2007 Arctic Cat F1000 stock evaluation/ low buck tuneup.

D&D racer/ tech rep Glenn Hall drove all night from a Michigan asphalt race to meet me and Billy Howard at the dyno for a Sunday AM (8/20) DTR session. Glenn had a trailer full of new but uncrated F1000s, destined for factory sponsored NE dragracers that he had picked up at the factory. The one closest to the trailer door was Billy Howard's, and even though there was no rear skidframe we dragged it up on the dyno table and strapped it in place.

The crankshaft drive taper is longer than the old F7 style taper, a lot like the Z1 crank we saw a month or so ago. Our short F7 crank adaptor sufficed for this test, but I'm having our machine shop make us some new ones with longer tapers.

Also new this year are automotive EFI hose connectors, the same as those used on SkiDoo EFI sleds so we had clipon hose adaptors to route fuel from the pump to the SuperFlow fuel flow meter, then back to the fuel rail.

One other significant change from the Firecats is that according to Glenn water pump capacity is doubled (to increase velocity of coolant through the engine). Kevin Cameron says that turbulent coolant is critical for effectively removing engine heat. High velocity ensures that there are fewer (or zero) areas where coolant can stagnate. Also the thermostat opening temp is said to be much lower than the Firecats'.

Today we connected the F1000's cooling system to the dyno cooling system, ensuring constant temp from run to run. Constant coolant, constant pipe center section temp, constant engine run time during test, and plenty of fresh outside air (no unintended EGR)= best possible repeatability.

Billy filled his sled with 87 octane unleaded gas bought next door, and here is our bone stock baseline, with the windshield/ gauge pod fitted to the sled.

07 F1000 all stock

EngSpd	STPTrq	STPPwr	FulA+B	AirTmp	BSFC	A/F 2	FuelP	Air1+2	
RPM	Clb-ft	CHp	lb/hr	degF	lb/hph	Ratio	psig	scfm	
5200	103.7	102.7	57.3	78	0.607	0	44.1	0	
5300	103.8	104.8	57.6	77	0.598	0	44.2	0	
5400	103.8	106.8	58.1	77	0.591	0	44.1	0	
5500	104.9	109.9	59.2	78	0.586	0	44.1	0	
5600	105.4	112.4	60.2	77	0.583	0	44.1	0	
5700	103.7	112.5	59.6	75	0.575	0	44.1	0	
5800	101.9	112.5	58.1	74	0.561	0	44.1	0	
5900	100.6	113.1	56.6	74	0.544	0	44.1	0	
6000	100.7	115.1	58.1	75	0.549	0	44.1	0	
6100	100.2	116.4	58.1	76	0.542	0	44.1	0	
6200	99.9	117.9	58.6	76	0.541	0	44.1	0	
6300	100.5	120.5	58.4	76	0.527	0	44.1	0	
6400	104.9	127.8	59.9	76	0.511	0	44.1	0	
6500	107.2	132.6	61.6	76	0.505	0	44.1	0	
6600	109.4	137.5	62.2	76	0.492	0	43.9	0	
6700	125.2	159.7	97.7	76	0.664	0	43.6	0	
6800	125.6	162.6	100.1	76	0.669	0	43.5	0	
6900	125.3	164.6	104.2	76	0.688	0	43.5	0	
7000	124.1	165.3	104.1	76	0.684	0	43.5	0	
7100	122.5	165.6	104.1	76	0.683	0	43.5	0	

7200	120.9	165.8	103.1	76	0.676	0	43.4	0
7300	117.8	163.7	102.4	75	0.681	0	43.5	0
7400	114.1	160.7	100.5	75	0.681	0	43.5	0
7500	108.1	154.2	98.3	76	0.695	0	43.5	0

Note that there is awfully lean midrange then a violent HP surge as valves open way too late here, but according to Glenn in the field the valves open instantly as throttle is whacked open. But on the dyno, where acceleration of the engine is very gradual, the Cat guys have programmed the valves to stay shut until about 6600. So we can only interpolate the early part of the graph (initially during each run the valves would open, then close (for cleaning and to make sure they are functioning correctly?) on the graphs you can see torque begin to rise during the run, then drop as valves were closed. Also, as we added HP the late opening became more violent, overrunning the servo valve on the dyno absorption unit, so the higher power plateau shows up later. But again, we should interpolate the HP curve as following an invisible line from start of the test to where the dyno regains control after valve opening.

