**Module Design Document**

**For**

**FordMsg077BusHiSpd**

**02-May-2018**

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Table of Contents

[Table of Contents 3](#_Toc513218329)

[1 Introduction 6](#_Toc513218330)

[1.1 Purpose 6](#_Toc513218331)

[1.2 Scope 6](#_Toc513218332)

[2 FordMsg077BusHiSpd & High-Level Description 7](#_Toc513218333)

[3 Design details of software module 8](#_Toc513218334)

[3.1 Graphical representation of FordMsg077BusHiSpd 8](#_Toc513218335)

[3.2 Data Flow Diagram 9](#_Toc513218336)

[3.2.1 Component level DFD 9](#_Toc513218337)

[3.2.2 Function level DFD 9](#_Toc513218338)

[4 Constant Data Dictionary 10](#_Toc513218339)

[4.1 Program (fixed) Constants 10](#_Toc513218340)

[4.1.1 Embedded Constants 10](#_Toc513218341)

[5 Software Component Implementation 11](#_Toc513218342)

[5.1 Sub-Module Functions 11](#_Toc513218343)

[5.1.1 Init: FordMsg077BusHiSpdInit1 11](#_Toc513218344)

[5.1.2 Per: FordMsg077BusHiSpdPer1 11](#_Toc513218345)

[5.2 Server Runnables 11](#_Toc513218346)

[5.2.1 ComIPduCallout\_BrakeSnData\_3\_FD1 11](#_Toc513218347)

[5.2.1.1 Design Rationale 11](#_Toc513218348)

[5.2.1.2 Processing of function 11](#_Toc513218349)

[5.2.2 ComTimeoutNotification\_VehLatComp\_A\_Actl 11](#_Toc513218350)

[5.2.2.1 Design Rationale 11](#_Toc513218351)

[5.2.2.2 Processing of function 11](#_Toc513218352)

[5.3 Interrupt Functions 12](#_Toc513218353)

[5.4 Module Internal (Local) Functions 12](#_Toc513218354)

[5.4.1 Local Function #1 12](#_Toc513218355)

[5.4.1.1 Design Rationale 12](#_Toc513218356)

[5.4.1.2 Processing 12](#_Toc513218357)

[5.4.2 Local Function #2 12](#_Toc513218358)

[5.4.2.1 Design Rationale 13](#_Toc513218359)

[5.4.2.2 Processing 13](#_Toc513218360)

[5.4.3 Local Function #3 13](#_Toc513218361)

[5.4.3.1 Design Rationale 13](#_Toc513218362)

[5.4.3.2 Processing 13](#_Toc513218363)

[5.4.4 Local Function #4 14](#_Toc513218364)

[5.4.5 Design Rationale 14](#_Toc513218365)

[5.4.5.1 Processing 14](#_Toc513218366)

[5.4.6 Local Function #5 15](#_Toc513218367)

[5.4.6.1 Design Rationale 15](#_Toc513218368)

[5.4.6.2 Processing 15](#_Toc513218369)

[5.4.7 Local Function #6 15](#_Toc513218370)

[5.4.7.1 Design Rationale 15](#_Toc513218371)

[5.4.7.2 Processing 15](#_Toc513218372)

[5.4.8 Local Function #7 15](#_Toc513218373)

[5.4.8.1 Design Rationale 16](#_Toc513218374)

[5.4.8.2 Processing 16](#_Toc513218375)

[5.4.9 Local Function #8 16](#_Toc513218376)

[5.4.9.1 Design Rationale 16](#_Toc513218377)

[5.4.9.2 Processing 16](#_Toc513218378)

[5.4.10 Local Function #9 16](#_Toc513218379)

[5.4.10.1 Design Rationale 16](#_Toc513218380)

[5.4.10.2 Processing 16](#_Toc513218381)

[5.4.11 Local Function #10 17](#_Toc513218382)

[5.4.11.1 Design Rationale 17](#_Toc513218383)

[5.4.11.2 Processing 17](#_Toc513218384)

[5.4.12 Local Function #11 17](#_Toc513218385)

[5.4.12.1 Design Rationale 17](#_Toc513218386)

[5.4.12.2 Processing 17](#_Toc513218387)

[5.4.13 Local Function #12 17](#_Toc513218388)

[5.4.13.1 Design Rationale 18](#_Toc513218389)

[5.4.13.2 Processing 18](#_Toc513218390)

[5.4.14 Local Function #13 18](#_Toc513218391)

[5.4.14.1 Design Rationale 18](#_Toc513218392)

[5.4.14.2 Processing 18](#_Toc513218393)

