IMPACT ECU · IGNITION BUTTON GUIDE

Knock Control

Knock (also called pinging or detonation) is the fuel exploding in the cylinder instead of burning smoothly. It can crack pistons. Your engine has a knock sensor on each cylinder. Knock control listens to them, takes timing out when it hears knock, then puts the timing back slowly.

Knock control is on in most of our tunes and set for your engine. If yours shows **enabled**, leave it on. If it shows **disabled**, leave it that way and call us before turning it on.

WHERE TO FIND IT

A **Ignition ▸ Knock Control**

B **Ignition ▸ Max knock retard**

The numbers in these pictures come from one example bike. Your tune's numbers will be different, so don't copy them. Units are Metric (°C, kPa, km/h). Red numbers in each picture match the table below it.

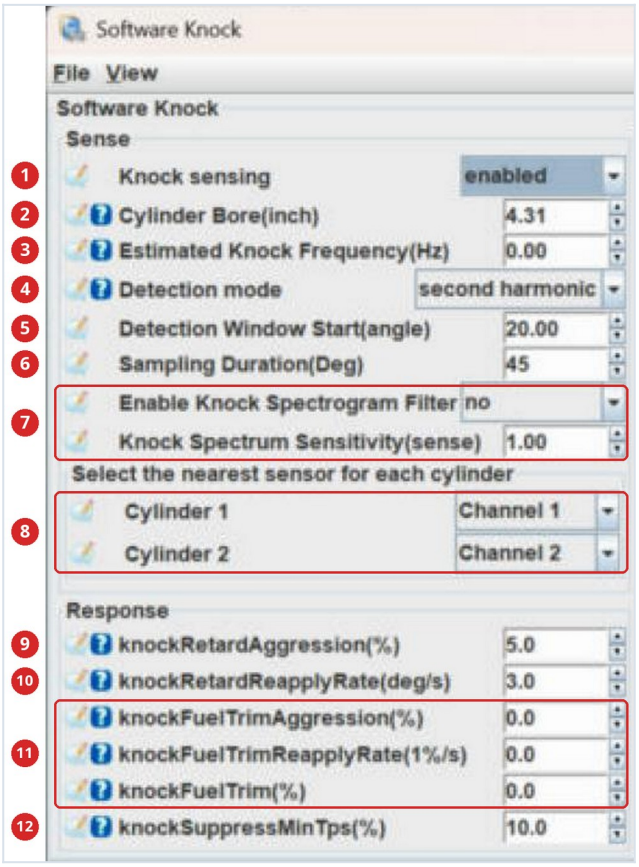
How knock control works

- Right after each spark, the ECU listens to that cylinder's knock sensor for a short moment.
- If the sound is louder than the knock line for that RPM (13), it counts a knock and takes timing out of **both cylinders**: 5% here (9) of the distance from the current timing down to −20°. At 30° of timing that's 2.5°.
- It never takes out more than the **Max knock retard** table allows (B).
- Then it puts the timing back at **3 degrees per second** here (10).
- Below **10% throttle** opening here (12), it doesn't take timing out, and any timing it took out goes straight back. Knocks it hears there still add to the knock count.

SOME CHANGES NEED A RESTART Changes to Knock sensing, Cylinder Bore, Estimated Knock Frequency and Detection mode (items 1 to 4) only take effect after the ECU restarts. Click **Burn**, turn the key off and unplug the USB cable for a few seconds, then plug it back in and turn the key on. The ECU stays on while the USB cable is plugged in, even with the key off.

A Knock Control

The window is titled **Software Knock**. Its left half holds the settings (1 to 12). Its right half holds the knock line (13).



#	SETTING	WHAT IT DOES
1	**Knock sensing** LEAVE AS SET	**enabled** turns knock control on. Leave it as your tune came.
2	**Cylinder Bore (inch)** LEAVE AS SET	Your engine's bore (cylinder width): **4.31** in this example. The ECU uses it to work out the pitch of the knock sound to listen for: a bigger bore knocks at a lower pitch. Fitted a big-bore kit? Call us.
3	**Estimated Knock Frequency (Hz)** LEAVE AS SET	Frequency is the pitch of the sound, in Hz. **0** means the ECU works it out from the bore (2), using Detection mode (4). Any other number is used exactly as typed, and Detection mode is then ignored.
4	**Detection mode** LEAVE AS SET	**second harmonic:** listens at twice the knock frequency, where there's usually less background noise.