Glenn had been with D&D dyno testing a prototype F1000 this summer, and they found the airbox outside air inlet to be very restrictive. The original screened air inlet on the upper left side of the hood caused elevated intake noise, and a problem meeting dB requirements. So a new intake crossover chamber was fitted to the widshield/ gauge pod, sealed to the stock airbox opening, the left screened inlet vent was closed with a plastic snapin panel. Inlet air is now routed from the right side of the hood, and apparently that tubular air duct in the pod is horrible restrictive (surely to reduce dB). D&D's fix is to remove the black plastic panel behind the vent on the left side, and drill four 1.5" holes and install four Bullseyes. For our first test of the airbox afterthought addon, we simply removed the pod and ductaped our dyno airflowmeter to the rectangular opening at the top of the airbox. The HP increase was substantial, a combination of added airflow and leaned out A/F mixture.

07 F1000 stock, remove gauge/ windshield pod, install airflowmeter

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	FulA+B lb/hr	AirTmp degF	BSFC lb/hph	A/F 2 Ratio	FuelP psig	Air1+2 scfm
5300	104.9	105.9	57.7	75	0.591	15.53	43.8	196
5400	105.5	108.4	58.6	75	0.586	15.31	43.8	196
5500	105.9	110.9	59.6	76	0.584	15.02	43.8	195
5600	106.5	113.5	60.8	77	0.582	14.62	43.9	194
5700	98.9	107.4	57.1	76	0.578	15.61	43.9	195
5800	98.1	108.3	56.9	76	0.571	15.71	43.9	195
5900	98.2	110.3	56.2	76	0.554	15.93	43.9	195
6000	97.1	110.9	56.2	74	0.551	16.01	43.9	196
6100	99.4	115.5	57.6	75	0.542	15.59	43.8	196
6200	100.4	118.5	59.5	76	0.546	15.05	43.8	196
6300	101.5	121.8	61.8	76	0.552	14.49	43.8	196
6400	102.2	124.5	62.3	76	0.544	14.39	43.7	196
6500	102.6	127.1	62.8	76	0.538	14.33	43.7	197
6600	103.3	129.8	63.3	76	0.531	14.33	43.7	198
6700	104.6	133.4	65.3	76	0.533	13.96	43.7	199
6800	128.5	166.4	101.1	75	0.658	11.06	43.2	244
6900	128.7	169.1	102.9	76	0.661	11.01	43.2	247
7000	128.1	170.7	104.5	75	0.664	10.99	43.2	251
7100	126.7	171.2	104.7	75	0.664	11.03	43.2	252
7200	125.2	171.6	104.1	75	0.659	11.12	43.2	253
7300	122.1	169.7	102.2	74	0.654	11.37	43.2	254
7400	118.7	167.2	100.4	74	0.652	11.57	43.3	254
7500	114.1	162.9	97.6	74	0.651	11.84	43.3	252

Also note that the added airflow resulting from the relived airbox restriction also leaned out the midrange excessively, causing HP in that area to suffer. But remember, this is dyno only, and in the field those valves open instantly and we believe there is plenty of fuel there to support the higher midrange airflow with open Ex valves.

We left the airflowmeter fitted to the airbox inlet, then Billy and Glenn installed a D&D stamped Ypipe that had smoother bents and was devoid of the dimples at the crotch of the stock Ypipe. Once again, the HP surge was even more violent and the engine surged another hundred revs before the dyno could catch up with it. But the bottom line is a dandy 4% increase in airflow CFM which by itself would have added seven HP then the other 4 HP we saw from the Y pipe could be assumed came from the leaner A/F mixture (higher airflow plus fixed EFI fuel flow = leaner mixture).

