FORD MOTOR COMPANY

BODY ELECTRICAL/ELECTRONIC SUBSYSTEM

Rear Gate/Trunk Module
Functional Specification

FS-DP5T-14B673-BE
AE00 - E- 12617306-001
Revision AD

Date:	6/20/2013
Author:	Anibal Santoyo

Engineering Specification

PART NAME	PART NUMBER
Specification – Module Assembly – Power Rear Gate/Trunk/Decklid Module	FS-DP5T-14B673-BC

	LET	FR	REVISIONS	DR	CK	REFERENCE
	A	All	Release FS-DP5T-14B673-BA			
			AE00 - E- 12394067-145			PREPARED BY
	B	All	Release FS-DP5T-14B673-BB			Juan Quezada
			AE00 - E- 12416946-409			APPROVED BY / DETAILED BY
	C	All	Release FS-DP5T-14B673-BC			Juan Quezada
			AE00 - E- 12617306-001			CONCURRENCE/APPROVAL
	D	All	Release FS-DP5T-14B673-BD			SIGNATURES
						Design Engineering Supervisor
						Ron Brombach
						Design Engineering Management
						Terry Haggerty
						Manufacturing Engrg.
						Quality Control
						Purchasing
						Supplier Quality Assistance

FRAME 1 OF 164 | REV C

PD
May 1988 **3947a1e** (Previous editions may **NOT** be used)

Revision History

Date	Description of Change	Sections Affected	Name	Source
1/28/11	Initial Release : Notice number **AE00 - E- 12394067-145**		M James	
2/9/11	Added "Power Stop" calibration to Table 2		K Vosburgh	
2/9/11	Changed Table 4 req 26 to "Clear Pending_RGT_Rqst"		K Vosburgh	
2/9/11	Table 5 transitions 2->1.1 and 2->1.2 DrTgate_D_Rq = "OPENING", changed to "NOT_MOVING"		K Vosburgh	
2/9/11	Table 5 transitions 3->5.1, 4->5.1, 6->5.1 and 6->5.2 DrTgate_D_Rq = "OPENING", changed to "NOT_MOVING"		K Vosburgh	
2/10/11	Table 5 transitions 6→2 transition event changed to make use of Power Trunk Present and Power Gate Present calibrations as follows <1> Power Trunk Present=YES & (RGT_Latch_Status=UNLATCHED) <2>Power Gate Present=YES & (RGT_Latch_Status = <3>UNLATCHED | <4>BEFORE_SECONDARY | <5>MIDLATCH |<6>BEFORE_PRIMARY & RGT_Sector_Gear_Status = NEUTRAL		K Vosburgh	
2/10/11	Figure 8 transition 4->5.6 changed to RGT_Handle_Req		K Vosburgh	
2/10/11	Figure 8 Transition 2→4.4 Changed to "<4> RGT_Move_Rqst = CLOSE&(RGT_Position_Status <= RGT_Position_Near_Latch | RGT_Position_Status = RGT_Position_Out_Of_Range)" To allow cinching to start when ECU RESET and gate not fully closed.		K Vosburgh	
2/11/11	Changed CAN Message from 0x331… To : "0x313 Power_Liftgate_Mode_StatM"	2.3.5.1	K Vosburgh	
2/11/11	Figure xx Changed all transition DTC references to …DTC B144F	2.3.7.3	K Vosburgh	
2/11/11	Figure 24 added "GearLvrPos_D_Actl_Signal_UB" CAN signal	2.4.2	K Vosburgh	
2/11/11	Figure 25 added "GearLvrPos_D_Actl_Signal_UB" CAN signal To transitions : 1→2.1, 2→1.1, 2→2.1	2.4.1.1	K Vosburgh	
2/11/11	Changed figure 28 2→2.1 transition containing "Odo_Status = HIGH" to 2→2.2 to eliminate duplicate naming	2.4.2	K Vosburgh	

Date	Description of Change	Sections Affected	Name	Source
2/11/11	Figure 27 added "OdometerMasterValue_UB" CAN signal	2.4.2	K Vosburgh	
2/11/11	Figure 28 added "OdometerMasterValue_UB" CAN signal To transitions : 1→2.1, 2→1.1, 2→2.1,2→2.2	2.4.2	K Vosburgh	
2/18/11	Added note to Table 1 to clarify rear switch functionality by decklid vs liftgate.	2.2	K Vosburgh	
3/1/2011	Changed requirements throughout document, for requirement traceability.	Multiple	K. Vosburgh	
3/7/2011	Removed Table 42 in	2.4.17	J. Quezada	
5/5/2011	Updated Section 2.3.5.1 In Figure 12 removed text references and replaced with numbered transitions between states 1,2,3 ,4. Added Table 47. RGTM Chime Decision Table, this table contains the logic for figure 12.	2.3.5	J Quezada	Preparation for DNA Chimes update.
5/9/2011	1. Updated Section 2.3.5.1 In Figure 12 state 4 re-numbered as state 5 "Fast Chime". Added a new state 4 named "Long Chime Repeated" Updated Table 47 to included new states for state 4 "Long Chime Repeated" 2 Added RGT_Precondition_Changed in table 4, this is an output from the table. 3. Replaced DrTgateChime_D_Rq with DrTgateChime2_D_Rq . In Table 18 added DrTgateChime2_D_Rq=0x4 for DNA B Repeated	2.3.5 2.3.1 2.3.5.1	J Quezada	Implementation of DNA Chimes for CD4.1 program
5/9/2011	1. Added Pending_Rq_Time_CFG calibration in Table 2 2. Updated Figure 72 and 73 with Pending_Rq_Time_CFG configuration. 3. Updated Figure 72 IF Time Since Event "Pending Move" <=Pending_Rq_Time AND GTM received CAN messages from PCM, go to Idle and perform pending request. IF Time Since Event "Pending Move" > Pending_Rq_Time, RGTM will go to state 4 "Pending Req Timeout" and will start a 1 second delay, after the delay has expired the RGTM will move to Idle and will execute the pending request. 4. Added Pending_Req_Timeout as an input to table 46, this variable is used for pending request time out .	2.2. 2.4.18 2.4.18 2.4.18	J Quezada	Update to Start Stop interaction

