DNE Performance built this four cylinder turbocharged 1700cc monstrosity for radar run contestant Canadian Tom McConkey. This an 809 triple-based creation, with CP Industries cast cylinders and a stroked stock crankshaft with an extra throw pressed on, and firing at 180 degrees—incredibly smooth on the dyno even with solid motor mounts! As we documented previously on this website, DNE made over 400 "on the motor", then over 500HP on nitrous oxide. Tommy used the 500HP combo to set a 2000' record at 190HP last year. But looking to be the first 200MPH sled in sanctioned ice racing, DNE's Don and Curtis Emery and sled owner Tom decided that turbocharging could take them to the power level required to add 10 MPH. Friction drag increases as the square of speed, but aero drag increases as the cube of speed! So that extra 10 MPH will take gobs more HP to achieve. DNE and Tom were tapped out on N2O, which can be brutal on components. But turbocharging has a unique ability to make more power with less strain on rotating parts. If we double a normally aspirated engine's power with turbo boost, peak cylinder pressure is said to increase by only 20% at 15-20 degrees ATC! But at 90 degrees ATC, the highly boosted turbo engine is said to provide meaningful cylinder pressure which adds to torque, where NA and N2O engines' pressure is long exhausted. It's this average increase in pressure over the full power stroke that adds so much HP without wrecking parts, as long as tuning is good and octane is adequate. The added advantage to this smooth delivery of added cylinder pressure is minimizing destructive torsional crankshaft vibrations that result from extremely high peak cylinder pressures like we experience with wickedly high compression/ N2O engines. But take any turbocharged engine into detonation/ preignition and all bets are off! Cylinder pressures go to the moon—heads lift, gaskets blow, studs stretch and/ or pull the threads out of cylinder blocks, pistons deform or break. Too often, engine builders substitute brutally strong parts for proper tuning. Our experience here with highly boosted engines is if tuning is spot on, and octane is adequate stock components can hold up to amazing increases in HP.

When Don Emery called me last year to discuss the possibility of turbocharging this 1700cc engine, I suggested that he consult with Gus Bohne (Bohne Stock Racing in NH—gus.bohne@comcast.net). Gus has built some amazing non-dyno tested carbureted engines with mega boost, including an 800 SkiDoo twin that uses 44mm carbs and a big intercooled ball bearing Garrett turbocharger to run 5.0's at 130mph in 660 ft. So it seemed logical that if Gus designed a setup with two of his 800 turbo systems on it, either with twin turbos or one monster Garrett turbo, their HP goal could be achieved. Since Gus uses a Y pipe and a single CPI pipe on the 800 twin, then doubling up that combo would be easy.

Why not EFI? One Stop Jim has a great handle on the standalone Big Stuff EFI systems he sells to 4 stroke turbo guys making gonzo HP, and is just now getting into the 2 stroke turbo tuning business. But their 4 stroke turbo learning curve was steep, and what we see now from big Jim is the near perfection that has resulted from years of tuning/ testing/ racing that the OSP guys have done with the four stroke turbos. Turbocharged 2 stroke EFI tuning is more finicky—way less forgiveness without the extra two strokes that help cool the combustion chambers, so if you goof you goof big.

Now we have dyno tested/ tuned many EFI 2 stroke turbo systems with Boondocker boost tuners, and those are excellent user-friendly systems. But those "piggyback" onto good stock factory ECU maps that are close to perfect on stock engines, then add fuel as boost pressure rises. But starting from scratch with an EFI boosted two stroke is a daunting task—remember 20 years ago when I had Injection Research Services put the first aftermarket EFI system on my Bender "Avalanche" three cylinder Exciter? We ran 55 gallons of gas through the engine on the IRS dyno to create an EFI map that was not quite perfect. Then if we had added boost to it, it could have been 100 gallons of dyno gas to create the proper map!

But since I've been involved in many thousands of boosted carbureted sleds and Harleys when I was involved with Aerodyne, I know that a properly tuned blow-through carburetor turbo system can be much easier for the average tuner to deal with! Yes, carburetors are dumb spigots that sense air flowing (based upon pressure differential from venturi to float bowl) and spew fuel into that air stream, increasing as velocity rises, providing a decent A/F mixture. Carbs don't measure temperature, nor can they adjust for varying baro pressure. However, the greatest attribute of carburetors is that when airflow goes up, fuel flow goes up! Every time! They don't need to be told—it just happens.

If my old 854cc Yamaha needed 55 gallons of dyno gas to create a base EFI map, then perhaps Tom McConkey's big quad could need 55 gallons of dyno tuning gas to make a base EFI map, then even more to make proper boost compensation fueling!

So hooking up DNE Don with Gus Bohne was a good move. Their collaboration on this higher power combo was fruitful. As we surmised, two of Gus' 800 Y pipes/ CPI single pipes feeding heat energy to a monstrous Garret turbo is working dandily on the big 1700 quad. Gus and Curtis Emery collaborated on turbo size, and they would up with a huge Garrett ball bearing/ Tial hermaphrodite.

