Measurement and calibration tool

The Diagra X Windows software from RA Consulting provides a solution for measurement and calibration tasks using Classical CAN, CAN FD, CCP, XCP, and other protocols. The company introduces this and further CAN products.

RA Consulting, headquartered in the asparagus town of Bruchsal, Germany, develops software inspired by people. The IT service provider and tool specialist comes with measurement, calibration, and diagnostic know-how for the automotive industry offering over 30 years of experience through intensive development. The products are used by more than 400 customers worldwide with over 40 000 active licenses in the market. RA Consulting has a global presence with regional offices in Beijing, Detroit and more than 13 sales partners in Europe, North America, and Asia. In 2022, RA Consulting joined CAN in Automation (CiA) as a member.

Generations of RA tools are supporting CAN-based protocols such as Classical CAN, CAN FD, CCP, and XCP, and are scalable to CAN XL and beyond. In addition, they support many other protocols used in the automotive industry. RA tools are modular and are highly-scalable to the latest technological trends and individual needs of customers. Some of the well-known tools includes Diagra D, a specialized diagnostic software providing complete solution for vehicular diagnostic development. Diagra D offers reliable diagnostic functions for the acquisition of high-quality diagnostic data from vehicle ECUs (electronic control unit). It supports Classical CAN, CAN FD, SAE J1939, SAE J1979, and others.

Silver Scan-Tool focuses on 100 % OBD compliance for OBD-II, EBOD, HD OBD, and WWH OBD diagnostics around the world including J1939 and J1979. We offer many other software tools, components, and services to our customers worldwide. Diagra Flash Station is a flashing tool which lets users flash up to 20 control units on separate Classical CAN or CAN FD vehicle networks. In the case of DoIP, the control devices can be operated together in a subnet.

Measurement and calibration tool

Diagra X, a relatively young and modern tool for measurement and calibration tasks with focus on usability joins the RA tools family. Measuring and calibrating ECUs is a complex process, due to frequent changes in ECU software and short time-to-market, poses a great challenge for application engineers to optimally adjust software parameters for the given configuration of the system. Although there are many tools for measurement and calibration tasks on the market, Diagra X stands out for its function-oriented, data-rich, and user-friendly design. Diagra X is developed in compliance with ASAM standards and functional safety is ensured in accordance with ISO 26262. The tool is not limited to automotive applications. Its design and configurable architecture allow it to be used in other application areas using Classical CAN, CAN FD, CCP, and XCP on CAN.

Figure 1: Diagra X 1.11 (Source: RA Consulting, AB Graphic)

Plug-and-play source connectivity

In a larger project with multiple model variants and multiple stakeholders from different areas such as development, calibration, and validation, there is often the possibility that many different control software and interface hardware being used from different vendors. In such scenarios many of the times setting-up of tool environment and associated hardware interfaces is too cumbersome and confusing to novices. Diagra X's plug-and-play source connectivity and compatibility with a range of interface hardware makes it easier for users to create and share configura-

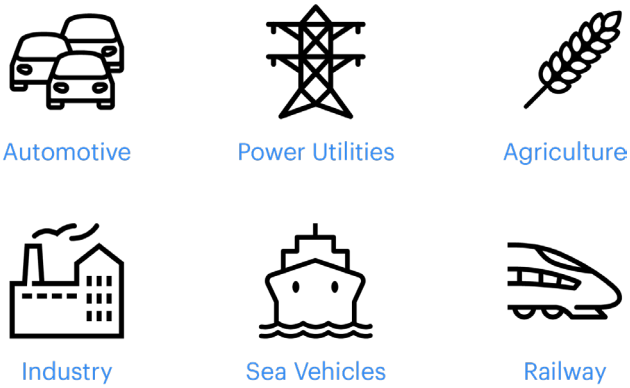

Figure 2: Diagra X application areas (Source: RA Consulting)

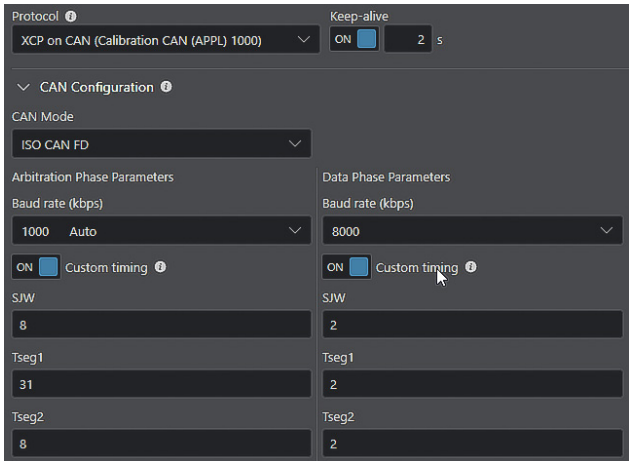

Figure 3: CAN configuration in Diagra X (Source: RA Consulting)

tions. The product automatically detects the supported protocols based on the source description files such as A2L, DBC. Today, vehicles are equipped with many ECUs, each of which may have thousands of signals to measure and characteristics to optimize. In many cases, users need to tune these ECUs in parallel to achieve optimal vehicle performance.