Date	Description of Change	Sections Affected	Name	Source
5/9/2011	Updated Figure 56 , added RGT_Drift_Control_Rqst input. Deleted requirement 145 in Table 20, RGTM_Move_Rqst doesn't have a HOLD domain	2.4.12	J Quezada	HIL test feedback
7/26/2011	Updates to Table 47 1. Transition 1->4 Updated condition from:RGT_Chime_Rqst == ACTIVE to: RGT_Chime_Rqst =->ACTIVE 2. Transition 3->4 updated condition From: RGT_Chime_Rqst == ACTIVE To: RGT_Chime_Rqst =->ACTIVE 3. Removed transition Remove 4->3 it's not needed 4. Transition 5->4 Updated condition From:RGT_Chime_Rqst ==ACTIVE To: RGT_Chime_Rqst =->ACTIVE	2.3.5	J. Quezada	Implementation of DNA Chimes for CD4.1 program
7/26/2011	1. Table 46, Removed Pending_Req_Timeout flag from table and also Removed rows labeled as TBD. 2. Removed Pending_Req_Timeout flag from state machine in Figure 74	2.4.17	J. Quezada	Update to Start Stop interaction
12/2/2011	Added the following calibrations to Table 2: a) Max_Close_Delay_Time	2.2	J. Quezada	Spec Update
12/2/2011	Delete crank pause on closing, implement a calibratable variable to adjust the pause time between user close request and the power close cycle. - Updated Figure 6. - Deleted Transition 2->4 for Pause Crank - Deleted Transition 3->4 for Pause Crank - In transition 3->3 replace 1 second value with Max_Close_Delay_Time	2.3.2 3	J. Quezada	Spec Update
2/13/2012	Updated requirement numbers throughout document.	Multiple	J. Quezada	Spec Update
2/13/2012	Added the following calibrations to Table 2: a) HW_Chime_Present b) Chime_Present c) Fast_Chime_Decay_Rate	2.2	J. Quezada	HW Chime addition
2/13/2012	Added HW_Chime_Present and Chime_Present to conditions evaluated in Table 47	2.3.5.1	J. Quezada	HW Chime addition
2/13/2012	Added Figure 75 for hardwired chime.	2.3.5.2	J. Quezada	HW Chime addition
5/03/2012	Updated drift detection. Figure 19 section 2.3.7.1 Table 2 Calibration table	2.3.7.1. 2.2	J. Quezada	Drift detection updates
5/29/2012	Table 18.1 Inverted LOCKED and UNLOCKED states for RGTM Lockout Status	2.4.9.3	J. Quezada	RGTM lockout state inverted logic

Date	Description of Change	Sections Affected	Name	Source
7/10/2012	Added Vehicle_Speed_Low_Limit in Table 4.	2.2	J. Quezada	Manual Transmission logic.
7/10/2012	1. Updates for Gear Box Type Determination a) 2.4.1 Updated Figure 22 to add CAN signal 0x40A for gear box type b) Added Section 2.4.1.1.1 Read Gear Box Type. 2. Updates for Generation of Park Status c) 2.4.3 Updated table 10 to Include Gear Box Type and Vehicle Speed Slow. d) 2.4.4.2 Updated vehicle speed hysteresis to feature a calibratable value for low speed determination	2.2 2.4.1 2.4.1.1 2.4.3 2.4.4.2	J. Quezada	Manual Transmission logic.
7/23/2012	Updated Vehicle_Speed_Low_Limit in Table 4. Updated table 10 to simplify Park determination for manual transmission Updated Table 9.3 Gear Box Type Decode to 8 bytes instead of 9 Added Start Stop calibration to Table 4 Added Start Stop calibration	2.2 2.4.3 2.4.1.1.1 2.2 2.4.17	J. Quezada	Manual Transmission logic. Start Stop configuration
08/08/2012	Added program in vehicle program supported. Added program in table 3 for options. Added program in table 4 for calibrations. Added new section for manual liftgate / power cinch 5. Added section for cinch/release control state	1.1 2.2 2.2 2.4.17 2.4.17.1	Anibal Santoyo	Manual liftgate Power cinch
08/09/2012	Added section for sector gear position	2.4.17.2	Anibal Santoyo	Manual liftgate Power Cinch
08/14/2012	Added section for Factory Mode Updated table 16 for Factory Mode and handle rqst Added new table for interaction between lifecycle mode and odo status	2.4.18 2.4.17 2.4.18	Anibal Santoyo	Factory Mode
08/15/2012	Added State Transition Diagram for missing message	2.4.18	Anibal Santoyo	Factory Mode
09/25/2012	Added comment for Open position case when RGTM uses self rising systems vs. counter balanced systems	2.4.10.1	Anibal Santoyo	Rear Gate / Trunk Position
09/28/2012	Second Release : Notice number **AE00 - E- 12416946-409**		Anibal Santoyo	

Date	Description of Change	Sections Affected	Name	Source
10/03/2012	Added description when Torsion Bars are broken	2.3.8	Anibal Santoyo	Manual Operation for broken TB
10/04/2012	Updated table: 4 Pending_Rq_Time_CFG and Max_Close_Delay_Time parameters. Added comment for difference between NA and EU market for start-stop funcionality	2.2 2.4.16	Anibal Santoyo	Start-Stop
10/10/2012	Remove section for inhibit. Added L1 option for C489 Added comment section 2.4.3 where table applies only for Normal mode. Added functionality for factory mode with several scenarios.	2.1 2.2 2.4.3 2.4.18	Anibal Santoyo	Inhibited Calibrations Park Status Factory mode
16/10/2012	Increase timeout for exiting factory mode Remove key fob operation while in factory mode	2.4.18	Anibal Santoyo	Factory Mode
30/10/2012	Updated table 9.3 for Transmission status	2.4.1.1.1	Anibal Santoyo	Read Gear Box Type
05/11/2012	Added Phase 2 for Torsion Management.	2.3.8	Anibal Santoyo	Broken Torsion Bar
27/11/2012	Updated figure 74 & table for 6 Start-Stop transition Added switch specifications for Europe	2.4.16 2.4.5.1 2.4.5.2 2.4.6 2.4.7.1	Anibal Santoyo	Start Stop IP Switch
04/12/2012	Added new item in table 4, regarding obstacle detection disconnect when learning process. Added note in Obstacle detection. Added note for Drift Control while learning process	 2.4.9.4 2.1	Anibal Santoyo	Obstacle Detection & Drift Control while Learning Process
18/01/2013	Added section Latch position for GECOM latch Updated table 4 Included new flag that indicated RGT configuration MANUAL or POWER New requirement for RGT position status New requirement for RGT Lockout Status Updated figure 8 for RGT manual system Updated figure 75 RGT instead of PLG Pinch Strip Note for manual gate systems Updated data dictionary.	2.4.17.1 2.4.17.1 2.4.10.1 2.4.17.1 2.4.9.3	Anibal Santoyo	Manual Liftgate Power Cinch
26/02/2013	Added ECE IP switch configuration. Added new table 15. Fix tables numeration.	2.4.5.1.1 2.4.5.4	Anibal Santoyo	ECE 11.03

