

CANoe.NMEA2000, Version 7.1

Simulation and Development of NMEA2000® Systems

NMEA 2000® is a communication protocol of the National Marine Electronics Association (NMEA®) based on J1939 for data exchange between control units in a marine application.

Features and Advantages

CANoe.NMEA2000 can be used through the entire development process, from planning to realization. The models created and checked by simulation in the design phase are continually reused in other forms. It is possible for example to use the models to verify the implementation and later for functional testing at the end check.

It is not necessary for the user to become familiar with the NMEA2000® protocol; he can concentrate on the actual task of creating a simulation or do data analysis. This significantly increases the quality of the development process and the efficiency of data analysis.

Functions

CANoe.NMEA2000 expands the standard functionality of CANoe with:

- > Simple simulation
- > Support of the transport protocols BAM, CMDT, and Fast Packet
- > Protocol-specific representation in the Trace Window
- > GNSS/GPS display and simulation
- > Graphic display of the network nodes (scanner)
- > Expanded database
- > Diagnostic Trouble Code Monitor (DTC Monitor)

- > Diagnostic Memory Dialog (DiagMem)
- > J1939 XML Test Module Manager

Application Areas

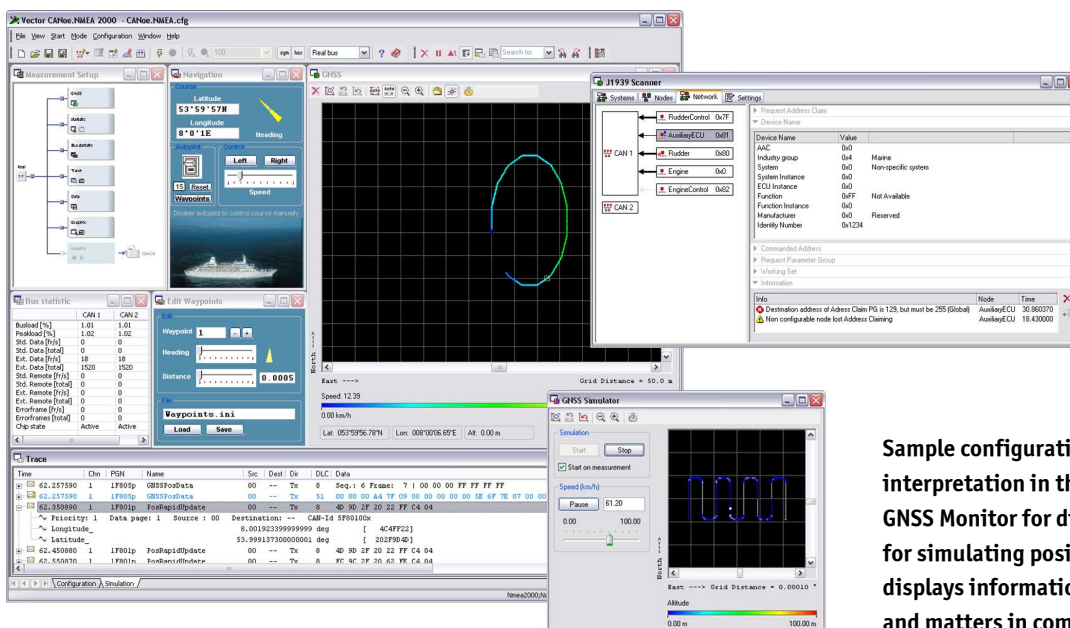
Because of its simulation capabilities, CANoe.NMEA2000 is well-suited to the development, design and verification of NMEA2000® networks. It can also be used as a tool for the diagnostics and testing of networks and control units. CANoe.NMEA2000 can also be used for startup or assembly of NMEA2000® systems if it is necessary to simulate missing network components. Especially the J1939 XML Test Module Manager supports the user in preparing integration and module tests.

Hardware Interfaces

CANoe.NMEA2000 makes no special demands on hardware. All interface cards supported by CANoe can be used. For compatibility, however, the use of ISO11898 (ISO High speed) compatible bus drivers (for example CANcab 251 or CANcab 251opto) is recommended.

Simulation

CANoe.NMEA2000 makes simulation and analysis of data traffic of control device networks possible by using the NMEA2000® communication protocol. The system environment is modeled by means of environment variables and graphic interactive control panels. The integrated NMEA2000 CAPL Code Generator generates CAPL models for the entire network based on the communication interrelation-



Sample configuration with activated NMEA2000® interpretation in the Trace Window. GNSS Monitor for displaying and GNSS Simulator for simulating position data. The J1939 Scanner displays information about protocol violations and matters in communication.

ships described in the database. In addition, there are specific functions for CAPL available with the NMEA2000 node layer DLL.

Transport Protocols

There is a display of the signals that are transmitted with the help of parameter groups. If, for example, the “Fast Packet Transport Protocol” is used, CANoe.NMEA2000 can reassemble the individual CAN telegrams transmitted. The interpretation of the NMEA2000® protocol is limited to the CAN channels configured by the user. Gateway solutions with various protocols can thus be monitored easily.

Protocol-specific Display

CANoe.NMEA2000 allows the user to monitor communication on symbolic level. The Trace Window displays transmitted parameter groups. All relevant information is output in individual columns such as parameter group number, priority or source and destination address. Individual subject areas such as transport protocols or network management are highlighted in color. Additional functions such as Quick Find and View Filter simplify finding specific parameter groups.

Signals selected by the user are displayed in the Data Window. Wide ranges of display options are available to the user for this purpose, including bar diagrams, hexadecimal, decimal, and binary display. The NMEA2000®-specific coding of the signal values Error and Not Available is realized with the help of a status display.

Database

NMEA2000® parameter groups and signals are described in a database. This database is already filled with standard objects. The user can expand the database using the CANdb++ Editor (included with delivery). This makes it possible to define application-specific parameter groups, for example. Parameter groups and signals defined thus can be selected symbolically in the entire program.

Signal processes can be displayed and evaluated as a function over time with the online Graphic Window.

GNSS/GPS Display and Simulation

The GNSS Monitor records position data (GNSS/GPS) and thus the path covered is displayed graphically. The position, current speed, and height information are output. Using the GNSS node layer DLL or GNSS Simulator, the user can define paths that will then be taken by the GNSS Simulator. The paths can also be simulated easily. The realization, with the aid of the node layer DLL, allows complex simulations that take into account feedback of systems, e.g. speed and direction changes. After stop of measurement, the GNSS Monitor, Graphic Window and Trace Window can be synchronized for the subsequent analysis.

J1939 Scanner

The J1939 Scanner monitors communication and makes a clear display of all network nodes available. Information about the functionality and manufacturer is output. If necessary, a central and clear reconfiguration of the node addresses can occur.

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New functions of Version 7.1

Button for time-synchronous display

> The time-synchronous display of data can be activated with the help of a button. Starting from location information in the GNSS Monitor the user is lead to the respective parameter group in the Trace Window or gets a measuring point in the Graphic Window at the corresponding point in time or vice versa.

CANdb++ Editor optimized for messages with DLC>8

> Simplified arrangement of signals for messages with DLC>8Byte

CAPL extension

> The assignment operator supports parameter groups with DLC>8Byte.

Error messages with time stamp

> Error messages regarding transport protocols contain a time stamp in the Write Window. This simplifies analysis of cause in the Trace Window or in the log file.

Revised J1939 Scanner

> The view is optimized for dynamic networks, which significantly simplifies tracing and analyzing changes in the network configuration.