

Recording OBD-2 Information

What is OBD-2?

OBD stands for “On-Board Diagnostics” and is a vehicle diagnostics system. It was introduced in 1988 by the *California Air Resources Board* and is used for the continuous monitoring of all systems in a vehicle that have an influence on the exhaust gas. Any occurring problems are reported to the driver by means of warning lights and can be read out via standardized interfaces using standardized codes. After its introduction, the OBD system was developed further. The second generation is called OBD-2. In Europe, OBD-2 became mandatory for new vehicles with gasoline engines in 2001 with the Euro-3 standard. New diesel cars must be equipped with an OBD-2 system since 2003, trucks since 2005.

The interface is a 16-pin socket, which must be accessible within a radius of 1 meter from the driver’s seat. Via special OBD-2 cables, the data available at the socket can be accessed. Figure 1 shows how such a cable is connected.



Figure 1: Using an OBD-2 cable

With the OBD-2 system, vehicles provide an interface which also allows current operational data to be polled. This includes, for example, the current engine revolution speed and the vehicle speed. Since these data are subject to standardization, they are always encoded in the same way regardless of the manufacturer. This allows users easy access without requiring manufacturer-specific information to read out the data. Polling the OBD data removes the necessity to equip the vehicle with RPM sensors or to use the manufacturer-specific dbc databases for reading out the CAN bus signals.

You can record data from the OBD-2 system easily and directly with the HEAD Recorder¹ and the ADA CAN add-on module. All you need is an OBD-2 cable and, for example, a HEADlab front-end, a CAN4 module from the DATaRec 4 series or the PCAN USB interface from PEAK-System Technik GmbH.

¹ Version 2.0 or later

Please note that, depending on the vehicle manufacturer, the OBD-2 data may be updated less frequently than the data on the CAN bus. If the revolution speed varies rapidly, the RPM curve can become stepped. The steps in the curve should be smoothed prior to analysis with the ArtemiS analysis software, e.g. by applying a low-pass filter.

Recording OBD-2 Parameters with the HEAD Recorder

Configuring an OBD Sensor with the HEAD Sensor Explorer

To record OBD-2 data, you can use a predefined OBD-2 sensor. The following section explains in detail how to proceed.

First, open the HEAD Sensor Explorer² and press the keyboard shortcut [Ctrl]+[N] to open a new sensor list. Then open the "File" menu and use the "New" -> "Sensor" command to select the predefined OBD sensor from the submenu (see figure 2).