Date	Description of Change	Sections Affected	Name	Source
11/04/2013	Adding Power Stop for C489 New chime strategy Clarification in state diagram (figure 12, table 8.3) 1→3.2 SHORT chime for memory heigth	2.2 2.3.5.1 2.3.5.1	Anibal Santoyo	Power Stop Chime
13/05/2013	Table 19.3 updated to only listed to ALL lock/unlock status Table 19 updated to clarify true conditions for CAN signal **DrTgateExtSwMde_B_Stat**	2.4.7.1	Anibal Santoyo	Read RGT Handle Signal
27/08/2013	Added section for Self Test Mode	2.4.19	Anibal Santoyo	Self Test Mode
03/10/2013	1. Added comment to evaluate only pawl switch for power open operation	2.4.12	Anibal Santoyo	Strattec Latch
02/12/2013	1. Added new interaction between Factory Mode and Self Test Mode.	2.4.18 2.4.19	Anibal Santoyo	Factory Mode Self Test Mode
29/01/2014	1. Added information regarding Remote Request Key Fob and Hands Free	2.4.5.2	Anibal Santoyo	Read Remote Request
09/05/2014	1. Change section 2.4.19.1 to a complete section 2.4.20 for Learn Cycle	2.4.19.1 2.4.20	Anibal Santoyo	Learn Cycle
21/05/2014	1. Added Max_Drift_Close_Attempts = 4 since the Hilex program.	2.2	Anibal Santoyo	Calibrations
22/05/2014	1. Correction figure 42 for chime request at maximum open position	2.4.6	Anibal Santoyo	Local Open /Close Switch
02/06/2014	1. Update section for Normal mode in Learn section	2.4.20	Anibal Santoyo	Learn Cycle
20/06/2014	1. Added table for PLG action taken depending on life cycle, learn, config file status	2.4.21	Anibal Santoyo	PLG Action Table
10/09/2014	**1.** Added Reflash scenarios considerations	2.2	Anibal Santoyo	Reflash Operation

TABLE OF CONTENTS

1. INTRODUCTION

PURPOSE AND SCOPE

This document provides detailed requirement descriptions of Power Rear Gate/Trunk subsystems. This represents requirements combination of Power Liftgate and Power Decklid features, into common controller using configuration constants selecting appropriate software behavior by configuration constants. Terminology of Rear Gate is used synonymous with Liftgate and Trunk is used synonymous with Decklid in other documents.

Although the Hatley-Pirbhai System Specification method was used to generate the contents herein, it has been tailored substantially for conformance to the generic systems engineering process and specification formats. This format is intended to provide the reader a well-organized structure to ease the understanding of the functionality allocated to this subsystem and at the same time provide a modular set of specification elements for reuse and/or re-allocation.

Program Code	Feature type	MY
CD391	Power Rear Gate	2013
CD533	Power Trunk	2013
C489	Manual Liftgate / Power Cinch	2014

Vehicle Programs Supported

1.2.1 Conflict of Documentation

If any conflict of documentation, the released Part Drawing shall take precedence over the Component Specification, which shall take precedence over this Functional Specification, which shall take precedence over the System Specification.

1.3 DOCUMENT ROAD MAP

Section 1.0: This section provides the scope, purpose of the body features in the DC/AC Power inverter Module for the

CGEA 1.3 ICM Functional Specification. It also contains general requirements for the features supported in the DC/AC Power inverter Module.

1.4 DOCUMENT CONVENTIONS

1.4.1 Methodology & Data Flow Diagrams

The requirements in this specification are partitioned into processes with data flowing between them. This partitioning is
represented in the data flow diagrams. A bubble represents each process. Arrows represent data flows, with the direction
indicating the direction of the flow of information.

The context diagram shown below is presented here to illustrate the methodology and conventions used in the requirements modeling.

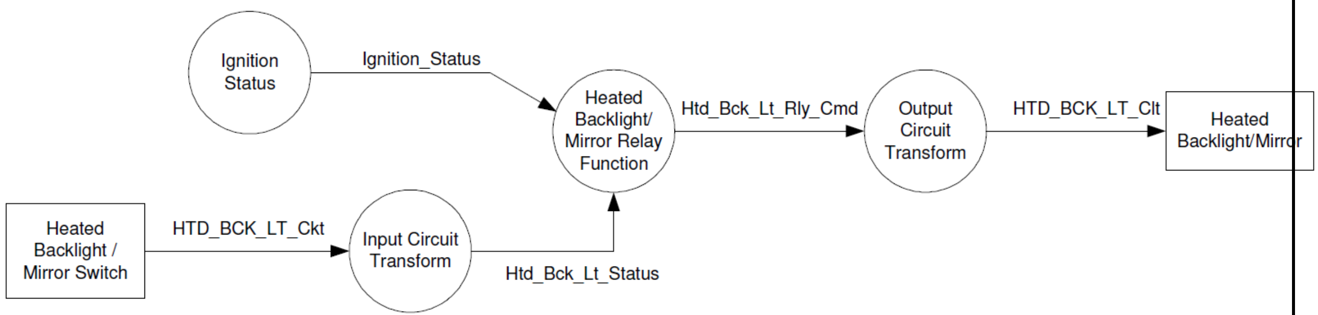


Figure 1.4-1 Context Diagram Illustration

The Hatley-Pirbhai method is used exclusively. Control flows, CFDs, and CSPECS are NOT used. All modeling is done via
data flows and DFDs. *unless otherwise specified, it is assumed that all processes are activated when the module awakes and*
are deactivated when the module goes to sleep.

When the use of an event would be highly desirable, the ”Ev” suffix is appended to a data flow.
All context diagrams in *Section 3, Feature Specifications,* include terminators for all data flows. Terminators can be
processes or physical devices connected to the module. If the terminator is a process, such as *IGNITION STATUS,* this
means that the reader must go to *the subsection for the process* to actually see the requirements for the Ignition Status
process.

