# ECU Diagnostics with CalDesk

- **Measurement, calibration, and diagnostics with CalDesk**

- **ODX support**

- **Fault memory, diagnostic services, Java jobs, flash programming**

Version 1.3 of the CalDesk measurement and calibration software has an additional software module for diagnostics on electronic control units (ECUs): the CalDesk ECU Diagnostics Module. Users now need only one single tool to perform measurement, calibration, and diagnostics tasks. The core functionalities of the ECU Diagnostics Module are reading and resetting the fault memory, executing diagnostic services and Java jobs, and flash-programming ECUs. The diagnostic support provided by CalDesk is completely based on the ASAM standard ODX.

## Measurement, Calibration, and Diagnostics with a Single Tool

Currently, often two tools are required for calibrating software parts that are relevant to diagnostics: one for measurement and calibration, the other for diagnostic tasks. This frequently involves complex setups containing twice the amount of hardware.

As regards standards, the established standard for measurement and calibration is ASAP2 (ASAM-MCD 2MC). For diagnostics, the ODX standard is gaining in importance. It will close the gap between the two types of tool, paving the way towards generic tools for measurement, calibration, and diagnostics (or MCD tools for short) that are completely based on standards. These have obvious advantages:

- Universally applicable to different ECU projects – completely standard-based
- Time and cost saved – users need to learn only one tool

- The same interface hardware for measurement, calibration, and diagnostics – saving costs and simplifying hardware setups
- Greater convenience: parameter tuning and fault memory evaluation with a single tool, for example – so diagnostic functions are easy to calibrate
- Measurement, calibration, and diagnostic data are time-correlated and stored together

In close consultation with an automotive lead customer, ODX-based diagnostic support is being added to the CalDesk measurement and calibration software to create a generic MCD tool. (For details of the release date for the ECU Diagnostics Module as part of CalDesk 1.3, see *www.dspace.com/goto?releases)*.

### The ASAM Standard ODX

Open Diagnostic Data Exchange (ODX) is the ASAM-MCD 2D V2.0 diagnostics standard, providing an open diagnostic data exchange format throughout the entire vehicle lifecycle. During the development phase, ODX and ASAP2 (ASAM-MCD 2MC) together describe the capabilities of an ECU with regard to measurement, calibration, and diagnostics. ODX describes communication with ECUs via diagnostic interfaces, covering points such as:

- Vehicle topology and access paths to an ECU
- Diagnostic protocols and communication parameters

- Services of the protocols, such as reading the fault memory
- Data of the protocols, such as the ECU's fault memory entries and logical identifiers for ECU variables
- Specifications for ECU flash programming
- Java jobs for controlling specific diagnostic sequences such as recurring complex tasks and flash sequences, using the available diagnostic services
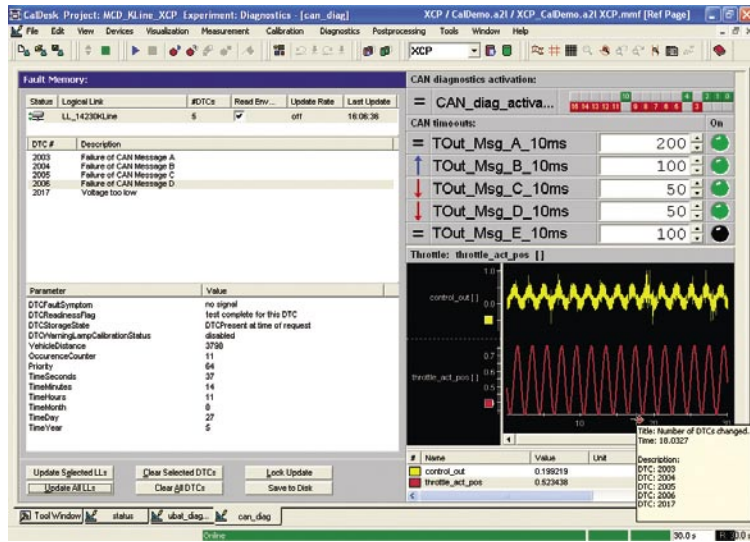
*▲ Measurement, calibration, and diagnostics in CalDesk – shown here with the Fault Memory instrument. The measurement comment in the plotter indicates a change to the fault memory entries.*
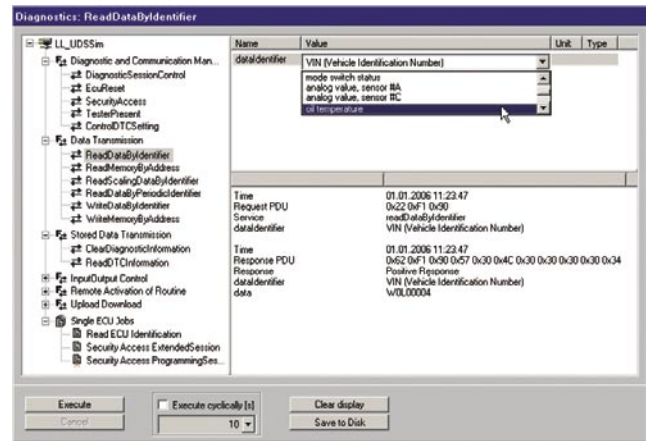
Every time a fault memory entry occurs, a bookmark is automatically inserted into the ongoing measurement and saved together with the measurement and parameter values.

