2009 Arctic Cat Crossfire 1000

BMP East (Herkimer, NY) proprietor Jake Jenkins borrowed his dad's brand new Crossfire 1000 for the December 2008 [DTR/AmSnow] Adirondack Shootout. They would enter the sled in the aftermarket Trail Mod class with comparatively inexpensive add-on parts, and dyno tuning was a prerequisite. This gave us an opportunity to see a stocker, and then see what the individual bolt-on parts would do for Jake's horsepower.

This would also allow us to see what HP the Xfire 1000 cheater might have been producing at the Adirondack Shootout. The word on the street is that sled was secretly fitted with someone's Ypipe, an offset key, and an earlier F1000 ECU which is said to have more timing. The Unlimited Stock class was made up of two cats—why would one cheat against the other? We used the honor system here for the first time in 19 years, and it failed miserably. But here's the real stocker, very excellent power in that light chassis.

After fitting Jake's dad's new sled with all the ICU-like instrumentation measuring fuel flow and airflow, we did a brand-new cold engine "cold shot" and made 170 HP. Once the coolant was up to 100 F or so, and internal engine parts were as hot as they are during normal operation, here is a typical dyno test. Note that we have no numbers below 6500—that's when the exhaust valves open on the dyno. Closed valve data is not very useful, since in the field the new Cats are said to open the valves as soon as throttle is opened wide. But on the dyno with slow gradual acceleration at WOT, the Xfire 1000 valves stay closed until 6500 then they whack wide open.

Here's the new bone stock Crossfire 1000 heat soaked with 120 degree F coolant temp:

EngSpd	STPTrq	STPPwr	BSFC A	Fuel A	A/F A	AirTmp	Air 2	FuelP
RPM	Clb-ft	CHp	lb/hph	lb/hr	Ratio	degF	scfm	psig
6600	128.0	160.9	0.65	102.7	10.90	44	245	40.1
6700	128.0	163.3	0.66	105.0	10.67	44	245	40.1
6800	127.2	164.7	0.67	107.3	10.59	44	248	40.1
6900	126.3	166.0	0.66	107.7	10.65	43	250	40.0
7000	125.2	166.9	0.66	108.2	10.63	43	251	40.1
7100	123.4	166.8	0.66	107.3	10.76	42	252	40.1
7200	120.8	165.6	0.66	106.8	10.83	42	253	40.1
7300	117.4	163.1	0.67	106.2	10.89	42	253	40.1
7400	104.5	147.3	0.71	102.0	11.16	43	249	40.2

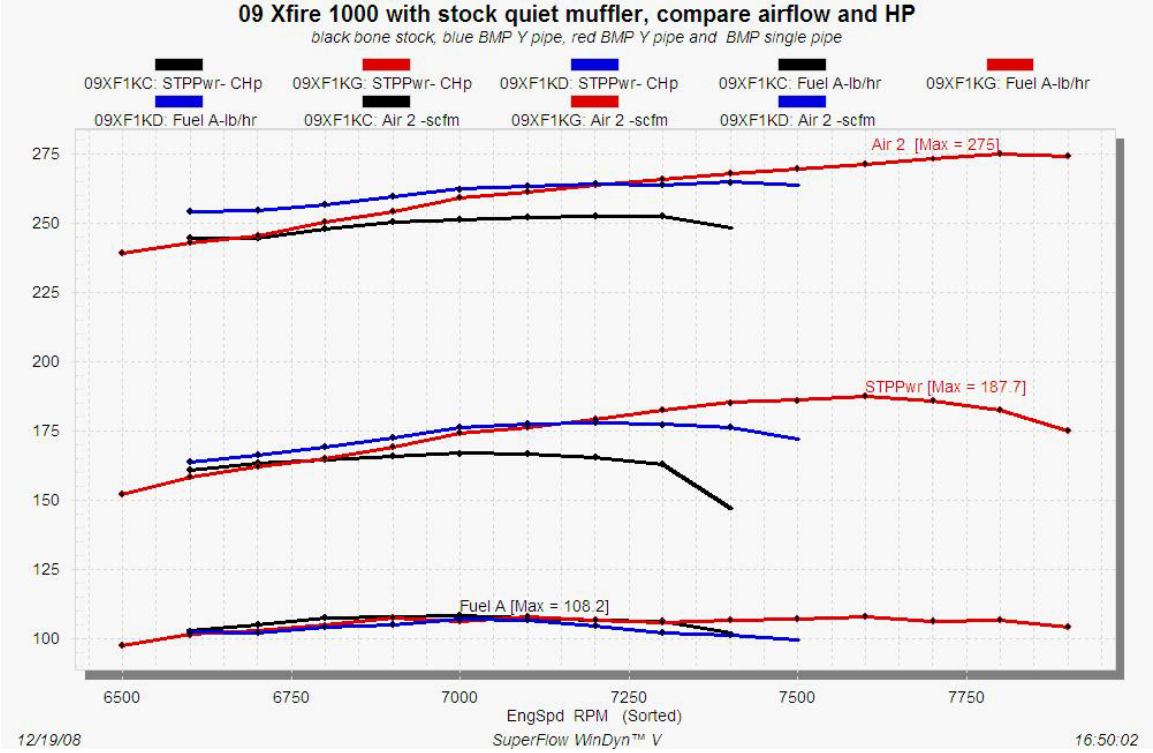
Next Jake installed a Bikeman Y pipe. This added 6% more HP (10) as the result of a combination of 5% more airflow CFM and the leaning out of the A/F ratio because of fixed EFI fuel flow lb/hr and added airflow lb/hr. But also note in the following graph, the BMP Ypipe adds huge airflow at valve opening, and the midrange power increase is even higher than it is at peak. That usually unreported violent midrange power increase is felt on the trail, every time one whacks the throttle.