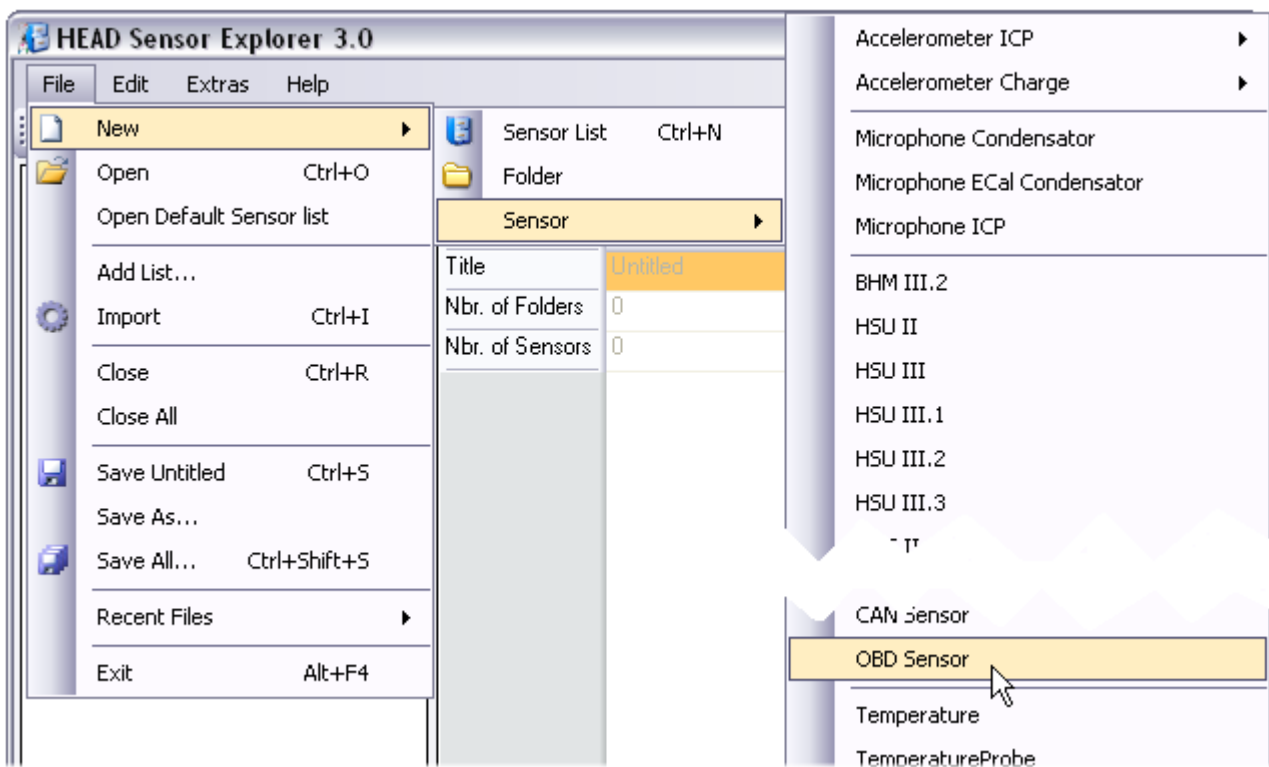


Figure 2: Selecting the predefined OBD sensor

For a newly created sensor, the two options "EngineRPM" and "VehicleSpeed" are activated by default for being read out (see figure 3).

