

## Initial tuning with PCV on a broken in 2018 ZR8000

Pennsylvanian Scott Williams has been blessed with early season lake effect snow so he's well over the four hour breakin time on his new ZR8000, and was here to try for more HP by tuning fuel and timing with a Dynojet 11-029 PCV that can adjust both fuel and timing. Also I had told Scott that we had a stock pipe modified by SSI here, sent to us by Erich Long for "evaluation" that looks promising (based upon some preliminary testing) so he was anxious to try that as well.

As we sometimes see with preproduction sleds/ ECU's brought here by dealers (ie: the preproduction Yamaha Apex that was 10+ HP higher than all production Apex's) the first ZR8000 preproduction sled brought here by Tom Ferry of Arctic Adventures was able to tweak 160 HP after breakin. But our first production Ctec 800 brought here by Tom Ferry to be run at the AmSnow/ DTR NY Shootout made only 150 HP--matching production dyno test data reported by others like Dale Roes of D&D Racing.

So here's Scott's broken in ZR8000 heat soaked on 92.1 R+M/2 octane 5% ethanol fuel. Not that the LamAF1 A/F ratio is obtained by our LM1 wideband A/F ratio meter via a probe inserted, proctoscope-like, up the muffler outlet. The LM1Air SCFM is the airflow computed by the SuperFlow dyno based upon wideband A/F reading and measured fuel flow, and doesn't account for the O2 contributed by ethanol content in the fuel. But it gives us a reasonable A-B reference.

### 2018 ZR8000 after breakin.

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA lb/hph	FuelA lbs/hr	LamAF1 Ratio	LM1Air SCFM	FulPrA psig	STPCor Factor
6750	112.3	87.4	0.750	79.7	13.92	249	58.5	1.049
6800	114.3	88.3	0.745	80.6	13.84	251	58.4	1.049
6850	116.3	89.2	0.739	81.4	13.77	252	58.4	1.049
6900	118.2	90.0	0.733	82.1	13.72	253	58.4	1.049
6950	120.1	90.8	0.727	82.7	13.69	254	58.4	1.049
7000	121.9	91.5	0.721	83.3	13.67	256	58.3	1.049
7050	123.6	92.1	0.716	83.8	13.66	257	58.3	1.049
7100	125.3	92.7	0.710	84.2	13.67	259	58.3	1.049
7150	127.0	93.3	0.703	84.5	13.70	260	58.3	1.049
7200	128.6	93.8	0.697	84.8	13.73	262	58.3	1.049
7250	130.1	94.2	0.691	85.1	13.77	263	58.3	1.049
7300	131.7	94.8	0.684	85.3	13.80	264	58.3	1.049
7350	133.3	95.3	0.677	85.5	13.83	265	58.3	1.049
7400	134.8	95.7	0.670	85.6	13.85	266	58.3	1.049
7450	136.3	96.1	0.665	85.7	13.85	267	58.3	1.049
7500	137.6	96.4	0.660	86.0	13.85	267	58.3	1.049
7550	139.1	96.8	0.655	86.3	13.83	268	58.3	1.049
7600	140.5	97.1	0.652	86.8	13.80	269	58.2	1.049
7650	142.1	97.5	0.650	87.4	13.76	270	58.2	1.049
7700	143.6	98.0	0.648	88.1	13.71	271	58.2	1.049
7750	145.2	98.4	0.647	88.9	13.65	272	58.1	1.049

7800	146.7	98.7	0.646	89.7	13.58	274	58.1	1.049
7850	148.0	99.0	0.646	90.5	13.50	274	58.1	1.049
7900	149.0	99.1	0.647	91.2	13.42	275	58.0	1.049
7950	149.8	98.9	0.648	91.8	13.33	275	58.0	1.049
8000	150.1	98.5	0.650	92.3	13.24	275	58.0	1.049
8050	150.1	97.9	0.653	92.7	13.15	274	58.0	1.049
8100	149.6	97.0	0.657	93.0	13.07	273	58.0	1.049
8150	148.9	96.0	0.661	93.1	13.00	272	58.0	1.049
8200	147.9	94.7	0.666	93.1	12.95	271	58.0	1.049
8250	146.3	93.1	0.672	92.9	12.92	270	58.1	1.049
8300	144.5	91.3	0.678	92.7	12.90	269	58.1	1.049
8350	142.8	89.6	0.685	92.4	12.89	268	58.1	1.049

We next used the PCV to optimize fuel flow and timing to create more torque and HP, with zero clicks of detonation. This would be the initial DTR map for trail riders who desire more torque and HP. But remember--all Arctic Cat ECU's will recognize and then show on the dealers' diagnostic software that a PCV or Boondocker has been fitted to your machine.

