

2023 Polaris Boost with Hot Rod Sled Shop Torque Link Reflashes

Here is sled number two—the new Polaris Boost—brought by HRSS to demonstrate their Torque Link tunes for pump gas, 100 octane and 114 octane (stages 1,2,3 respectively). This is the third Polaris Boost tested here, and in stock form well out of breakin mode it made 3-4 more HP than did the others. It's likely that since Branko pounded this one on the trail for several hundred brutal miles prior to bringing it to DTR, the rings were seated better than the were others. Remember how long it took us to get our then-new 800 Axys and 850 Patriot up to max HP. As I recall both engines began dyno testing out of the crate with non-breakin ECU's with more than a 10 HP deficit and gradually, over 50+ repeat dyno tests gained that and settled in at around 160 and 165 HP respectively. And just last week, we dyno tested a “broken in” Polaris 9R that came in well shy of HP, and we gained eight HP by doing 20 dyno sweep tests at 250 RPM/second (that test data will be posted here soon).

Changing ECU tuning to make more HP on pump gas comprises three main parameters that can be manipulated—boost pressure, fuel flow and timing. Sean Ray, who worked with me at Aerodyne and DTR, operated the dyno in my absence while I was working with H-D and Buell as they were assessing turbocharging various models with our self lubricating turbos. After Aerodyne closed, Sean wound up doing OEM calibration/ combustion analysis at Delphi in nearby Rochester NY. Then after Delphi closed, he began doing dyno tuning/ combustion analysis at Roush Yates in NC on the Ford GT40 turbocharged race engines. Sean explained that at Dephi their goal was to make the targeted TQ/ HP with the least peak combustion chamber pressure—minimizing the high temperatures (high heat of recompression) that can lead to detonation (scroll down in the tech articles to read Kevin Cameron's article on Detonation). That means high boost and less timing to achieve target TQ/ HP can prevent high peak combustion chamber pressures/ temperatures but will carry reasonable combustion pressure well beyond TDC that will add to torque, creating the target output.

The last time Baldur Gislason visted DTR from Iceland, he was traveling in a rented EcoBoost minivan of some sort. Being a crazed gearhead, he was monitoring engine function while traveling. On 87 octane pump gas the engine would make peak HP with 21 psi boost, with less than 10 degrees of timing—sometimes as low as 5 degrees BTC!

But other savvy twostroke turbo ECU tuners that I deal with at DTR are concerned about the higher EGT's and higher tuned pipe pressure (backpressure that might hinder the evacuation of active radical end gases from the combustion chambers—end gases that can autoignite into detonation) resulting from high boost/ retarded timing.

Here are Hot Rod Sled Shop's three stage tunes for 90.8, 100 and 114 octane fuel.

STOCK

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	FulPrA psig	AFRWB1 Ratio	BoostP psig	STPCor Factor
6900	146.4	111.4	0.663	97.0	72.5	14.03	2.9	1.001
6950	147.7	111.6	0.659	97.3	72.4	14.01	2.9	1.001
7000	149.5	112.1	0.657	98.1	72.4	14.00	2.9	1.001
7050	152.1	113.3	0.660	100.3	72.3	14.01	2.9	1.001
7100	154.5	114.3	0.660	101.9	72.2	14.00	2.9	1.001
7150	157.2	115.4	0.663	104.1	72.1	13.95	2.9	1.001
7200	160.1	116.8	0.669	106.9	71.9	13.85	2.9	1.001
7250	163.0	118.1	0.672	109.4	71.8	13.73	2.9	1.001
7300	166.3	119.7	0.671	111.5	71.7	13.57	2.9	1.001
7350	169.1	120.9	0.667	112.7	71.6	13.46	2.9	1.001
7400	172.1	122.2	0.661	113.6	71.6	13.37	2.9	1.001
7450	175.0	123.3	0.653	114.1	71.6	13.32	2.9	1.001
7500	178.0	124.6	0.642	114.1	71.6	13.28	3.0	1.001
7550	180.5	125.6	0.633	114.2	71.6	13.28	3.0	1.001
7600	182.7	126.3	0.625	114.0	71.6	13.30	3.0	1.001
7650	184.8	126.9	0.613	113.1	71.7	13.34	3.0	1.001
7700	186.5	127.2	0.605	112.8	71.7	13.35	3.0	1.001
7750	188.0	127.4	0.600	112.7	71.7	13.35	2.9	1.001
7800	189.1	127.3	0.597	112.7	71.7	13.31	2.9	1.001
7850	189.9	127.1	0.595	112.9	71.7	13.23	2.9	1.001
7900	190.2	126.4	0.599	113.8	71.6	13.13	2.9	1.001
7950	190.2	125.7	0.602	114.3	71.6	13.04	2.9	1.001
8000	189.8	124.6	0.607	115.0	71.5	12.95	2.9	1.001
8050	188.5	123.0	0.616	115.9	71.5	12.84	3.0	1.001
8100	187.0	121.2	0.628	117.3	71.5	12.75	3.0	1.001
8150	185.0	119.2	0.642	118.5	71.5	12.66	3.0	1.001
8200	182.7	117.0	0.656	119.6	71.4	12.59	2.9	1.001
8250	179.9	114.5	0.673	120.9	71.4	12.54	2.9	1.001
8300	176.9	112.0	0.686	121.2	71.5	12.50	2.9	1.001
8350	173.8	109.3	0.697	120.9	71.5	12.49	2.9	1.001
8400	169.5	106.0	0.706	119.5	71.6	12.49	2.9	1.001

