	12.90	13.29	203.2
7400	131.0	93.0	0.575	73.7	12.84	13.20	206.9
7500	135.2	94.7	0.567	75.0	12.86	13.11	210.7
7600	139.3	96.2	0.556	75.8	12.95	13.04	214.3
7700	143.8	98.1	0.542	76.3	13.07	13.02	217.8
7800	146.5	98.6	0.538	77.1	13.03	13.02	219.5
7900	148.0	98.4	0.542	78.4	12.92	13.02	221.4
8000	148.9	97.8	0.547	79.6	12.80	13.01	222.5
8100	149.0	96.6	0.560	81.5	12.52	12.95	222.9
8200	148.5	95.1	0.566	82.1	12.40	12.88	222.5
8300	146.4	92.6	0.568	81.2	12.49	12.81	221.6
8400	142.8	89.3	0.574	80.1	12.59	12.72	220.3
8500	135.1	83.5	0.602	79.4	12.56	12.61	217.9



2013 calibration, stock reeds:

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	LamAF1 Ratio	Air_1s SCFM
5500	75.9	72.5	0.587	43.3	15.39	14.34	145.5
5600	77.1	72.3	0.564	42.2	15.91	14.39	146.7
5700	78.9	72.7	0.570	43.7	15.57	14.54	148.8
5800	80.9	73.3	0.584	45.9	15.05	14.58	150.8
5900	83.1	74.0	0.609	49.1	14.30	14.46	153.4
6000	85.5	74.8	0.614	50.9	14.01	14.27	155.9
6100	87.9	75.6	0.600	51.2	14.20	14.18	158.6
6200	90.0	76.3	0.586	51.2	14.40	14.18	161.1

6300	92.6	77.2	0.578	51.9	14.46	14.21	164.0
6400	95.1	78.1	0.565	52.2	14.60	14.20	166.5
6500	97.4	78.7	0.559	52.9	14.62	14.10	169.1
6600	99.5	79.1	0.590	57.0	13.88	13.94	172.9
6700	101.5	79.5	0.618	60.8	13.26	13.76	176.2
6800	104.7	80.9	0.658	66.9	12.46	13.38	182.2
6900	109.1	83.1	0.679	71.9	11.95	12.95	187.6
7000	112.7	84.6	0.686	75.1	11.69	12.72	191.8
7100	115.9	85.7	0.686	77.2	11.61	12.56	195.9
7200	119.1	86.9	0.679	78.5	11.67	12.43	200.3
7300	122.7	88.3	0.664	79.2	11.81	12.35	204.3
7400	127.5	90.5	0.644	79.7	11.98	12.30	208.7
7500	131.2	91.9	0.629	80.1	12.07	12.31	211.3
7600	134.5	92.9	0.616	80.4	12.16	12.34	213.6
7700	137.5	93.8	0.599	80.0	12.32	12.42	215.3
7800	140.2	94.4	0.572	77.9	12.73	12.59	216.5
7900	142.4	94.7	0.543	75.1	13.23	12.84	217.1
8000	143.7	94.4	0.525	73.3	13.59	13.09	217.5
8100	144.2	93.5	0.520	72.8	13.69	13.21	217.6
8200	143.4	91.9	0.523	72.7	13.67	13.11	217.2
8300	141.5	89.5	0.534	73.3	13.50	12.94	216.3
8400	137.9	86.2	0.550	73.6	13.36	12.81	214.8
8500	131.2	81.0	0.546	69.5	13.38	12.70	203.0

2013 calibration Vforce3 reeds:

