One Stop Performance Apex Turbo dragrace engine

Jim McKeown, Brett Huff and Paul Thail of OSP (Howell, MI, 517-448-2325)(www.onestopperformance.com) stopped at DTR on their way to deliver a new turnkey drag sled to a customer in Northern NY. They were looking to test and tune their own record holding (4.52 @ 150 in 660' on ice) Apex turbo system, and to join Tommy McConkey (DNE) and Glenn Hall (D&D) in the exclusive DynoTech 500 HP club. Perhaps Glenn's 537.3 HP DTR record could fall.

OSP's Apex engines are machined and assembled in-house. They are totally reconfigured to put up with the stresses of nearly 10 HP per cubic inch, and the even greater stresses resulting from detonation. When you achieve this power/ boost level on gasoline occasional clicks of deto are unavoidable and parts must be made to handle those pressure spikes. Beginning with a totally reinforced stock bore (and stock stroke) block, OSP adds Carillo rods and turbo pistons and a modified oiling system. The head is ported for turbo use, and retimed stock cams are used.

The OSP turbo system begins with their own high velocity stainless header with merge collector. The turbos are huge hybrids with custom compressors and turbines, assembled by Tial with Garrett ball bearing center sections. The air to air intercooler is as large as possible and still fit under the cowl.

The ignition, EFI system, and datalogging is all handled by an automotive "Big Stuff III" standalone system with coil-on-plug ignition. New this year is traction control integrated into the Big Stuff III system that can instantly reduce power by as much as 32% if track slip is detected. OSP is the distributor of these systems for sleds and bikes. Also note that the "Fuel A" reading shows that the fuel system can easily support 700 HP.

Off the trailer, with 30 psi boost the engine made an incredible warmup pass of over 500 HP as follows:

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFA-B lb/hph	FulA-B lb/hr	A/FA-B Ratio	Air 2 scfm	FuelP psig	Fuel A lb/hr	Fuel B lb/hr
8700	265.1	439.2	0.57	245.4	12.64	678	100.4	413.6	168.2
8800	260.6	436.6	0.55	234.7	13.49	691	100.4	412.8	178.1
8900	262.2	444.2	0.52	227.3	14.53	722	100.3	410.5	183.2
9000	257.9	441.9	0.53	228.2	14.60	728	101.5	405.8	177.6
9100	256.6	444.5	0.54	233.4	14.49	738	102.1	413.9	180.5
9200	255.1	446.9	0.50	217.8	15.70	747	102.5	408.5	190.7
9300	248.9	440.7	0.54	235.4	14.80	761	103.2	413.0	177.6
9400	251.4	449.9	0.53	231.9	15.08	764	102.9	411.1	179.2
9500	253.7	458.8	0.53	240.1	14.62	767	102.8	414.5	174.4
9600	251.1	459.0	0.51	231.3	15.18	767	102.9	410.5	179.2
9700	251.7	464.9	0.53	243.6	14.36	764	102.3	419.7	176.1
9800	247.7	462.1	0.53	240.3	14.61	767	102.3	416.2	175.9
9900	246.2	464.2	0.53	240.3	14.61	767	102.1	410.5	170.2
10000	249.8	475.6	0.53	245.4	13.74	736	101.7	414.2	168.8
10100	249.6	479.9	0.54	252.2	13.81	761	101.7	409.7	157.5
10200	248.9	483.4	0.55	259.3	13.92	788	102.4	415.3	156.0

10300	255.4	500.8	0.54	265.1	13.06	756	102.9	411.9	146.8
10400	252.0	499.1	0.53	258.9	13.68	773	103.2	409.1	150.2
10500	247.8	495.3	0.53	254.9	13.62	758	102.4	405.2	150.3
10600	244.9	494.2	0.53	256.3	13.83	774	103.3	407.2	150.9
10700	246.0	501.1	0.55	267.9	13.40	784	103.3	410.8	142.9

During the first test, the copper tube deto sensor bolted to the head transferred loud clicks of deto to my headphones indicating that the 116 octane race gas wasn't up to the task. To reduce the detonation which was moistening the dyno operator's armpits- Jim M. would need to reduce compressed charge temperature by retarding timing (less combustion chamber heat), adding fuel or reducing boost. Since going backwards with boost is not in Jim McKeown's vocabulary, he reduced timing a few degrees, and of course bumped the boost up a bit more. 515 HP, and more severe clicks of deto. Then less timing and 517 HP and still too many clicks. Then more fuel was added, less clicks but power dropped on top end. Finally Jim M. went to 34 psi boost, and as we can see here the too-lean mixture resulted in violent clicking from about 10,000 on up and I pulled out of the run before the power tailed off, 537.0 HP which put the O.S.P. Apex within .4 HP of Glenn Hall's F1200 turbo.

