What's new in
ASAM MCD-2MC V1.6

ASAM MCD-2MC

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ASAM MCD-2MC
Overview

Within ASAM AE the MCD standards specify interfaces and formats for Measurement, Calibration and Diagnostic of Electronic Control Units (ECU).

The MCD-2MC standard specifies a format to describe the ECU software objects.

Measurement and Calibration (MC) Tools use this description to get detailed information about the ECU software objects. With the detailed information the MC tools are able to measure and to calibrate it.

Additionally MCD-2MC specifies an ASAM meta language (AML).
The AML is used to describe specific ECU interfaces. The MC tools use these interfaces to get access to the ECU internal objects.

ASAM MCD-2MC

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Dates and Deliverables

ASAM MCD-2MC Specification V1.6

Bug fixes + downward compatible extensions

For exceptions see specification chapter 1.4 'Compatibility'

Seed&Key and Checksum Calculation V1.0

Extract of CCP specific information from ASAP2 V1.51

What's New

Overview of all main changes and extensions

Checker Rules for A2L Checker

Extension of the rules of V1.51

Release
2009-02-16

ASAM MCD-2MC
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Encoding

Support of international Data Exchange

UTF-8 as preferred encoding

BOM (Byte-Order Mark) to add the encoding information to the A2L file

All keywords with string values (long name, unit, …) may contain language dependent text

Use Case

When A2L files are created or modified on operating systems other than American / European (e.g. Asian / Pacific) than special characteristics may be used in the string types.

This leads to a wrong interpretation of the files if they are shipped to different countries.

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CALIBRATION_HANDLE_TEXT

Additional Text String for the calibration handle

A textual strings additionally to the numbers is now possible

Use Case

If the calibration handle points to specific object the text string can be used as pointer to an identifier.

CHARACTERISTIC
Support of n-dimensional Maps

CHARACTERISTIC supports now additionally types

- CUBE_4

  - 4-dimensional map

- CUBE_5

  - 5-dimensional map

Use Case

In the ECU software there are functions with more than three inputs necessary.

E.g. to calculate a value depending from temperature, rpm, gas-pedal, gear.

COMPU_METHOD
Support of IDENTICAL and LINEAR

Use Case

Most of the physical data representations are identical or linear depending on the ECU internal data representation.

Note:

IDENTICAL needs no additional coefficients.

For LINEAR a set of COEFFS_LINEAR is defined.

Data Types
Support of 64bit Integer

Use Case

64 bit ECU support.

Note:

If ECU values of type int 64 are converted in physical values depending on the computation formula a higher precision in the physical area is necessary.
The currently used float 64 format supports less precision than int 64. Therefore the precision of the physical representation is reduced to the precision of float 64.
This is relevant for ASAM MCD-3 standards where data transfer is defined as physical. This is additionally relevant for all tools working on PCs / operating systems that do not support higher precision than float 64. Here the representation is rounded for physical and maybe also for internal representation.

DEFAULT_VALUE_NUMERIC

Support of numerical default values

For the computation method COMPU_TAB it is possible to add either textual or numeric default values.

Use Case

For the computation method COMPU_TAB it makes sense to support not only

textual default values.

DISCRETE

Measure and calibration values without interpolation

DISCRETE indicates that a measure or calibration object has discrete values which should not be interpolated – e.g. in graphic display windows or further calculations. This flag can be used e.g. for integer objects describing states.

Use Case

When mapping measure values from a non equidistant raster to an equidistant one, interpolation is not allowed when the measure object has the DISCRETE flag.

Furthermore, the DISCRETE flag can affect the display of measure values in a graphic window (e.g. connection type of measure values)

FORMULA

Use of ANSI-C conform operators

The operators are now ANSI-C conform. The supported operators are listed.

This allows easy exchange with other standards

Use Case

The ECU software is designed with tools that are ANSI-C conform. The formula description must be ANSI C too.

ECU description is handled in different standards. The user (tool) likes to transfer formulas easily, without transformation, between the different automotive standards like MCD, MSRSW, MDF, …

Note:

The ANSI-C notation of operators is not always compatible to earlier formula description of ASAM MCD-2MC

FORMULA

System Constants in FORMULA

System constants which are defined in MODULE | SYSTEM_CONSTANT can be used in the formula text if their name does not contain white space or special signs. The value of the system constant must contain either a numerical value or a string that contain further FORMULA part (recursive replacement of the text in the formula). Endless loop for the system constant usage in FORMULA is not allowed.

Use Case

With that it is possible to use conversion rules cross-project with specific settings for each project defined as system constants (e.g. cylinders)

IF_DATA for Group and Function

IF_DATA can be used to add specific data

Use Case

Add semantic information to explain how the parameters and measurements are used in the ECU. This shall allow tools to handle the data objects semantic dependent.

E.g. that the group of measurements is located in one block of memory and can be accessed via block read.

E.g. that curves are used as a set of curves and shall be selected and displayed as group

LAYOUT

Record Layout for Measurements

For measurement arrays with more than one dimension this keyword can be used to specify the layout of the array.

Use Case

For measurements with complex data structure a record layout description is necessary.

MONOTONY

Extension of the existing keyword MONOTONY

MONOTONY supports now additionally

- MONOTONOUS

    - to force simple monotony without direction

- STRICT_MON

    - to force strong monotony without direction

- NOT_MON

    - to allow not monotonous axis

    - requires a inverse computation method

Use Case
Allow more granular settings.

PHYS_UNIT

Local units for measure and calibration objects

PHYS_UNIT specifies a deviant physical unit for a measure or calibration object.
A computation method can be reused even if the unit is different.
It also can be used to specify a unit if no conversion rule is referenced
(NO_COMPU_METHOD).

Use Case
Measure or calibration objects use often the same computation method but have
different units.

STATIC_RECORD_LAYOUT
Curves and Maps with constant Record Size

If the RECORD_LAYOUT shall not condense curves and maps and use a static addressing instead the keyword STATIC_RECORD_LAYOUT can be added.

Use Case

Programming languages define record layouts static. If the axis points are removed, the addresses of the used cells remain the same.
The RECORD_LAYOUT normally assumes that all used cells of curves and maps are condensed if an axis point is removed.

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STATUS_STRING_REF

Add textual Values to a numerical Computation Method

The STATUS_STRING_REF keyword is used to split up the value range of ECU internal values into a numerical and a verbal part.
The verbal part can be used to visualize status information
(e.g. "Sensor not connected").

Use Case

Some values of measurements and calibrations may show error information. For visualization a textual string instead of the numeric value is useful.

STEP_SIZE

Support of step sizes for increment and decrement

STEP_SIZE at CHARACTEISTIC and AXIS_PTS defines the steps a tool shall use for increment or decrement.

Use Case

If a characteristic is a floating point value, the characteristics least significant digit is a very fine unit. For characteristics of the type floating point the calibration tool has no rule to determine a step size for up/down buttons.

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SYMBOL_LINK
Reference to Symbol Name within a Linker Map File

SYMBOL_LINK specifies the name of a symbol within a linker map file that corresponds to the respective CHARACTERISTIC or MEASUREMENT of the A2L file.

Use Case

The symbol representation of objects in the linker MAP file usually does not correspond to the naming within the variable description. A mapping is necessary for address updates after a rebuild of the ECU application.