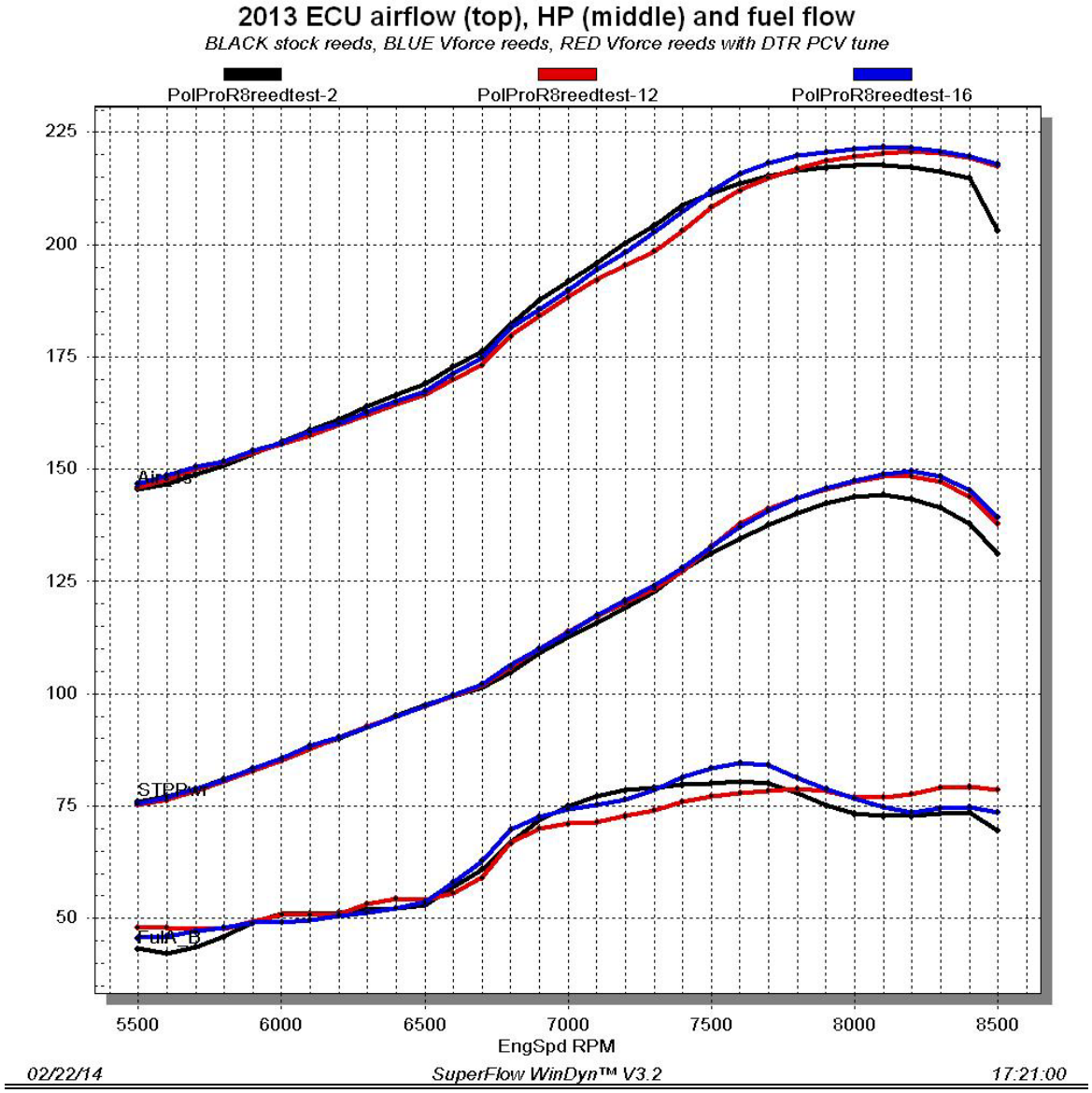
EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	LamAF1 Ratio	Air_1s SCFM
5500	75.5	72.1	0.610	44.9	14.96	14.25	146.8
5600	76.9	72.1	0.612	46.0	14.80	14.35	148.5
5700	78.8	72.6	0.611	47.0	14.66	14.44	150.5
5800	80.7	73.1	0.607	47.8	14.54	14.45	151.8
5900	83.3	74.2	0.597	48.6	14.54	14.32	154.2
6000	85.6	75.0	0.589	49.2	14.47	14.22	155.7
6100	88.4	76.1	0.580	50.0	14.51	14.17	158.3
6200	90.4	76.6	0.577	50.9	14.40	14.16	160.1
6300	92.6	77.2	0.577	52.2	14.28	14.12	162.7
6400	94.9	77.9	0.584	54.0	13.99	14.08	165.1
6500	97.2	78.6	0.597	56.6	13.54	14.08	167.4
6600	99.6	79.3	0.616	59.8	13.11	14.09	171.3
6700	102.1	80.1	0.636	63.4	12.63	13.96	174.8
6800	106.3	82.1	0.646	67.0	12.41	13.35	181.5
6900	110.0	83.8	0.654	70.2	12.10	12.88	185.6
7000	113.7	85.3	0.658	73.0	11.91	12.57	189.8
7100	117.6	87.0	0.657	75.3	11.82	12.43	194.4
7200	120.7	88.1	0.656	77.3	11.74	12.37	198.1
7300	124.1	89.3	0.653	79.0	11.75	12.30	202.7

