

2009 Arctic Cat Crossfire 800 w/ D&D “shim kit”

Carl Theriault of Northboro, MA purchased a D&D “shim kit” and Y pipe for his new Xfire 800. He came to DTR to see what his HP was, and what RPM he might expect it to occur at. D&D’s Dale Roes had suggested to Carl that with shim and Ypipe the new Xfire *may* need a bit extra top end fuel—maybe 5 Boondocker numbers at peak revs to cover the added high RPM airflow.

But since the new Xfire 800 has detonation protection, Carl installed the shim kit and Y pipe (with 2.5 degree offset timing key) and trail rode 1300 miles w/o Boondocker (or PCIII) on Maine 91 octane gas. In those 1300 hard miles the det light came on only twice (each time during mile-long top end runs), with no ill effects to the engine.

The D&D shim kit consists of an aluminum cylinder spacer and two base gaskets that raise the cylinder. Raising the cylinder increases the Xfire 800 engine port timing (conservative compared to the 800 Skidoo and Polaris Dragon). But raising the cylinder also raises the combustion chamber, which would increase squish clearance by the thickness of the shim and one base gasket and reduce compression ratio. To offset that, D&D machines the customer’s cylinder head to allow the combustion chambers to drop *into* each cylinder. This precision machining process maintains the desired tight squish clearance and compression ratio.

D&D also sent us a Crossfire 800 single pipe to test. This pipe would surely require added top end fuel, but its ultimate performance would prove to be hindered by the Crossfire 800’s 8500 RPM electronic rev limiter.

For baseline comparison, here is the data from this year’s AmSnow DTR Adirondack Shootout Crossfire 800. For all of these tests we’re including only data obtained after exhaust valve opening at 7200 RPM.

EngSpd	STPTrq	STPPwr	AirTmp	TsTim2	BaroP
RPM	Clb-ft	CHp	degF	second	in/Hg
7300	88.8	123.4	34	10.9	29.23
7400	104.3	147.0	35	13.4	29.23
7500	103.4	147.7	34	14.0	29.23
7600	102.2	147.9	34	14.6	29.23
7700	100.7	147.7	35	15.4	29.23
7800	98.4	146.2	35	16.2	29.23
7900	95.7	144.0	35	17.0	29.23
8000	92.5	140.9	35	18.0	29.23

Here is Carl's Crossfire 800, with D&D Shim kit installed with stock Y pipe and exhaust. No fuel is added. Note that on this 30 degree/ 29+ in/hg test the stock ECU delivers a peak of 90 lb/hr fuel flow. For comparison, the stock Polaris Dragon 800 delivers 110 lb/hr in these conditions. Here is about nine HP for a bargain \$250, and puts this engine right on par with the more powerful stock Skidoo 800 XP and Dragon 800 (when the D8 is tuned properly).

RPM	stpTQ	stpHP	BSFC	FUEL	A/F	SCFM	Fuel PSI	LM-1
7300	103.2	143.4	0.61	85.7	11.86	222	39.0	14.0
7400	104.4	147.1	0.61	87.6	11.82	226	38.9	13.4
7500	105.0	150.0	0.61	88.5	11.81	228	38.9	13.2
7600	105.5	152.7	0.60	90.0	11.69	230	38.9	12.9
7700	105.1	154.1	0.60	89.8	11.80	231	38.9	12.8
7800	104.7	155.5	0.59	89.3	11.89	232	39.0	12.7
7900	104.3	156.9	0.58	88.4	12.06	233	38.9	12.6
8000	102.5	156.1	0.57	86.1	12.34	232	38.9	12.7
8100	101.0	155.7	0.56	85.3	12.40	231	38.9	12.3
8200	98.8	154.3	0.55	82.4	12.81	230	39.1	12.9
8300	95.0	150.2	0.56	82.2	12.80	230	39.1	13.1
8400	89.3	142.8	0.59	81.6	12.80	228	39.0	13.3

Next Carl removed the stock Y pipe installed the D&D Y pipe with the stock tuned pipe and muffler. This is exactly the way Carl has ridden this sled for 1300 miles on 91 octane pump gas. This good reliability on pump gas at very low BSFC can be attributed to the modern "reverse" cooling system that pumps coolant through the head first to cool combustion chambers best (like all nascar engines do). The twin plugs per cylinder also help keep combustion chamber surfaces cool by reducing the time (ignition timing advance) from spark ignition to peak combustion chamber pressure at the desired time after TDC. Interestingly, the D&D Y pipe added three HP but the dyno-recorded airflow CFM was nearly identical to stock.

RPM	stpTQ	stpHP	BSFC	FUEL	A/F	SCFM	FuelPSI	LM-1
7400	105.7	148.9	0.59	84.7	12.14	225	39.5	13.7
7500	107.0	152.8	0.58	86.2	12.16	229	39.5	13.4
7600	107.5	155.6	0.58	88.0	11.95	230	39.4	13.2
7700	108.1	158.5	0.58	89.2	11.89	232	39.4	12.9
7800	107.1	159.0	0.58	88.9	11.92	231	39.4	12.8
7900	106.3	160.0	0.57	87.8	12.13	233	39.4	12.8
8000	104.7	159.4	0.55	85.0	12.44	231	39.5	12.9
8100	102.7	158.4	0.55	83.9	12.69	232	39.4	13.1
8200	100.4	156.8	0.55	83.8	12.64	231	39.4	13.1
8300	97.4	154.0	0.56	83.3	12.61	229	39.5	13.2
8400	90.2	144.3	0.58	81.4	12.68	225	39.5	13.6

For those who have to use 87 octane gas, and want to run long distances without the annoying det light reminding you to be reasonable, here's Carl's same shim/ Y pipe combination, but with Boondocker programmed with 3's at peak torque and HP RPM.