1.4.2 Requirements Representations

Within each process, the required functionality is described in the form of text, decision tables, state transition diagrams
and/or state transition tables.

Decision tables show combinational logic where Inputs are on the left side of the table and Outputs are on the right side of
the table. A double vertical line separates inputs and Outputs. Each row has a unique number to allow reference to that
particular requirement.

State transition diagrams and state transition tables contain four key elements: states, transitions, events, and actions. States
represent a known condition with the model. Transitions represent the interaction of the states. Events represent the
conditions, which must be true for a transition to be taken. Actions represent the operations that must be accomplished when
a transition is taken.

State transition diagrams use the following conventions: States are represented by rectangles. Arrows represent transitions.
The symbols_, –>, and => mean "transitions to" and represent an event occurring at a specific point in time. For example
Ignition_Status _ RUN means that the ignition switch has transitioned to the RUN position. This is different than

Ignition_Status = RUN, which means that the ignition switch is in the RUN position. The events and actions for a transition
are in text with the events listed before a "/" and the actions following the "/". Timers in one State Transition Diagram are
independent of timers in other State Transition Diagrams.

State transition tables have the Current State, Events, Actions, Next State column format with one transition per row. Each
row has a unique number to allow reference to that particular requirement.
Processing order shall be such that all inputs have been processed prior to evaluation of a given p-spec.

Requirements that are in purple bolded italics and highlighted in blue are "protect for" requirements. Requirements marked
as such identify features that are 1) implemented in the FS, but not coded, 2) are not testable or 3) mark summary type
information that needs to be searched easily. An example of such markings is ***R:2.4.2.12.2***

1.4.3 State Transition Table/Diagram Notation

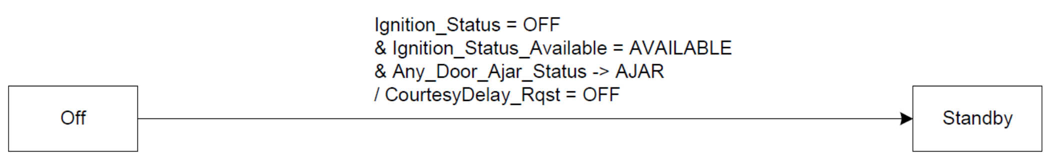
In state machines, some special symbols are used. All symbols used in state machines are listed below. The equality
symbols (=) is explained because it is both used for comparisons and assignments.

Symbol	Event or Action	Definition
<n>	Event	Requirement number <n>: uniquely identifies requirement #1 when transitioning between state A and state B. is assigned a unique requirement number. Example: <1>
=	Event	Equality:
<>	Event	Inequality:
>=	Event	Greater than or equal:
<=	Event	Less than or equal:
>	Event	Greater than:
<	Event	Less than:
-> →	Event	Transitions to: activates only on the transition from one value to the target value. Unless specified otherwise in the Finite State Machine, the state machine must look for the data transition to occur while it is in the state (or superstate) that has the -> as an exit condition. In modeling terms, this means that the transition flag is cleared upon entry to the state (or superstate). Special care must be taken when the -> event must be evaluated as part of a logical AND operation. .
&	Event	Boolean “AND”:
|	Event	Boolean “OR”:
=	Action	Assignment:
no event	Event	No event trigger

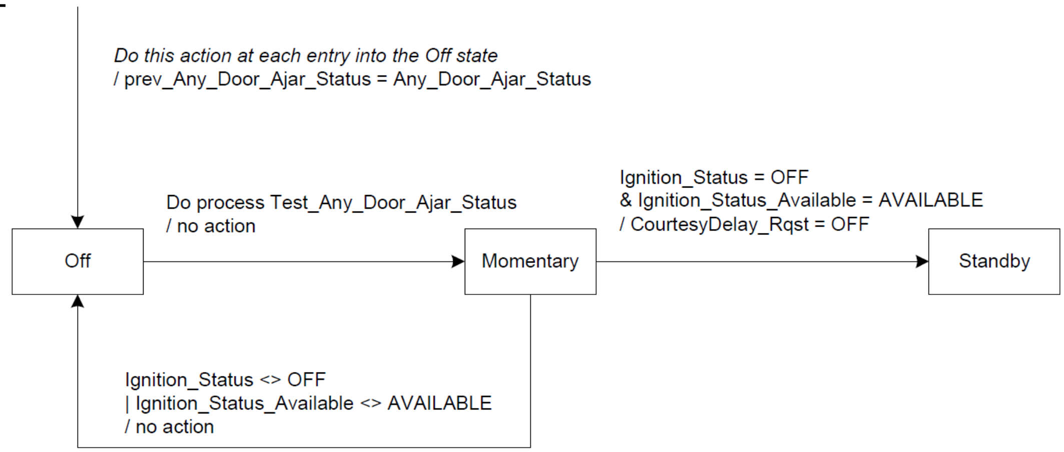
no action	Action	No action taken:
Mark event xyzzy	Action	Event in time: conceptual timing requirement – this action marks the event "xyzzy" on an imaginary timeline. Later referenced by Time since event
Time since event xyzzy	Event	Elapsed time: determines the amount of time that has elapsed since the last occurrence of the Mark event xyzzy

Table 1.4-1 Special Symbols used in Finite State Machines

This is an example of a state transition requirement using the "transitions to" notation (->) from the Courtesy Lighting Delay feature within Interior Lighting.



This is an example of one possible method to implement the above requirement without using the -> notation. The Momentary state is included to guarantee that prev_Any_Door_Ajar_Status is updated every time the exit conditions of the Off state are evaluated regardless of Ignition_Status or Ignition_Status_Available.




```
Definition of process Test_Any_Door_Ajar_Status

        If ( prev_Any_Door_Ajar_Status <> Any_Door_Ajar_Status
                & Any_Door_Ajar_Status = AJAR )
        then
                prev_Any_Door_Ajar_Status = Any_Door_Ajar_Status
                return TRUE
        else
                prev_Any_Door_Ajar_Status = Any_Door_Ajar_Status
                return FALSE
```

Feature Behavior Summary

To show by representation the difference between volatile memory and non-volatile memory data storage symbols. The non
volatile memory data storage symbol representation is 2 horizontal lines, one line above and one line below the non volatile
dataflow name. The volatile memory data storage is represented by 2 horizontal bars with solid / filled boxes at the end of
each line, one line above and one line below the volatile dataflow name.