7400	128.0	90.9	0.645	80.5	11.79	12.23	207.4
7500	132.7	92.9	0.630	81.6	11.90	12.21	211.9
7600	137.2	94.8	0.613	82.0	12.05	12.30	215.8
7700	140.8	96.0	0.595	81.6	12.24	12.44	218.2
7800	143.5	96.6	0.576	80.6	12.49	12.63	219.7
7900	145.7	96.8	0.557	79.1	12.76	12.82	220.5
8000	147.4	96.8	0.540	77.6	13.05	13.07	221.2
8100	148.9	96.6	0.525	76.2	13.32	13.32	221.8
8200	149.6	95.8	0.515	75.1	13.50	13.43	221.5
8300	148.4	93.9	0.515	74.5	13.56	13.36	220.7
8400	145.3	90.9	0.523	74.0	13.57	13.23	219.5
8500	139.3	86.1	0.543	73.6	13.54	13.12	217.8

2013 calibration, Vforce3 reeds, PCV fuel map:

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	LamAF1 Ratio	Air_1s SCFM
5500	76.0	72.5	0.667	49.5	13.62	14.24	147.2
5600	77.3	72.5	0.677	51.1	13.31	14.30	148.6
5700	79.2	73.0	0.672	52.0	13.28	14.43	150.8
5800	81.4	73.7	0.653	51.9	13.45	14.48	152.3
5900	84.1	74.8	0.643	52.7	13.42	14.40	154.6
6000	86.3	75.5	0.634	53.4	13.41	14.31	156.3
6100	88.5	76.2	0.624	53.9	13.48	14.24	158.6
6200	91.0	77.1	0.606	53.8	13.72	14.21	161.1
6300	93.4	77.8	0.591	53.8	13.89	14.18	163.3
6400	95.7	78.5	0.587	54.8	13.82	14.15	165.5
6500	97.8	79.0	0.589	56.2	13.68	14.17	168.0
6600	100.1	79.7	0.597	58.3	13.47	14.25	171.5
6700	102.6	80.4	0.603	60.3	13.30	14.22	175.2
6800	106.3	82.1	0.623	64.6	12.80	13.91	180.7
6900	111.7	85.0	0.646	70.4	12.15	13.28	186.8
7000	115.3	86.5	0.638	71.7	12.18	13.01	190.7
7100	118.3	87.5	0.625	72.0	12.36	12.90	194.5
7200	121.5	88.6	0.614	72.7	12.49	12.85	198.4
7300	126.0	90.7	0.613	75.4	12.33	12.84	203.0
7400	130.2	92.4	0.604	76.6	12.35	12.80	206.7
7500	134.1	93.9	0.591	77.3	12.46	12.79	210.3
7600	138.7	95.8	0.574	77.6	12.66	12.83	214.6
7700	143.0	97.6	0.557	77.6	12.85	12.88	217.8
7800	145.7	98.1	0.546	77.5	12.97	12.89	219.7
7900	147.1	97.8	0.545	78.2	12.95	12.94	221.0
8000	148.0	97.1	0.552	79.5	12.77	13.01	221.9
8100	148.0	96.0	0.556	80.1	12.70	13.05	222.3
8200	147.4	94.4	0.557	79.9	12.73	13.00	222.3
8300	145.3	91.9	0.566	80.0	12.67	12.87	221.5
8400	141.5	88.4	0.582	80.1	12.56	12.74	219.8

