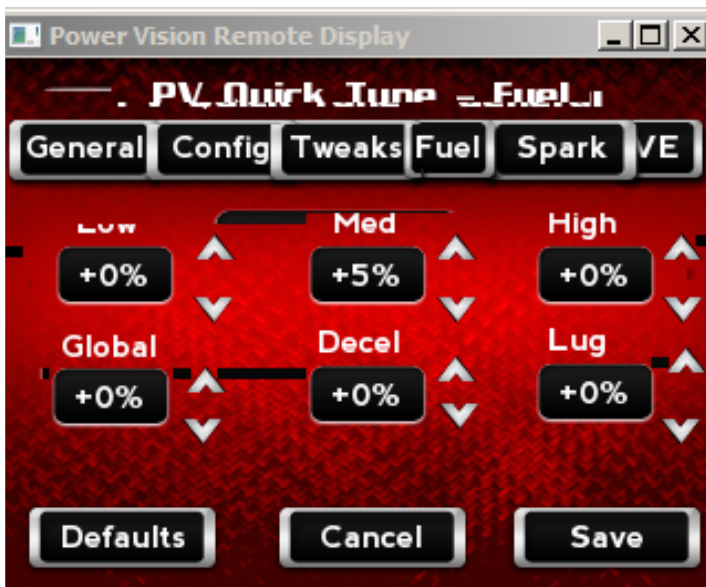


ADDRESSING SPARK KNOCK OR PINGING

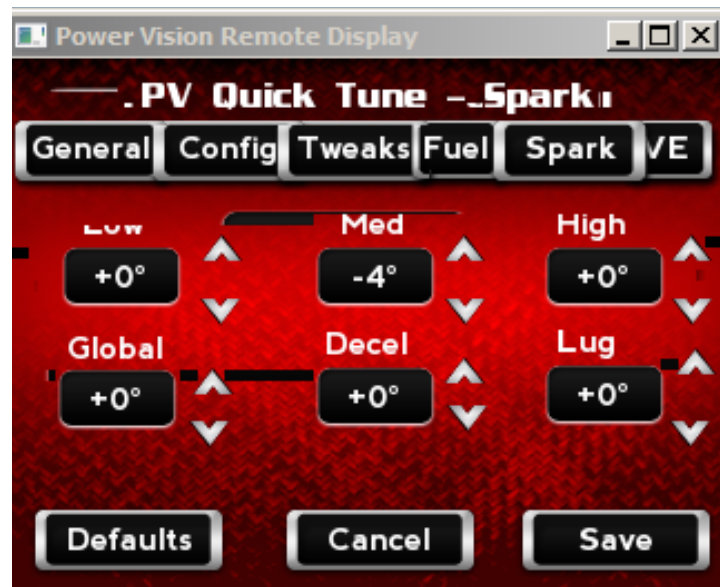
If you can hear engine knock or pinging, the tune you are using should be adjusted to address this problem before engine damage occurs. The way to address the problem is usually adding fuel and retarding ignition timing in that area of the tune.

Quick Tune

A simple way to attempt a fix would be to use the built in Power Vision feature Quick Tune. If you know the area of the tune that has the problem, and it falls neatly into one of the six available columns in Quick Tune, you can make a simple change. If you notice the pinging is in the middle of the RPM scale, start with making changes to the Med column.

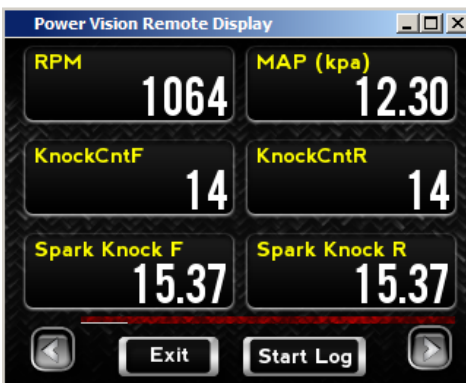


Start by adding +5 on the Fuel tab, Med column.



Next, select the Spark tab, and retard the spark -3 in the Med column.

Now you would need to test the bike and see if the simple change reduced the problem. Adjust further as needed.



Display Gauges

You can setup gauges on the Power Vision to watch for knock events. You can setup gauges to display data live, and setup channels to log for later review. Two channels would be knock count **front (KnockCntF)** and **rear (KnockCntR)**, this is the number of knock events that have occurred. Two more would be PV Spark Knock degrees front (**Spark Knock F deg**) and rear (**Spark Knock R deg**), this is the degrees of timing that have been retarded.

While riding you could look for knock events, and try to remember at what rpm and Map the knock occurred, on which cylinder. You would then modify the tune with WinPV, reducing the spark timing and adding fuel in the area of the tune you observed knock, then test.



Create Log

If the simple changes made in Quick Tune did not solve the problem, and displaying gauges did not help, you may want to go a little further and log knock events. **See guide for creating a log.**



Be sure to setup channels to log that include the 4 channels listed above.