[5.4.15 Local Function #14 18](#_Toc513218394)

[5.4.15.1 Design Rationale 18](#_Toc513218395)

[5.4.15.2 Processing 19](#_Toc513218396)

[5.4.16 Local Function #15 19](#_Toc513218397)

[5.4.16.1 Design Rationale 19](#_Toc513218398)

[5.4.16.2 Processing 19](#_Toc513218399)

[5.4.17 Local Function #16 19](#_Toc513218400)

[5.4.17.1 Design Rationale 19](#_Toc513218401)

[5.4.17.2 Processing 19](#_Toc513218402)

[5.4.18 Local Function #17 19](#_Toc513218403)

[5.4.18.1 Design Rationale 20](#_Toc513218404)

[5.4.18.2 Processing 20](#_Toc513218405)

[5.4.19 Local Function #18 20](#_Toc513218406)

[5.4.19.1 Design Rationale 20](#_Toc513218407)

[5.4.19.2 Processing 20](#_Toc513218408)

[5.5 GLOBAL Function/Macro Definitions 20](#_Toc513218409)

[6 Known Limitations with Design 21](#_Toc513218410)

[7 UNIT TEST CONSIDERATION 22](#_Toc513218411)

[Appendix A Abbreviations and Acronyms 23](#_Toc513218412)

[Appendix B Glossary 24](#_Toc513218413)

[Appendix C References 25](#_Toc513218414)

# Introduction

## Purpose

Module Design Document for MM124A\_FordMsg077BusHiSpd\_Impl.

## Scope

The following definitions are used throughout this document:

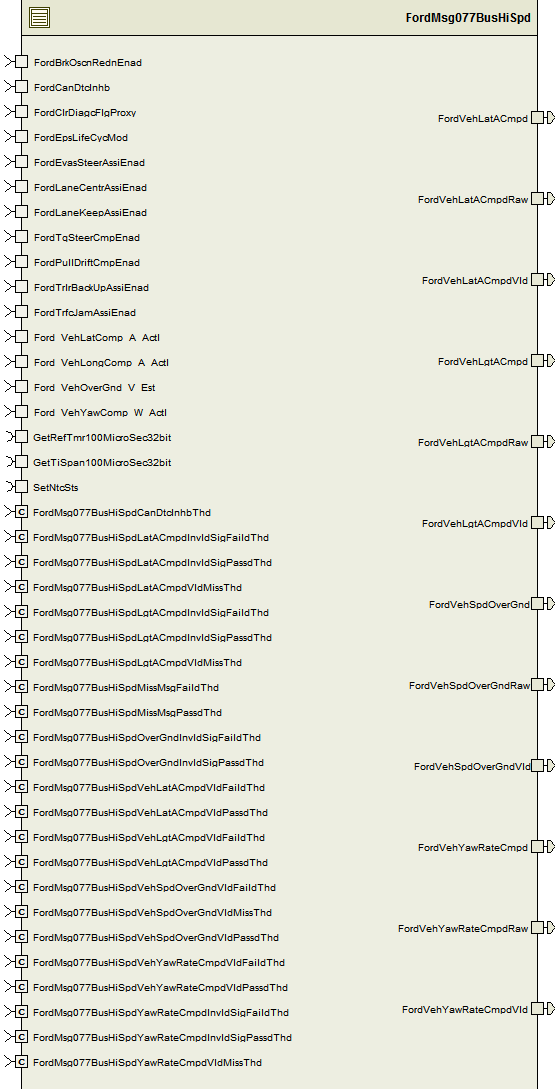
* **Shall**: indicates a mandatory requirement without exception in compliance.
* **Should**: indicates a mandatory requirement; exceptions allowed only with documented justification.
* **May**: indicates an optional action.

# FordMsg077BusHiSpd & High-Level Description

Refer the FDD.

# Design details of software module

## Graphical representation of FordMsg077BusHiSpd



## Data Flow Diagram

Refer FDD

### Component level DFD

Refer FDD

### Function level DFD

Refer FDD

# Constant Data Dictionary

## Program (fixed) Constants

### Embedded Constants

#### Local Constants

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

# Software Component Implementation

## Sub-Module Functions

The sub-module functions are grouped based on similar functionality that needs to be executed in a given “State” of the system (refer States and Modes). For a given module, the MDD will identify the type and number of sub-modules required. The sub-module types are described below.