8500	133.3	82.4	0.595	77.1	12.5	12.63	210.6



2014 Calibration, stock reeds:

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	LamAF1 Ratio	Air_1s SCFM
5500	75.3	71.9	0.622	45.7	14.61	14.23	146.0
5600	76.4	71.6	0.611	45.5	14.83	14.24	147.3
5700	78.0	71.9	0.595	45.2	15.07	14.29	149.0
5800	80.3	72.7	0.586	45.9	15.06	14.32	151.1
5900	82.5	73.4	0.580	46.6	15.05	14.24	153.3
6000	84.8	74.2	0.578	47.8	14.92	14.11	155.8

6100	87.2	75.1	0.584	49.7	14.60	14.00	158.4
6200	89.6	75.9	0.583	50.9	14.46	13.98	160.9
6300	92.2	76.8	0.580	52.1	14.38	13.99	163.8
6400	94.5	77.6	0.562	51.8	14.68	13.98	166.2
6500	96.8	78.2	0.567	53.5	14.49	13.99	169.3
6600	99.0	78.8	0.595	57.5	13.81	13.98	173.3
6700	101.7	79.7	0.632	62.6	12.99	13.82	177.8
6800	106.2	82.1	0.666	69.0	12.29	13.18	185.1
6900	110.0	83.7	0.667	71.5	12.11	12.77	189.3
7000	113.1	84.8	0.668	73.6	12.00	12.56	193.0
7100	116.4	86.1	0.669	75.9	11.92	12.42	197.6
7200	119.7	87.3	0.666	77.7	11.87	12.34	201.6
7300	123.0	88.5	0.665	79.7	11.80	12.27	205.4
7400	127.2	90.3	0.655	81.3	11.78	12.19	209.3
7500	131.6	92.1	0.634	81.3	11.94	12.16	212.0
7600	135.1	93.4	0.614	80.9	12.12	12.18	214.1
7700	138.3	94.3	0.594	80.1	12.35	12.27	216.0
7800	141.0	94.9	0.568	78.1	12.75	12.44	217.6
7900	143.1	95.1	0.549	76.6	13.04	12.68	218.3
8000	144.4	94.8	0.532	74.9	13.34	12.86	218.3
8100	144.7	93.8	0.517	73.0	13.68	13.01	218.1
8200	144.4	92.5	0.514	72.3	13.76	13.08	217.5
8300	142.4	90.1	0.522	72.5	13.66	13.05	216.2
8400	139.2	87.0	0.529	71.7	13.71	12.94	214.9
8500	131.2	81.0	0.562	71.8	13.55	12.79	212.6

2014 calibration, Vforce3 reeds:

