

SkiDoo Etec 800 reed comparison Jim Czekala

This is the same Etec 800 that was loaned to us by Bowens Powersports in Illion, NY for our test of the 2012 sled with breakin miles compared to the latest “2013” reflash. Jim Cooper came again with his BUDS computer to monitor engine temperatures and to watch for knock while we compared the stock reeds to the new Boyesen Rad valves.

One new variable for this test was fresh “93” octane gas I bought from the same pump at gas station. This batch was different—8% ethanol. Was octane higher or lower than the previous “93”? It was surely different, and since Jim noted some clicks of deto showing on the ECU, he retarded ignition timing one degree (net three degrees added to the stock baseline). After that there were no more clicks of detonation even on tests with high coolant and high exhaust temps. All of the tests here were done with coolant at @130 F, and muffler temps from 800-900 F. Both of those appear to be the “happy zone” for this engine. If muffler temp is low, fuel flow is increased (perhaps injected late—with timing backed off to burn in the pipe to get temperature optimized?) causing power to drop.

This first test is with timing backed off one degree, and different fuel compared to the way we tested in our prior session. To test the effectiveness of the stock airbox with the twin air inlets in the pod compared to our wide open modified dyno airbox, we plumbed a pressure sensor into the stock airbox. At peak revs, the very efficient stock airbox/ inlet tube/ screen combination registered a negative pressure of about .2 psi compared to the .1 psi negative pressure of our wide open dyno airbox with 3” inlet! Since the engine operates at about 14.2 psi absolute at this altitude this equates to less than 1% drop in airflow! That equates to only .7% reduction in HP by the stock airbox and the twin inlet tubes and screens that duct outside air to the engine, compared to the free breathing dyno airbox (shown in the photo with 4” airflow meter).

2012 Etec 800 w/ latest reflash, stock airbox and stock cowl air ducting, stock reeds

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FuIA_B lbs/hr	Airbox psig	AirInT degF	LamAF1 Ratio	FulPrA psig
6000	86.7	75.9	0.800	63.6	-0.117	72.6	15.29	46.2
6100	87.0	74.9	0.791	63.1	-0.103	72.7	15.22	46.0
6200	91.4	77.4	0.763	64.0	-0.117	72.7	15.21	45.8
6300	94.8	79.1	0.760	66.2	-0.117	72.7	15.21	45.8
6400	99.9	82.0	0.734	67.3	-0.117	72.7	15.20	45.8
6500	104.2	84.2	0.714	68.3	-0.103	72.7	15.17	45.7
6600	108.3	86.2	0.700	69.6	-0.124	72.7	15.12	46.0
6700	113.9	89.3	0.675	70.6	-0.158	72.7	15.01	46.0
6800	116.8	90.2	0.678	72.7	-0.151	72.7	14.94	45.8
6900	120.8	91.9	0.662	73.4	-0.144	72.8	14.70	45.6
7000	126.0	94.5	0.655	75.8	-0.144	72.8	14.47	45.6
7100	130.1	96.3	0.638	76.2	-0.165	72.8	14.36	45.5

7200	134.7	98.2	0.619	76.5	-0.199	72.8	14.32	45.6
7300	138.3	99.5	0.591	75.0	-0.193	72.8	14.35	45.5
7400	140.8	100.0	0.573	74.1	-0.193	72.8	14.42	45.4
7500	143.4	100.4	0.595	78.4	-0.206	72.8	14.47	45.3
7600	147.7	102.1	0.603	81.8	-0.206	72.9	14.40	45.5
7700	152.8	104.2	0.610	85.7	-0.199	72.9	14.26	45.7
7800	156.4	105.3	0.604	86.7	-0.203	72.9	14.06	46.0
7900	156.7	104.2	0.608	87.5	-0.199	72.9	13.93	45.9
8000	155.4	102.0	0.610	87.0	-0.206	72.9	13.93	45.4
8100	153.1	99.3	0.597	83.8	-0.227	72.9	14.07	45.2
8200	147.9	94.7	0.578	78.4	-0.199	72.9	14.19	45.1
8300	141.0	89.2	0.572	73.9	-0.213	73.0	14.28	44.8



2012 Etec 800 w/ latest reflash, dyno airbox in place, 73 degree F intake air, stock reeds
EngSpd STPPwr STPTrq BSFA_B FuIA_B Airbox AirInT LamAF1 Air_1s