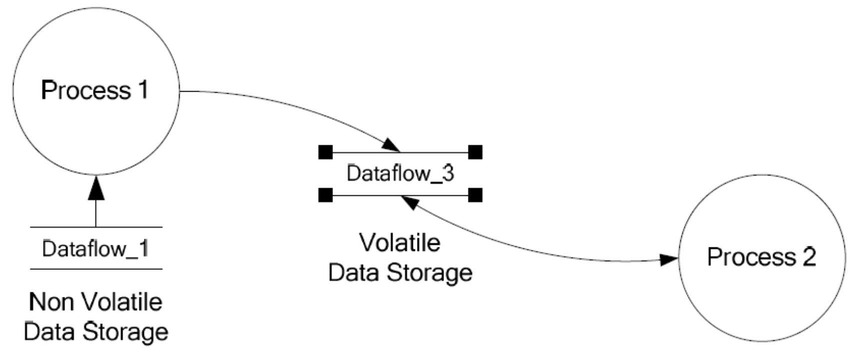


Figure 1.4.3-1 Convention Context Diagram

1.4.3.1 Feature Functional Requirements

The following state transition diagram defines the core processing for the feature.

R: 1.4.3.1.1 At Reset, Dataflow_3 must be set to the initial value specified in the Data Dictionary.

Rqmt. No.	Dataflow_1	Dataflow_2		Dataflow_3
R: 1.4.3.1.2	INACTIVE	INACTIVE		No Change
R: 1.4.3.1.3	INACTIVE	ACTIVE		No Change
R: 1.4.3.1.4	ACTIVE	INACTIVE		No Change
R: 1.4.3.1.5	ACTIVE	ACTIVE		ACTIVE

Table 1.4.3-1 Process 1 Determine Dataflow Status

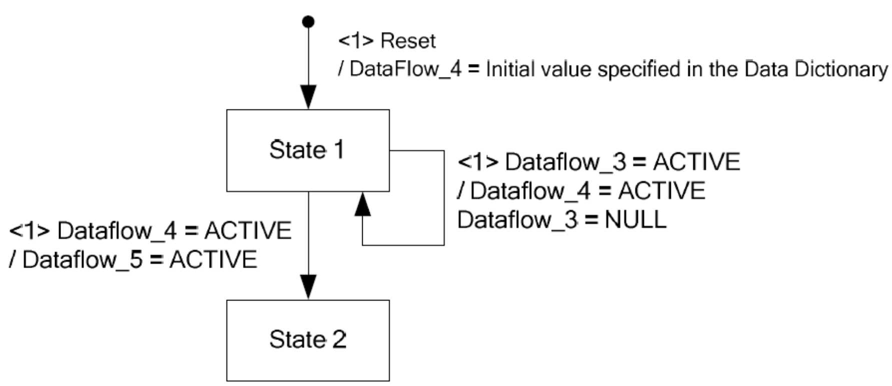


Figure 1.4.3-2 Process 2 Convention State Machine

1.4.4 Glossary of Terms

Acronyms and terms used in this document that may not be commonplace in the engineering world.

Table 1.4-2 Glossary of Terms

Term	Definition as used and applied in this functional specification
Active	ON or Enable
A/D	Analog to Digital convertor
ANI	Agree not to implement Functions with this flag are not included in the program. No planning/status entry is expected in any column further to the right of it in the FIP template.
Awake	All individual state machines are evaluating their operating conditions. (Reference sections 1.4.1 – 1.4.10)
BCM	Body Control Module
BFSL	Body Functional Specification Library
BESS	Body Electronics Subsystem Specification
Cfg	Configure, Configuration, Configurable
CCSM	Climate Control Seat Module
Cmd	Command
Constant	In Program Memory, Only Suppler can change this value (Flash/Re-Flash/ROM or EEPROM)
DCM	Dimming Control Module
DFD	Data Flow Diagram
DRB	Deployable Running Boards
Disable	OFF
DSM	Driver Seat Module
DTC	Diagnostic Trouble Code
EEPROM	Electrically Erasable Programmable Read Only Memory
EESE	Electrical / Electronic Systems Engineering
EESS	Electrical / Electronic System Specification
Enable	ON
Ev	Event
FNOS	Ford Network Operating System
HS-CAN	High Speed Controller Area Network
IC	Instrument Cluster
InActive	OFF or Disable
INDEF	Indefinitely
Initial State	Upon reset this is the value that the data flow is to take until a new value can be obtained.
Initial Value	Upon reset this is the value that the data flow is to take until a new value can be obtained.

Table 1.4-2 Glossary of Terms

Term	Definition as used and applied in this functional specification
LTM	Lift Trunk Module
MS-CAN	Medium Speed Controller Area Network
NM	Network Manager
Network Receive Default	This is the timed out value that the data flow is to take until a new value is received over the network.
Non-Volatile Customer SET	Customer uses feature to change this value. Diagnostics can change this value. (EEPROM)
Non-Volatile Factory SET	Diagnostics can change this value. (EEPROM)
N/A	Not Applicable
OFF	Off / Disable
ON	On / Enable
OSEK	**O**ffene **S**ystems und deren Schnittstellen fur die **E**lektronik in **K**raftfahzeugen (Open systems and their corresponding interfaces for automotive electronics)
Out	Output
PNI	Plan not to implement Functions with this flag are included in the program but are not implemented at the relevant integration point. This flag is only applicable to "Planned" column. No entry is expected in the "Actual" column in the FIP template.
PID	Parameter Identification
PLG	Power Lift Gate Module
Received Default	This is the timed out value that the data flow is to take until a new value is received over the network.
Req or Rqst	Request
Rqmt. No.	Requirement Number <n>, **R: 1.4.4.1.1**
R: 1.4.4.1.1	For example, **R: 1.4.4.1.1** is requirement number 1 in Section 1.4.4.1 of this document. Requirements are text denoted as "Caption, the font is Arial 8pt, **BOLD"** to identify a requirement. All Requirements are Level 4 Captions. Requirements are sequenced based upon the "Heading 4" numbering sequence
Reset	To force the state machine to a known condition. Each state machine may have an independent reset condition not defined in the software requirements. This independent condition shall not conflict with the body module software requirements. Reference the software requirements document for conditions that may or may not cause a reset.
Selection	This is the configuration or option selected from the BFSL feature.
Sleep	All of the sleep criteria for the module have been met. All individual state machines must retain their current states prior to sleep. Retained states to be used as defined in the Wake Up definition. (Reference software requirement 62, and sections 1.4.1)

Table 1.4-2 Glossary of Terms

Term	Definition as used and applied in this functional specification
SJB	Smart Junction Box
SPDJB	Smart Power Distribution Junction Box
TPMS	Tire Pressure Monitor System
Toggle	To change state for example from On to OFF, or Disable to Enable
Volatile	Changes during run-time, program execution (RAM)
Wake Up	An input event that results in a transition from the module SLEEP state to the AWAKE state. All individual state machines resume at their previously retained states as defined in the Sleep definition. (Reference sections 1.4.1)
WCR	Worldwide Customer Requirements

1.4.5 Assumed Interface to NVRAM Manager

Note: This document assumes the following interface with an EEPROM manager. The supplier does not need to support this exact interface.