The Diagra X architecture supports multiple controllers in parallel for measurement and calibration operations, users can also use multiple working pages for each controller. The tool offers a variety of configurable visualizers that are well-suited for low to high-speed, high-performance tasks.

Reusable architecture

Typical users of an MCD tool create an experiment consisting of multiple visualizers to perform measurement and calibration operations. In traditional tools, these visualizers are loosely aligned and can be freely moved around the computer screen. As the number of visualizers increases, it often becomes difficult for the users to find and keep track of the visualizers and variables. Diagra X addresses this typical user pain-point with its grid-based layout of

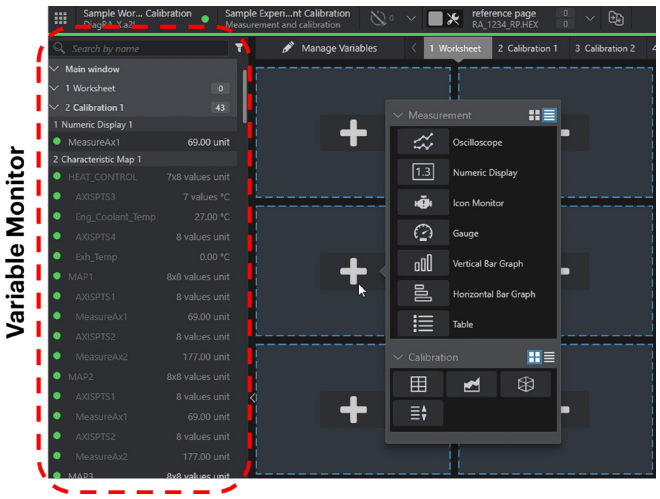

Figure 4: Grid layout of a worksheet and the variable monitor (Source: RA Consulting)

CAN Newsletter Online: Tools

The CAN Newsletter Online, continuously informs about various CAN-based tools:

Oscilloscope

CAN XL decoder software

Keysight Technologies has introduced the D9010AUTP software package for its Infiniium oscilloscopes. Besides other automotive network protocols it can trigger and decode CAN XL frames.

Read on

CAN Newsletter magazine

Improving automotive CAN diagnostics

As automotive CAN FD networks are proliferating throughout today's road vehicles, it is important to diagnose, if there is a fault on the CAN lines.

Read on

Internet of Things

Cloud solution for CAN networks

The Cloudcommander from Odos combines the CAN-to-USB converter from Kvaser, the Leaf Light HS V2, with the IoT cloud platform from Odos to offer a complete CAN-to-cloud data monitoring and data-logging solution.

Read on

CAN tools and background

CAN data streaming and electronic CAN guide

CSS Electronics recently enabled its CANmod sensor-to-CAN modules to stream acquired data in real-time. It also added online tools for OBD-II, J1939, and CAN FD to its portfolio. Further, the company introduced a 100-page CAN guide as PDF.

Read on

Tire Technology Expo 2022

Showcasing hydraulic and filtration products

Parker Hannifin, provider in motion and control technologies, will show products to the tire industry. The Service Master Connect diagnostic measuring device can compile, store, monitor, and evaluate CAN data. It can be connected to CAN, CANopen, and J1939.

Read on

PCIM Europe 2022

Test solutions for power electronics

At the PCIM Europe 2022 in Nuremberg, Germany, Rohde & Schwarz demonstrated its latest test solutions for developers of power supplies and other power electronics.

Read on

worksheets and well-organized experiments. The users can assign a measurement or a calibration visualizer to a grid or a set of grids, these assigned visualizers are fixed in that worksheet. The users could easily search and find worksheets, visualizers, and variables using the variable monitor.

Connectivity to automation systems

Product development encompasses many known scenarios and workflows, but also many unknown scenarios and failures. For the known scenarios and workflows, the users can optimize the measurement and calibration effort by design of experiments and intelligently automating the measurement and calibration process. For example, the users can define a calibration approach to optimize sweet points instead of calibrating a complete map. Diagra X supports remote control by an automation system, such as a testbench, via the ASAP3 and ASAM MCD-3 MC protocol.

