# Module -- DEM Interface

# High-Level Description

# Figures

## Component Diagram

# Variable Data Dictionary

|  |  |  |
| --- | --- | --- |
| Module Inputs | Module Outputs | |
| IgnCnt\_Cnt\_u16 | |  |
| MtrTrq\_MtrNm\_f32 | |  |
| VehSpd\_Kph\_f32 | |  |
| HwTrq\_HwNm\_f32 | |  |
| SystemState\_Mode | |  |

## Module Internal Variables

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable Name | Datatype | Resolution | | Legal Range  (min) | | Legal Range  (max) | Software Segment  {Data Type} | | |
| DEMEventActive\_Cnt\_M\_lgc[D\_NUMOFDEMEVENTS\_CNT\_U08+1] | Refer to Diagnostics\_Manager\_Core\_MDD.docx | | | | | | | | |
| ResetNTCFlag\_Cnt\_M\_u08 | Diagnostics\_Manager\_GeneratedCfg\_MDD.docx | | | | | | | | |
| LatchCounter\_Cnt\_u16 | uint16 | | 1 | | 0 | | | 65535 | DIAGMGRDEMIF\_START\_SEC\_VAR\_16 |
| NTCStrgArray\_Cnt\_str | Refer to Diagnostics\_Manager\_Core\_MDD.docx | | | | | | | | |
| NTCBlackBoxData\_Cnt\_str | Refer to Diagnostics\_Manager\_Core\_MDD.docx | | | | | | | | |

### User defined typedef definition/declaration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Typedef Name | Element Name | User Defined Type | Legal Range  (min) | Legal Range  (max) |
| Typedef struct {} NTCLatch\_Str | NTC | NTCNumber | 0 | 511 |
|  | DiagSettings\_Str.Threshold | Uint16 | 0 | 65535 |
|  | DiagSettings\_Str.PStep | Uint16 | 0 | 65535 |
|  | DiagSettings\_Str.NStep | Uint16 | 0 | 65535 |

# Constant Data Dictionary

## Calibration Constants

|  |
| --- |
| Constant Name |
| t\_SortedNTCs\_Cnt\_enum[] |
| k\_FltRspTbl\_Cnt\_str[] |
| t\_BlkBoxGrp\_Ptr\_u32[][] |
| t\_LatchFaults\_Cnt\_str[] |

## Program(fixed) Constants

### Embedded Constants

#### Local

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Units | Value |
| D\_EVTNOTPASSBITS\_CNT\_B8 | N/A | Counts | (D\_TESTFAILEDBIT\_CNT\_B8 | D\_TESTNOTCOMPLETETHISOPCYCLEBIT\_CNT\_B8) |
| D\_AGINGCOUNTERTHRESH\_CNT\_U08 | N/A | Counts | 0x40 |

#### Global

|  |
| --- |
| Constant Name |
| D\_NUMOFDEMEVENTS\_CNT\_U08 |
| D\_TESTFAILEDBIT\_CNT\_B8 |
| D\_TESTNOTCOMPLETETHISOPCYCLEBIT\_CNT\_B8 |
| D\_NTCACTIVEBITS\_CNT\_B8 |
| D\_MAXLATCHACTIVENTCS\_CNT\_U08 |

### Module specific Lookup Tables Constants

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Value | Software Segment |
| T\_DiagMgrNtcAppInfoMap\_Cnt\_Str[SIZE] |  | Refer \* | AP\_DIAGMGR\_CONST |
| T\_DiagMgrNtcInfoPtr\_Cnt\_Str[SIZE] |  | Refer \* | AP\_DIAGMGR\_CONST |
|  |  |  |  |

Note: “ Refer \*” - Refer to Diagnostics\_Manager\_GeneratedCfg\_MDD

Note Size and elements of Table constants varies across projects. Check project configuration files Under UTP/ Contract folder for data.

# Functions/Macros used by the Sub-Modules

## Library Functions / Macros

The library and functions / Macros that are called by the various sub modules are identified below,

1. TableSize\_m()

## Data Hiding Functions

1. <None>

## Global Functions/Macros Defined by this Module

### Diagnostic Manager Init 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Init1 | Type | Min | Max |
| **Arguments Passed** | none |  |  |  |
| **Return Value** | none |  |  | |

#### Description



### Diagnostic Manager Transition 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Trns1 | Type | Min | Max |
| **Arguments Passed** | none |  |  |  |
| **Return Value** | none |  |  | |

#### Description

Rte\_Call\_DemIf\_RestartDem()

Rte\_Call\_DemIf\_SetOperationCycleState(NxtrDefaultOpCycle, NXTR\_CYCLE\_STATE\_START)

### Diagnostic Manager StaCtrl Shutdown

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_StaCtrl\_Shutdown | Type | Min | Max |
| **Arguments Passed** | none |  |  |  |
| **Return Value** | none |  |  | |

#### Description

Rte\_Call\_DemIf\_SetOperationCycleState(NxtrDefaultOpCycle, NXTR\_CYCLE\_STATE\_END)

Rte\_Call\_DemIf\_DemShutdown()

CreateStorageArray(1U)

NvM\_SetRamBlockStatus(NVM\_BLOCK\_DIAGMGR\_NTCSTRG, TRUE)

NvM\_SetRamBlockStatus(NVM\_BLOCK\_DIAGMGR\_BLACKBOX, TRUE)

### Diagnostic Manager Periodic 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Per2 | Type | Min | Max |
| **Arguments Passed** | none |  |  |  |
| **Return Value** | none |  |  | |

#### Description





### Diagnostic Manager Get NTC Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_SCom\_GetNTCInfo | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | Param\_Ptr\_T\_u08 | const uint8 pointer | 0 | FULL |
|  | Status\_Ptr\_T\_u08 | const uint8 pointer | 0 | FULL |
|  | AgingCounter\_Ptr\_T\_u08 | const uint8 pointer | 0 | FULL |
| **Return Value** | none |  |  |  |

#### Description



### Diagnostic Manager Reset NTC Status

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_SCom\_ResetNTCStatus | Type | Min | Max |
| **Arguments Passed** | None |  |  |  |
| **Return Value** | none |  |  |  |

#### Description

ResetNTCFlag\_Cnt\_M\_u08 = ~ResetNTCFlag\_Cnt\_M\_u08

### Diagnostic Manager Read Storage Array

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_SCom\_ReadStrgArray | Type | Min | Max |
| **Arguments Passed** | None |  |  |  |
|  |  |  |  |  |
| **Return Value** | none |  |  | |

#### Description

CreateStorageArray(0U)

### Diagnostic Manager Clear Black Box

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_SCom\_ClearBlackBox | Type | Min | Max |
| **Arguments Passed** | None |  |  |  |
| **Return Value** | none |  |  | |

#### Description



### Diagnostic Manager Clear Latch Counters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_SCom\_ClearLatchCounters | Type | Min | Max |
| **Arguments Passed** | None |  |  |  |
| **Return Value** | none |  |  | |

#### Description



### Update Black Box

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | UpdateBlkBox | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_u08 | Uint8 | 0 | FULL |
|  | Param\_Cnt\_T\_u08 | Uint8 | 0 | FULL |
|  | BlkBoxGrpIdx\_Cnt\_T\_u08 | Uint8 | 0 | 6 |
| **Return Value** | none |  |  | |

#### Design Rationale

The configuration option DIAGMGR\_IS\_MTO\_PROGRAM is used to configure the use of Param1 and Param2 for specific program types. If DIAGMGR\_IS\_MTO\_PROGRAM is set to TRUE, Param1 is used for Differential Pressure and Param2 is used for Coil Current Commanded.. Meanwhile, if DIAGMGR\_IS\_MTO\_PROGRAM is set to FALSE, Param1 is mapped to Handwheel torque and Param2 is mapped to Motor Torque. It is intended that DIAGMGR\_IS\_MTO\_PROGRAM will be set to FALSE for EPS systems and TRUE for MTO systems.

#### Description



## Local Functions/Macros Used by this MDD only

### Create Storage Array

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | CreateStorageArray | Type | Min | Max |
| **Arguments Passed** | AgingCounterIncrement | uint8 | 0 | 1 |
| **Return Value** | N/A |  |  |  |

#### Description





# Software Module Implementation

## Runtime Environment (RTE) Initial Values

|  |  |
| --- | --- |
| Data | Value |
|  |  |

## Initialization Functions

None

## Periodic Functions

None

## Fault Recovery Functions

None

## Shutdown Functions

None

## Interrupt Functions

None

## Fault Recovery Functions

None

## Shutdown Functions

None

## Interrupt Functions

None

## Serial Communication Functions

None

# Execution Requirements

## Execution Sequence of the Module

## Execution Rates for sub-modules called by the Scheduler

This table serves as reference for the Scheduler design

|  |  |  |
| --- | --- | --- |
| Function Name | Calling Frequency | System State(s) in which the function is called |
|  |  |  |

## Execution Requirements for Serial Communication Functions

|  |  |
| --- | --- |
| Function Name | Sub-Module called by (Serial Comm Function Name) |
|  |  |

# Memory Map Definition Requirements

## Sub Modules (Functions)

This table identifies the software segments for functions identified in this module.

|  |  |
| --- | --- |
| Name of Sub Module | Software Segment |
|  |  |

## Global and Local Functions

This table identifies the software segments for local functions identified in this module.

|  |  |
| --- | --- |
| Name of Sub Module | Software Segment |
| DiagMgr\_Trns1 | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_Trns2 | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_Per2 | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_SCom\_GetNTCInfo | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_Scom\_ResetNTCStatus | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_Scom\_ReadStrgArray | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| DiagMgr\_Scom\_ClearBlackBox | RTE\_AP\_DIAGMGR\_APPL\_CODE |
| UpdateBlkBox | AP\_DIAGMGR\_CODE |
| CreateStorageArray | AP\_DIAGMGR\_CODE |

# Known Issues / Limitations With Design

1. The latch active counters will not be stepped/checked on a quick ignition cycle as the Init1 function will not be called.

# Revision Control Log

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev #** | **Change Description** | **Date** | **Author Initials** |
| 1 | Initial MDD version | 26-Mar-13 | VK |
| 2 | MDD Catch up to match to SRC Ver 5 | 24- June- 13 | NRAR |
| 3 | Added init function to support latch active diagnostic addition | 04-OCT-13 | Jared |
| 4 | Updated for changes to snapshot configuration to make HwTrq and MtrTrq parameters more generic | 28-Feb-14 | Jared |