2004 SkiDoo Rev 600 SDI tuneup

This 2004 600SDI was brought to us by Matt Kelchlin of Ken's Service and Sales (SkiDoo dealer) in Elma, N.Y. (716-683-1155). We knew ahead of time that though it had only 2600 miles, it had worn rings, which have plagued some SkiDoo twins (leakdown was 50% and 30%). This sled has not had a life of abuse; Matt's computer read the sled's ECU—it showed only 71 minutes at full throttle, and max RPM attained was 8300. *Big Brother is watching you*. Ken and I thought it would be interesting to see what actual power improvement would result from freshening this engine up. So, we connected the sled to our Superflow dyno for baseline numbers. Note that at 70 degrees F the ECU allows us mid .70's BSFC.

Usually, we warm up the engine, engine coolant and pipe(s) and do two or three 10-12 second dyno runs, and expect the engine to repeat within a few tenths of a HP. But even with very constant tuned pipe and coolant temp this engine exhibited an unusually wide nearly one percent HP variation from run to run. One percent variation in HP might not seem like much but it makes looking for minute gains and losses difficult. So, we ran seven dyno runs and used SuperFlow's averaging program to give us our whipped-ring baseline.

04600AV1 all stock, worn piston rings

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air 2 scfm	Oil P psig	AirTmp degF
5000	50.6	48.2	0.737	32.9	13.93	100	59.4	73
5100	50.5	49.1	0.731	33.2	14.01	102	59.5	73
5200	51.8	51.3	0.711	33.8	13.91	103	59.4	73
5300	55.1	55.5	0.682	35.1	13.72	105	59.3	73
5400	56.6	58.2	0.671	36.2	13.62	108	59.3	73
5500	57.6	60.3	0.662	37.1	13.58	110	59.3	73
5600	58.7	62.6	0.653	37.9	13.61	113	59.3	73
5700	60.2	65.3	0.637	38.6	13.81	116	59.2	73
5800	60.8	67.2	0.629	39.2	14.07	121	59.2	73
5900	61.5	69.1	0.629	40.3	14.17	125	59.2	73
6000	62.2	71.1	0.631	41.5	14.18	129	59.1	73
6100	63.8	74.1	0.641	43.9	13.94	134	59.1	73
6200	64.3	75.9	0.661	46.5	13.65	139	59.1	73
6300	64.5	77.4	0.681	48.8	13.35	142	58.9	73
6400	64.4	78.5	0.694	50.5	13.18	145	58.8	73
6500	64.8	80.3	0.711	52.9	12.92	149	58.8	73
6600	65.1	81.8	0.711	53.8	13.01	153	58.8	73
6700	65.1	83.1	0.718	55.2	13.08	158	58.8	73
6800	65.4	84.7	0.721	56.5	13.05	161	58.7	73
6900	66.6	87.5	0.738	59.8	12.61	165	58.5	73
7000	67.3	89.8	0.764	63.5	12.02	167	58.5	73
7100	68.4	92.5	0.758	65.1	11.93	169	58.4	73
7200	69.5	95.3	0.751	66.3	11.92	173	58.4	73

7300	72.1	100.1	0.736	68.2	11.99	179	58.4	73
7400	74.2	104.6	0.729	70.7	12.01	186	58.3	73
7500	75.7	108.1	0.732	73.5	12.08	194	58.2	71
7600	76.5	110.7	0.747	76.7	11.99	201	58.2	72
7700	77.1	113.1	0.746	78.2	11.96	204	58.1	73
7800	76.6	113.8	0.751	79.2	11.92	206	58.1	73
7900	75.9	114.1	0.758	80.2	11.84	208	58.1	73
8000	72.9	111.1	0.787	80.8	11.82	209	58.1	74

Next, Matt removed the stock pistons (looked beautiful) and rings (were flaked) and installed aftermarket pistons and rings purchased from Cudney Racing. The pistons are cast, with what appears to be ceramic dome coating and black moly on the skirts. SkiDoo owners have reported good reliability with the Cudney setup, no problem with ring seal going away so early. We did several initial heat cycles, and then spent 30 minutes doing varying load/ varying engine speed breakin cycle (done automatically by the dyno). We checked leakdown and now it was 9%/ 10%.

We did a group of dyno runs and again averaged the numbers. It was interesting to see that though ring seal is drastically improved, airflow CFM only increased slightly and HP was increased only 2.5% throughout the powerband! We surely expected more.

04600AV2 replace pistons/ rings, 30 minute breakin

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air 2 scfm	WtrOut degF	AirTmp degF
5100	51.1	49.5	0.744	34.2	14.07	105	94	74
5200	51.6	51.1	0.724	34.1	14.15	105	94	74
5300	53.5	54.1	0.698	34.8	14.02	107	94	74
5400	56.1	57.6	0.678	36.1	13.78	109	94	74
5500	57.9	60.6	0.666	37.3	13.71	112	94	74
5600	58.5	62.4	0.657	37.9	13.79	114	95	74
5700	59.5	64.6	0.641	38.2	14.05	117	94	74
5800	60.7	67.1	0.631	39.1	14.26	122	95	74
5900	61.6	69.2	0.631	40.3	14.34	126	95	74
6000	62.3	71.2	0.631	41.5	14.37	130	95	74
6100	63.5	73.8	0.642	43.6	14.18	135	95	74
6200	64.6	76.3	0.651	45.9	13.91	140	95	74
6300	64.7	77.6	0.676	48.5	13.54	144	95	74
6400	65.1	79.2	0.703	51.5	13.07	147	95	73
6500	65.3	80.8	0.714	53.3	12.91	150	95	74
6600	65.4	82.2	0.715	54.3	12.93	153	96	74
6700	65.5	83.5	0.723	55.8	12.85	157	96	74
6800	66.1	85.6	0.722	57.1	12.81	160	96	74
6900	67.1	88.1	0.746	60.7	12.32	163	96	74
7000	68.4	91.2	0.765	64.4	11.91	168	96	74
7100	69.7	94.2	0.757	65.9	11.84	171	97	74
7200	71.4	97.9	0.746	67.4	11.84	174	96	75

7300	73.4	102.1	0.728	68.6	12.06	181	97	74
7400	75.3	106.1	0.723	70.9	12.01	186	97	74
7500	77.1	110.2	0.731	74.4	11.94	194	97	74
7600	77.8	112.6	0.737	76.7	11.93	200	98	74
7700	78.4	115.1	0.741	78.6	11.89	204	98	74
7800	79.1	117.3	0.736	79.8	11.95	208	98	74
7900	77.5	116.6	0.746	80.3	11.93	209	98	74
8000	75.3	114.6	0.767	81.2	11.84	210	98	74

For the next test, Matt increased the ignition timing to the maximum timing possible with his service computer. The timing was changed from 2 degrees advance (the prior two sets of runs were at 2 degrees advance) to 4 degrees advance. And by now Matt noted the muffler exhaust probe reading seemed to be proportional to HP—high temps seemed to give us max HP—not from increased backpressure (lower airflow CFM) but we now believe the ECU retards ignition timing until the muffler (and pipe center section temp) is up to the temperature that the spark/ fuel map was created for (for clarification look at our archives, V3_#4_ "EFI and pipe temperature"). With the muffler EGT constant, this time we did three runs and it repeated within a few tenths. Note that added timing increased midrange and top end HP, but overrev HP suffers.

04600AV3 advance ignition timing to maximum by computer

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air1+2 scfm	WtrOut degF	AirTmp degF
5100	52.2	50.7	0.704	33.1	14.73	106.2	83	73
5200	52.8	52.3	0.696	33.6	14.53	106.7	83	73
5300	55.5	56.1	0.669	34.7	14.29	108.3	84	72
5400	57.6	59.2	0.657	36.1	14.02	110.3	85	73
5500	58.4	61.2	0.641	36.3	14.21	112.6	86	72
5600	60.1	64.1	0.632	37.4	14.12	115.4	87	73
5700	60.2	65.3	0.624	37.7	14.35	118.2	87	73
5800	61.6	68.1	0.616	38.8	14.57	123.5	87	73
5900	61.8	69.5	0.616	39.6	14.73	127.4	88	73
6000	62.4	71.3	0.611	40.2	14.85	130.4	88	73
6100	64.2	74.6	0.616	42.5	14.66	136.1	89	73
6200	65.3	77.1	0.662	47.1	13.73	141.3	90	72
6300	66.1	79.3	0.671	49.2	13.48	144.9	90	73
6400	66.5	81.1	0.701	52.5	12.97	148.8	90	73
6500	66.3	82.1	0.709	53.9	12.88	151.7	90	72
6600	66.1	83.1	0.704	54.1	13.12	155.1	91	72
6700	66.7	85.1	0.712	56.1	12.97	158.7	91	73
6800	66.1	85.5	0.719	56.9	13.03	162.1	91	73
6900	66.9	87.9	0.714	58.1	12.92	164.2	91	73
7000	69.8	93.1	0.712	61.3	12.56	168.2	91	73
7100	73.2	98.9	0.716	65.6	12.24	175.4	92	72
7200	76.3	104.6	0.707	68.5	12.21	182.7	92	72
7300	76.9	106.9	0.702	69.5	12.29	186.6	92	73

7400	77.6	109.3	0.695	70.3	12.42	190.8	92	73
7500	79.4	113.4	0.691	72.4	12.39	196.1	92	73
7600	80.4	116.3	0.705	75.9	12.34	204.6	93	73
7700	80.4	117.9	0.713	77.8	12.25	208.2	92	73
7800	80.6	119.7	0.714	79.1	12.18	210.5	92	73
7900	79.3	119.4	0.731	80.6	11.99	211.2	92	73
8000	65.8	100.2	0.856	79.1	12.08	208.7	92	73

Since the 600SDI system monitors engine knock via a sensor bolted to the cylinder head, we were comfortable making a conservative compression increase. Obviously the local owner of this sled does only reasonable length bursts at WOT, and he always buys 93 octane. In this case, the cylinder head had begun life as a poor die casting—the cast combustion chambers has asymmetrical squish clearance because the chambers were cocked .014". As we measured it, the squish clearance varied from .072 to .058 depending on what part of the chamber we were measuring. When we removed the head, each chamber's squish band had a .014" step on the outside and there was no step on the opposite side. So we had Batavia Job Shop (585-343-5533) take .020" off the head surface, then recut each squish band to achieve the original bore diameter, with no step all the way around the circumference. Reinstalled, this gave us an even .047" squish clearance.

With the double benefit of tighter squish and raised compression, the engine gained several lb/ft of torque throughout the powerband. As expected, the HP peak was moved 100 or so revs lower, and overrev HP dropped.

Also note that on this second day of testing, air temp was nearly 10 degrees F warmer (and was more humid) than day one when we ran tests 1-3. However, fuel flow appears to be higher at the elevated air temperature. Were this sled carbureted, we would have dropped jet size to maintain similar A/F ratio—but here the ECU appears to [rightfully?] add a bit of fuel to add even more safety during operation at high temperature. One other note is today, we took measures to make sure the muffler (and accompanying internal temp) stayed very hot from run to run, and our repeatability was within a few tenths of a HP.

04600AV4 Increase compression, reduce squish clearance

04600AV4 increase compression, reduce squish clearance

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air1+2 scfm	Oil P psig	AirTmp degF
5300	59.6	60.1	0.675	37.2	13.31	108.2	58.8	80
5400	60.3	62.1	0.665	37.8	13.36	110.3	58.7	80
5500	61.1	63.9	0.653	38.2	13.47	112.4	58.7	80
5600	62.5	66.6	0.648	39.6	13.34	115.4	58.6	80
5700	63.3	68.7	0.643	40.5	13.47	119.2	58.7	80
5800	63.8	70.5	0.639	41.3	13.61	122.8	58.7	80
5900	65.1	73.1	0.632	42.3	13.79	127.4	58.6	81
6000	66.6	76.1	0.643	44.9	13.61	133.5	58.5	80

6100	67.1	77.9	0.655	46.8	13.48	137.8	58.5	80
6200	67.3	79.4	0.677	49.3	13.21	142.3	58.4	80
6300	67.3	80.7	0.688	50.9	13.02	144.6	58.3	80
6400	67.9	82.7	0.706	53.5	12.69	148.3	58.2	80
6500	68.4	84.7	0.727	56.4	12.34	152.1	58.2	80
6600	68.6	86.2	0.727	57.4	12.41	155.5	58.2	81
6700	68.3	87.1	0.728	58.1	12.53	158.8	58.2	81
6800	68.3	88.5	0.722	58.5	12.58	160.8	58.2	80
6900	69.1	90.8	0.722	60.1	12.42	162.8	58.1	80
7000	70.6	94.1	0.724	62.4	12.11	165.1	57.9	80
7100	73.4	99.2	0.723	65.7	11.73	168.3	57.9	81
7200	77.7	106.5	0.709	69.2	11.68	176.5	57.8	81
7300	81.4	113.2	0.692	71.8	12.05	189.1	57.7	80
7400	81.2	114.4	0.695	72.9	12.03	191.6	57.7	81
7500	82.3	117.5	0.695	74.9	12.01	196.3	57.6	80
7600	82.8	119.9	0.703	77.2	12.02	202.7	57.6	81
7700	82.6	121.2	0.714	79.2	11.98	207.2	57.5	81
7800	80.8	120.1	0.743	81.7	11.78	210.3	57.4	81
7900	75.4	113.5	0.789	81.9	11.72	209.7	57.4	81

Next we installed a DynoPort single pipe, with a factory insulated heat shield (looks stock enough to fool most trail patrolling Barney Fifes who like to write tickets for even quiet non-stock exhausts), and the stock muffler. This is the same single pipe Sean Ray used in our Rev 600 carbureted tuneup done earlier. After a year of hard use, the original black hi temp paint looked perfect. Newer versions of the DynoPort pipe use the stock pipe donut gasket on the stinger instead of the early steel ball socket we had on our test pipe. Note that the DynoPort pipe had a broader top end HP curve, and much better overrev power (9 HP more than stock at 7900).

04600AV5 DynoPort tuned pipe

04600AV5 install DynoPort single pipe, stock muffler

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air1+2 scfm	Oil P psig	AirTmp degF
5000	54.2	51.6	0.741	34.9	13.25	101.2	58.8	83
5100	54.7	53.1	0.727	35.3	13.24	102.1	58.8	82
5200	56.2	55.6	0.705	35.8	13.19	103.2	58.7	83
5300	58.9	59.5	0.679	36.9	13.07	105.4	58.7	82
5400	60.4	62.1	0.663	37.6	13.11	107.7	58.7	82
5500	61.1	64.1	0.654	38.3	13.11	109.7	58.7	82
5600	61.8	65.9	0.651	39.2	13.09	112.1	58.7	82
5700	63.1	68.5	0.642	40.2	13.24	116.3	58.6	82
5800	64.1	70.8	0.638	41.3	13.31	120.1	58.6	82
5900	65.9	74.1	0.629	42.5	13.54	125.7	58.5	83
6000	66.4	75.9	0.635	44.1	13.51	129.8	58.5	83
6100	66.5	77.3	0.651	45.9	13.32	133.6	58.4	83
6200	67.5	79.7	0.665	48.4	13.05	138.1	58.4	83

6300	67.6	81.1	0.681	50.4	12.85	141.5	58.2	83
6400	68.1	82.8	0.711	53.7	12.38	145.2	58.2	83
6500	68.4	84.7	0.721	55.8	12.21	148.9	58.1	83
6600	68.1	85.6	0.727	56.8	12.22	151.6	58.1	83
6700	68.1	86.8	0.732	58.1	12.18	154.6	58.1	82
6800	68.6	88.8	0.738	59.8	12.01	156.8	58.1	83
6900	69.6	91.4	0.741	61.9	11.77	159.2	57.9	82
7000	71.1	94.8	0.741	64.2	11.49	161.1	57.8	82
7100	72.7	98.3	0.738	66.3	11.31	163.8	57.8	82
7200	74.1	101.5	0.729	67.6	11.25	166.1	57.8	83
7300	76.4	106.2	0.722	70.1	11.12	170.3	57.7	82
7400	82.1	115.5	0.695	73.4	11.43	183.3	57.6	82
7500	82.4	117.7	0.693	74.6	11.66	190.1	57.6	82
7600	83.5	120.8	0.691	76.4	11.65	194.5	57.5	82
7700	83.6	122.6	0.706	79.3	11.54	200.1	57.4	81
7800	83.1	123.3	0.721	81.3	11.56	205.3	57.3	81
7900	81.3	122.2	0.741	82.8	11.47	207.4	57.3	82
8000	72.4	110.3	0.829	83.5	11.37	207.4	57.3	82

We had a new style silver ceramic coated DynoPort can muffler which has a bung fitting to accommodate the muffler temperature probe. This muffler gave us more backpressure, which increased tuned pipe center section temp enough to shift the power curve to the right, and raised peak HP 100 revs. Interestingly, midrange (WOT 5000-7000 RPM) sound level was nearly as quiet as stock, but then dB increased from 84 to 88 when the exhaust valves open on top end. Slightly more HP with less airflow is not a combination that lakerunners should consider optimal, but should be fine for dragracers and on-off-on throttle trail riders.

04600AV6 DynoPort tuned pipe and muffler

04600AV6 install DynoPort muffler with DynoPort pipe

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	BSFC lb/hph	Fuel A lb/hr	A/F Ratio	Air1+2 scfm	Oil P psig	AirTmp degF
4900	53.3	49.7	0.751	34.2	13.44	99.8	58.8	84
5000	52.9	50.4	0.731	33.6	13.71	100.6	58.8	83
5100	53.6	52.1	0.716	34.1	13.64	101.3	58.8	84
5200	56.1	55.5	0.694	35.1	13.39	102.7	58.7	84
5300	57.6	58.1	0.676	35.9	13.35	104.7	58.7	83
5400	59.7	61.4	0.659	36.9	13.26	106.9	58.6	84
5500	60.6	63.5	0.661	38.3	13.11	109.6	58.6	84
5600	61.4	65.4	0.648	38.7	13.25	112.1	58.6	84
5700	62.8	68.1	0.631	39.2	13.44	115.1	58.6	84
5800	64.1	70.8	0.632	40.8	13.43	119.7	58.6	84
5900	64.6	72.5	0.625	41.4	13.67	123.6	58.6	83
6000	65.2	74.5	0.624	42.5	13.73	127.5	58.5	83
6100	67.2	78.1	0.655	46.7	13.07	133.3	58.4	83

6200	67.1	79.2	0.681	49.3	12.73	137.1	58.3	83
6300	67.5	81.1	0.697	51.5	12.47	140.3	58.2	84
6400	67.1	81.8	0.716	53.5	12.28	143.5	58.1	83
6500	67.2	83.2	0.724	54.9	12.18	146.1	58.1	84
6600	67.2	84.5	0.731	56.3	12.11	149.1	58.1	83
6700	67.6	86.3	0.736	57.9	12.09	152.9	58.1	84
6800	68.1	88.1	0.729	58.5	12.11	154.6	58.1	84
6900	69.1	90.7	0.743	61.5	11.65	156.5	57.9	84
7000	70.1	93.4	0.752	64.1	11.34	158.6	57.8	84
7100	72.1	97.4	0.744	66.1	11.14	160.9	57.8	84
7200	74.3	101.9	0.735	68.3	10.98	163.9	57.7	84
7300	76.3	106.1	0.721	69.7	11.16	169.9	57.7	84
7400	77.9	109.8	0.711	71.2	11.14	173.3	57.7	84
7500	80.6	115.1	0.704	74.1	11.33	183.2	57.5	84
7600	82.8	119.9	0.701	76.7	11.43	191.5	57.5	83
7700	83.8	122.9	0.703	78.8	11.37	195.7	57.4	84
7800	83.3	123.7	0.719	81.2	11.29	200.2	57.3	84
7900	82.7	124.3	0.731	82.9	11.29	204.4	57.3	83
8000	77.4	118.1	0.771	82.9	11.31	204.9	57.3	84

With the DynoPort pipe and can left in place, we removed the stock reeds and installed Boyeson power reed petals (part number 557 on the blister pack) on the stock reed cages. We also installed the recommended ¼" thick aluminum reed spacers. Six repeat dyno tests, each within a few tenths, showed airflow CFM and peak HP was virtually the same as stock. However, if you overlay graph (with your own SuperFlow Windyne software) the airflow and HP you will see that that though the midrange airflow was identical to stock reeds, the runs with the Boyeson reeds lost a noticeable (on the dyno) amount midrange torque and HP.

04600AV7 Same as 6, add Boyeson reeds/ reed spacers.

