

Knock Sensor Explained

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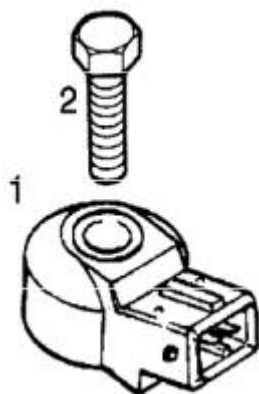


Figure 1:
 Typical 2-pin KS.

What is a 'Knock Sensor'?

The knock sensor (KS) are commonly found on modern injection engines (carburetor engines do not have them installed), but NOT all injection engines use a KS. It is a sensor that outputs a small electrical signal on detecting 'engine knock'. Its related to ignition timing and fuel detonation within the cylinder head. On receiving a knock signal, the ECU (Engine Control Unit) will temporarily adjust (retard) the ignition timing to prevent the condition.

Some engine systems with a KS can detect engine knock in an individual cylinder. Timing for that cylinder alone will be retarded by the ECU until knock ceases.

So basically, the KS is used to stop the engine detonating (destroying) itself when the engine is running.

How does a KS work?

The optimal ignition timing (at engine speeds greater than idle) for a high compression engine is quite close to the point where engine knock occurs.

However running so close to the point of knock means that knock will almost certainly occur on one or more cylinders at certain times during the engine operating cycle. Since knock may occur at a different moment in each individual cylinder, the ECU uses a knock control processor to pinpoint the actual cylinder or cylinders that are knocking.

The knock sensor is mounted on the engine block, normally close to cylinder 1 (which is usually at the cam belt side of the engine). It consists of a piezoelectric crystal measuring element that responds to engine noise oscillations. This signal is then converted into a voltage signal (analogue) that is proportional to the level of knock and transmitted to the ECU for processing.

The knock frequency from the sensor is usually between 6KHz and 15KHz. GM engines are around the 8KHz area.

The ECU will then analyse the noise from each individual cylinder and set a reference noise level for that cylinder based upon the average noise over a predetermined period. If the noise level exceeds the reference level, the ECU identifies the presence of engine knock.

Initially the timing will occur at its optimal ignition point. Once knock is identified the knock control processor retards the ignition for that cylinder(s) by degrees. After knocking ceases the timing is advanced, but when knock returns, the ECU retards it once more. The process is a 'too and fro' one and the knock sensor and ECU are continually monitoring the engine to allow the optimum performance.



Figure 2:
 KS located on 1.6L 16v
 Corsa engine.



Figure 3:
 KS located on 2L engines.

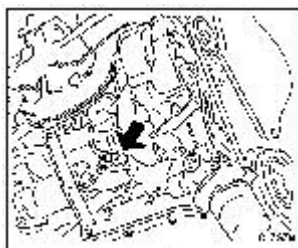


Figure 4:

KS located at the back of the block under the inlet manifold.

If the system develops a fault, the ignition timing is automatically retarded by 5 degrees as a safety precaution and this may lead to a slight reduction in engine performance. Plus the ECU warning light usually is illuminated on the dashboard.

KS on Motronic Fuel Systems (some models)

The KCP (Knock Control Processor) analyses the noise from each individual cylinder and sets a reference noise level for that cylinder based upon the average of the last 16 phases. If the noise level exceeds the reference level by a certain amount, the KCP identifies the presence of engine knock.

Initially, timing will occur at its optimal ignition point. Once knock has been identified, the KCP retards the ignition timing for that cylinder or cylinders by a set number of degrees. Approximately 2 seconds after knock ceases (20 to 120 knock-free combustion cycles) the timing is advanced in 0.75° increments until the reference timing value is achieved or knock occurs once more.

This procedure continually occurs so that all cylinders will consistently run at their optimum timing. If a fault exists in the KCP, knock control sensor or the wiring, a fault code shall be logged in the ECU and the ECU warning bulb is lit on the dash. The ignition timing is then retarded by 10.5° by the ECU. The ECU also limits the revs to no more than 4000rpm.

For a list of ECU fault codes and how to read them, see the [ECU fault code](#) guide.

Where is the KS located on the engine?

The knock sensor is mounted on the engine block, normally close to cylinder 1 (which is usually at the cam belt side of the engine). However on most Vauxhall engine blocks it appears to be mounted on the back of the block in the middle of the block (i.e. cylinders 2 & 3 for 4 cylinder engines). See [figure 3](#) and [figure 4](#).

But for V6 engines where there are two banks of cylinder heads, there are two knock sensors. Consult the Haynes book for your car for sensor location.

How do I test the KS?

See the maintenance testing guide by [clicking here](#).

Article based on text in the [Haynes Books](#) series and peoples personal experiences.



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