**Module Design Document**

**For**

**AssiPahFwl**

**Feb 05, 2016**

**Prepared For:**

**Software Engineering**

**Nexteer Automotive,**

**Saginaw, MI, USA**

**Prepared By:**

**Sarika Natu,**

**KPIT Technologies,**

**India**

**Change History**

|  |  |  |  |
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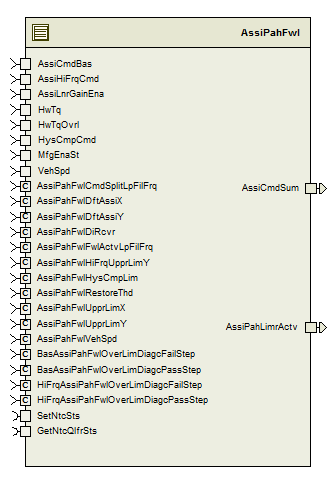
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# AssiPahFwl & High-Level Description

Refer FDD

# Design details of software module

## Graphical representation of AssiPahFwl



## 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 |
| NODEBSTEP\_CNT\_U16 | NA | NA | 65535U |

# Software Component Implementation

## Sub-Module Functions

## Init: AssiPahFwl\_Init1

## Design Rationale

*Refer FDD*

## Module Outputs

*Refer FDD*

## Per: AssiPahFwl\_Per1

## 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

None

## Interrupt Functions

None

## Module Internal (Local) Functions

## Local Function #1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | Dynamic\_Assi\_Boundary | Type | Min | Max |
| **Arguments Passed** | VehSpd\_Kph\_T\_u9p7 | Uint16 | 0 | 511 |
|  | HwTq\_HwNwtMtr\_T\_f32 | Float32 | -10.0 | 10.0 |
|  | LoFrqInp\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | \*LowrBndLpFil\_MotNwtMtr\_T\_f32 | Float32\* | -16 | 16 |
|  | \*UpprBndLpFil\_MotNwtMtr\_T\_f32 | Float32\* | -16 | 16 |
| **Return Value** | HiFrqAssiLimd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |

## Design Rationale

LowrBndLpFil\_MotNwtMtr\_T\_f32 and UpprBndLpFil\_MotNwtMtr\_T\_f32 will be updated in this function.

## Processing

Refer to the subsystems 'Determine HiFreqAsst Boundaries' and 'Low pass filter boundaries' in FDD.

## Local Function #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | Base\_Assi\_Boundary | Type | Min | Max |
| **Arguments Passed** | HwTrq\_HwNwtMtr\_T\_f32 | Float32 | -20.0 | 20.0 |
|  | VehSpd\_Kph\_T\_u9p7 | Uint16 | 0 | 511 |
|  | AssiCmdBas\_MotNwtMtr\_T\_f32 | Float32 | -8.8 | 8.8 |
|  | BasAssiLowrBnd\_MotNwtMtr\_T\_f32 | float32\* | -16 | 16 |
|  | BasAssiUpprBnd\_MotNwtMtr\_T\_f32 | float32\* | -16 | 16 |
| **Return Value** | BasAssiLimd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |

## Design Rationale

BasAssiLowrBnd\_MotNwtMtr\_T\_f32 and BasAssiUpprBnd\_MotNwtMtr\_T\_f32 will be updated in this function

## Processing

Refer the subsystem ‘Determine\_BaseAsst\_Boundaries’ implementation in FDD.

## Local Function #3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | Det\_Boundary\_Lim | Type | Min | Max |
| **Arguments Passed** | AssiCmdBas\_MotNwtMtr\_T\_f32 | Float32 | -8.8 | 8.8 |
|  | BasAssiUpprBnd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | BasAssiLowrBnd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | LowrBndLpFil\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | UpprBndLpFil\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | LoFrqInp\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | HiFrqOverBnd\_MotNwtMtr\_T\_Logl | Boolean\* | FALSE | TRUE |
|  | BasAssiOverBnd\_MotNwtMtr\_T\_Logl | Boolean\* | FALSE | TRUE |
| **Return Value** | AssiFwlFailSts\_Cnt\_T\_Logl | Boolean | FALSE | TRUE |

## Design Rationale

HiFrqOverBnd\_MotNwtMtr\_T\_Logl and BasAssiOverBnd\_MotNwtMtr\_T\_Logl will be updated in this function.

## Processing

Refer to the section ‘Check both command paths for reaching boundary limits, if so begin de bounce counters’ in FDD.

## Local Function #4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | Assist\_Recovery\_Cond | Type | Min | Max |
| **Arguments Passed** | AssiCmdBas\_MotNwtMtr\_T\_f32 | Float32 | -8.8 | 8.8 |
|  | DftAssi\_MotNwtMtr\_T\_f32 | Float32 | -8.8 | 8.8 |
|  | AssiFwlFailSts\_Cnt\_T\_Logl | Boolean | FASLE | TRUE |
|  | SumInp\_MotNwtMtr\_T\_f32 | Float32 | -17.6 | 17.6 |
|  | BasAssiLimd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | HiFrqInp\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | HiFrqAssiLimd\_MotNwtMtr\_T\_f32 | Float32 | -16 | 16 |
|  | BasAssiOverBnd\_MotNwtMtr\_T\_Logl | Boolean | FALSE | TRUE |
|  | HiFrqOverBnd\_MotNwtMtr\_T\_Logl | Boolean | FALSE | TRUE |
|  | \*AssiPahLimrActv\_Uls\_T\_f32 | Float32 | FASLE | TRUE |
| **Return Value** | CombdAssiDft\_MotNwtMtr\_T\_f32 | Float32 | -8.8 | 8.8 |

## Design Rationale

AssiPahLimrActv\_Uls\_T\_f32 will be updated in this function

## Processing

Refer to the section ‘Check Input commands vs. Fwl Output command for Assist Recovery Conditions’ in FDD.

## Local Function #5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | Set\_Faults | Type | Min | Max |
| **Arguments Passed** | HiFrqOverBnd\_MotNwtMtr\_T\_Logl | Boolean | FASLE | TRUE |
|  | BasAssiOverBnd\_MotNwtMtr\_T\_Logl | Boolean | FASLE | TRUE |
| **Return Value** | None |  |  |  |

## Design Rationale

None

## Processing

Refer ‘Set\_Faults’ subsystem in FDD.

## GLOBAL Function/Macro Definitions

None

# Known Limitations with Design

# 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 01.00.00 |
| 3 | [Software Naming Conventions.doc](http://misagweb01.nexteer.com/eRoomReq/Files/erooms8/NextGeneration/0_fc55f/Software%20Naming%20Conventions%2003x(In%20Work).doc) | 2.0 |
| 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 |