#	SETTING	WHAT IT DOES
5	**Detection Window Start (angle)** LEAVE AS SET	Listening starts this many degrees of crankshaft turn after each spark: **20** here.
6	**Sampling Duration (Deg)** LEAVE AS SET	How long it listens, in degrees of crankshaft turn: **45** here.
7	**Knock spectrogram settings** LEAVE AS SET	For the knock spectrogram, a picture of the knock sensor's sound that a TunerStudio add-on can show. They don't change how knock is found.
8	**Cylinder 1 and Cylinder 2** LEAVE AS SET	Which knock sensor input each cylinder listens on. **Cylinder 1 is the rear cylinder** (Channel 1), Cylinder 2 the front (Channel 2).
9	**knockRetardAggression (%)** ADVANCED	How much timing to take out for each knock: **5%** of the distance from the current timing down to −20°.
10	**knockRetardReapplyRate (deg/s)** ADVANCED	How fast timing comes back after knock: **3.0** degrees per second.
11	**knockFuelTrim settings** LEAVE AS SET	Can add fuel when knock is heard. All **0** in our tunes: no fuel is added. Leave them at 0.
12	**knockSuppressMinTps (%)** ADVANCED	Below this throttle opening (**10%**), knock control doesn't take timing out, and any timing it took out goes back at once.

Burn means save. Changes go to the ECU as you make them, but they are only kept after you click **Burn**.

THE KNOCK LINE



13 **Knock Sensitivity By RPM** ADVANCED

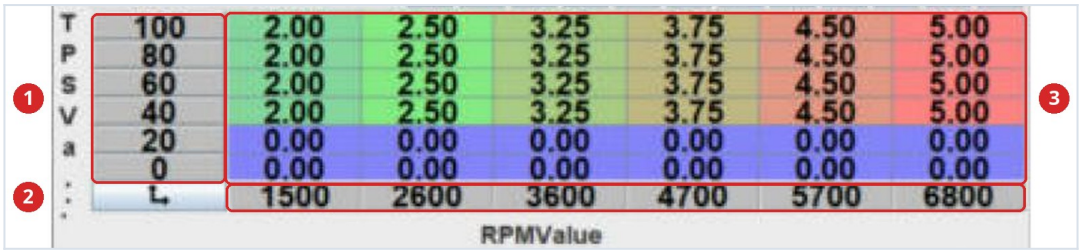
A knock is counted when a sensor's reading goes above this line. The columns are **RPM** and **Threshold** (loudness, in dB): **−20** up to 2300 RPM, rising to **−5** from about 6200 RPM. Engines get noisier as RPM rises, so the line rises too.

A lower number is more sensitive and counts more knocks.

The graph beside these columns stays empty (its scale only goes from 0 to 8). Go by the columns.

B Max knock retard

The most timing knock control may take out, by RPM and load.



#	SETTING	WHAT IT DOES
1	**Load rows**	Engine load: manifold pressure in kPa, like the timing table, even though TunerStudio labels them **TPSValue**: 60 means 60 kPa. For the same reason, don't go by Follow Mode's highlight in this table.
2	**RPM columns**	Engine speed.
3	**Cells (deg)** ADVANCED	The most timing that may be taken out. In this example: **none** at 0 and 20 kPa (closed throttle); **2°** at 1500 RPM up to **5°** at 6800 RPM from 40 kPa up.

Burn means save. Changes go to the ECU as you make them, but they are only kept after you click **Burn**.

Checking for knock

- Take a datalog (a recording of what the engine is doing). **Knock: Retard** shows how many degrees knock control is taking out of both cylinders right now, and **Knock: Count** how many knocks it has heard since the ECU last started.
- **Knock: Cyl 1** (rear) and **Knock: Cyl 2** (front) show how loud each cylinder's sensor is. **Knock: Threshold** shows the knock line at the current RPM: a reading above it is a knock.
- Seeing knock retard often? Call us: the tune may have too much timing for your fuel, or the engine may be running hot.

NEED HELP? **Call (464) 250-9894**
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