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Rolls-Royce Motor Cars Limited

Darh Classic Integration Manual

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Revision History

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5.0.2	2017-11-09	JC-42	Version Update
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1 Introduction

This Integration Manual describes the basis functionality, API and the configuration and integration of the BMW System Function Darh.

Functional overview

The main objective of the Darh functionality is to send errors that occurred locally in the ECU and are reported to the Dem to a central master over the system bus. The idea is to collect errors of the individual ECUs in the vehicle in one central place to allow later analysis of error correlations between the different ECUs.

For this purpose, errors are sent to the master containing timestamp information. This allows deducing the order in which errors occurred in the complete system and helps to find out the original reason of a complex causal loop.

The Darh module itself is modeled as an AUTOSAR software component (SWC).

2 Related documentation

References

3 Limitations

No limitations are known.

4 Software Architecture

Dependencies on AUTOSAR modules

The current version of the Module Darh depends on the following BSW modules:

RTE

As a software component, the Darh module uses RTE client/server communication to communicate with other SWCs and BSW. Additionally the scheduling is done by the RTE.

Det

In case Det usage is enabled in the Darh configuration, Darh will report development errors by using the Det functionality.

Dcm

The Darh is tightly coupled with the Dcm. The Darh implements certain RDBI and RC services. Dcm shall be configured in a way, that it dispatches theses jobs to the Darh SWC.

Dem

The Darh receives general callbacks of the Dem in case event related data changed. Additionally the Darh controls specific events via ClientServerInterface DiagnosticMonitor of the Dem.

Nvm

The Darh uses the NvM to store and read the content of the error queue which shall be stored on non volatile memory at shutdown and restored at startup. Darh also stores if the tranmission is enabled or not.

Dependencies to other modules

Darh does not have dependencies to other modules.

5 Integration

Configuration of other Modules

The following modules shall be configured, before this module can be generated, compiled and linked.

Dcm

Read Data By Identifer

The RDBI command 22 17 23 shall be configured within Dcm:

- DcmDspDataSize shall be long enough to store the complete list of DTC configured within Darh (DarhActiveReportedEvent). Greater than count of DarhActiveReportedEvent * 3.
- DcmDspDataInfoRef shall reference to DcmDspDataInfo with DcmDspDataFixedLength set to false
- DcmDspDataUsePort shall be set to USE_DATA_SYNCH_CLIENT_SERVER
- DID shall be configured to be read in all sessions and security levels

Routine Control

Two Routine Control command shall be configured within Dcm.

One used to trigger two Dummy DTCs (31 01 03 04):

- DcmDspRoutineFixedLength shall be true
- DcmDspRoutineUsePort shall be true
- Only DcmDspStartRoutineIn shall be configured
  - DcmDspRoutineSignalLength shall be set to 8
  - DcmDspRoutineSignalPos shall be set to 0
- DcmDspStartRoutineOut
  - 4 paramters with a length of 8 bits shall be configured
  - DcmDspRoutineSignalPos shall be set to 0, 8, 16, and 24.

[] ⌈The second one to start and stop the transmission to the diagnose master (31 0x 40 0A): ⌋(DMA_PA_9154)

- DcmDspRoutineFixedLength shall be true
- DcmDspRoutineUsePort shall be true
- Neither input or output parameters are needed
- Start and Stop sub services shall be supported

NvM

The Darh needs 2 NvM blocks to store the event queue and the status of the transmission.

The variable Darh_ErrorQueue shall be mapped to the NvM block:

- Darh_ErrorQueue
  - Block size shall be set to the size of Darh_ErrorQueue
  - Ram block address shall be set to Darh_ErrorQueue
  - Rom block address shall be left empty. The default value shall be 0
  - NvmBlockManagementType shall be set to NVM_BLOCK_NATIVE
  - NvmBlockUseCrc shall be set to true
  - NvmSelectBlockForReadall shall be set to true
  - NvMSelectBlockForWriteAll shall be set to true
- Darh_DiagnoseMasterEnable
  - Block size shall be set to the size of boolean
  - Ram block address shall be set to Darh_DiagnoseMasterEnable
  - Rom block address shall be left empty.
  - NvmBlockManagementType shall be set to NVM_BLOCK_NATIVE
  - NvmSelectBlockForReadall shall be set to true
  - NvMSelectBlockForWriteAll shall be set to false

Dem

Event

Two Dem events shall be configured for Darh:

- DTC vale shall be set to 0xC90400 + (0x4000 * ECUDiagnosticAddress) + 0x07FF
- Event destination: primary origin
- Event kind: DEM_EVENT_KIND_SWC
- Description: Dummy Network DTC
- DTC vale shall be set to 0x02FF00 + ECUDiagnosticAddress
- Event destination: primary origin
- Event kind: DEM_EVENT_KIND_SWC
- Description: Dummy Application DTC

Det

A Darh entry shall be added to the Software Component List from Det.

BswM

The BswM controls the states of the Darh module.

- BswMModeRequestPort for the Darh operation mode
- BswMRules to switch the Darh operation mode
- BswMRteSwitch actions for the Darh operation mode

Com

The Darh requires a IPDU Multiplexer PDU for the transmission of the DTCs and their corresponding timestamp to the diagnostic master ECU. The Com port shall be connected to the corresponding port in Com. At the moment of this release there was not definition in the BNE regarding this PDU.

Configuration

The Darh configuration contains the following containers:

- Darh General
- DarhActiveReportEvent

DarhGeneral

This container contains the configuration (parameters) of the Darh

DarhDevErrorDetect

Activate/Deactivate the Development Error Detection and Notification. true: Development Error Detection and Notification activated false: Development Error Detection and Notification deactivated.

DarhQueueHandlerCycleTime

Cycle time of the Queue handler functionality. This value determines in which interval the queue is checked for pending entries that have to be sent to the Diagnose Master.

[] ⌈The valid range is between 1 and 16 seconds, but the delay between a Event is Report by the Dem and the transmission to the master shall be less than 10 seconds. ⌋(DMA_PA_5762, DMA_PA_8248)

DarhQueueSize

Max. number of entries (of type Darh_QueueElementType) the queue can contain.

DarhActiveReportListType

This parameter defines how and if Darh handles the DarhActiveReportedEvent to report errors to the Diagnose Master.

If configured to POSITIVE_LIST the event listed in DarhActiveReportedEvent are those reported to the Diagnose Master (mode compatible to Darh in SP2015). If configured to DYNAMICALLY the events listed in DarhActiveReportedEvent are ignored, the Operation EventToReport of the Client Server Interface

DarhReportDynamicallyEvent (over the port ReportDynamicallyEventPort) is used to check if a specific event shall be reported to Diagnose Master.

NOTE: NEGATIVE_LIST is not more supported in SP2021 (BAC4 Rel. 3).

DarhActiveReportedEvent

This container contains the Dem events to be reported to the Darh master.

[] ⌈Please refer to DMA$_P$ $A_8415 and DMA_P$ $A_8417 to include in this list the correct DTCs/Events to be reported.$⌋(DMA_PA_8415, DMA_PA_8417)

Configuration of the RTE

Event Mapping

The followings runnable entities shall be mapped:

- Init (triggers the Darh function Darh_Init)
- QueueHandler (triggers the Darh function Darh_QueueHandler).

Data Mapping

Dcm

- The port ActivelyReportedDtcPort shall be connected to the Dcm generated DataService_<xxx> see 6.1 Dcm.
- The port TriggerDTCPort shall be connected to the Dcm generated RoutineService_<xxx> see 6.1 Dcm.

Det

- The port DetPort shall be connected to the Det generated service port.

Dem

- The ApplicationDTCInfoPort shall be connected to the Dem generated EvtInfo_<xxx>.
- The ApplicationDTCPort shall be connected to the Dem generated Event_<xxx>.
- The NetworkDTCInfoPort shall be connected to the Dem generated EvtInfo_<xxx>.
- The NetworkDTCPort shall be connected to the Dem generated Event_<xxx>.

NvM

- The port NvMServicePort shall be connected to the NvM generated service port see 6.1. NvM.

BswM

- The port notificationDarhModePort shall be connected to the BswM generated mode switch port see 6.1 BswM.
- The port requestDarhModePort shall be connected to the BswM generated mode request port see 6.1 BswM.
- The port DarhReportErrorMode shall be connected to the BswM generated mode request port see 6.1 BswM.

NvM

- The port DiagnoseMasterStatus shall be connected to the NvM port created for the NvM block Darh_DiagnoseMasterEnable.
- The port ErrorQueueBlock shall be connected to the NvM port created for the NvM block Darh_ErrorQueue.

User SWC

It the configuration parameter DarhActiveReportListType is set to DYNAMICALLY the port ReportDynamicallyEventPort shall be connected to a user implemented SWC which indicates which Events shall be reported to the Diagnose Master.

This CSI shall implement the following methods:

- EventToReportCount: shall return the count of events to be reported.
- EventIdx2EventId: shall return the event (intsance ID) for an event index between 0 and GetEventCount.
- EventToReport: shall return if a specific event (instance ID) shall be reported or not.

Exclusive Areas

The Darh uses one exclusive area. The exclusive area shall be configured within the RTE.

Software Integration

The SWC description file has to be updated manually after the Dcm configuration.

After generating the Dem and Dcm SWC description files the integrator shall perform changes within Darh_ext_interface.arxml.tt to make the RTE interfaces between Dcm/Dem and Darh compatible from RTE point of view.

Within the Darh_ext_interface.arxml.tt the <ARRAY-SIZE> of the parameters Dem_MaxDataValueType and Dcm_RequestData_ArrayType shall be set to the vaules given by Dcm and Dem.

The size of the parameter Dem_MaxDataValueType shall be set to the length indicated within the Dem client server interface GeneralDiagnosticInfo, the operation GetEventFreezeFrameData the parameter FFData. The size of the parameter Dcm_RequestData_ArrayType shall be set to the length indicated within the Dcm interface ServiceRequestNotification, the operation Indication the parameter RequestData.

Startup/Initialization

The NvM ReadAll shall be complete before the Darh mode DARH_INIT is switched.

The Darh will request an DARH_RUN after initialization is completed.

The BswM shall switch the Darh Mode to DARH_RUN when the DARH requests this mode.

While in DARH_RUN the Darh will receive and store errors but will not transmit them to the Diagnose Master.

The BswM shall switch the Darh ReportErrorMode to DARH_REPORT_ERROR_ACTIVE to activate the transmission of the errors to the Diagnose Master, this may be performed for example when COM_FULL_COMMUNICATION is requested.

To request a specific state the user shall use the port LifeCycleRequest.

Normal Operation

If needed the BswM may switch the Darh ReportErrorMode to DARH_REPORT_ERROR_INACTIVE to disable the transmission of errors to the Diagnose Master. To activate the transmission again the mode DARH_REPORT_ERROR_ACTIVE shall be set again.

Shutdown/Deactivation

The BswM shall switch the Darh Mode to DARH_STOP to stop the Darh SW-C.