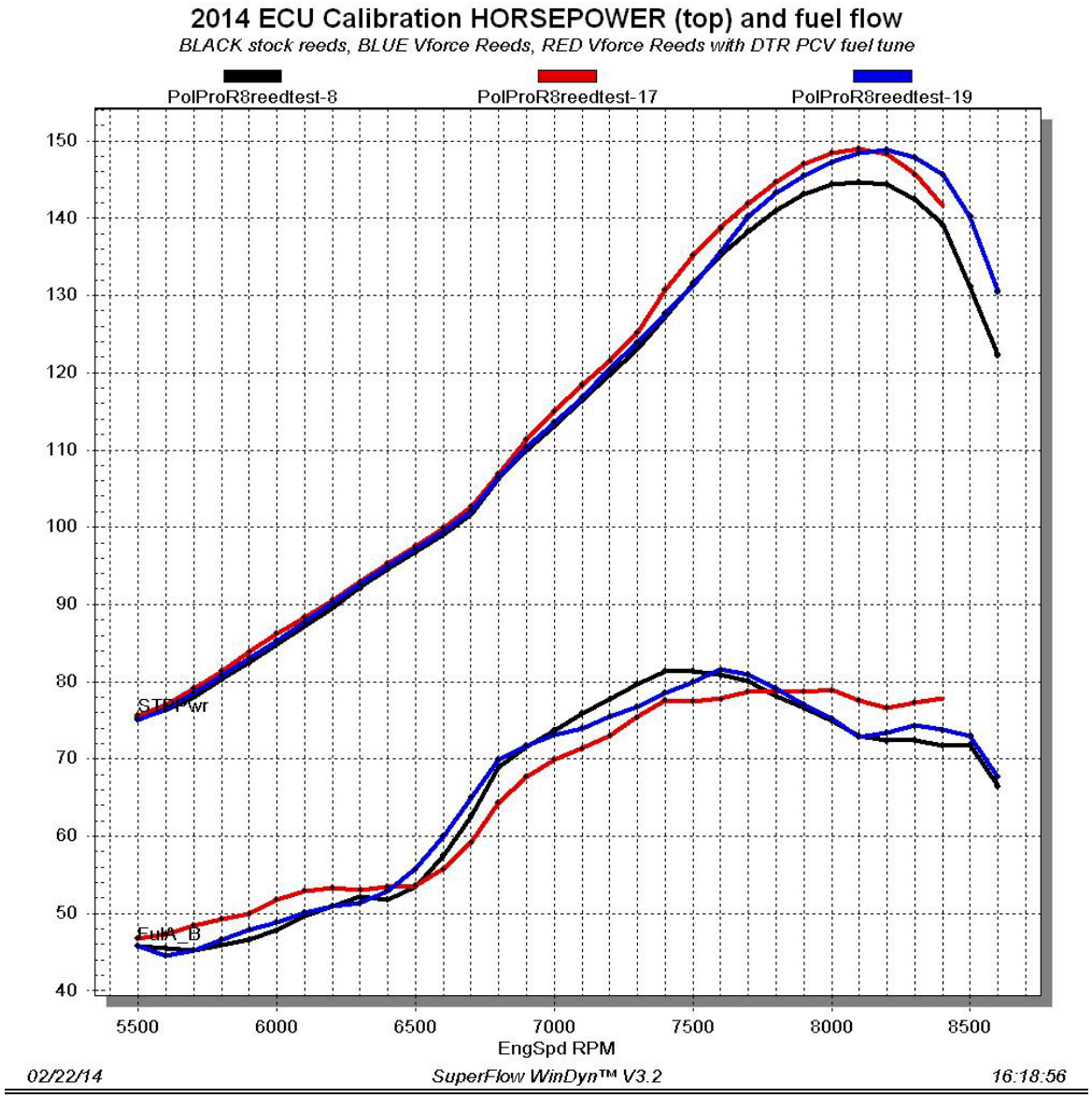
EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	LamAF1 Ratio	Air_1s SCFM
5500	75.1	71.7	0.624	45.8	14.65	14.22	146.5
5600	76.4	71.7	0.597	44.6	15.23	14.27	148.2
5700	78.6	72.4	0.590	45.3	15.19	14.43	150.1
5800	80.8	73.2	0.591	46.6	14.93	14.47	152.1
5900	83.1	73.9	0.590	47.9	14.75	14.36	154.2
6000	85.3	74.7	0.587	48.8	14.63	14.24	156.0
6100	87.7	75.5	0.586	50.2	14.42	14.16	158.0
6200	90.2	76.4	0.578	50.9	14.43	14.12	160.4
6300	92.6	77.2	0.569	51.4	14.50	14.10	162.8
6400	94.9	77.9	0.571	52.9	14.28	14.09	165.1
6500	97.2	78.5	0.588	55.7	13.79	14.11	167.9
6600	99.4	79.1	0.619	60.0	13.07	14.09	171.2
6700	102.1	80.1	0.653	65.1	12.36	13.88	175.8
6800	106.5	82.2	0.673	69.9	11.91	13.24	181.9
6900	110.3	84.0	0.667	71.8	11.87	12.76	186.1
7000	113.5	85.2	0.660	73.1	11.91	12.52	190.1
7100	116.7	86.4	0.649	74.0	12.00	12.42	193.9