² Version 3.0 or later

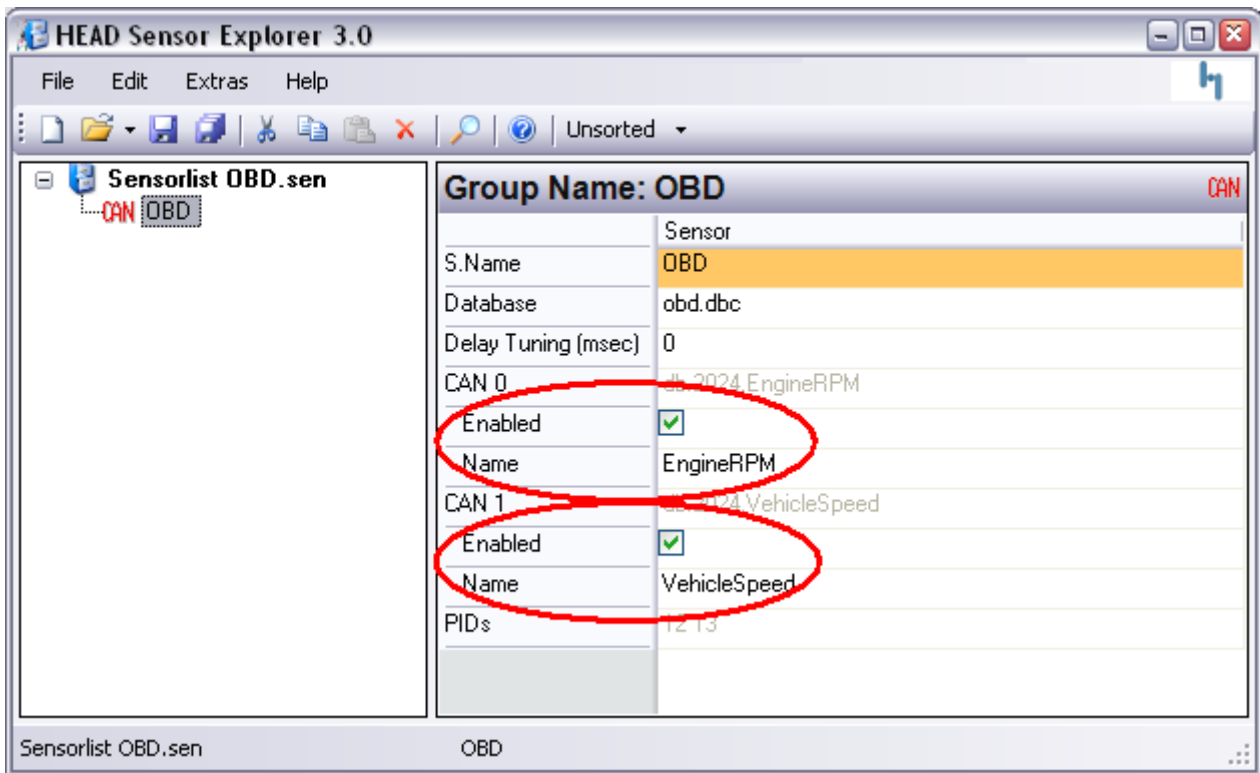


Figure 3: Properties of the OBD sensor

Once the sensor has been created, additional quantities can be activated for recording with the HEAD Recorder or for triggering the recording. To do so, open the Properties dialog via the context menu of the OBD sensor (right-click on the "OBD" label, see figure 4).

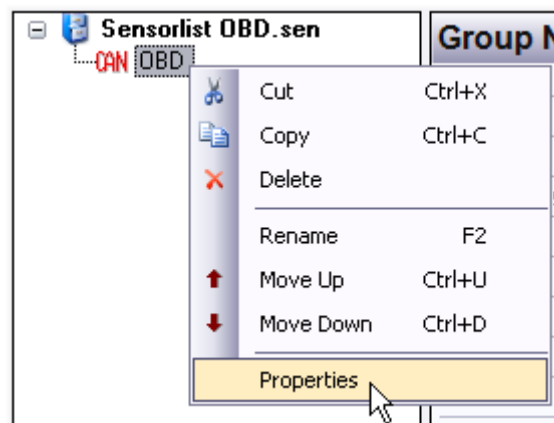


Figure 4: Context menu of the OBD sensor

The Properties dialog shows a selection of the OBD quantities relevant for NVH diagnostics. By clicking on the checkboxes, you can select up to seven different quantities to be decoded during the recording. Besides the quantities activated by default, these can include, for example, the throttle position (see figure 5).

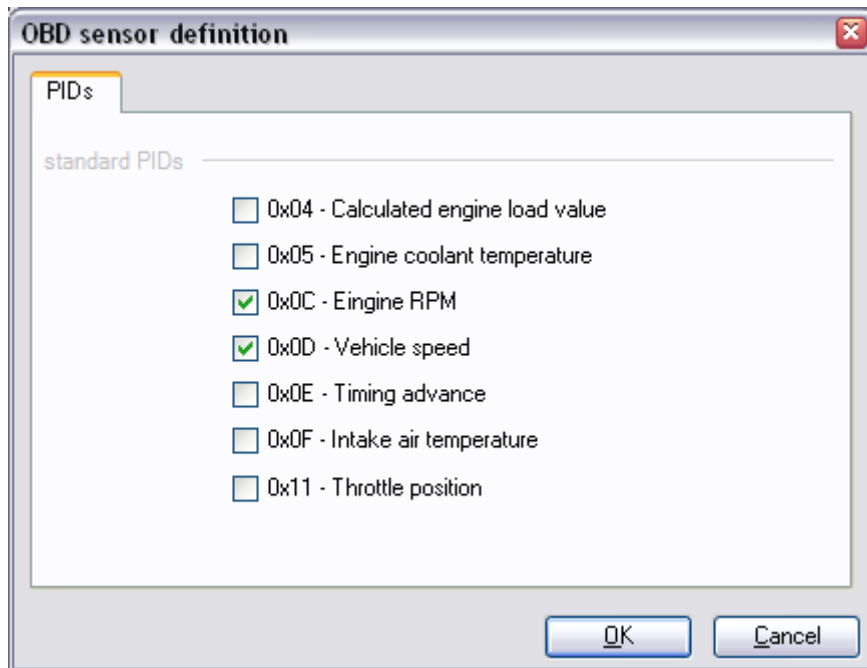



Figure 5: Selecting the parameters to be decoded

Once you have activated all desired quantities in this dialog, you can save your new sensor list and use the OBD sensor in the HEAD Recorder.

