**Module Design Document**

**For**

**GmTqArbn**

**Feb 9, 2017**

**Prepared For:**

**Software Engineering**

**Nexteer Automotive,**

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**Saginaw, MI, USAChange History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **Author** | **Version** | **Date** |
| Initial Version | Sankardu Varadapureddi | 1 | 5-Oct-2015 |
| Updated graphical representation to match anomaly EA4#2143 fixes | Nick Saxton | 2 | 1-Feb-2016 |
| Updated graphical representation | Nick Saxton | 3 | 6-Apr-2016 |
| Updates as per latest FDD version | Jayakrishnan T | 4 | 9-Feb-2017 |

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# Introduction

## Purpose

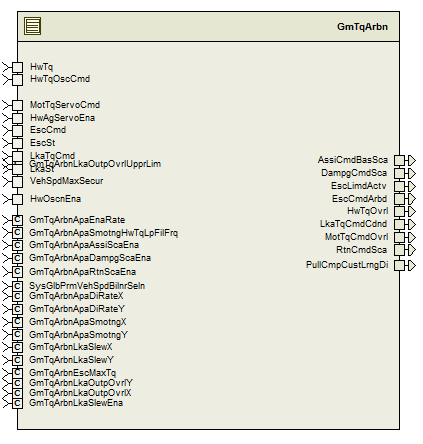
## Scope

# GmTqArbn High-Level Description

Refer to FDD

# Design details of software module

## Graphical representation of GmTqArbn



## Data Flow Diagram

Refer FDD

### Component level DFD

### Function level DFD

# Constant Data Dictionary

## Program (fixed) Constants

### Embedded Constants

#### Local Constants

Refer .m file

# Software Component Implementation

## Sub-Module Functions

## Init: GmTqArbnInit1

## Design Rationale

*Refer FDD*

## Module Outputs

*Refer FDD*

## Per: GmTqArbnPer1

## 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** | PosnServoSmotRamp | Type | Min | | Max |
| **Arguments Passed** | PosSrvoCmd\_HwNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 | |
|  | PosSrvoSmoothEnable\_Cnt\_T\_logl | boolean | FALSE | TRUE | |
|  | HwTq\_HwNwtMtr\_T\_f32 | float32 | -10 | 10 | |
|  | \*APAOvrlCmd\_MotNwtMtr\_T\_f32 | float32 | -8.8 | 8.8 | |
|  | \*ScaleFactor\_Uls\_T\_f32 | float32 | 0 | 1 | |
| **Return Value** | none |  |  |  | |

## Description

'PosnServo\_Smoothed\_Ramp' functional block implementation.

## Local Function #2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Function Name** | RampVal | Type | Min | | Max |
| **Arguments Passed** | DesLKATqCmd\_HwNwtMtr\_T\_f32 | float32 | -3 | 3 | |
|  | VehSpd\_Kph\_T\_f32 | float32 | 0 | 511 | |
|  | OutpTqOvrlCmd\_MotNwtMtr\_T\_f32 | float32 | 0.0F | 8.8F | |
| **Return Value** | LKAInterTqCmd\_HwNwtMtr\_T\_f32 | float32 | -3 | 3 | |

## Description

'Ramp to Value' functional block implementation.

## Local Function #3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Function Name** | ESCLogic | Type | Min | | Max |
| **Arguments Passed** | EscCmd\_HwNwtMtr\_T\_f32 | float32 | -10 | 10 | |
|  | EscSt\_Cnt\_T\_enum | GmTqArbnEscSt1 | 0 | 4 | |
|  | \*ESCTqCmd\_HwNwtMtr\_T\_f32 | float32 | -3 | 3 | |
|  | \*EscLimdActv\_Cnt\_T\_logl | boolean | FALSE | TRUE | |
| **Return Value** | ESCActv\_Cnt\_T\_logl | boolean | FALSE | TRUE | |

## Description

'ESC Logic' functional block implementation.

## 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 : CF010A\_ GmTqArbn\_Design | See Synergy sub project version |