#### 2018 ZR8000 with DTR fine tuning of timing and fuel, zero clicks of deto

EngSpd RPM	STPPwr CHp	STPTRq Clb-ft	BSFA lb/hph	FuelA lbs/hr	LamAF1 Ratio	LM1Air SCFM	FuIPrA psig	STPCor Factor
6950	123.4	93.7	0.699	81.4	14.29	263	58.8	1.051
7000	124.9	93.8	0.697	82.3	14.20	263	58.7	1.051
7050	126.2	94.0	0.695	82.8	14.13	264	58.7	1.051
7100	127.6	94.4	0.690	83.2	14.09	264	58.7	1.051
7150	129.4	95.0	0.684	83.5	14.08	265	58.7	1.051
7200	131.3	95.8	0.676	83.9	14.10	267	58.7	1.051
7250	133.4	96.7	0.668	84.2	14.14	268	58.6	1.051
7300	135.6	97.5	0.658	84.2	14.18	269	58.7	1.051
7350	137.3	98.1	0.648	84.0	14.22	270	58.7	1.051
7400	138.9	98.6	0.638	83.7	14.25	269	58.7	1.051
7450	140.3	98.9	0.629	83.4	14.27	268	58.7	1.051
7500	141.8	99.3	0.621	83.1	14.29	268	58.7	1.051
7550	143.4	99.7	0.614	83.1	14.32	268	58.7	1.051
7600	145.1	100.3	0.607	83.2	14.33	269	58.7	1.051
7650	147.0	100.9	0.602	83.5	14.33	270	58.7	1.051
7700	148.9	101.6	0.598	84.0	14.31	271	58.7	1.051
7750	150.7	102.1	0.596	84.8	14.27	273	58.6	1.051
7800	152.1	102.4	0.598	85.9	14.22	275	58.6	1.051
7850	153.3	102.6	0.602	87.2	14.12	278	58.5	1.051
7900	154.4	102.6	0.605	88.2	14.00	279	58.5	1.051
7950	155.1	102.5	0.608	89.0	13.86	278	58.5	1.051
8000	155.6	102.1	0.610	89.5	13.73	277	58.5	1.051
8050	155.7	101.6	0.612	89.9	13.63	276	58.5	1.051
8100	155.4	100.8	0.614	90.1	13.56	276	58.5	1.051
8150	154.7	99.7	0.617	90.0	13.53	275	58.5	1.051

8200	153.7	98.5	0.618	89.7	13.52	274	58.5	1.052
8250	152.1	96.8	0.621	89.1	13.55	272	58.5	1.052
8300	149.7	94.7	0.626	88.3	13.62	271	58.6	1.052
8350	146.0	91.5	0.634	87.2	13.74	270	58.6	1.052

Finally, we installed the SSI "pipe mod" made famous by Erich Long with the many Firecat 700 pipes he and BMP "modded" on the early-mid 2000's. That included a flared internal stinger and a small spacer to lengthen out the pipe's center section that increased HP and airflow CFM. In this case, the ZR8000 pipe mod added HP, but appeared to decrease airflow which enriched A/F ratio perhaps slightly diminishing HP gains. But Scott was pleased with the dyno numbers and opted to not lean out fuel flow further.

Note that with the fine tuned A/F ratio and ignition timing *and* the SSI pipe mod the top end HP curve looks nearly identical to the preproduction ZR8000 tested on this dyno. We are waiting for more pipes and mods for this new engine. Stay tuned for updates.

### 2018 ZR8000, DTR PCV map and SSI pipe mod

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA lb/hph	FuelA lbs/hr	LamAF1 Ratio	LM1Air SCFM	FulPrA psig	STPCor Factor
6950	119.8	90.8	0.723	81.8	13.44	248	58.6	1.052
7000	121.2	91.1	0.721	82.4	13.39	249	58.6	1.052
7050	122.5	91.3	0.717	82.9	13.35	250	58.6	1.052
7100	123.9	91.6	0.712	83.2	13.33	250	58.5	1.052
7150	125.5	92.2	0.703	83.3	13.33	251	58.5	1.052
7200	127.5	93.0	0.693	83.3	13.35	251	58.5	1.052
7250	129.5	93.8	0.681	83.2	13.38	251	58.5	1.052
7300	131.6	94.7	0.670	83.1	13.42	252	58.6	1.052
7350	133.9	95.7	0.657	83.0	13.47	252	58.6	1.053
7400	136.0	96.5	0.647	83.0	13.50	253	58.6	1.052
7450	138.2	97.4	0.636	82.9	13.54	253	58.6	1.053
7500	140.4	98.3	0.625	82.7	13.57	253	58.6	1.053
7550	142.4	99.1	0.615	82.7	13.60	254	58.6	1.053
7600	144.4	99.8	0.607	82.7	13.62	254	58.6	1.053
7650	146.4	100.5	0.600	82.8	13.64	255	58.5	1.053
7700	148.5	101.3	0.594	83.2	13.65	256	58.5	1.053
7750	150.8	102.2	0.590	83.9	13.64	258	58.5	1.053
7800	153.0	103.0	0.588	84.9	13.61	261	58.4	1.053
7850	155.2	103.8	0.588	86.1	13.56	264	58.4	1.053
7900	157.2	104.5	0.589	87.3	13.49	266	58.4	1.053
7950	158.7	104.8	0.591	88.5	13.40	268	58.4	1.053
8000	159.6	104.8	0.595	89.5	13.30	269	58.4	1.053
8050	160.2	104.5	0.597	90.2	13.20	269	58.3	1.053
8100	160.3	103.9	0.599	90.6	13.12	268	58.3	1.053
8150	160.2	103.2	0.601	90.7	13.07	268	58.3	1.053
8200	159.8	102.3	0.600	90.4	13.06	267	58.4	1.053
8250	159.1	101.3	0.599	89.8	13.08	265	58.4	1.053
8300	158.2	100.1	0.597	89.0	13.14	264	58.4	1.053

8350	156.7	98.4	0.595	87.9	13.26	263	58.4	1.053
8400	155.0	96.7	0.594	86.6	13.39	262	58.4	1.053

### Broken in 2018 ZR8000

Blue stock, Red tune timing and fuel, Black tune timing and fuel plus SSI stock pipe mod