NVRAM_Rqst	**NULL** = do nothing
	UPDATE = post all changes to NVRAM (going to reboot)
	STOP = Let any current write finish – don't start another
NVRAM_Status	**BUSY** = NVRAM is busy, write is occurring
	NULL = NVRAM is not busy
	DONE = request for UPDATE or STOP has been completed

This interface is used in the Sleep/Awake feature and in the Diagnostics feature.

1.4.6 Timer Mark Event / Time Since Event

Mark event xyzzy	Action	Event in time. This action marks the event "xyzzy" on an imaginary timeline. Later referenced by Time since event"
Time since event xyzzy > = TimeValue_Cfg	Condition	Elapsed time: determines the amount of time that has elapsed since the last occurrence of the "Mark event xyzzy"

Timers in the Behavior and Implementation models

a) The Behavior models shall implement the following timer resolutions (selection based on Data Dictionary criteria):

b) Note: all timers are 32-bit unsigned integers (U32).

c) Following API shall be used to mark and check timers:

Mark_Timer_msec(TIMER_NAME)

Check_Timer_msec(TIMER_NAME)

This timer runs only while the module is awake. While the resolution is in millisecond, it may be actually incremented by 5 every 5 msec, for example. This timer will retain its value across module sleep status, and be reset to 0 if the CPU is reset.

Mark_Timer_sec(TIMER_NAME)

Check_Timer_sec(TIMER_NAME)

This timer runs only while the module is awake. This timer will retain its value across module sleep status, and be reset to 0 if the CPU is reset.

Mark_GRTimer(TIMER_NAME)

Check_GRTimer(TIMER_NAME)

This global real timer runs while the module is supplied with power, even while the module is asleep. Its resolution is 100 milliseconds. The value is committed to EEPROM on a schedule, so that a "recent" value will be retained across a power loss. The value is also (normally) retained across short CPU resets.

Note that this means that across a power loss, the timer could "go backwards". Practically, this means that after a power loss, you must Mark a GRTimer before checking it.

Note also that this clock is not necessarily synchronized with the other 2 timers. i.e., it may run at a slightly different rate, because it must be very accurate over long time periods to be used for time of day clock on the radio.

Note that even though GRT timer resolution is 100milliseconds
Check_GRTimer() reports in seconds. This is to have consistent usage of timers in milliseconds or seconds.

d) The supplier may develope a timer behavior library which simulates the timer implementation.
Test harness shall use this library to test the timers that are used in behavior library model.

All Data Dictionary time entries should use milliseconds or seconds as their units.

Note: The GRT is not allowed to use 0xFFFFFFFF (which indicates "unknown" in the vehicle CAN network). So every 13.6 years, we will have a 100msec error in GRT (which we will ignore). The GRT timer actually uses 100msec resolution. However,all uses of GRT use seconds as the unit. This means the calculation performed by the subroutine must be (ActualGRTime - BaseGRTime)/10 to convert to seconds.

Example Timer Implementation

Timer is 32 bit unsigned integer (U32).

Mark Event	Timer Base Unit	Time Since Event	Eng. Unit
Mark_Timer_msec	Milliseconds	Actual - Base >= Target	milliseconds
Mark_Timer_sec	second	Actual - Base >= Target	second
Mark_GRTTimer	100 milliseconds	$\frac{\text{Actual – Base}}{10}$ >= Target	second

			Time Value Hexadecimal (U32)	Decimal
			0000 0000	0
Mark event	Base	→	0000 0001	1
			0000 0002	2
			0000 0003	3
			0000 0004	4
			0000 0005	5
Time since event	Actual	→	0000 0006	6
			0000 0007	7
			0000 0008	8

Example computer computation:

Actual - Base

Actual + Two's Compliment of (Base)

Actual	6	0000 0006	0000 0006	Time Since Event	
- Base	-1	0000 0001	+ FFFF FFFF	Mark Event	2's Compliment of Base
	5	0000 0005	**0000 0005**		

Compare Result of **Actual + Two's Compliment of (Base)** to **Target** (Note: Target is typically a method 3 **TimeValue_Cfg**)

Now compare **0000 0005** to the **Target** (TimeValue_Cfg)

1.5 RELATED DOCUMENTS

Related documents, referenced elsewhere in this document, are listed below for quick reference.

Table 1.5-1 – Related Documents

Item	Title	Control Number
1	DC/AC Power Inverter Statement of Engineering Statement of Work (ESOW)	Version TBD (TBD DATE)
2	Hardware Specification – DC/AC Power Inverter	SY-DG9T-TBD-A
3	Engineering Specification DC/AC Power Inverter	ES-DG9T-TBD-A
4	DC/AC Power Inverter Diagnostic Specification (Part 2)	DS-DG9T-TBD-A
SDS Requirements		
5	SDS, ELCOMP Generic Body Module SDS	Rev.: 17
6	SDS, MPLELC Generic Body E/E Feature Function SDS	Rev.: 29
Engineering Specifications and Requirements		
7	BCM Functional Specification, Section 2.14 Battery Management System	FS-DG9T-14B476-AE
8	PCM Start Stop Functional Specification	TBD
Software Requirements		
9	Body Software Statement of Work	Ver. 2009.1 (14-Apr-2009)
10	In – Vehicle Software Release Procedure	Ver. 2.8 4/22/2005
11	ECU Software Requirements EESE-SMD CSE-PG-033	Ver. 2009.0
12	ECU Software Testing Requirements EESE-SMD CSE-PG-034	Ver. 2006.0
13	ECU Software Testing Traceability EESE-SMD CSE-PG-038	Ver. 2006.0
14	ECU SW Requirements Traceability EESE-SMD CSE-PG-037	Ver. 2007.0
15	MISRA C Traceability Matrix EESE-SMD CSE-PG-040	Ver. 2005.1
16	Output Fault Management Traceability EESE-SMD CSE-PG-063	Ver. 2006.0
17	Voltage Range Monitor EESE-SMD-CSE-PG-035	Ver. 2005.1
18	Non-Volitale Memory EESE-CSE-PG-070	Ver. 2008.0
19	Generic_Simulation_SOW_FNA EESE-SMD-CSE-PG-067	Ver. 2009.0
20	Outputs Fault Management EESE-SMD-CSE-PG-061	Ver. 2008.0
21	Software Release Notes Template EESE-SMD-CSE-PG-044	Ver. 2009.0
22	Sware Architecture Review Checklist EESE-SMD-CSE-PG-042	Ver. 2009.0
23	Sware Code Review Checklist EESE-SMD-CSE-PG-043	Ver. 2009.0