RPM	CHp	Clb-ft	lb/hph	lbs/hr	psig	degF	Ratio	SCFM
6000	86.1	75.4	0.814	64.3	-0.048	73.0	15.05	180.5
6100	87.7	75.5	0.811	65.2	-0.021	73.0	15.03	181.7
6200	91.8	77.8	0.786	66.2	-0.021	73.0	15.04	182.2
6300	94.8	79.0	0.764	66.4	-0.034	73.0	15.08	188.8
6400	100.6	82.6	0.737	68.0	-0.041	73.0	15.11	196.7
6500	104.5	84.4	0.725	69.5	-0.041	73.0	15.11	203.2
6600	109.1	86.8	0.707	70.8	-0.048	73.0	15.03	208.5
6700	113.0	88.6	0.691	71.7	-0.069	73.0	14.90	211.4
6800	116.0	89.6	0.680	72.4	-0.055	73.0	14.76	214.5
6900	122.2	93.0	0.652	73.1	-0.007	73.0	14.51	217.7
7000	125.9	94.4	0.641	74.0	-0.048	73.0	14.42	221.9
7100	130.2	96.3	0.637	76.1	-0.076	73.0	14.33	225.9
7200	134.9	98.4	0.613	75.9	-0.069	73.0	14.28	230.2
7300	138.4	99.6	0.597	75.9	-0.055	73.0	14.32	235.3
7400	142.0	100.8	0.578	75.3	-0.103	73.1	14.44	240.8
7500	145.0	101.5	0.579	77.1	-0.089	73.1	14.49	245.7
7600	148.8	102.8	0.585	79.9	-0.076	73.1	14.44	250.9
7700	154.0	105.1	0.592	83.7	-0.096	73.1	14.23	256.8
7800	157.3	105.9	0.604	87.2	-0.096	73.2	13.99	261.6
7900	158.4	105.3	0.604	87.9	-0.089	73.2	13.82	265.5
8000	157.4	103.3	0.603	87.1	-0.089	73.2	13.85	268.5
8100	154.5	100.2	0.595	84.3	-0.083	73.2	13.94	270.5
8200	149.8	96.0	0.607	83.4	-0.083	73.2	14.03	272.5

2012 Etec 800 w/ latest reflash, dyno airbox, winter intake air, **stock reeds**

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AFRA_B Ratio	AirInT degF	LamAF1 Ratio	Air_1s SCFM
6100	86.2	74.2	0.788	65.8	12.63	36.2	14.51	181.7
6200	88.4	74.8	0.791	67.7	12.71	36.1	14.49	187.9
6300	91.9	76.6	0.763	68.0	12.98	36.1	14.46	192.8
6400	96.6	79.3	0.760	71.1	12.74	36.0	14.42	198.0
6500	99.8	80.6	0.748	72.3	12.73	36.0	14.38	201.1
6600	104.8	83.4	0.726	73.7	12.69	35.9	14.27	204.3
6700	107.6	84.4	0.709	74.0	12.82	35.8	14.21	207.2
6800	110.5	85.3	0.703	75.3	12.88	35.8	14.16	212.0
6900	116.1	88.3	0.673	75.7	13.05	35.8	14.08	216.0
7000	120.6	90.5	0.646	75.5	13.32	35.7	14.03	219.8
7100	126.7	93.7	0.626	76.9	13.32	35.6	13.98	223.9
7200	131.3	95.8	0.609	77.5	13.44	35.6	13.95	227.6
7300	135.3	97.3	0.597	78.3	13.59	35.6	13.94	232.3
7400	139.5	99.0	0.587	79.4	13.70	35.5	13.96	237.6
7500	144.4	101.1	0.584	81.8	13.63	35.4	13.95	243.6
7600	148.9	102.9	0.582	84.0	13.56	35.3	13.90	248.8
7700	152.5	104.0	0.592	87.6	13.26	35.2	13.83	253.7
7800	155.6	104.8	0.595	89.8	13.14	35.1	13.73	257.9
7900	158.2	105.2	0.580	89.1	13.47	34.9	13.61	262.1
8000	159.7	104.8	0.557	86.4	14.08	34.8	13.62	265.6