## Diagnostics Instrument

The Diagnostics instrument allows direct communication with the ECU via the diagnostic protocol. It includes a structured, configurable display of the available diagnostic services and Java jobs from the ODX database. Jobs describe predefined sequences, which can include the ECU's elementary diagnostic services, and are quick and easy to use, even with no in-depth knowledge of diagnostics. Users select a service or job and then parameterize or execute it.

*▼ The diagnostics instrument for flexible communication with the ECU via the diagnostic interface.*



## Seamless Integration into CalDesk

The ECU Diagnostics Module has two instruments, the Fault Memory instrument and the Diagnostics instrument. These can be combined with CalDesk's other instruments in any way required. ECU flash programming can also be performed directly from CalDesk. ECU access is performed via the diagnostics standards KWP2000 on CAN or K-line (ISO15765/ ISO14230) and UDS (Unified Diagnostic Services, ISO14229). The existing dSPACE CAN hardware, such as DCI-CAN1, the USB-to-CAN Converter, can be reused for CAN-based diagnostic access, and also shared by measurement, calibration, and diagnostics tasks. If the CalDesk Automation Module is used, the ECU can be accessed via the ASAM-MCD 3D automation interface, for example, for test automation or test bench tasks.

## Fault Memory Instrument

The Fault Memory instrument displays the fault memory contents for one or more ECUs. This can be updated manually, or automatically at regular intervals. It also lets you delete individual entries or clear the entire fault memory. The fault memory contents can be saved in ASCII or XML format. Users often need to know not only whether a fault memory entry occurred, but also when. CalDesk provides a means of recording these events.

## ECU Flash Programming

New software updates and data sets can be flashed quickly and easily. The user simply selects one of the flash sessions defined in the ODX database and starts execution – a "push-button solution".
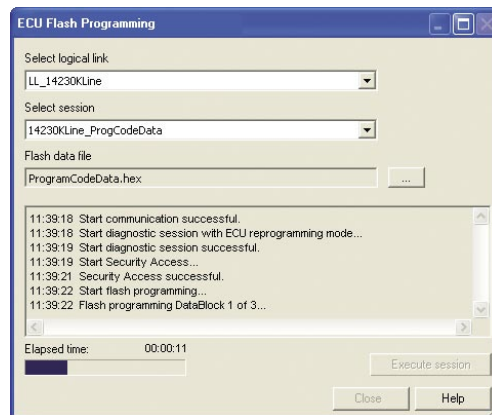


*◀ Flashing at a click: selecting and executing a flash session. An alternative HEX file can be specified, for example, if the latest calibration data has to be flashed.*