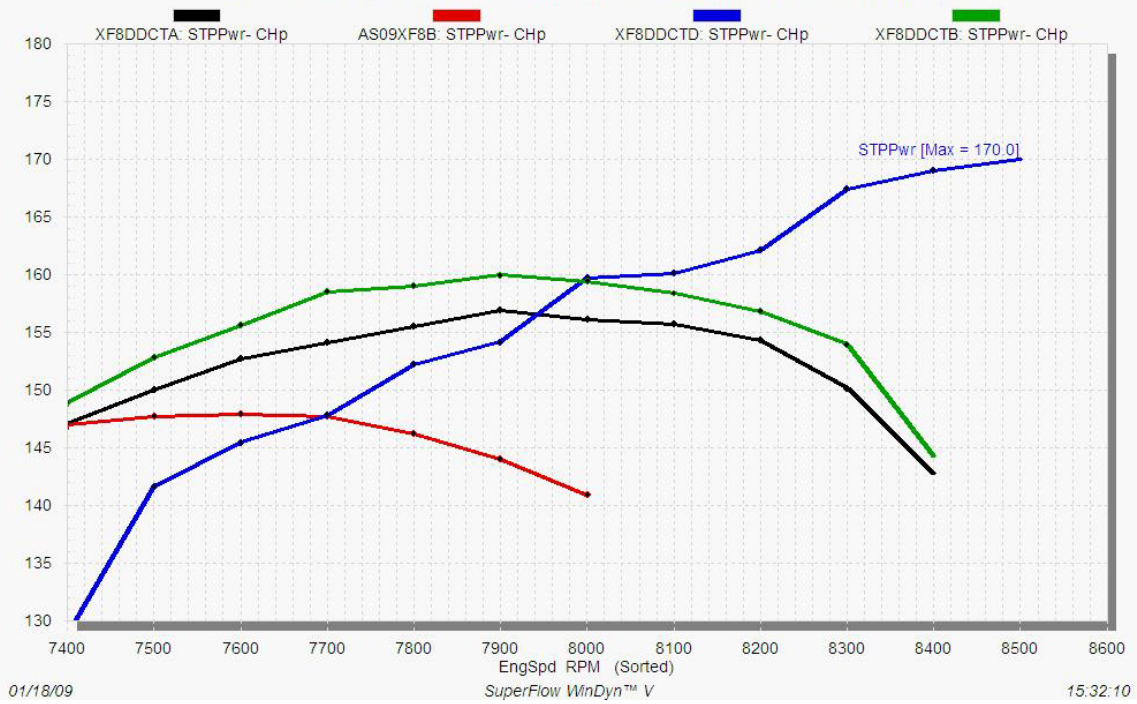
RPM	stpTQ	stpHP	BSFC	FUEL	A/F	SCFM	fuelPSI	LM-1
7300	104.2	144.9	0.61	86.8	11.85	225	39.7	14.2
7400	106.0	149.4	0.62	89.8	11.63	228	39.7	13.6
7500	107.4	153.4	0.61	90.9	11.69	232	39.7	13.0
7600	107.2	155.1	0.61	92.2	11.56	233	39.7	12.9
7700	106.8	156.5	0.61	92.5	11.61	234	39.6	12.5
7800	105.6	156.9	0.61	93.4	11.48	234	39.6	12.5
7900	104.7	157.5	0.61	93.0	11.55	235	39.7	12.4
8000	103.5	157.7	0.59	91.2	11.72	233	39.7	12.4
8100	101.4	156.4	0.58	89.0	11.98	233	39.7	12.5
8200	97.9	152.9	0.59	87.6	12.07	231	39.7	12.6

Finally, here is D&D's single pipe for the Xfire 800. If this was designed for the M/F series 800's that had no rev limiter it might be a good radar run or lake race pipe, peaking at 8500 and tailing off beyond that RPM. But since the new Xfire has a rev limiter just beyond 8500 this would not be very desirable for trail use since if you clutched for peak HP you would be constantly hitting the rev limiter. But the fact that it picks up 10 HP and lots of airflow over stock at 8500 might indicate that if there was length added to the header/ center section to create max HP at 8-8200 this could be a good trail pipe even if peak power was increased by, say, five HP, with Boondocker/ Power Commander needed to add fuel to support 165ish HP. But as is, here is the D&D single with 8 added to Boondocker at 7800 and 12 at 8000.

RPM	stpTQ	stpHP	BSFC	FUEL	A/F	SCFM	fuelPSI	LM-1
7400	91.4	128.8	0.64	80.2	11.31	198	39.7	13.5
7500	99.2	141.7	0.63	86.4	11.28	213	39.6	12.9
7600	100.5	145.5	0.62	87.8	11.27	216	39.6	12.2
7700	100.8	147.8	0.61	88.6	11.37	220	39.5	12.1
7800	102.5	152.2	0.60	89.2	11.60	226	39.5	12.1
7900	102.5	154.2	0.60	89.7	11.52	226	39.5	12.1
8000	104.8	159.7	0.55	85.9	12.27	230	39.6	12.4
8100	103.8	160.1	0.55	85.9	12.30	231	39.6	12.4
8200	103.8	162.1	0.55	86.4	12.30	232	39.6	12.5
8300	105.9	167.4	0.54	87.6	12.41	237	39.5	12.6
8400	105.7	169.0	0.54	88.4	12.32	238	39.5	12.6
8500	105.0	170.0	0.54	89.3	12.27	239	39.5	12.6

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red stock, black shim kit only, green shim kit and D&D Ypipe, blue shim kit, D&D Ypipe and D&D single pipe



high mileage high performance Cat trail rider.