### Init: FordMsg077BusHiSpdInit1

#### Design Rationale

Refer FDD

#### Module Outputs

Refer FDD

### Per: FordMsg077BusHiSpdPer1

#### 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 Runnables

### ComIPduCallout\_BrakeSnData\_3\_FD1

## 5.2.1.1 Design Rationale

None

## 5.2.1.2 Processing of function

None

### ComTimeoutNotification\_VehLatComp\_A\_Actl

## 5.2.2.1 Design Rationale

None

## 5.2.2.2 Processing of function

None

## Interrupt Functions

None

## Module Internal (Local) Functions

## Local Function #1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagEna | Type | Min | Max |
| **Arguments Passed** | FordTqSteerCmpEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordBrkOscnRednEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordLaneKeepAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordTrfcJamAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordLaneCentrAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordPullDriftCmpEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordTrlrBackUpAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordEvasSteerAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordCanDtcInhb\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordClrDiagcFlgProxy\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*MissMsgDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| \* FordVehLatACmpdInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLgtACmpdInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehSpdOverGndInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/DiagEna

## Local Function #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | CalSeln | Type | Min | Max |
| **Arguments Passed** | FordEpsLifeCycMod\_Cnt\_T\_u08 | uint8 | 0U | 1U |
| \*BusHiSpdMissThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
| \*BusHiSpdLatACmpdInvldThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
| \*BusHiSpdLgtACmpdInvldThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
| \*BusHiSpdYawRateCmpdInvldThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
| \*BusHiSpdOverGndInvldThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/CalSeln

## Local Function #3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | MissMsg | Type | Min | Max |
| **Arguments Passed** | MissMsgDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| BusHiSpdMissTiThd\_MilliSec\_T\_u16 | uint16 | 0U | 6000U |
|  | \*FordVehLatACmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 1023U |
|  | \*FordVehLatACmpd\_Cnt\_T\_f32 | float32 | -17.9 | 17.835 |
|  | \*FordVehLatACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
|  | \*FordVehLgtACmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 1023 |
|  | \*FordVehLgtACmpd\_Cnt\_T\_f32 | float32 | -17.9 | 17.835 |
|  | \*FordVehLgtACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
|  | \*FordVehYawRateCmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 4095 |
|  | \*FordVehYawRateCmpd\_Cnt\_T\_f32 | float32 | -75 | 74.92659 |
|  | \*FordVehYawRateCmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
|  | \*FordVehSpdOverGndRaw\_Cnt\_T\_u16 | uint16 | 0U | 65535 |
|  | \*FordVehSpdOverGnd\_Kph\_T\_f32 | float32 | 0 | 655.33 |
|  | \*FordVehSpdOverGndVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MissingMsgDetermination

## Local Function #4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | OutProcg | Type | Min | Max |
| **Arguments Passed** | Ford\_VehLatComp\_A\_Actl\_Cnt\_T\_enum | Ford\_VehLatComp\_A\_Actl | 0U | 1023U |
| Ford\_VehLongComp\_A\_Actl\_Cnt\_T\_enum | Ford\_VehLongComp\_A\_Actl | 0U | 1023U |
| Ford\_VehYawComp\_W\_Actl\_Cnt\_T\_enum | Ford\_VehYawComp\_W\_Actl | 0U | 4095U |
| Ford\_VehOverGnd\_V\_Est\_Cnt\_T\_enum | Ford\_VehOverGnd\_V\_Est | 0U | 65535U |
| \*FordVehLatACmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 1023U |
| \*FordVehLatACmpd\_Cnt\_T\_f32 | float32 | -17.9 | 17.835 |
| \*FordVehLatACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLgtACmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 1023U |
| \*FordVehLgtACmpd\_Cnt\_T\_f32 | float32 | -17.9 | 17.835 |
| \*FordVehLgtACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehYawRateCmpdRaw\_Cnt\_T\_u16 | uint16 | 0U | 4095U |
| \*FordVehYawRateCmpd\_Cnt\_T\_f32 | float32 | -75 | 74.92659 |
| \*FordVehYawRateCmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehSpdOverGndRaw\_Cnt\_T\_u16 | uint16 | 0U | 65535U |
| \*FordVehSpdOverGnd\_Kph\_T\_f32 | float32 | 0 | 655.35 |
| \*FordVehSpdOverGndVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLatACmpdVldInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLgtACmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehYawRateCmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehSpdOverGndInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing

## Local Function #5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VldElpdTi | Type | Min | Max |
| **Arguments Passed** | \*VehLatVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehLatInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehLgtVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehLgtInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehYawRateVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehYawRateInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehSpdOverGndVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehSpdOverGndInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/VldElpdTi

