

## 2013 Polaris 600 IQR stock evaluation

Pete Nixon brought this fresh out-of-the crate 2013 Polaris 600 IQR Snocross racer to DTR to tune for maximum horsepower on 106 octane race gas. For stock Snocross racing, all that can be adjusted is jetting and ignition timing. The timing switch on the 600IQR is E = one degree retard, D = 0 adjustment, C = +1 degree added across the board, B = +2 degree added, A = +3 degrees added across the board. High octane will allow lean, high BMEP power levels that might knock and wreck parts with the awful stuff that can come from the gas pumps today. Remember, the NYS Bureau of Weights and Measures reports the 10% of the pump gas they test in this state is substandard—meaning if you buy 93 octane at the pump you should expect to get 87 once every ten refills! And is it different in other states and countries? Doubtful. So, racers are smart people and spending money for race gas is cheap insurance if it means (1) you can tune for maximum HP, and (2) you can finish the race with pistons that still go up and down inside the bores.

There are new SnoCross rules for 2013—mod racers must use stock engines (!) except for twin race pipes and higher compression heads, ostensibly to “level the playing field” and increase mod sled entrants at national SnoCross events. In anticipation of this goofy new rule, manufacturers may have stepped up the port timing of their stock engines to allow reasonable power levels in the mod classes. I think we saw that coming last year, testing the 2012 SkiDoo 600 that had seemingly very radical port timing based upon the testing we did then. That SkiDoo has radical port timing that probably was dandy with high compression and high RPM twin pipes, but didn't do much with the stock single pipe and muffler.

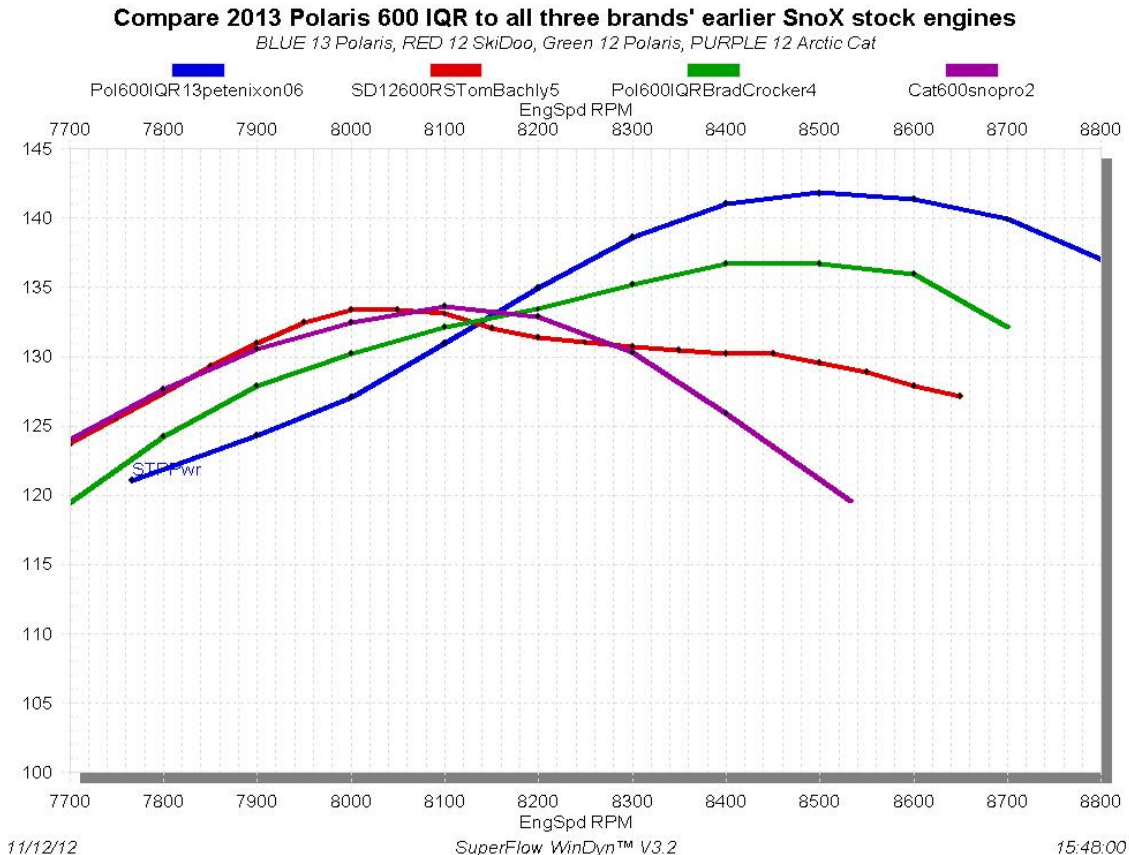
But for 2013, Polaris seems to have hit on the sweet spot—optimizing port timing to create maximum stock single pipe HP but allowing reasonable “mod” HP levels when compression is cranked up, and when twin pipes are tuned to make power at high revs. We have yet to test the 2013 SkiDoos and Arctic Cats (free dyno tunes here await the first of each!) but this is how this is how the new Polaris 600IQR compares with the 2012s of each manufacturer.