Multiplex Communications & Diagnostic Specifications		
24	Core Multiplex Technology Statement of Work	2009.0
25	HS/MS-CAN CGEA ECU Level Functional Requirements Specification	2009.0
26	HS/MS-CAN ECU Level Functional Test Procedures	2009.0
27	Vehicle Network Software Review Process Guidelines	Latest version @ <PSC>
28	MUX S/W Review FNOS I³ Integration Questionnaire	2.42, January 20, 2009
29	FNOS I³ Software Implementation Guide	Ver. 2009.2
30	FNOS Vector, Interaction Layer Technical Reference	Ver.: 1.8 (14-Jul-20030
31	LIN Ford Subsystem Design Verification Test Document	Latest version @ <PSC>
Diagnostic Specifications		
32	EESE Network Communications Diagnostic Statement of Work	Latest version @ <PSC>
33	Generic Global Central Configuration Specification	Latest version @ <PSC>
34	Generic Global Diagnostic Specification (Part 1)	Latest version @ <PSC>
35	ECU Configuration Specification	9/26/2008
36	Software Download Specification (SWDL)	6/27/2007
37	Versatile Binary Format v2.4 (VBF) Specification	3/10/2008
38	GGD&SWDL Diagnostic Communication Test Specification_003_005	7/19/2007
39	ECU Configuration Test Specification_001_004	9/25/2008
40	Versatile Binary Format (VBF) Test Specification V2.2 004_002	Latest version @ <PSC>
41	Multiplex Diagnostic Exchange Format Specification (MDX) Rev 002	Latest version @ <PSC>
42	Communication "Link Based" Diagnostic Requirements for the Ford Motor Company Diagnostic Tools -	Latest version @ <PSC>
43	Generic Diagnostic DVP&R Form (CAN or NON-CAN)	Latest version @ <PSC>
44	GGD&SWDL Diagnostic Services Test Specification_003_00x	Latest version @ <PSC>
45	GGD&SWDL Diagnostic Communication Test Specification_003_00x	Latest version @ <PSC>
46	Software Download Functionality Test Specification 004_00x	Latest version @ <PSC>
47	ECU Configuration Test Specification_001_00x	Latest version @ <PSC>
48	Versatile Binary Format (VBF) Test Specification V2.3 005_00x	Latest version @ <PSC>
49	Multiplex Diagnostic Exchange Format Specification (MDX) Rev 003	12/4/2008
50	Generic Diagnostic DVP&R Form GGDS (ISO-14229) ECUs – CAN_Diag_DVP&R_GGDS003x.xls	Latest version @ <PSC>
51	Part 2 Template – GGDS (ISO14229) based.	Latest version @ <PSC>
52	MDX Validator	Latest version @ <PSC>
53	MDX To Word (Human Readable) Utility	Latest version @ <PSC>
54	Global Diagnostics Specification (Part I) – V2003.0 **(NON-CAN ECUs)**	Latest version @ <PSC>
55	Module Programming and Configuration Design Specification – V2003.0 **(NON-CAN ECUs)**	Latest version @ <PSC>

56	Global Diagnostic Specification (Part I) Test Procedure Specification – V2003.0.x **(NON-CAN ECUs)**	Latest version @ <PSC>
57	Module Programming & Configuration Design Specification Test Procedure Specification – V2003.0.x **(NON-CAN ECUs)**	Latest version @ <PSC>
58	Part 2 Diagnostic Specification **Template (NON CAN ECUs)**	Latest version @ <PSC>
59	Released CAN Message List	DS-DG9T-14B476-Ax
60	CGEA HS/MSCAN ECU Functional Requirements Spec	January 2007
61	Core Netcom Protocol Software Implementation Requirements Specifications	Version 2004.16

1.6 GENERAL REQUIREMENTS

1.6.1 Module - Memory / Power Up / Microcontroller Reset

1.6.1.1 Microcontroller memory Storage Classification Requirements:

The data dictionary specifies a "Storage Class" for every data flow used in this functional specification. The following five (5) requirements further specify / define the memory storage classes:

Table 1 Memory Storage Classification Requirements

Rqm't Num.	Memory Storage Classification	Definition
R: 1.6.1.1.1	Constant	Re-Program the program memory to change it. (FLASH / ROM or EEPROM, Named Complier Constants)
R: 1.6.1.1.2	Non-Volatile – Customer Set	Customer uses feature to change it. Diagnostics can change it. (EEPROM)
R: 1.6.1.1.3	Non-Volatile -- Factory Set Method 2	Diagnostics can change it. (EEPROM)
R: 1.6.1.1.4	Non-Volatile -- Factory Set Method 3	Diagnostics can change it. (EEPROM)
R: 1.6.1.1.5	Non-Volatile – Functional Requirement	Changes during program run – time. (EEPROM)
R: 1.6.1.1.6	Volatile	Changes during program run – time. (RAM)

1.6.1.2 Non-volatile Memory Requirements:

Table 2 Non-Volatile Memory Generic Requirements

Rqm't Num	Requirement
R: 1.6.1.2.1	NVRAM Management According to the requirements & expectations for development (RED) nonvolatile memory (NVM) document #EESE-SMD-CSE-PG-070 version 2008.0
R: 1.6.1.2.2	# 0076 – Coding Practice – Concurrency Shared Resources ECE software Requirements document #EESE-SMD-CSE-PG-033 version 2009.0