## Local Function #6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehLatVldElpdTi | Type | Min | Max |
| **Arguments Passed** | \*VehLatVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehLatInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/VldElpdTi

## Local Function #7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehLgtVldElpdTi | Type | Min | Max |
| **Arguments Passed** | \*VehLgtVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehLgtInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/VldElpdTi

## Local Function #8

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehYawRateVldElpdTi | Type | Min | Max |
| **Arguments Passed** | \*VehYawRateVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehYawRateInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/VldElpdTi

## Local Function #9

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehSpdOverGndVldElpdTi | Type | Min | Max |
| **Arguments Passed** | \*VehSpdOverGndVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*VehSpdOverGndInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/VldElpdTi

## Local Function #10

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehLatAVld | Type | Min | Max |
| **Arguments Passed** | FordVehLatACmpdVldInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehLatVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehLatInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLatACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/ChkElpdTi

## Local Function #11

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehLgtAVld | Type | Min | Max |
| **Arguments Passed** | FordVehLgtACmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehLgtVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehLgtInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehLgtACmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/ChkElpdTi

## Local Function #12

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehYawRateVld | Type | Min | Max |
| **Arguments Passed** | FordVehYawRateCmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehYawRateVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehYawRateInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehYawRateCmpdVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/ChkElpdTi

## Local Function #13

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | VehSpdOverGndVld | Type | Min | Max |
| **Arguments Passed** | FordVehSpdOverGndInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehSpdOverGndVldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| VehSpdOverGndInvldElpdTi\_Cnt\_T\_logl | boolean | 0U | 1U |
| \*FordVehSpdOverGndVld\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/OutputProcessing/ChkElpdTi

## Local Function #14

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | MissMsgNtcPass | Type | Min | Max |
| **Arguments Passed** | MissMsgDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordVehYawRateCmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| BusHiSpdYawRateCmpdInvldThd\_Cnt\_T\_u16 | uint16 | 0U | 65535U |
| FordEvasSteerAssiEnad\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/MissMsgNtcPass

## Local Function #15

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | FordVehLgtACmpdInvldNtc | Type | Min | Max |
| **Arguments Passed** | FordVehLgtACmpdInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordVehLgtACmpdInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| BusHiSpdLgtACmpdInvldThd\_Cnt\_T\_u16 | uint16 | 0U | 65535U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/FordVehLgtACmpdInvldNtc

## Local Function #16

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | FordVehLatACmpdInvldDiagEnaPass | Type | Min | Max |
| **Arguments Passed** | FordVehLatACmpdInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| FordVehLatACmpdVldInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| BusHiSpdLatACmpdInvldThd\_Cnt\_T\_u16 | uint16 | 0U | 65535U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/FordVehLatACmpdInvldDiagEnaPass

## Local Function #17

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | FordVehSpdOverGndInvldNtc | Type | Min | Max |
| **Arguments Passed** | FordVehSpdOverGndInvldDiagEna\_Cnt\_T\_logl | boolean | 0U | 1U |
| BusHiSpdOverGndInvldThd\_Cnt\_T\_u16 | uint16 | 0U | 65535U |
| FordVehSpdOverGndInp\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/MsgProcessing/FordVehSpdOverGndInvldNtc

## Local Function #18

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | IsFeatActv | Type | Min | Max |
| **Arguments Passed** | Enad\_Cnt\_T\_logl | boolean | 0U | 1U |
| **Return Value** | NA |  |  |  |

## Design Rationale

None

## Processing

Please refer to the below path in the FDD model.

MM124A\_FordMsg077BusHiSpd/FordMsg077BusHiSpd/FordMsg077BusHiSpdPer1/DiagEna

## GLOBAL Function/Macro Definitions

None

# Known Limitations with Design

None

# UNIT TEST CONSIDERATION

None

1. Abbreviations and Acronyms

| **Abbreviation or Acronym** | **Description** |
| --- | --- |
| FDD | Functional Design Document. (See references) |

1. 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 |  |

1. References

|  |  |  |
| --- | --- | --- |
| Ref. # | Title | Version |
| 1 | AUTOSAR Specification of Memory Mapping (Link:AUTOSAR\_SWS\_MemoryMapping.pdf) | v1.3.0 R4.0 Rev 2 |
| 2 | MDD Guideline | EA4 01.02 |
| 3 | Software Naming Conventions.doc | EA4 01.02 |
| 4 | Software Design and Coding Standards.doc | EA4 2.01 |
| 5 | FDD: MM073A\_FordMsg3CABusHiSpd\_Design | See Synergy subproject version |