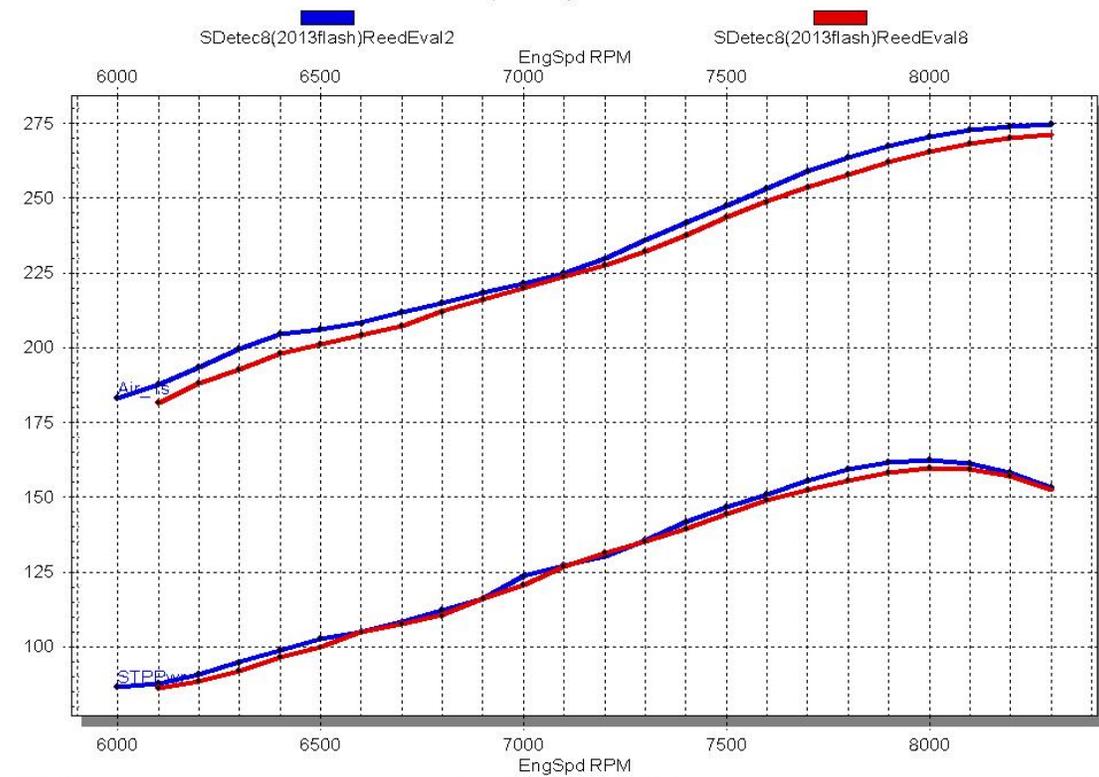
8100	159.5	103.4	0.553	85.6	14.35	34.7	13.71	268.1
8200	157.1	100.6	0.542	82.7	14.94	34.6	13.82	270.0
8300	152.3	96.3	0.541	79.9	15.53	34.5	13.94	271.3

2012 Etec 800 w/ latest reflash, winter intake air, **Boyesen Rad Valves, 1.8% increase in airflow and HP**

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FuIA_B lbs/hr	AFRA_B Ratio	AirInT degF	LamAF1 Ratio	Air_1s SCFM
6000	86.7	75.9	0.765	64.6	12.99	35.3	15.56	183.3
6100	87.7	75.5	0.774	66.2	13.00	35.3	15.46	187.9
6200	90.7	76.8	0.786	69.4	12.76	35.3	15.23	193.4
6300	94.8	79.0	0.756	69.8	13.08	35.3	15.30	199.6
6400	98.8	81.1	0.746	71.9	13.03	35.3	14.79	204.6
6500	102.7	83.0	0.722	72.3	13.05	35.3	14.77	206.0
6600	105.1	83.6	0.715	73.2	13.02	35.3	14.67	208.2
6700	108.2	84.8	0.696	73.4	13.21	35.3	14.33	211.7
6800	112.3	86.7	0.683	74.7	13.18	35.4	14.19	215.1
6900	116.2	88.4	0.665	75.3	13.27	35.3	14.15	218.4
7000	123.5	92.7	0.652	78.5	12.90	35.3	14.00	221.4
7100	127.2	94.1	0.625	77.5	13.28	35.3	13.77	224.8
7200	130.2	94.9	0.612	77.6	13.55	35.2	13.86	229.7
7300	135.6	97.6	0.596	78.8	13.70	35.1	13.87	235.8
7400	141.7	100.6	0.583	80.6	13.73	35.1	13.90	241.6
7500	146.6	102.7	0.579	82.8	13.69	35.0	13.98	247.6
7600	151.1	104.4	0.582	85.7	13.52	34.9	13.90	253.2
7700	155.4	106.0	0.594	87.0	13.18	34.9	13.83	259.1
7800	159.2	107.2	0.586	90.0	13.25	34.8	13.67	263.5
7900	161.6	107.4	0.579	89.6	13.42	34.7	13.68	267.3
8000	162.4	106.6	0.568	86.8	13.77	34.6	13.71	270.6
8100	161.4	104.7	0.552	86.1	14.35	34.5	13.66	272.6
8200	158.3	101.4	0.548	83.4	14.82	34.4	13.87	273.9
8300	153.2	96.9	0.552	80.1	15.26	34.3	14.00	274.8

