**Module Design Document**

**For**

**LoaMgr**

**June 22, 2016Prepared For:**

**Software Engineering**

**Nexteer Automotive,**

**Saginaw, MI, USA**

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# Introduction

## Purpose

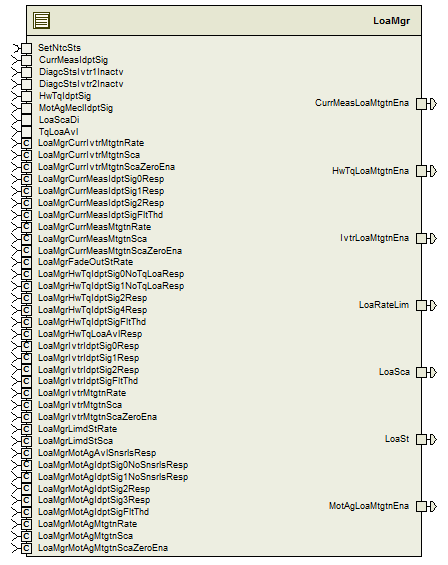
## Scope

# LoaMgr High-Level Description

Refer to FDD

# Design details of software module

## Graphical representation of LoaMgr



## Data Flow Diagram

Refer FDD

### Component level DFD

### Function level DFD

# Constant Data Dictionary

## Program (fixed) Constants

### Embedded Constants

#### Local Constants

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Units | Value |
| Refer .m file |  |  |  |

# Software Component Implementation

## Sub-Module Functions

## Init: LoaMgrInit1

## Design Rationale

*Refer FDD*

## Module Outputs

*Refer FDD*

## Per: LoaMgrPer1

## Design Rationale

*Refer FDD*

## Store Module Inputs to Local copies

*Refer FDD*

## (Processing of function)………

*Refer FDD*

## Store Local copy of outputs into Module Outputs

*Refer FDD*

## Server Runables

*None*

## Interrupt Functions

*None*

## Module Internal (Local) Functions

## Local Function #1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReqHwTqResp | Type | Min | Max |
| **Arguments Passed** | HwTqIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 4 |
|  | TqLoaAvl\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
| **Return Value** | HwTqResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |

## Design Rationale

None

## Processing

Refer to ‘HwTqResp’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Request\_Responses’

## Local Function #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReqMotAgResp | Type | Min | Max |
| **Arguments Passed** | MotAgIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 3 |
|  | SmpAvl\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
| **Return Value** | MotAgResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |

## Design Rationale

None

## Processing

Refer to ‘MotAgResp’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Request\_Responses’

## Local Function #3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReqCurrMeasResp | Type | Min | Max |
| **Arguments Passed** | CurrMeasIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 2 |
| **Return Value** | CurrMeasResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |

## Design Rationale

None

## Processing

Refer to ‘CurrMeasResp’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Request\_Responses’

## Local Function #4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReqInvtrResp | Type | Min | Max |
| **Arguments Passed** | IvtrIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 2 |
| **Return Value** | InvtrResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |

## Design Rationale

None

## Processing

Refer to ‘CurrMeasResp’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Request\_Responses’

## Local Function #5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | CntSwBasdMtgtnChk | Type | Min | Max |
| **Arguments Passed** | Resp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
|  | PrevMtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
| **Return Value** | MtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |

## Design Rationale

None

## Processing

This function corresponds to common logic (for all requests) in ‘CntSwBasdMtgtn’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Arbitrate\_Responses’

## Local Function #6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | SelFinalResp | Type | Min | Max |
| **Arguments Passed** | MultiMtgtnResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
|  | HwTqResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
|  | MotAgResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
|  | CurrMeasResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
|  | InvtrResp\_Cnt\_T\_u08 | uint8 | 0 | 5 |
| **Return Value** | LoaSt\_Cnt\_T\_enum | LoaSt1 | 0 | 5 |

## Design Rationale

None

## Processing

This function corresponds to ‘SelFinalResp’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Arbitrate\_Responses’

## Local Function #7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | SetFaults | Type | Min | Max |
| **Arguments Passed** | LoaSt\_Cnt\_T\_enum | LoaSt1 | 0 | 5 |
|  | HwTqIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 4 |
|  | MotAgIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 3 |
|  | CurrMeasIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 2 |
|  | IvtrIdptMin\_Cnt\_T\_u08 | uint8 | 0 | 2 |
| **Return Value** | None |  |  |  |

## Design Rationale

None

## Processing

This function corresponds to ‘Set\_Faults’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1’

## Local Function #8

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | SwMtgtnEn | Type | Min | Max |
| **Arguments Passed** | HwTqLoaMtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
|  | MotAgLoaMtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
|  | CurrMeasLoaMtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
|  | IvtrLoaMtgtnEna\_Cnt\_T\_lgc | boolean | FALSE | TRUE |
|  | \*LoaSca\_Uls\_T\_f32 | float32 | 0 | 1 |
|  | \*LoaRateLim\_UlsPerSec\_T\_f32 | float32 | 0.01 | 500 |
| **Return Value** | None |  |  |  |

## Design Rationale

None

## Processing

This function corresponds to ‘SwMtgtn’ block in FDD at ‘SF049A\_LoaMgr/LoaMgr/LoaMgrPer1/Assign\_Scale’.

Note that ‘\*LoaSca\_Uls\_T\_f32’ and ‘\*LoaRateLim\_UlsPerSec\_T\_f32’ are the outputs of this function.

## GLOBAL Function/Macro Definitions

None

# Known Limitations with Design

None

# UNIT TEST CONSIDERATION

None

Abbreviations and Acronyms

| **Abbreviation or Acronym** | **Description** |
| --- | --- |
|  |  |
|  |  |

Glossary

**Note**: Terms and definitions from the source “Nexteer Automotive” take precedence over all other definitions of the same term. Terms and definitions from the source “Nexteer Automotive” are formulated from multiple sources, including the following:

* ISO 9000
* ISO/IEC 12207
* ISO/IEC 15504
* Automotive SPICE® Process Reference Model (PRM)
* Automotive SPICE® Process Assessment Model (PAM)
* ISO/IEC 15288
* ISO 26262
* IEEE Standards
* SWEBOK
* PMBOK
* Existing Nexteer Automotive documentation

| **Term** | **Definition** | **Source** |
| --- | --- | --- |
| MDD | Module Design Document |  |
| DFD | Data Flow Diagram |  |

References

| **Ref. #** | **Title** | **Version** |
| --- | --- | --- |
| 1 | AUTOSAR Specification of Memory Mapping (Link:[AUTOSAR\_SWS\_MemoryMapping.pdf](http://www.autosar.org/download/R4.0/AUTOSAR_SWS_MemoryMapping.pdf)) | v1.3.0 R4.0 Rev 2 |
| 2 | MDD Guideline | EA4 01.00.01 |
| 3 | [Software Naming Conventions.doc](http://misagweb01.nexteer.com/eRoomReq/Files/erooms8/NextGeneration/0_fc55f/Software%20Naming%20Conventions%2003x(In%20Work).doc) | EA4 01.00.00 |
| 4 | [Software Design and Coding Standards.doc](http://eroom1.nexteer.com/eRoomReq/Files/erooms8/NextGeneration/0_1a67a9/Software%20Design%20and%20Coding%20Standards.doc) | 2.1 |
| 5 | FDD : SF049A\_LoaMgr\_Design | See Synergy sub project version |