Recording OBD Quantities with the HEAD Recorder

The sensor defined in the Sensor Explorer can now be used in the HEAD Recorder. As mentioned above, you need either a HEAD/lab front-end, a CAN4 module from the DATaRec 4 series from HEAD acoustics or the PCAN USB interface from PEAK-System Technik GmbH to make the recording, which means that one of these modules must be configured to appear in the Channel List of the HEAD Recorder.

In the Channel List, you can then connect the OBD sensor to the PEAK-CAN channel, for example. Figure 6 shows a screenshot of such a Channel List. Besides the channel names and the Baud rate, this list also shows the "Listen Only Mode" option. It may be necessary to enable the display of this option first by clicking on the "Show all Columns" button . The Listen Only mode must be disabled for recording OBD quantities, because the CAN4 module or the PCAN USB interface must be able to communicate interactively with the OBD system in order to poll the desired OBD data.

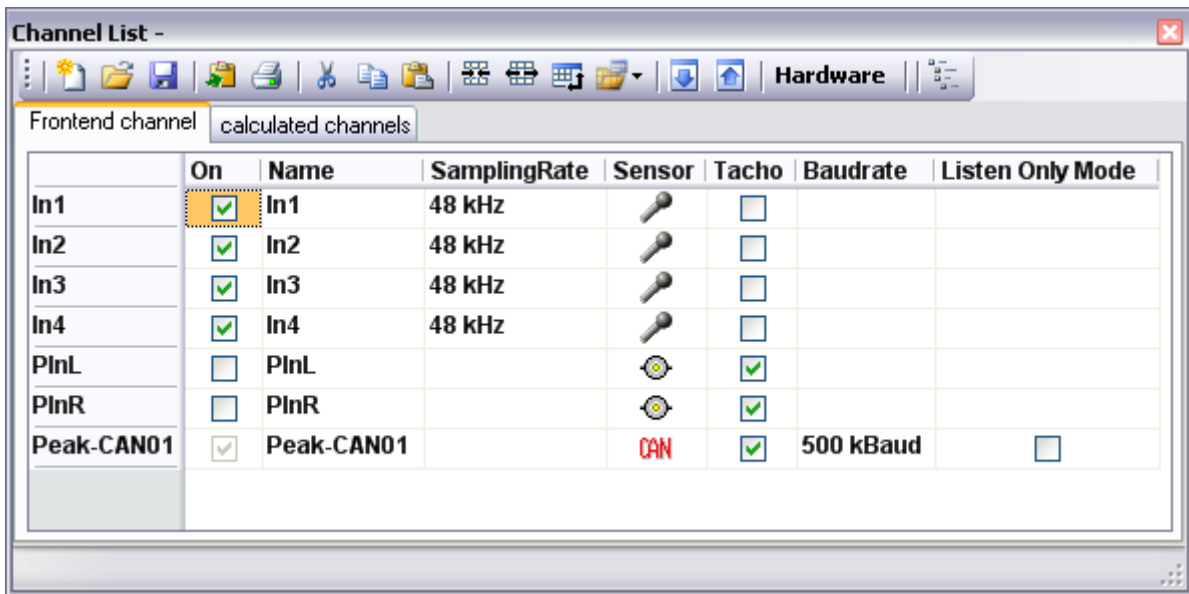


Figure 6: Channel list in the HEAD Recorder

Once the OBD sensor is connected in the Channel List and the Listen Only mode is deactivated, you can close the Channel List.

An OBD sensor configured as described above, combined with the required hardware (OBD cable and recording front-end) allows the recording of the quantities selected in the Properties dialog, as well as using these quantities for triggering a recording.

In order for the OBD quantities to be recorded, the option “Exclude extended channels” must be disabled in the “Hardware Properties” dialog of the HEAD Recorders on the “File output” tab (see figure 7).