7200	120.5	87.9	0.643	75.5	11.99	12.37	197.8
7300	123.9	89.1	0.635	76.7	12.02	12.31	201.4
7400	127.6	90.6	0.631	78.5	12.02	12.24	206.2
7500	131.3	91.9	0.624	79.9	12.03	12.22	210.0
7600	135.6	93.7	0.617	81.6	12.02	12.31	214.2
7700	140.2	95.6	0.592	80.9	12.33	12.50	218.0
7800	143.3	96.5	0.566	79.1	12.71	12.65	219.5
7900	145.5	96.7	0.543	77.1	13.10	12.87	220.6
8000	147.2	96.7	0.524	75.2	13.47	13.08	221.2
8100	148.5	96.3	0.504	72.9	13.93	13.29	221.7
8200	148.8	95.3	0.506	73.4	13.83	13.40	221.9
8300	147.9	93.6	0.515	74.3	13.64	13.38	221.4
8400	145.7	91.1	0.520	73.8	13.68	13.28	220.3
8500	140.2	86.6	0.535	73.0	13.71	13.19	218.6
8600	130.5	79.7	0.533	67.7	13.66	13.10	201.9

2014 calibration, Vforce3 reeds, PCV fuel map

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AFRA_B	LamAF1	Air_1s
RPM	CHp	Clb-ft	lb/hph	lbs/hr	Ratio	Ratio	SCFM
5500	75.7	72.3	0.632	46.7	14.40	14.21	146.9
5600	77.1	72.3	0.628	47.3	14.40	14.32	148.7
5700	79.1	72.9	0.628	48.5	14.22	14.46	150.5
5800	81.3	73.6	0.621	49.3	14.10	14.52	151.9
5900	83.9	74.6	0.611	50.0	14.09	14.45	153.8
6000	86.2	75.5	0.615	51.8	13.79	14.30	156.1
6100	88.3	76.0	0.614	52.9	13.68	14.22	158.1
6200	90.6	76.7	0.603	53.3	13.79	14.18	160.6
6300	93.0	77.5	0.585	53.1	14.05	14.17	162.9
6400	95.2	78.2	0.575	53.4	14.15	14.16	165.2
6500	97.6	78.8	0.563	53.6	14.35	14.20	168.1
6600	99.9	79.5	0.571	55.7	14.09	14.28	171.5
6700	102.7	80.5	0.591	59.2	13.59	14.24	175.8
6800	106.9	82.6	0.617	64.4	12.91	13.87	181.5
6900	111.3	84.7	0.623	67.7	12.61	13.40	186.4
7000	115.0	86.3	0.623	69.9	12.48	13.10	190.6
7100	118.4	87.6	0.618	71.4	12.47	12.92	194.5
7200	121.5	88.6	0.615	72.9	12.44	12.85	198.2
7300	125.1	90.0	0.618	75.4	12.25	12.81	201.8
7400	130.7	92.8	0.608	77.6	12.22	12.72	207.2
7500	135.2	94.7	0.587	77.5	12.48	12.70	211.2
7600	138.7	95.9	0.575	77.8	12.62	12.76	214.5
7700	141.8	96.8	0.569	78.7	12.62	12.87	217.0
7800	144.7	97.4	0.557	78.7	12.75	12.99	219.2
7900	147.0	97.8	0.548	78.7	12.85	13.11	220.8
8000	148.4	97.5	0.545	78.9	12.86	13.19	221.7
8100	149.0	96.6	0.534	77.6	13.10	13.21	222.2

8200	148.3	95.0	0.529	76.6	13.30	13.16	222.5
8300	145.7	92.2	0.544	77.3	13.13	13.02	221.6
8400	141.5	88.5	0.565	77.9	12.93	12.85	220.1



Here's the ProR 800 with Vforce3 reeds and stock 12,13,14 ECU tuning: