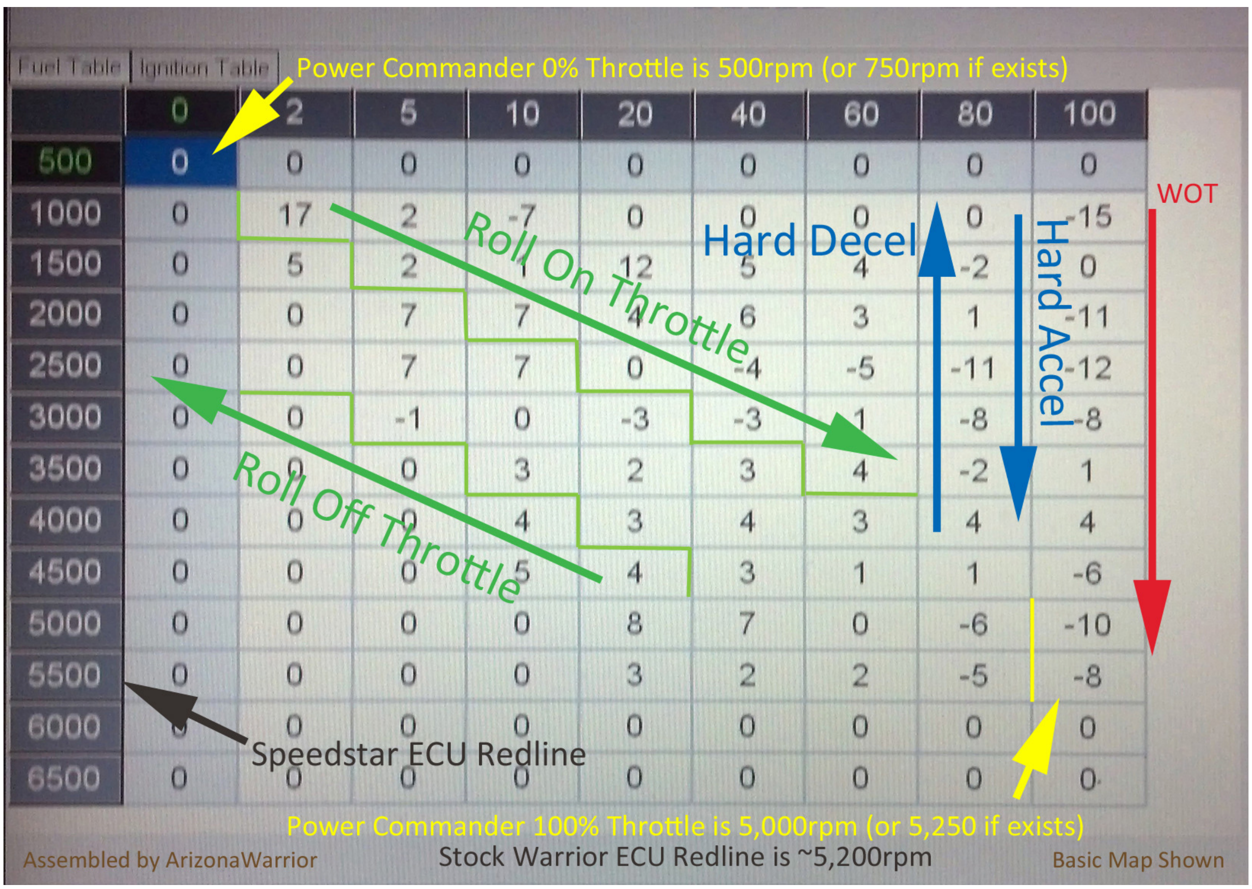
Reading Power Commander Maps (Rev 1.1b)

1. Hard Accel. Read vertical columns top-to-bottom for when you twist the throttle from 0% to (for example) 20% then hold it steady while your bike accelerates. In this case throttle% is no longer increasing but rpm continues to increase until it meets the conditions set by twisting the throttle. In this map, when accelerating this way: (1500 rpm at 80% = -2)(2000 rpm at 80% = +1)(2500 rpm at 80% = -11).

2. Hard Decel. Read vertical columns bottom-to-top for when you fully-release the throttle while riding, for example from 50% throttle to 0% throttle. Variables include clutch engagement and rapid-decel. In this case throttle% is no longer decreasing but rpm continues to decrease until it meets the conditions set by releasing the throttle. In this map, when decelerating this way: (3000 rpm at 80% = -8)(2500 rpm at 80% = -11) (2,000 rpm at 80% = +1). In this case rpm falls rapidly but instead of less fuel it appears to be getting more fuel and unburned fuel might ignite in the exhaust ('pop'). There are other variables, I'm not suggesting in this case that a value change is required.