DNE shelved their excellently carbureting Cutler carbs, and installed the four cheap Mikuni 44mm round slide carbs vented and jetted per Gus Bohne's recommendation. The tuning specs—pilot, slide cutaway, needle, main jet and adjustable power jet specs that Gus uses on the SkiDoo 800 were nearly spot on with the big quad! So instead of putting 55 gallons of gas through this engine creating a good base EFI map, all we had to do is tweak needles and power jets ever so slightly.

But today, I goofed on the dyno test setup—putting in an incorrect engine to dyno speed ratio. Blame it on new the new 902 system, much different than the 901 that I've used for 25 years. Blame it on the fact that we had an engine on the dyno that could make way more HP than ever here, and my armpits were wet. Blame it on my 61 year old brain. But regardless, blame it one me that the indicated engine speed was WAY HIGHER than actual! So here the engine was shrieking like a banshee at 6500 RPM, but the dyno was showing 9800 RPM! So we easily tuned this engine up to 9800 RPM indicated and decided to stop there—no need to overspeed this huge engine or the big dyno drive shaft!

But in reality I was loading the engine at awfully low RPM, and shutting it off at 6500 thinking it was overspeeding at 9800 where we were close to 500 HP. So we created a dandy power jet tune, made all the power we cared to at what we thought was 9800, then instead of possibly overspeeding the engine we quit and the Canadian boys went home. Don and Curtis were planning to go home and cut the pipes to add enough material to lower peak HP RPM by more than a thousand revs!

But on his way back home to NH, Gus Bohne was having one of those "WTF" long I-90 thinking sessions, and could not figure out how his turbo 800 twin setup x 2 could be overreving by 1500 or more revs.

The next day I had some hilldrag sleds to tune, and when I was calibrating the dyno I discovered the goof in engine to dyno speed calibration. So where I was stopping each dyno test, out of concern for engine and dyno driveshaft longevity, at 9800 it was actually 6533! Just getting into the HP band. What will we see with torque climbing at 6533, and another 2000 RPMs to make HP peak?

I was able to communicate with Gus and DNE that morning after I discovered the problem, well before hacksaws attacked the pipes. So those guys have a real good tune, but not sure what HP they really have, and what RPM it peaks at (although turbos seem to create a wide plateau of HP). So I'm hoping that they come back for a complimentary dyno session to see what HP they can make, and at what RPM. Stay tuned for updates.

Here is a compilation of two dyno tests—one with dyno shut off early, and one buzzing engine to 6533 RPM that we thought was 9800! Note that I have zero'd out Gus' boosted fuel pressure reading which is part of his proprietary setup. And also note the DNE's huge turbo exhaust backpressure is lower than optimal for drag sleds, but perhaps dandy for 2000' radar runs. We expect that the backpressure will rise as the revs climb to 8500.

DNE/ Bohne/ McConkey/ 1700cc turbo quad, with RPM corrected….

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	TrbnIn deg F	ExhPrs psig	BoostP psig	FulPrA psig
5467	213.0	204.6	0.907	182.7	641	8.9	8.1	
5533	236.3	224.3	0.859	192.0	658	10.3	9.6	
5600	248.1	232.8	0.856	201.1	666	11.2	10.4	
5667	257.4	238.5	0.863	210.2	671	11.8	10.8	
5733	279.0	255.6	0.836	221.0	681	12.9	12.1	
5800	289.7	262.4	0.815	223.5	684	13.2	12.5	
5867	313.0	279.9	0.801	237.5	695	14.1	13.4	
5933	339.2	300.8	0.742	238.6	706	14.8	14.1	
6000	367.2	321.5	0.720	250.8	722	15.6	14.7	
6067	388.0	335.9	0.698	256.9	742	16.1	15.1	
6133	393.4	336.9	0.707	263.6	747	16.1	15.2	
6400	452.8	371.6	0.620	266.1	732	18.9	16.9	
6467	473.7	384.8	0.611	274.0	764	19.5	17.7	

6533	482.6	387.9	0.633	289.3	780	19.5	17.9
6600	??????						
6800	??????						
7000	??????						
7200	??????						
7400	??????						
7600	??????						
7800	??????						
8000	??????						
8200	??????						
8400	??????						
8800	??????						

Below are from left to right, Curtis Emery (seemingly praying to thank the HP Gods), turbo madman Gus Bohne, equally mad man Don Emery, and the only sane one in the bunch Carl McBride. Sled owner Tom McConkey was at home ill with the flu. The clear plastic-shrouded copper tube attached to the cylinder head is a most valuable instrument—attached on the other side of the wall to a set of headphones in the control room, where detonation can be listened to. None was heard today.