Go to Datalog>Datalog Settings>Signals>Manual.

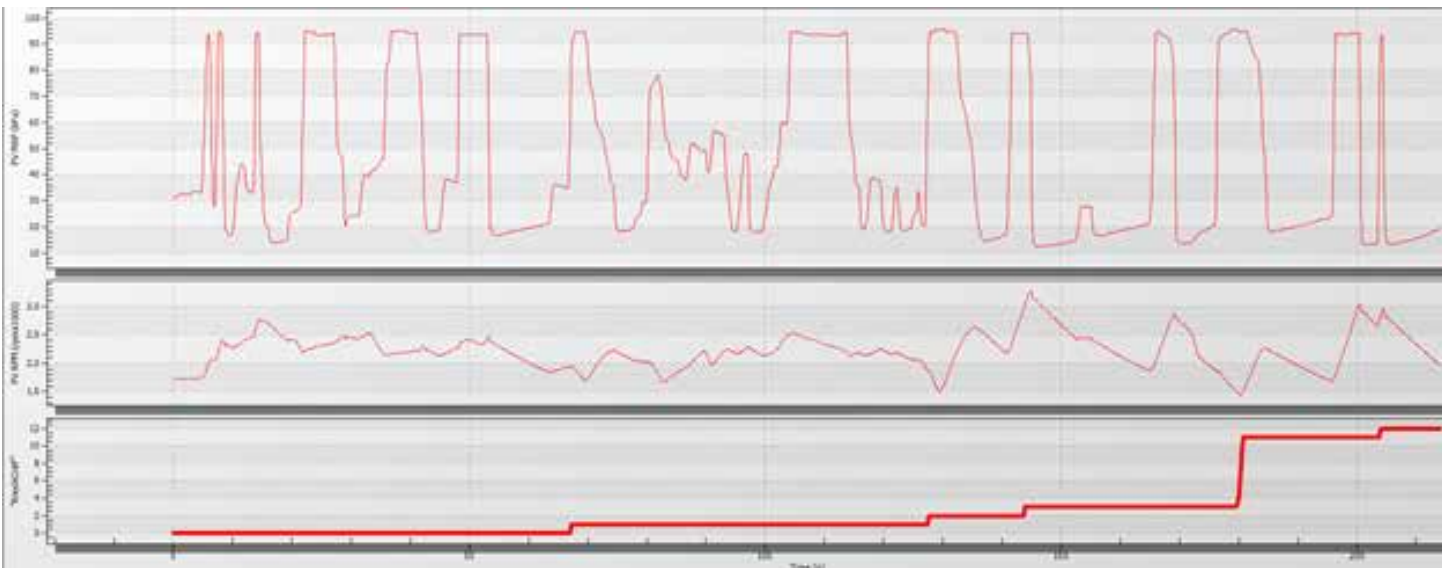
Those four channels will be logged.

Once you have a log created, you can open that log to look for spark knock events. **See guide for reviewing a log.**

Looking at the log, graphing the spark knock events, and then see under what conditions you are getting those knock events. See the graph below, it is showing knock event count in Red for one cylinder. Each time the line moves, one or more knock events has occurred.