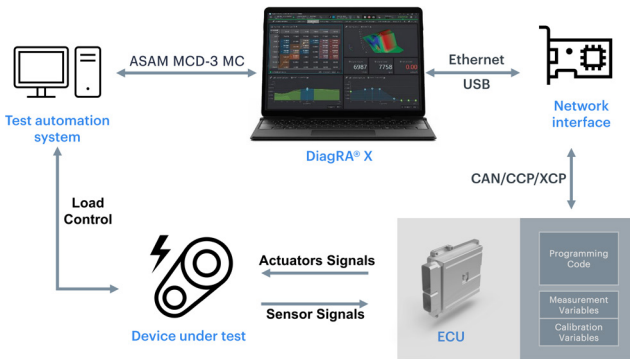

Figure 5: Remote control of Diagra X using ASAM MCD-3 MC (Source: RA Consulting)

Triggers and action management

For recording and analysis of random scenarios and faults, the tool offers several unique features, such as "Event Setup", which allows the users to define a set of recorders to be triggered by independent events. "Snapshot" is another interesting feature that allows the user to record last 1 minutes of measurement data with click of a button, this helps to avoid large amounts of unwanted data being recorded during analysis or reproduction of random failure scenarios.

Controller calibration can be a safety-critical operation, where user needs to be conscious of the calibration impact. Diagra X supports both online and offline calibration with smart and safe calibration visualizers, which offers calibration in Table, Matrix, and 2D map view with clear visibility of applied values, operating point, changes in relation to the reference page and many other options.

Calibration data management

In the initial phase of a project, users typically start by calibrating an ECU using the base dataset from an existing similar system. Diagra X offers the "Compare Pages" function, an easy-to-use, integrated calibration data manager that enables management of dataset configurations in .hex,.s19 and .dcm file formats. After performing intensive calibration operation, one definitely needs to have an overview of changes, "Compare Pages" offers online comparison of reference and working page, also one could import and export calibration data. For extended dataset management, the IAV MACARA tool can be used in combination with Diagra X.

To protect the ECU software know-how and calibration data, each manufacturer uses various techniques to prevent access to the ECU software and its subsequent adaptation in the aftermarket. Diagra X supports secured access to an ECU such as seed and key based mechanism, cross-check of code and data segment.

Diagra X offers flash programming of ECUs via CCP and XCP as state-of-the-art, with an add-on software users can even perform custom UDS flashing. This UDS add-on allows users to configure the flash process graphically without programming knowledge. The configured flash process can be used encrypted, Classical CAN and CAN FD are supported.

Data analysis with Diagra X Viewer

Diagra X records the measurement data in the ASAM standard file format ASAM MDF(.mf4). During online measurement, users can perform various operations on the measured signals, such as fast statistical evaluation, computation of virtual or calculated variables, trace analysis. The software includes an additional viewer tool “X Viewer” to visualize the measurement file, this enables users to analyze their measurement data. Users can launch X Viewer as a stand-alone tool or directly from Diagra X environment.

X Viewer offers structured configurations, wherein users can define their own visualization configurations, the measurement file from Diagra X environment can be directly opened in the desired pre-defined X Viewer configuration. Users can perform data analysis in X Viewer using various visualizers, stacked view of oscilloscope, various types of cursors, statistical functions, built-in library functions, and define custom analysis using virtual variables.

In summary, Diagra X is a modern, state-of-the-art software that offers excellent usability and efficiency in measurement, calibration, and flashing tasks using CAN, CAN FD, CCP, XCP and many other protocols. ◀

Author

Hanamant Hirekurbar
RA Consulting
info@rac.de
www.rac.de

1992 - 2022

The non-profit CiA organization promotes Classical CAN, CAN FD, and CAN XL, develops CAN FD recommendations as well as CANopen-related specifications, and supports other higher-layer protocols such as J1939-based approaches.

Join the community!

- Initiate and influence CiA specifications
- Get credits on CiA training and education events
- Download CiA specifications, already in work draft status
- Get credits on CiA publication advertisements
- Receive the monthly CiA Member News email service
- Get the CANopen vendor-ID free of charge
- Participate in plugfests and workshops
- Get the classic CANopen conformance test tool
- Participate in joint marketing activities
- Develop partnerships with other CiA members
- Get credits on CiA testing services

CAN in Automation e. V.
Kontumazgarten 3
DE-90429 Nuremberg

headquarters@can-cia.org
www.can-cia.org