SKI DOO 4TEK TRAIL TURBO SYSTEM BY FULL POWER PERFORMANCE 716-699-6299

Here is another bone stock preproduction SkiDoo 4Tek sled with a few thousand miles on it, this time with a light pressure turbo system designed and built by Justin Fuller of Full Power Performance.

Justin was Bender Racing's engine/ turbo guy, and acquired Bender's turbocharger business. For competitive reasons, he was adamant that we didn't show the layout of his system or describe the fuel enrichment device he uses, hence the lack of photos here and the turning off of cameras in the engine room during this session. Late in the session, the control room dynocam was turned on so people could observe the new large screen "HP" readout above the original monitor. Full Power's plan is to produce and market this low buck intercooled system with Garrett GT25 ball bearing turbo, selling for an estimated $2999. After this tuning session, kit production is beginning in earnest with early deliveries planned.

The only mod to the stock sled is a hole in the stock airbox for the charge tube to deliver boost pressure. Otherwise this is completely bolt-on. Stock fuel pump and stock injectors deliver ample fuel for up to 300 HP, and since this Full Power system is designed for pump gas they are more than adequate.

Pump gas = 87 octane (or sometimes less) regardless of what you see posted on the pump. Those of you who follow DTR know that according to published information, when you buy "high-test" pump gas it's at best a roll of the dice. You pay for 93, and some percentage of the time you actually get 87 or less. In the states of NY and Michigan, it's been documented that you get hosed at the pump about 10% of the time. So tuning any trail sled for 87 octane is smart tuning. Tune for 87 for your riding style, and live with that, and flip your boost switch only when you have some race gas or Av gas to mix with your pump gas. The higher the actual motor octane the more safe HP you can make.

For this tuning session, Justin left last winter's 87 octane pump gas in the tank. He attached Sean Ray's copper tube detonation sensor to the engine, and listened while we dyno tested. Boost was set at 6.5 psi, and Justin listened for knock. Initial dyno runs showed 200 HP but light deto in midrange, so Justin added midrange fuel there to reduce combustion temperature. Here is Justin's 87 octane tuneup, no sounds of detonation. Note that the mechanical meters measuring air and fuel on my dyno show 11/1 and the wideband A/F ratio is richer than 10/1. Also note that the dyno reading shown at 8500 is just after the rev limiter shuts off fuel flow, hence lb/hr dropping there.

EngSpd	STPTrq	STPPwr	BSFA-B	FulA-B	A/FA-B	LAMAF1	BOOST	Air 2
RPM	Clb-ft	CHp	lb/hph	Lb/hr	Ratio	Ratio	IN HG	scfm
6000	131.0	149.7	0.51	71.1	10.64	10.1	14.5	165
6100	130.3	151.3	0.52	73.3	10.38	10.0	14.1	166
6200	130.1	153.6	0.52	74.6	10.36	9.9	13.9	169
6300	130.4	156.4	0.50	73.8	10.74	9.8	14.0	173
6400	130.0	158.4	0.51	75.6	10.65	9.7	14.1	176