EngSpd	STPTrq	STPPwr	BSFC A	Fuel A	A/F A	AirTmp	Air 2	FuelP
RPM	Clb-ft	CHp	lb/hph	lb/hr	Ratio	degF	scfm	psig

6600	130.4	163.9	0.64	102.3	11.38	42	254	40.8
6700	130.4	166.4	0.63	102.0	11.44	44	255	40.6
6800	130.8	169.4	0.63	104.2	11.28	44	257	40.6
6900	131.4	172.7	0.62	105.1	11.31	44	260	40.6
7000	132.4	176.4	0.62	106.9	11.24	44	262	40.5
7100	131.2	177.4	0.61	106.6	11.31	44	263	40.5
7200	129.7	177.8	0.60	104.5	11.58	44	264	40.6
7300	127.6	177.3	0.59	101.9	11.85	44	264	40.7
7400	125.2	176.5	0.59	101.2	11.98	44	265	40.7
7500	120.5	172.0	0.59	99.7	12.11	44	264	40.7

The BMP single pipe similarly adds 10 HP over the stock pipe combined with the BMP Y pipe. Now, since the BMP pipe raised peak HP to an area where stock fuel flow declined to a dangerous level, a Boondocker was called into play to add high RPM fuel flow as shown. Here is the bone stock Xfire 1000 with a Ypipe, single pipe and Boondocker EFI controller to flatten out fuel flow.

EngSpd	STPTrq	STPPwr	BSFC A	Fuel A	A/F A	AirTmp	Air 2	FuelP
RPM	Clb-ft	CHp	lb/hph	lb/hr	Ratio	degF	scfm	psig
6500	123.0	152.3	0.65	97.5	11.24	39	239	40.7
6600	126.2	158.5	0.65	101.4	10.97	41	243	40.3
6700	127.0	162.0	0.65	102.7	10.95	42	246	40.5
6800	127.4	164.9	0.65	104.8	10.94	41	250	40.6
6900	128.8	169.2	0.65	107.5	10.83	41	254	40.6
7000	130.6	174.1	0.62	106.2	11.18	41	259	40.5
7100	130.4	176.3	0.62	107.8	11.10	41	261	40.5
7200	130.7	179.2	0.61	106.8	11.32	40	264	40.5
7300	131.5	182.7	0.59	105.7	11.52	41	266	40.6
7400	131.5	185.3	0.59	106.6	11.50	41	268	40.5
7500	130.3	186.1	0.59	107.1	11.53	40	270	40.5
7600	129.7	187.7	0.59	107.9	11.52	40	271	40.5
7700	126.8	185.9	0.58	106.4	11.76	40	273	40.9
7800	122.8	182.4	0.60	106.6	11.82	40	275	40.6
7900	116.2	174.8	0.61	104.2	12.05	41	274	40.5



Jake called BMP Erich Long, who suggested that the 09 must have relaxed timing curve. Jake added a 3 degree offset key with no other changes and that brought the power up to 190 plus.