07 F1000, removed air inlet pod, installed dyno airflowmeter and D&D stamped Ypipe

EngSpd	STPTrq	STPPwr	FulA+B	AirTmp	BSFC	A/F 2	FuelP	Air1+2
RPM	Clb-ft	CHp	lb/hr	degF	lb/hph	Ratio	psig	scfm
5300	103.3	104.2	57.6	74	0.599	15.32	43.8	193
5400	104.4	107.4	58.1	74	0.586	15.24	43.8	193
5500	105.1	110.1	59.1	75	0.582	14.97	43.7	193
5600	105.1	112.1	59.8	75	0.579	14.75	43.8	193
5700	103.2	112.1	58.6	75	0.568	15.09	43.7	193
5800	100.7	111.3	57.3	75	0.559	15.41	43.8	193
5900	101.8	114.4	56.9	75	0.541	15.58	43.7	194
6000	102.2	116.7	56.7	75	0.527	15.71	43.8	194
6100	100.9	117.2	57.3	75	0.531	15.63	43.8	196
6200	103.1	121.7	59.1	75	0.528	15.13	43.7	195
6300	102.1	122.5	60.3	74	0.534	14.83	43.7	195
6400	102.2	124.6	60.3	75	0.526	14.85	43.7	196
6500	102.6	126.9	60.3	75	0.516	14.89	43.7	196
6600	103.5	130.1	60.6	75	0.506	14.88	43.7	197
6700	103.6	132.1	60.6	75	0.498	14.88	43.7	197
6800	105.4	136.5	60.8	75	0.484	14.97	43.7	199
6900	109.3	143.6	64.8	75	0.491	14.37	43.6	203
7000	135.4	180.5	104.6	75	0.628	11.31	42.5	258
7100	135.1	182.7	103.5	76	0.615	11.54	43.1	261
7200	132.9	182.2	103.8	76	0.619	11.59	43.2	263
7300	130.3	181.2	101.6	76	0.609	11.86	43.2	263
7400	126.1	177.5	99.1	76	0.607	12.14	43.2	263
7500	121.7	173.8	98.3	76	0.615	12.18	43.2	262
7600	115.2	166.7	95.9	75	0.625	12.41	43.3	260

How did Arctic Cat leave 15HP “on the table” with intake air ducting and Y pipe design? We should guess that the air inlet deal was hastily “engineered” to eliminate a few dB to get the F1000 to pass sound testing so they could begin manufacturing. The Y pipe doesn’t seem to effect dB, so maybe 170 was Cat’s target HP for this machine? Like back in the 80s when Yamaha kept the HP down to the 50’s with a very poor stock single pipe (fixed easily by adding an aftermarket quiet can pipe and 12-14HP), perhaps ensuring that Phazers would be not quicker than SRVs and Vmax 540 flagship.

Finally, we reinstalled the pod with four D&D Bulseye plastic air inlets. Despite their seemingly small size, with our airflowmeter removed and the modified pod reatteched to the sled and the rectangular airbox opening. Now intake air could come from both the stock right hand opening plus the newly opened left side. The ensuing dyno test, with pod an and Bullseye modded left side panel repeated the open box run perfectly, with 182.4 CHP and 135.2 lb/ft of torque (less than 2/10 th of one percent variation).

Speaking of torque, the true torque peak of the big 1000 twin was surely hidden by the late opening Ex valves, probable somewhere north of 140 lb/ft before valve opening.

How about the SnowWeek DTR Adirondack Shootout this year? If I were a Cat dealer, my dealer prep would surely include a D&D Ypipe and Bullseyes in the blocked off left side panel. The Cat, Yam and Pol dealers have complained that it's too easy for the Doo dealer to win the Dealer Prep "most improved" cup by pulling the MachZ revs from the moon (low HP and low dB) to where the HP happens. Maybe something like this will hel level the dealers' playing field. Just some new fuel for the fire at this fall's pre-shootout meeting in Old Forge!