STAGE 1

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	FulPrA psig	AFRWB1 Ratio	BoostP psig	STPCor Factor
6800	153.9	118.9	0.686	105.4	72.4	13.60	4.9	1.001
6850	155.6	119.3	0.691	107.4	72.3	13.49	4.9	1.001
6900	157.2	119.6	0.693	108.8	72.2	13.44	4.9	1.001
6950	158.8	120.0	0.691	109.6	72.2	13.42	4.9	1.001
7000	160.7	120.6	0.693	111.2	72.1	13.43	4.9	1.001
7050	162.9	121.4	0.697	113.4	72.0	13.43	4.9	1.001

7100	165.1	122.2	0.698	115.2	71.9	13.43	4.9	1.001
7150	168.1	123.5	0.704	118.2	71.8	13.42	4.9	1.001
7200	171.6	125.2	0.709	121.6	71.7	13.37	4.9	1.001
7250	174.4	126.3	0.707	123.1	71.7	13.33	4.9	1.001
7300	177.0	127.3	0.700	123.8	71.6	13.30	4.8	1.001
7350	179.7	128.4	0.693	124.5	71.6	13.28	4.8	1.001
7400	182.2	129.3	0.688	125.2	71.6	13.28	4.8	1.001
7450	184.8	130.3	0.682	125.8	71.6	13.28	4.9	1.001
7500	187.2	131.1	0.675	126.2	71.6	13.29	4.9	1.001
7550	189.6	131.9	0.670	126.8	71.7	13.30	4.9	1.001
7600	191.7	132.5	0.665	127.3	71.7	13.30	4.9	1.001
7650	193.5	132.8	0.659	127.3	71.7	13.29	4.9	1.001
7700	195.3	133.2	0.652	127.1	71.7	13.28	4.8	1.001
7750	197.1	133.6	0.647	127.2	71.7	13.25	4.8	1.001
7800	198.8	133.9	0.641	127.2	71.7	13.22	4.9	1.001
7850	200.7	134.3	0.634	127.1	71.6	13.17	4.9	1.001
7900	202.7	134.8	0.631	127.8	71.6	13.10	5.0	1.001
7950	204.4	135.0	0.632	128.9	71.5	13.04	5.1	1.001
8000	205.7	135.0	0.637	130.8	71.5	12.98	5.1	1.001
8050	206.3	134.6	0.649	133.8	71.4	12.90	5.2	1.001
8100	206.4	133.8	0.663	136.6	71.3	12.80	5.2	1.001
8150	205.9	132.7	0.676	139.0	71.2	12.71	5.3	1.001
8200	204.4	130.9	0.688	140.4	71.2	12.61	5.3	1.001
8250	203.1	129.3	0.693	140.5	71.1	12.55	5.4	1.001
8300	201.4	127.4	0.699	140.6	71.1	12.52	5.4	1.001
8350	199.4	125.4	0.704	140.2	71.1	12.51	5.4	1.001
8400	195.7	122.3	0.717	140.1	71.1	12.48	5.4	1.001
8450	191.3	118.9	0.729	139.2	71.1	12.44	5.5	1.001