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC A lb/hph	Fuel A lb/hr	A/F A Ratio	AirTmp degF	Air 2 scfm	FuelP psig
6500	125.7	155.6	0.63	95.2	11.57	44	241	40.8
6600	126.3	158.7	0.62	96.9	11.52	44	244	40.8
6700	128.9	164.5	0.62	100.6	11.38	43	250	40.7
6800	129.0	167.1	0.63	102.6	11.31	43	253	40.7
6900	130.3	171.1	0.63	105.5	11.17	43	257	40.6
7000	132.8	177.0	0.61	106.3	11.24	45	261	40.6
7100	133.6	180.7	0.59	104.6	11.52	45	263	40.6
7200	133.9	183.6	0.58	104.3	11.70	44	266	40.7
7300	134.9	187.5	0.57	103.8	11.82	44	268	40.6
7400	134.2	189.1	0.57	105.5	11.72	44	270	40.6
7500	133.3	190.4	0.57	105.9	11.74	44	271	40.6
7600	131.3	190.0	0.58	107.0	11.68	44	273	40.6
7700	127.3	186.6	0.58	105.5	11.92	44	275	40.6
7800	119.1	176.9	0.61	105.4	11.93	44	275	40.6

Next on the schedule was assessing the new Boyesen Rad Valves. Jake spent a long time removing the airbox, throttle body boot, throttle bodies and those awful coolant lines, to remove the stock reeds and install these very different aluminum body fiberglass reed assembly. But at the same time Jake's Boondocker failed causing high RPM leanout that

we caught before any problems occurred. We installed a prototype Power Commander III to recover the lost fuel flow. Now as we can see from the following data airflow was higher than stock, fuel flow as created by the hastily programmed PCIII was lower lb/hr and much leaner A/F ratio, and power was increased by 1 ½%. But could the fit of the plastic throttle body boot to triangular airbox with stock air horn, been sealing better after all that disassembly/ reassembly? We can't be sure here whether the power increase is from reduced fuel flow or added true airflow CFM. But power is higher now and HP is king.

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC A lb/hph	Fuel A lb/hr	A/F A Ratio	AirTmp degF	Air 2 scfm	FuelP psig
6600	129.9	163.2	0.62	99.9	11.92	40	260	40.5
6700	130.1	166.0	0.63	102.4	11.90	39	266	40.4
6800	131.1	169.7	0.62	103.3	11.89	39	268	41.5
6900	131.9	173.2	0.61	103.4	11.99	39	271	40.7
7000	132.4	176.4	0.60	103.7	12.02	39	272	40.4
7100	135.2	182.7	0.58	103.5	12.10	40	273	40.4
7200	136.5	187.1	0.57	104.2	12.15	40	276	40.4
7300	136.0	189.0	0.56	104.2	12.15	40	277	40.4
7400	136.2	191.9	0.54	102.5	12.46	40	279	40.4
7500	135.0	192.8	0.54	101.5	12.58	40	279	40.4
7600	133.0	192.4	0.54	101.3	12.66	40	280	40.5
7700	128.8	188.8	0.54	100.8	12.86	39	283	40.5
7800	122.8	182.4	0.56	100.7	12.84	39	282	40.5

Finally Jake installed a billet large diameter air intake, and there was no discernable airflow or HP difference from stock plastic intake to larger diameter aluminum intake.

How about the Adirondack Shootout Big Moose cheater Xfire 1000? If, as the spies suggest, it had a Y pipe, offset key and earlier hotter ECU we can surmise from observing this data that it could have been 180 plus HP. That's equal to the Z1 turbo but very much lighter in weight. But 10 mph better? Now if that sled had been left stock it surely would have been quickest and fastest at The Shootout, but we won't know for sure until next year, when the unlimited class sleds will be teched as closely as the others.