Compare stock reeds to new Boyesen Rad Valves in winter air

Red stock, Blue Boyesen Rad Valves



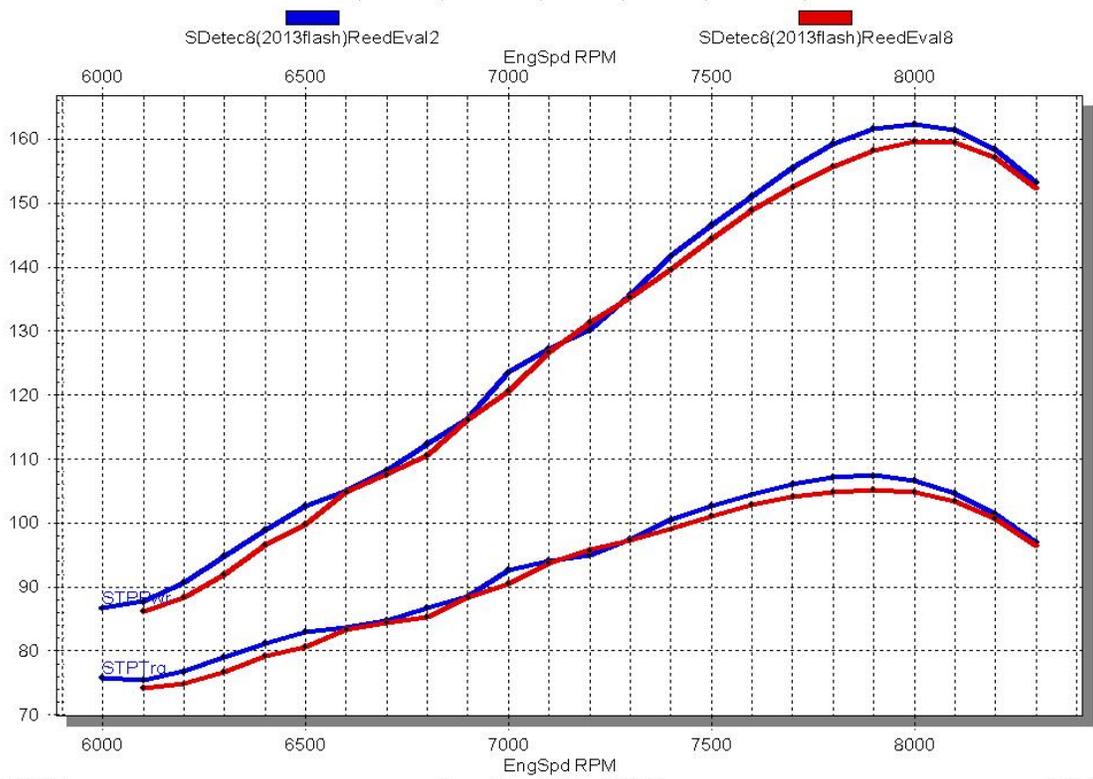
05/04/12

SuperFlow WinDyn™ V3.2

15:23:32

Compare Torque and HP only for proper scaling:

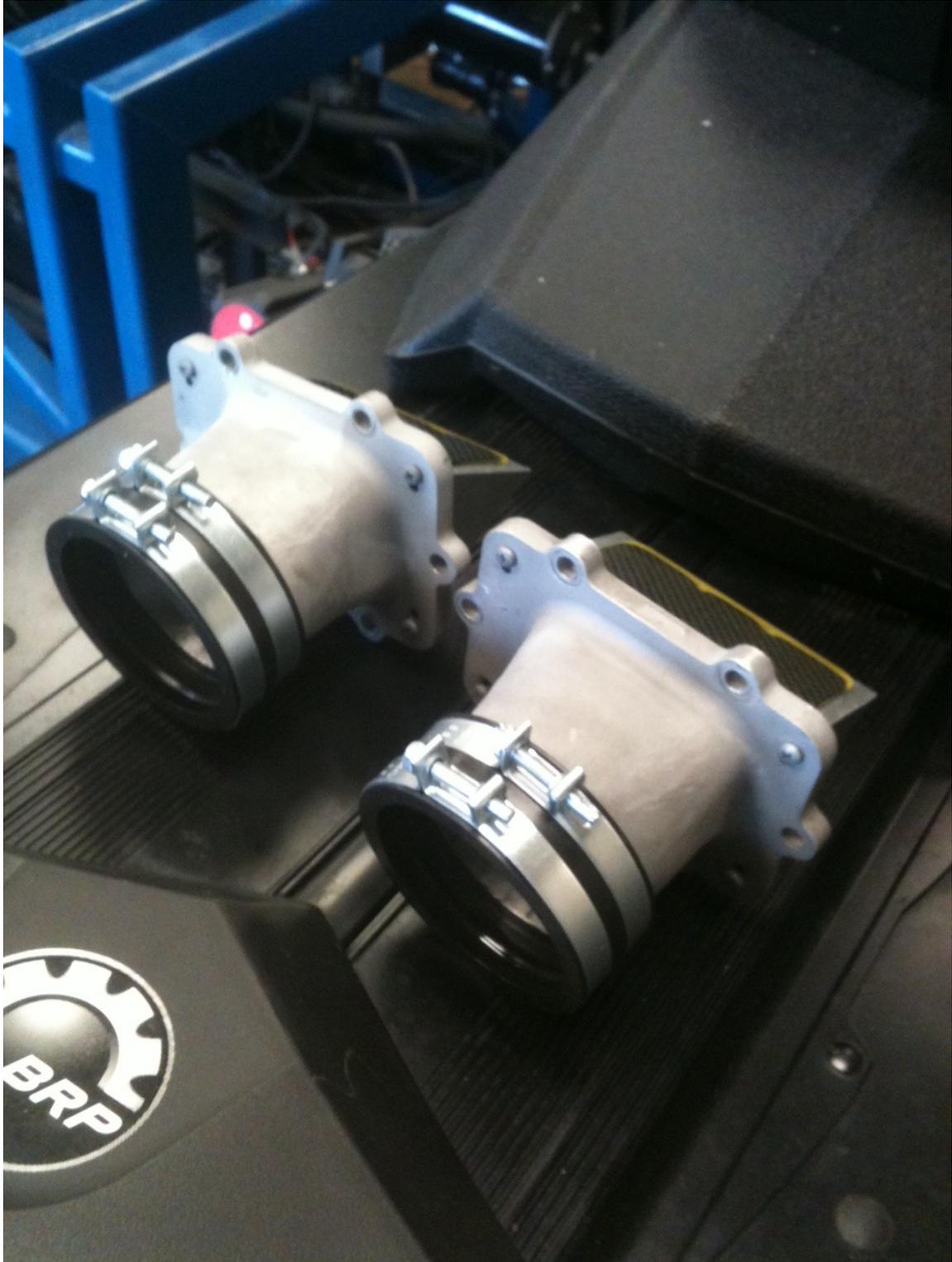
SDetec8(2013flash)ReedEval2, SDetec8(2013flash)ReedEval8,



05/04/12

SuperFlow WinDyn™ V3.2

15:29:35



Addendum:

In the previous test session where we evaluated this latest ECU reflash, we saw the fuel flow jump from a peak of @87 lb/hr to 90 lb/hr in the same air. That helps provide adequate fuel for the higher airflow of the Boyesen Rad Valves. We tested the Rad Valves down to 20 degrees F, and all was dandy. But there's not an awful lot of fuel left for airflow/ HP adding things like Y pipes, pipes, porting etc.