Obviously, Polaris has increased port timing that helps high RPM power without sacrificing much on the bottom end. Rules limit stock compression ratio to 6.8/1 *corrected* meaning from the top of the exhaust port to TDC. That means, that when Polaris raised the height of their exhaust port for 2013, they could shrink the combustion chamber to maintain that 6.8/1 *corrected* compression ratio. That would result in greatly improved *uncorrected* full-stroke compression ratio (much more meaningful than *corrected*) which helps HP at all RPM. Remember, that powerful sound wave returning from the rear cone of the pipe(s) traps much of the air/ fuel mixture into the cylinder(s) way before the piston(s) close(s) off the exhaust port(s)! So full-stroke, *uncorrected* compression ratio is best for comparing anything relating to modern two-stroke performance.

Here's Pete's 2013 Polaris 600 IQR, with 340 main jets that optimized A/F ratio at 325 ft density altitude. Stock timing was not far from optimal, but tweaking the timing with the ECU switch would pay dividends. With Pete's Sunoco race gas, switch position B was spot-on and gave us the best HP curve from midrange to beyond top end.

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFCAB lb/hph	FulAB lbs/hr	Exh_3 deg F	Air_1c CFM	DenAlt Feet	CoolOt deg F
7800	121.1	81.9	0.583	68.3	874	196.1	321	77
7900	124.3	82.6	0.589	70.9	895	201.0	323	78
8000	127.0	83.4	0.590	72.6	909	204.3	324	79
8100	130.9	84.9	0.574	72.8	922	207.3	324	79
8200	135.0	86.4	0.564	73.6	937	210.3	324	79
8300	138.6	87.7	0.553	74.1	953	213.1	325	79
8400	141.0	88.2	0.549	74.9	968	215.2	325	80
8500	141.8	87.6	0.545	74.8	983	216.9	326	80
8600	141.4	86.3	0.555	75.9	998	217.9	327	80
8700	139.9	84.5	0.561	76.0	1014	218.7	328	81
8800	137.0	81.8	0.579	76.7	1030	218.6	329	81
8900	132.0	77.6	0.593	75.6	1054	218.1	331	82

Note that the airflow CFM is now 218ish CFM compared to the 2012 and earlier 600IQR engines that measured about 205 CFM. The higher airflow of the 2013 cylinders is nearly directly proportional to the 2012 and earlier cylinders' output—137HP vs 142HP.



Finally, here's a snapshot of optimizing ignition timing on a very repeatable instrumented engine dyno with the 2013 Polaris 600 IQR. Remember—this is with Pete's 106 octane Sunoco fuel but shows how important dyno testing is in achieving absolutely maximum track performance. Not a big change in peak RPM HP, but midrange HP that gets you from clutch engagement to peak revs is greatly influenced.