04600AV7 DynoPort pipe & muffler/ install Boyeson reeds in stock cages, 1/4" reed spacers

EngSpd	STPTrq	STPPwr	BSFC	Fuel A	A/F	Air1+2	Oil P	AirTmp
RPM	Clb-ft	CHp	lb/hph	lb/hr	Ratio	scfm	psig	degF
5600	61.2	65.2	0.642	39.1	13.59	116.1	58.6	83
5700	61.8	67.1	0.642	40.1	13.58	118.7	58.5	84
5800	63.1	69.6	0.627	40.7	13.75	122.3	58.5	83
5900	63.6	71.4	0.631	42.1	13.74	126.1	58.5	84
6000	64.4	73.5	0.641	43.9	13.51	129.6	58.3	84
6100	64.7	75.1	0.664	46.5	13.11	133.2	58.3	84
6200	64.8	76.5	0.676	48.2	12.94	136.3	58.3	84
6300	65.1	78.1	0.698	50.7	12.57	139.2	58.2	84
6400	65.3	79.6	0.724	53.7	12.19	143.1	58.1	84
6500	65.3	80.9	0.736	55.5	12.07	146.4	58.2	84
6600	65.5	82.3	0.745	57.1	11.98	149.5	58.1	84
6700	65.7	83.8	0.741	57.8	12.13	153.2	58.1	84
6800	65.9	85.3	0.736	58.5	12.14	155.1	58.1	84
6900	66.5	87.3	0.753	61.3	11.72	156.9	57.9	83

7000	67.6	90.2	0.757	63.7	11.41	158.8	57.8	83
7100	69.1	93.3	0.752	65.5	11.22	160.6	57.8	83
7200	71.6	98.1	0.737	67.5	11.17	164.7	57.7	83
7300	74.4	103.4	0.723	69.7	11.19	170.4	57.6	83
7400	76.1	107.1	0.721	72.1	11.18	175.8	57.6	83
7500	77.9	111.2	0.713	73.9	11.33	182.9	57.6	84
7600	79.4	114.9	0.708	75.9	11.33	187.9	57.5	83
7700	81.3	119.2	0.711	79.1	11.21	193.3	57.4	83
7800	83.5	124.1	0.703	81.3	11.25	199.8	57.3	84
7900	82.7	124.3	0.711	82.5	11.35	204.6	57.3	84
8000	79.4	120.9	0.739	83.3	11.33	206.1	57.3	84

Some observations…….

We were surprised that more was not gained by replacing the rings in this engine. Blowby in a two-cycle should be doubly bad since one would assume that it would contaminate the incoming charge. Bender Racing's Terry Paine predicted correctly during our predyno coffee hour that little would be gained. They had worked for a week with one of their ProStock engines to improve leakdown from 20% to about 3% (special gapless rings, diamond honing, etc) and gained zero HP on their SuperFlow dyno.

The DynoTech Archives are useful—stuff we learned on now-obsolete sled engines still applies today. Virtually everything of interest we gleaned from 1000's of engines dyno'd is in those pages. The EFI/ Pipe Temp information in that old issue is helpful in understanding the necessity of muffler EGT probes (Doo) and the benefits of late, fixed ExhaustValve opening (Cat). Also, seeing 600SDI aftermarket reeds cause midrange HP loss with no CFM loss is strange, but we've seen that sort of anomaly before. My favorite instance of airflow not matching HP was the first Vmax4 750 FIII race engine Tim Bender received from Japan. Tim was not happy enough graduating from that awful (but quick), vibrating 130 HP Exciter F3 to a bolt-in-the sled Rolex-smooth 170ish HP 4-cylinder, so he needed to try to find even more. Tim found reed cages from a 250 Yamaha dirt bike that had reed windows larger than the ones on the race engine. Those larger cages made more CFM, and lost HP!?! So, naturally he next tried stock Phazer reed cages with windows *smaller* than the race cages. Airflow went down. HP went up. Don't know why. But for sure, HP rules and bigger is not always better.

As noted earlier, the 600SDI ECU enrichened mixture when the dyno air increased 10 degrees to 80+. We tried to fix that by dropping fuel pressure (shown as oil pressure on dyno sheets) like we do here successfully on EFI Firecats. We went all the way down to 50 psi at peak revs and fuel flow/ HP was unchanged! So we left it alone, surmising that there might be some fuel pressure transducer buried in that maze of hoses and wires that would allow the ECU to extend injector pulsewidth if pressure drops. Not only did we want to keep A/F ratio constant for evaluating the changes we were doing, but with that deto protection we would have been happy dropping the BSFC into the mid or even low .60's. That surely could have given us the 128+ HP we made with similar mods on the carbureted Rev 600.