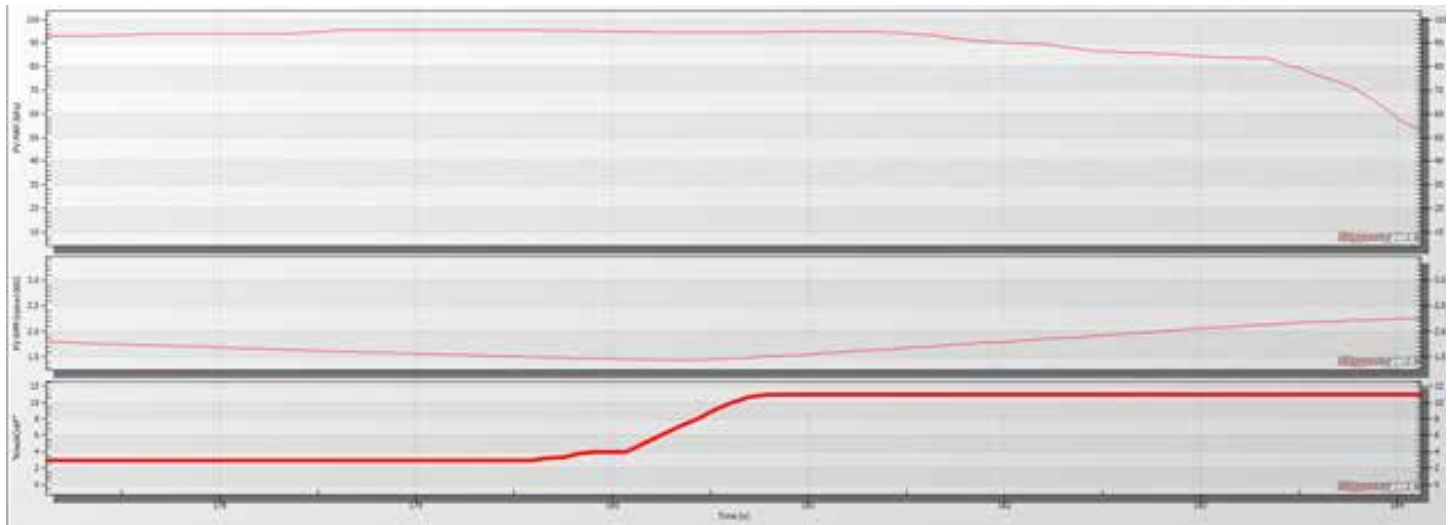


We would want to look at each of these knock events to see when they occur. See below the bottom graph shows knock events, the middle graph shows rpm, the top graph shows Map.



P O W E R V I S I O N T U N I N G G U I D E S

We can see that each time a knock occurred, the Map reading was above 90, while the RPM varied. Below is zoomed in on one of the events, showing more detail.



RPM	MAP (GPa)									
	15	20	30	40	50	60	70	80	90	100
750	16.50	16.00	16.00	16.00	13.25	10.50	10.00	10.00	10.00	10.00
1000	16.50	16.00	16.00	16.00	13.25	10.50	10.00	10.00	10.00	10.00
1125	18.50	18.00	17.75	17.75	14.50	11.50	10.00	10.00	10.00	10.00
1250	20.25	20.00	19.50	19.25	16.00	13.00	11.00	10.00	10.00	10.00
1500	22.25	22.00	21.25	21.00	18.75	16.50	13.50	10.00	10.00	10.00
1750	24.00	24.00	23.00	22.50	22.00	20.00	17.00	10.50	10.00	10.00
2000	28.00	28.00	27.00	26.50	25.50	23.50	20.00	15.00	10.00	10.00
2250	32.00	32.00	31.50	30.50	31.00	31.00	27.00	18.00	11.50	10.00
2500	34.00	36.00	36.00	36.50	37.00	35.00	31.00	21.00	15.00	11.50
2750	35.00	39.00	40.00	41.00	41.00	37.00	34.00	24.00	17.50	13.00
3000	35.00	40.00	44.00	44.00	42.00	39.00	36.00	26.00	19.00	15.00
3500	35.00	40.00	45.00	45.00	43.00	42.00	38.00	29.00	21.50	17.00
4000	35.00	40.00	45.00	45.00	45.00	43.00	40.00	33.00	24.00	20.00
4500	35.00	40.00	45.00	45.00	45.00	43.00	40.00	33.50	26.00	22.00
5000	35.00	40.00	45.00	45.00	45.00	43.00	40.00	35.00	28.50	25.00
5500	35.00	40.00	45.00	45.00	45.00	42.00	39.00	36.00	31.00	28.00
6000	35.00	40.00	45.00	45.00	45.00	42.00	39.00	37.00	33.00	30.00
6500	35.00	40.00	45.00	45.00	45.00	42.00	39.00	37.00	33.00	30.00
7000	35.00	40.00	45.00	45.00	45.00	42.00	39.00	37.00	33.00	30.00

Based on this data, we could modify the tune and retard spark timing on this cylinder at 90 Map and above, at RPMs between 1500 and 3250. Reducing the timing in this area may reduce knock. This area of the spark table for this cylinder is highlighted.

Tune Items

- [-] Tune Info
- [-] Airflow
- [-] Environment
- [-] Fuel
 - Acceleration Enrichment
 - Acceleration Enrichment Multipl
 - Air-Fuel Ratio (Lambda)
 - Cranking Fuel
 - Deceleration Enleanment
 - Deceleration Enleanment Multipl
 - Injector Gas Constant
 - Injector Size
 - MPG Adjustment
 - PE Air-Fuel Ratio (Lambda)
 - Warmup Enrichment (Lambda)
- [-] Closed Loop
- [-] Gear
- [-] Limits & Switches
- [-] Spark

Acceleration Enrichment
12T103000101.pvt

°F	Multiplier
3	2.20
32	1.88
61	1.58
90	1.27
118	1.02
147	0.81
176	0.67
205	0.56
234	0.47
262	0.39
291	0.33
320	0.31

This example is an overly simplistic example looking at only knock events, RPM and Map. But the idea is valid. We would also want to look at engine and intake temp, throttle position, AFR, VE, etc. In this example the knock could be occurring because the engine was very hot, or running very lean. Another consideration, each of these knock events happened when the throttle was opened quickly; increasing acceleration enrichment in the tune may reduce or eliminate this problem. To the left is the acceleration enrichment table is this tune. Increasing the values in the table, at the appropriate temperature range, may reduce knock.