6500	130.2	161.2	0.51	77.6	10.59	9.6	13.8	179
6600	128.8	161.9	0.52	78.5	10.70	9.6	13.7	183
6700	130.2	166.1	0.53	82.7	10.31	9.4	14.0	186
6800	129.9	168.2	0.53	83.5	10.34	9.4	13.7	189
6900	132.4	173.9	0.52	84.7	10.57	9.4	13.7	195
7000	132.4	176.4	0.52	85.9	10.72	9.4	13.3	201
7100	131.2	177.3	0.53	87.8	10.66	9.4	13.4	204
7200	129.6	177.6	0.53	87.7	10.72	9.4	13.4	205
7300	127.7	177.5	0.54	89.8	10.52	9.4	13.5	206
7400	125.5	176.8	0.54	88.7	10.83	9.4	13.2	210
7500	123.4	176.3	0.55	90.1	10.79	9.3	13.3	212
7600	125.5	181.5	0.55	94.3	10.52	9.2	13.4	217
7700	127.1	186.3	0.55	95.4	10.66	9.2	13.0	222
7800	127.9	190.0	0.55	97.4	10.51	9.2	12.9	224
7900	130.4	196.1	0.53	97.9	10.72	9.3	12.8	229
8000	131.0	199.5	0.53	98.8	10.76	9.4	13.2	232
8100	130.7	201.6	0.51	96.9	11.11	9.5	13.1	235
8200	129.5	202.2	0.52	98.7	11.01	9.6	12.9	237
8300	128.5	203.1	0.51	98.0	11.24	9.7	13.2	241
8400	127.7	204.2	0.51	97.4	11.40	9.8	13.2	242
8500	123.3	199.6	0.48	90.4	12.29	10.8	12.8	243

Justin ran six or more dyno tests on 87 octane, while assessing exhaust backpressure from engine to turbo to stock muffler, all tests were within less than 1/2% of this HP. That stock muffler is excellent, low backpressure even boosted, and very quiet (even quieter than stock with the turbo), Only riders who are most weight conscious will benefit from louder aftermarket turbo mufflers.

With base 87 octane tuning finished, we added two gallons of 100LL av gas (sucked out of a red GS1150 that can be seen now sitting on my cycle dyno) to the two gallons of 87 in the 4tek tank., probably equating to octane in the low nineties. Now Justin turned up the boost with a boost toggle switch. The first run was showing too much boost and HP was way too high for Justin and he wisely waved off the test as shown. But if we had adequate octane and fuel flow, HP may have exceeded 300 HP. With the low BSAC (brake specific air consumption) of this engine, 300 plus HP is surely doable with the small, fast boosting GT25 turbo. For bigger turbo HP like this, some race gas-level octane is your friend.

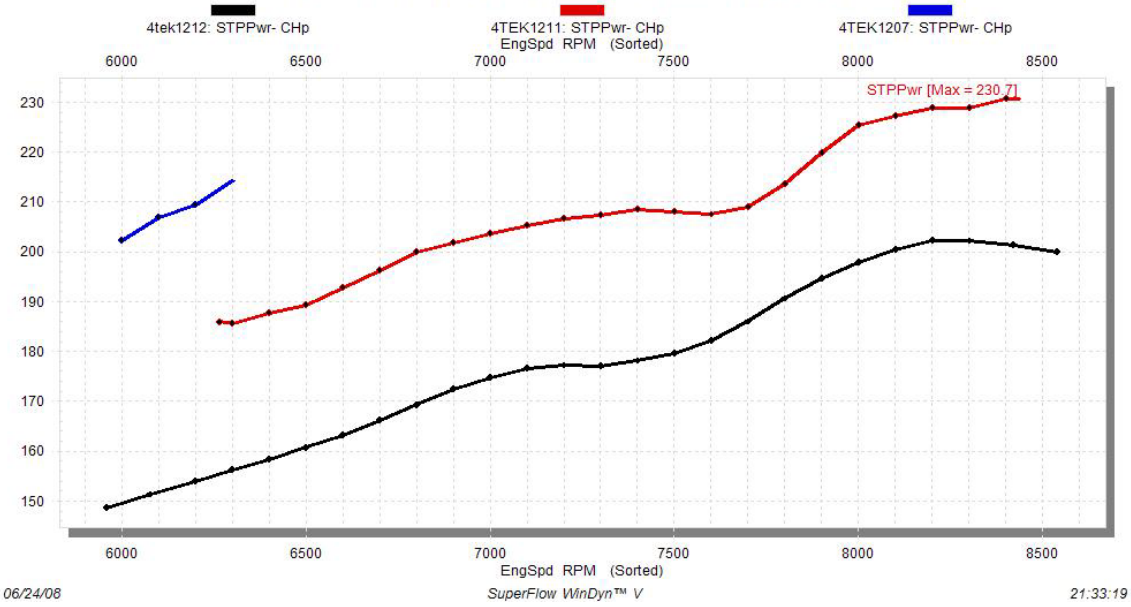
EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFA-B lb/hph	FulA-B lb/hr	A/FA-B Ratio	LAMAF1 Ratio	BOOST IN HG	Air 2 scfm
6000	177.0	202.2	0.35	66.1	16.10	15.3	32.0	232
6100	178.1	206.8	0.34	66.6	16.00	15.3	32.7	233
6200	177.4	209.4	0.35	68.4	15.86	15.0	30.8	237
6300	178.6	214.2	0.35	71.4	15.37	14.5	30.1	240