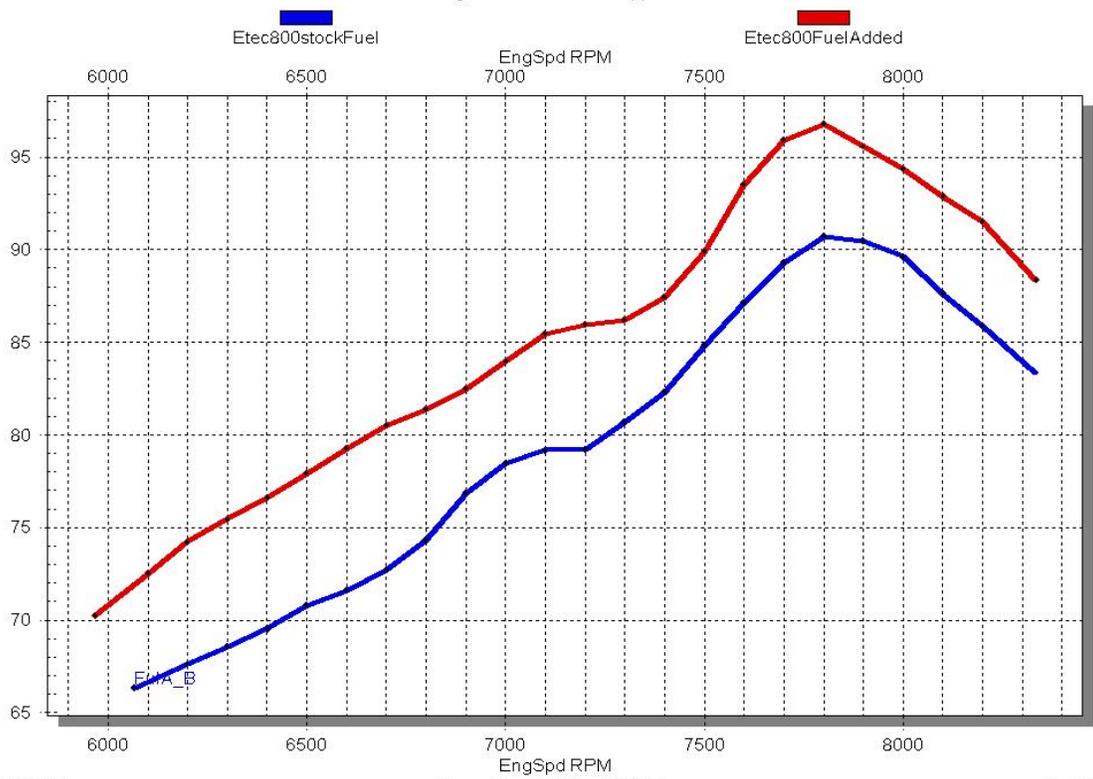
Our engineering pals at DynoJet have created a working prototype Etec Power Commander (about the size of a Samsonite suitcase) that can add or subtract fuel flow. But perhaps because of a perceived lack of demand for Etec fuel controllers, they aren't currently planning to invest the capital necessary to shrink the prototype into a small, easy to stow Power Commander 5.

With that in mind, Boyesen has been tweaking fuel pressure mechanically, and on the dyno we were able to add about 7 lb/hr to peak fuel flow—enough for 10-12 more HP if power adding pipes, etc., require it. This is similar in concept to what we did with the overfueled 2004 Firecat F7 (posted on this website 1/25/2004). Eight years ago, there were no Boondocker or Power Commander controllers so we had to resort to mechanically controlling fuel flow. So we did that by either choking fuel flow by inserting restrictors in the fuel line like we did with Scott Norine's F7, or adding fuel by bumping up fuel pressure with screw adjustable bypass regulators (or air pressurized bypass regulator domes).

Here is an example of a mechanical adjustment of fuel flow on the Etec 800. Boyesen is planning to sell an easy to tune, easy to install version of the mechanical fuel controller next fall. Bring on those power adders!

Fuel flow stock vs mechanical fuel enrichener system

tested at 20 degrees F intake air temp, 700 ft altitude



05/08/12

SuperFlow WinDyn™ V3.2

11:15:10