STAGE 2

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	FulPrA psig	AFRWB1 Ratio	BoostP psig	STPCor Factor
6750	169.5	131.9	0.744	125.7	71.6	12.82	6.3	1.002
6800	169.0	130.5	0.743	125.2	71.6	12.83	6.2	1.002
6850	169.3	129.8	0.745	125.8	71.5	12.79	6.2	1.002
6900	170.4	129.7	0.746	126.8	71.4	12.78	6.2	1.002
6950	171.9	129.9	0.747	128.1	71.4	12.79	6.3	1.002
7000	174.3	130.8	0.751	130.6	71.3	12.82	6.3	1.002
7050	177.9	132.5	0.751	133.2	71.2	12.88	6.3	1.002
7100	182.2	134.8	0.745	135.3	71.1	12.94	6.3	1.002
7150	185.3	136.1	0.736	136.1	71.0	12.95	6.2	1.002
7200	188.0	137.1	0.728	136.5	71.0	12.95	6.2	1.002
7250	190.3	137.9	0.726	137.9	71.0	12.94	6.1	1.002
7300	192.2	138.3	0.726	139.1	70.9	12.93	6.1	1.002
7350	194.0	138.7	0.723	139.9	70.9	12.92	6.1	1.002
7400	196.0	139.1	0.717	140.1	70.9	12.92	6.1	1.002

7450	198.1	139.6	0.709	140.0	70.9	12.93	6.2	1.002
7500	200.0	140.1	0.700	139.7	70.9	12.95	6.2	1.002
7550	202.3	140.7	0.690	139.3	70.9	12.96	6.3	1.002
7600	204.8	141.5	0.680	138.8	70.9	12.98	6.4	1.002
7650	207.7	142.6	0.668	138.3	70.9	12.99	6.5	1.002
7700	210.7	143.7	0.655	137.7	70.9	12.99	6.5	1.002
7750	213.2	144.5	0.647	137.6	70.9	12.99	6.6	1.002
7800	215.6	145.2	0.643	138.4	70.9	12.98	6.6	1.002
7850	217.6	145.6	0.643	139.5	70.8	12.96	6.7	1.002
7900	219.3	145.8	0.648	141.7	70.8	12.92	6.7	1.002
7950	220.8	145.9	0.651	143.5	70.7	12.87	6.8	1.002
8000	221.9	145.7	0.655	144.9	70.6	12.81	6.9	1.002
8050	222.6	145.2	0.661	146.8	70.5	12.74	7.0	1.002
8100	222.2	144.1	0.673	149.1	70.4	12.64	7.1	1.002
8150	220.9	142.3	0.689	151.8	70.4	12.53	7.2	1.002
8200	218.9	140.2	0.705	153.8	70.3	12.44	7.2	1.002
8250	215.7	137.3	0.722	155.4	70.2	12.34	7.3	1.002
8300	212.5	134.4	0.738	156.3	70.2	12.27	7.3	1.002
8350	209.5	131.8	0.740	154.6	70.2	12.22	7.3	1.002