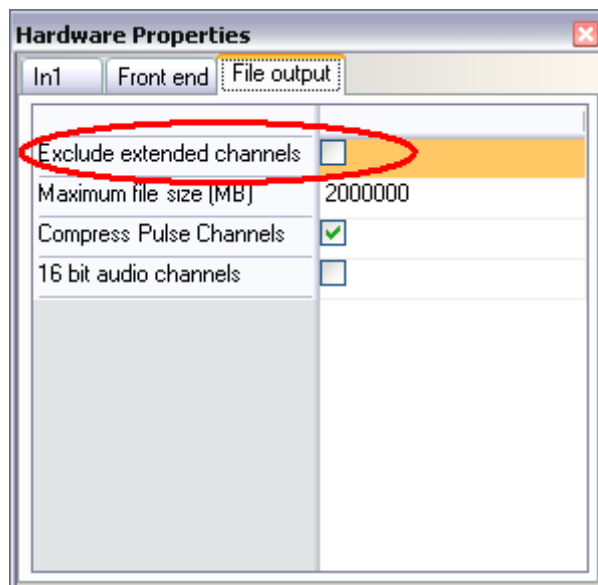


Figure 7: Hardware Properties configuration in the HEAD Recorder

If you want to use one of the OBD quantities as a trigger signal, open the Trigger window of the HEAD Recorder (keyboard shortcut [Ctrl]+[T]). In this window, you can select one of the quanti-

ties preselected in the Sensor Explorer (e.g. "EngineRPM") as the trigger channel. Afterwards, you can configure the desired trigger settings (see figure 8).

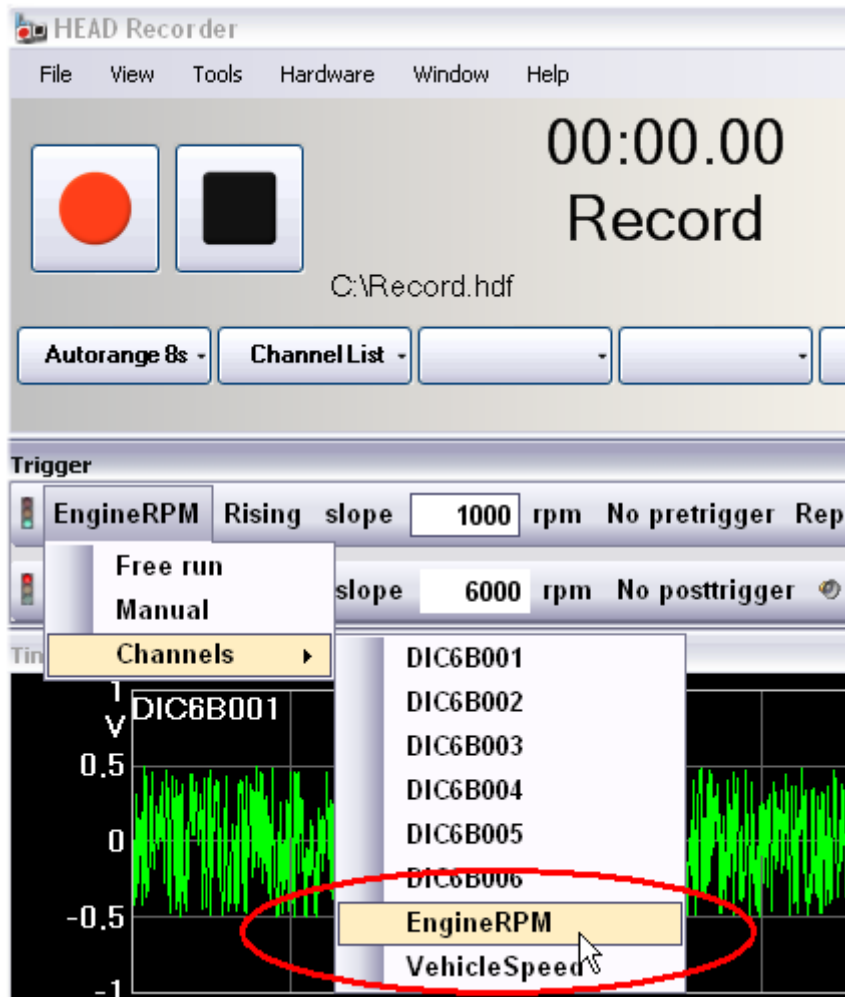


Figure 8: Configuring the trigger settings in the HEAD Recorder

Notes

For the applications described in this Application Note, you need the HEAD Recorder (code 4630) and the ArtemiS data acquisition module ADA-CAN (code 4629).

Do you have any questions for the author? Contact us at imke.hauswirth@head-acoustics.de. We are looking forward to your feedback!