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFA-B lb/hph	FulA-B lb/hr	A/FA-B Ratio	Air 2 scfm	FuelP psig	Fuel A lb/hr	Fuel B lb/hr
9300	274.5	486.1	0.52	247.4	13.32	720	107.9	408.0	160.6
9400	275.1	492.3	0.53	254.3	14.36	798	106.7	413.3	159.0
9500	271.0	490.2	0.51	244.6	13.80	737	106.1	407.7	163.1
9600	271.1	495.6	0.50	245.1	14.56	780	107.2	403.9	158.8
9700	267.7	494.3	0.50	242.6	15.22	806	107.5	402.5	159.9
9800	266.8	497.9	0.53	260.8	13.81	787	106.6	408.8	148.0
9900	271.3	511.4	0.50	252.7	14.92	823	107.3	396.7	144.0
10000	267.7	509.6	0.52	261.4	13.59	776	105.8	406.9	145.5
10100	265.0	509.7	0.51	257.0	14.28	801	105.9	405.0	148.0
10200	272.4	528.9	0.53	273.6	13.61	813	107.6	403.1	129.5
10300	267.8	525.2	0.49	254.2	14.75	819	108.1	396.7	142.5
10400	267.3	529.3	0.52	273.7	13.59	812	107.6	401.5	127.8
10500	263.7	527.1	0.53	274.9	13.51	811	107.3	395.9	121.0
10600	265.7	536.2	0.51	271.1	14.14	838	107.9	397.2	126.1
10700	262.4	534.7	0.51	270.8	14.18	839	107.8	391.3	120.5
10800	256.4	527.2	0.53	274.6	14.10	846	107.7	397.5	122.9
10900	256.4	532.1	0.52	274.6	14.10	846	108.1	397.5	122.9
11000	256.4	537.0	0.52	274.6	14.10	846	108.1	397.5	122.9

This time as I recall Jim just bumped fuel flow with his laptop tied into the sled's ECU, and added maybe a pound of boost—one more run for the "record", trying to begin the test at 9300 the engine loads itself for several seconds at about 8500 then boost comes on hard and and accelerates quickly. This time, with boost set even higher, before the dyno servo control could catch the engine it was around 10,000 RPM. Now the dyno is controlling the Apex engine howling at 35 psi boost, coaxing the wide open engine back down to 9300 to begin the test. But before we could get back to 9300 the head gasket,

surely tortured by the pressure spikes of prior deto, let go, spewing coolant on the control room window.

But while all this was happening, Paul was video recording the big HP screen on the second monitor, and during the deceleration after the dyno got control of the engine it showed 562 HP.

So the OSP Apex had 562 HP on the monitor (which only updates a few times per second). I know I saw 562 HP on the small, info laden main computer screen that I watch intently during testing, just as the engine settled down—just before popping the gasket. But we have no dyno data recorded. Many viewers watched HP screen on YouTube as the OSP Apex engine is being pulled down by the dyno. Engine and dyno absorber inertia surely add some to measured power on deceleration, and that was partly responsible for the 562, but the auto test button that would have caused data to be recorded was not pushed before the gasket gave up.

Some Yamaha loyalists cried foul on the internet over the last full run's 537.0 max, thinking that because D&D spends so much time here (as they have for 20 years) that I somehow shut the last 537.0 HP run down early with .4 HP to go. Anyone who has seen a three second dyno test like this knows that is not possible, nor is there some special SuperFlow software that can abort a run before some specific power number is reached. *It was the loud, frightening clicks in my headphone!* A few Cat people howled about the big HP number on the YouTube video. Sheesh.

This Apex made the highest HP I've ever seen with my eyes on my dyno computer readout, but Glenn Hall has the highest HP dyno sheet by .3 HP. We should call that sort of a tie, but I know dragracers don't like ties. The D&D and OSP crews are all a great bunch of guys, and I'm sure both have gotten enjoyment from this sort of battle-of-the-giants notoriety. And let's not forget Canadian radar run madman Tommy McConkey who ran a record 192mph last winter on that four cylinder Don Emery DNE full body SkiDoo four cylinder N2O engine that made the first 500+ HP dyno run here. The exclusive club has only three members.

Most importantly, this day we obtained very useful information for helping Jim create even more power with the OSP Apex during this tuning session even though it ended early. When you are making nearly 10 HP per cubic inch on gasoline, octane is your friend. Jim McKeown now has adopted 120 motor octane fuel for his engines, and reports that he is now running way more boost *and more timing advance* than he ran here with 116 octane.

I also learned that a strongly built Apex turbo can experience and survive about 10x the clicks of deto that will kill a two-stroke! On a two-stroke, ten clicks in a dyno run is way too many and will stick a piston or worse—five clicks and abort is the rule. That's why my withered orifice was so puckered after 50 loud deto clicks on the 537 dyno run….But the good news is we learned what we did, and the OSP sleds are surely more powerful as a result. That's why we dyno test and tune.