	0	2	5	10	20	40	60	80	100
500	0	0	0	0	0	0	0	0	0
1000	0	17	2	-7	0	0	0	0	-15
1500	0	5	2	1	12	5	4	-2	0
2000	0	0	7	7	4	6	3	1	-11
2500	0	0	7	7	0	-4	-5	-11	-12
3000	0	0	-1	0	-3	-3	1	-8	-8
3500	0	0	0	3	2	3	4	-2	1
4000	0	0	0	4	3	4	3	4	4
4500	0	0	0	5	4	3	1	1	-6
5000	0	0	0	0	8	7	0	-6	-10
5500	0	0	0	0	3	2	2	-5	-8
6000	0	0	0	0	0	0	0	0	0
6500	0	0	0	0	0	0	0	0	0

3. Roll-On Throttle. Read diagonal data fields down-and-right when you continue to twist the throttle a bit at a time as the rpm rises. In this map, when accelerating this way: (1000 rpm at 2% = +17)(1500 rpm at 5% = +2)(2000 rpm at 10% = +7). In this example the values increase fuel delivery as rpm decreases. Sometimes the ECU fuel map drastically reduces fuel delivery at certain points for economy and a dyno-tuner might make drastic adjustments for performance purposes. Other times its an error.

4. Roll-Off Throttle. Read diagonal data fields up-and-leftwhen you continue to release the throttle a bit at a time as the rpm drops. In this map, when decelerating this way: (4500 rpm at 20% = +4)(4000 rpm at 10% = +4)(3500 rpm at 5% = +0). In this example the 'roll off' values do not increase fuel delivery as rpm decreases so exhaust 'pop' is reduced or eliminated unless super-lean conditions overheat the motor.

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What The Numbers Mean:

Power Commanders use simple mathematics. The ECU's internal fuel map is populated with factory numbers that express how many milliseconds the fuel injectors will spray gasoline. This is called the energized duration, or just duration. The values in your power commander map either add (+ sign) or subtract (- sign) duration. Adding duration adds gas by spraying for a longer time = richer. Subtracting duration reduces gas by spraying for a shorter time = leaner. Power Commander map values act as percentages. A +5 value means 'make duration 105% of the ECU fuel map'. A -11 means 'make duration 89% of the ECU fuel map.' Maps with consistent large negative values at 100% throttle may be running more lean than intended and should be checked for super-lean conditions that can melt pistons.

When you see large positive numbers adjacent to large negative numbers in any of the five reading paths, circle them on the fuel map print-out and determine if they cause performance troubles by simply paying attention while riding (but watch the road!).

WOT: For these purposes, Wide Open Throttle means rapidly opening the throttle to 100% and keeping it there until the engine (including any up-shifting) reaches redline. Maps with consistent negative values at 100% throttle may be running more lean than intended and should be checked for super-lean conditions that can melt pistons.

About ECU Fuel Maps:

Depending on the motorcycle, its ECU fuel map might be a highly prized industrial secret or might be found in five minutes on the internet. The fact is, its not always economically feasible to retrieve ECU fuel data fields in a meaningful form. So for this section the example ECU map is pure fabrication intended only to clarify why sometimes:

"the Power Commander map values change drastically in places it seems they shouldn't."

In The Following Examples:
(ms = millisecond of fuel injector duration) (PCx = Power Commander) (DUR = Duration)

Let's assume the ECU has these values and has the example map above installed:
ECU: (1000rpm at 2%= .33ms) (1500rpm at 5%= .66ms) (2000rpm at 10%= .99ms).
PCx: (1000rpm at 2%= +17) (1500rpm at 5%= +2) (2000rpm at 10%= +7).
DUR: (1000rpm at 2%= .39ms) (1500rpm at 5%= .67ms) (2000rpm at 10%= 1.06ms).
(map is not 'linear' because .28ms then .39ms duration is added between data points)

But what if the 1500rpm ECU value is different?
ECU: (1000rpm at 2%= .33ms) (1500rpm at 5%= .73ms) (2000rpm at 10%= .99ms).
PCx: (1000rpm at 2%= +17) (1500rpm at 5%= +2) (2000rpm at 10%= +7).
DUR: (1000rpm at 2%= .39ms) (1500rpm at 5%= .74ms) (2000rpm at 10%= 1.06ms).
(map is now 'linear' with ~.34ms duration added between data points)

What to Look for:
Search Power Commander map data fields for paths that increase duration under deceleration, or decrease duration under acceleration, then test the suspect values by making appropriate adjustments to the Power Commander map and going for a ride to determine if performance improves and 'pop' decreases when fully warm. Never change field values arbitrarily because the Power Commander map field values could be off-setting odd values in the ECU fuel map in one rpm range and making power or performance adjustments in another rpm range. These potentials are in addition to making adjustments to accommodate engine mods. Its all about the air-fuel ratio.