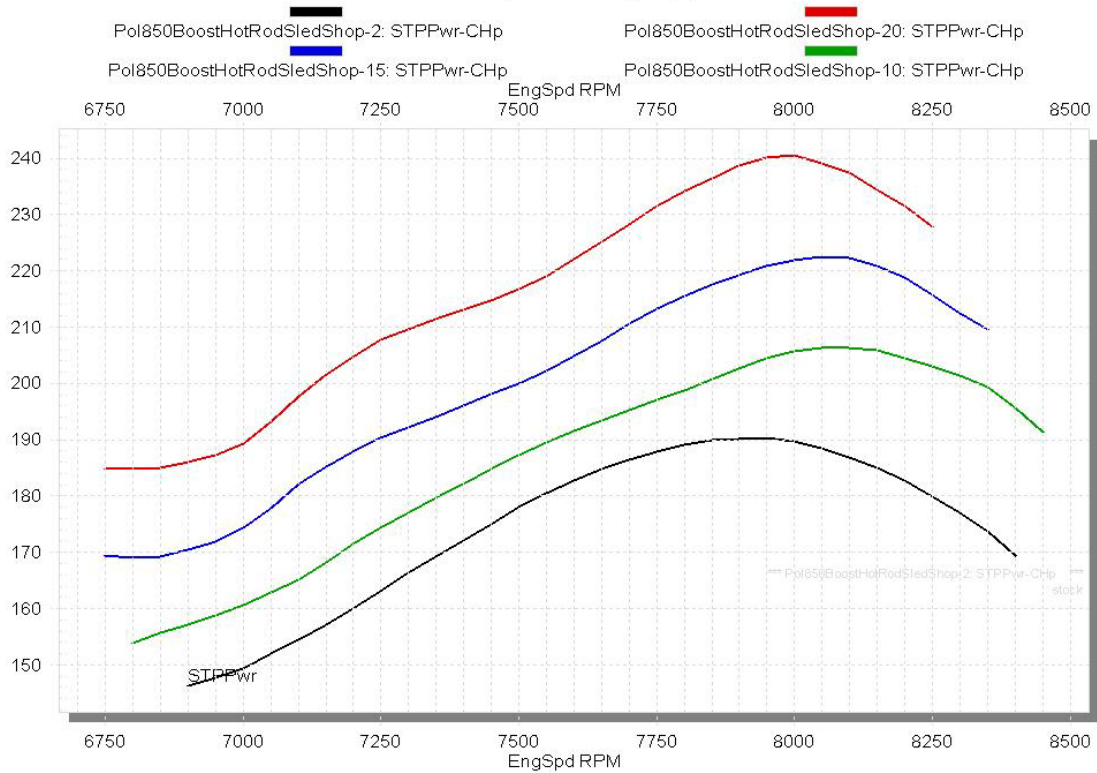
STAGE 3

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	FulPrA psig	AFRWB1 Ratio	BoostP psig	STPCor Factor
6750	184.8	143.8	0.805	148.2	70.5	12.25	8.9	1.003
6800	184.7	142.7	0.806	148.4	70.5	12.23	8.8	1.003
6850	185.0	141.9	0.810	149.4	70.5	12.20	8.8	1.003
6900	186.0	141.6	0.809	149.9	70.4	12.19	8.8	1.003
6950	187.2	141.5	0.807	150.6	70.4	12.20	8.8	1.003
7000	189.2	142.0	0.803	151.4	70.4	12.26	8.8	1.003
7050	193.3	144.0	0.798	153.7	70.4	12.40	8.9	1.003
7100	197.7	146.3	0.792	156.1	70.3	12.51	9.0	1.003
7150	201.6	148.1	0.784	157.6	70.3	12.56	9.0	1.003
7200	204.7	149.3	0.778	158.8	70.2	12.57	9.0	1.003
7250	207.7	150.5	0.771	159.5	70.1	12.56	8.9	1.003
7300	209.7	150.9	0.763	159.5	70.2	12.55	8.8	1.003
7350	211.4	151.1	0.756	159.4	70.2	12.55	8.7	1.003
7400	213.0	151.2	0.751	159.4	70.3	12.56	8.7	1.003
7450	214.7	151.4	0.744	159.3	70.3	12.58	8.7	1.003
7500	216.7	151.8	0.736	159.0	70.3	12.62	8.7	1.003
7550	219.0	152.4	0.725	158.3	70.3	12.66	8.8	1.003
7600	222.1	153.5	0.711	157.4	70.2	12.72	8.9	1.003
7650	225.2	154.6	0.701	157.3	70.1	12.76	8.9	1.003
7700	228.2	155.7	0.693	157.5	70.1	12.76	9.0	1.003
7750	231.5	156.9	0.688	158.6	70.0	12.74	9.1	1.003
7800	234.1	157.7	0.687	160.2	69.9	12.70	9.2	1.003
7850	236.5	158.2	0.686	161.7	69.9	12.64	9.3	1.003

7900	238.7	158.7	0.685	163.1	69.8	12.55	9.4	1.003
7950	240.1	158.6	0.686	164.2	69.8	12.45	9.5	1.003
8000	240.5	157.9	0.691	165.5	69.7	12.36	9.4	1.003
8050	239.2	156.1	0.704	167.9	69.6	12.26	9.4	1.003
8100	237.4	154.0	0.720	170.2	69.5	12.17	9.4	1.003
8150	234.5	151.1	0.743	173.5	69.3	12.07	9.5	1.003
8200	231.6	148.3	0.764	176.3	69.2	11.97	9.6	1.003
8250	227.8	145.0	0.787	178.6	69.1	11.86	9.7	1.003

Polaris Boost with HRSS Torque Link reflashes

Black = stock, others are stages 1,2,3



02/08/23

SuperFlow WinDyn™ V3.2

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