Lowering the boost into some reality for octane somewhere between 87 and 100, we dialed in this dyno test, knock free on the mix of 87 and 100LL av gas. Here is the way smart turbo riders might run their turbo 4tech with lots of cheap 100LL gas or race gas mixed with mystery pump gas. Please don't try this on straight "pump" gas (unless water/methanol injection is used to cool combustion chamber temps). Treat your high buck sled/ turbo with respect, and give it some reasonable octane to enjoy this smorgasborg of higher boost HP available at the flip of a boost switch. And as we can see from the prior aborted test (and Bennet's big HP 120 octane lake racer) there's lots more available with good fuel and proper turbo sizing.

EngSpd	STPTrq	STPPwr	BSFA-B	FulA-B	A/FA-B	BOOST	FuelP	Air 2
RPM	Clb-ft	CHp	lb/hph	lb/hr	Ratio	IN HG	Psig	scfm
6200	155.7	183.8	0.42	71.7	12.48	20.0	56.2	195
6300	155.8	186.9	0.42	74.4	12.24	19.8	56.1	199
6400	152.9	186.3	0.43	75.4	12.22	21.4	56.1	201
6500	153.3	189.7	0.44	77.7	12.12	21.2	56.1	206
6600	152.5	191.6	0.44	78.2	12.16	19.5	56.0	208
6700	154.4	197.0	0.44	81.0	12.09	20.9	56.0	214
6800	155.1	200.8	0.43	81.2	12.39	18.5	55.9	220
6900	153.5	201.7	0.43	82.0	12.29	18.5	55.8	220
7000	152.4	203.1	0.44	83.8	12.39	17.9	55.7	227
7100	152.4	206.0	0.44	84.7	12.44	18.8	55.6	230
7200	150.7	206.6	0.45	86.9	12.35	19.5	55.5	234
7300	149.0	207.1	0.46	89.2	11.96	18.9	55.5	233
7400	148.0	208.5	0.47	92.7	11.80	19.4	55.4	239
7500	146.8	209.6	0.47	93.0	11.75	19.3	55.3	239
7600	142.3	205.9	0.48	92.1	11.99	19.8	55.3	241
7700	141.0	206.7	0.48	92.6	11.95	19.6	55.3	242
7800	144.5	214.6	0.46	92.7	12.28	18.6	55.4	249
7900	145.9	219.5	0.46	94.1	12.30	18.9	55.3	253
8000	148.1	225.6	0.45	94.9	12.49	19.5	55.3	259
8100	149.5	230.5	0.44	95.0	12.59	19.1	55.3	261
8200	144.6	225.8	0.44	92.7	13.00	19.3	55.3	263
8300	145.8	230.4	0.44	94.3	13.04	19.0	55.4	269
8400	144.0	230.3	0.44	95.7	12.80	18.2	55.3	267
8500	142.9	231.3	0.44	94.7	13.15	18.5	55.3	272

STOCK SKI DOO 4TEK 1200 TRAIL TURBO

Black 87 octane, Red higher boost higher octane, Blue aborted test too high for octane



06/24/08 *SuperFlow WinDyn™ V* *21:33:19*