1.6.1.3 Module Power Up / Microcontroller Reset Requirements:

Table 3 Power Up / Reset Requirements

Rqm't Num.	Memory storage Class	Description
R: 1.6.1.3.1	Volatile	Upon module power-up and / or upon module reset the body feature initial values specified in the Data dictionary shall be used.
R: 1.6.1.3.2	ALL Non-Volatile	Shall be set to the initial values specificed in the Data Dictionary prior to delivery to FORD.
R: 1.6.1.3.3	Constant	Shall be set to the initial value specified in the Data dictionary
R: 1.6.1.3.4	Upon module power-up and / or upon module reset all of the decision tables defined within this functional specification must have all of the output dataflows set to the initial value as specified in the Data Dictionary	

1.6.1.4 Reset Processing Requirements TBD

On reset, we must retrieve some values from PRAM and/or NVM before starting other processes. Here is a list of these special reset processing requirements.

Table 4 Microcontroller Reset Processing Requirements

Rqm't Num.	Assignments to Protected RAM
R: 1.6.4.1.1a	Call **RestoreGRTime()**. Notice that RestoreGRTime() directly assigns a value to GlobalRealTime.
R: 1.6.4.1.2a	Call **RestoreIgnition()**. Notice that this function sets Last_Ignition and Last_KeyIn to the last known ignition values.
R: 1.6.4.1.3a	IgnitionPosition = Last_Ignition (in Ignition Arbitrator & Vehicle Starting Control) KC_Ign_Rqst = Last_Ignition (in Key Cylinder Ignition & Vehicle Starting Control) KC_Ignition_State = Last_Ignition PB_Ign_Rqst = Last_Ignition (in Pushbutton Ignition & Vehicle Starting Control) RawKeyPos = Last_Ignition (in Vehicle Starting Control) Ignition_Status = Last_Ignition If Ignition_Status = START and HEV_Cfg = HEV then Ignition_Status = RUN
R: 1.6.4.1.4a	If IgnitionPosition <> OFF then Last_KeyIn = KEY_IN Key_In_Ignition_Status = Last_KeyIn Key_In_Ignition _DbncV = Last_KeyIn (in Key Cylinder Ignition & Vehicle Starting Control) KC_Key_In_Ignition_Status = Last_KeyIn PB_KeyIn_State = Last_KeyIn
R: 1.6.4.1.5a	After the above requirement has been performed: PRAMaIgnition = IgnitionPosition PRAMaValdataIgnition = OnesComplement(PRAMaIgnition) PRAMbIgnition = PRAMaIgnition PRAMbValdataIgnition = OnesComplement(PRAMbIgnition) PRAMaKeyIn = Key_In_Ignition_Status

	PRAMaValdataKeyIn = OnesComplement(PRAMaKeyIn) PRAMbKeyIn = PRAMaKeyIn PRAMbValdataKeyIn = OnesComplement(PRAMbKeyIn)
R: 1.6.4.1.6a	Add assert RunStart and FuelPump outputs?
R: 1.6.4.1.7a	Add Elapsed engine off time?

1.6.2 Functional Classification

Reference EC-0058 requirement in the ELCOMP Generic Body Module specification for the functional classification of the body features implemented with this Body Control Module, this information is in the details for requirement EC-0058 under the column header "EMC Classification".

This classification level is important for meeting the testing requirements defined in the *Ford Body Module Testing Requirements* document.

1.6.3 Software Classification Level

The entire BCM software is Functional Classification level SMS.

Reference EY-0091 requirement in the E/E System SDS Version 45, as of 06-Feb-09

1.6.4 Timing Requirements TBD

1.6.4.1 Timing / Response Requirements

R: 1.6.4.1.1	T-1: Unless stated otherwise in the individual feature specification, activation / deactivation of an output response shall occur within the maximum delay time of the corresponding input(s) change as defined in *Table* 1.6-4 below. The maximum delay time is pin-to-pin, including debounce time and multiplex messaging.
R: 1.6.4.1.2	T1.1 Since ignition input debounce is longer than 100 milliseconds and is an exception to requirement T1.0, 55 milliseconds is the maximum delay time for output device activation after an ignition change is debounced.
R: 1.6.4.1.3	T-2: The time tolerances of all timing requirements are +/- 10% unless otherwise stated.

Table 5 Timing Requirements (in milliseconds)

Rqm't Num.	Input Action	Output Response (See Note 12)	Maximum Delay Time With Module In Awake State	Maximum Delay Time With Module In Sleep State
R: 1.6.4.1.4	Digital Switch	Output Control	73 Note 1a	114 Note 1b
R: 1.6.4.1.5	Discrete Analog	Output Control	113 Note 2a	---
R: 1.6.4.1.6	MS/HS CAN message	Output Control	43 Note 3a	123 Note 3b
R: 1.6.4.1.7	Digital Switch	MS/HS CAN Message Output	71 Note 4a	211 Note 4b
R: 1.6.4.1.8	Discrete Analog	MS/HS CAN Message Output	111 Note 5a	---
R: 1.6.4.1.9	RKE – RF Keyfob	Output Control	77 Note 6a	185 Note 6b
R: 1.6.4.1.10	RKE – RF Keyfob	MS/HS CAN Message Output	75 Note 7a	282 NOTE7B
R: 1.6.4.1.11	Ambient Light = FAULT PerimeterAlarm_Cfg = ENABLE DRL_Present_Cfg = PRESENT DRL_Trans_Cfg = AUTO Enter a valid key code. Measure time from when last button of code is pressed	Perimeter Lighting = ON	150msec	N/A (ECU WAKES UP ON FIRST BUTTON PRESS OF KEY-CODE)
R: 1.6.4.1.12	MS/HS CAN message (functional)	MS/HS CAN message (functional)	41 Note 13a	121 Note 13b
R: 1.6.4.1.13	MS-CAN message (gateway)	HS-CAN message (gateway)	21 Note 14a	71 Note 14b
R: 1.6.4.1.14	HS-CAN message (gateway)	MS-CAN message (gateway)	21 Note 14a	71 Note 14b
R: 1.6.4.1.15	MS/HS CAN message	LIN message	21 Note 14a	71 Note 14b
R: 1.6.4.1.16	LIN message	MS/HS CAN message	21 Note 14a	TBD Note 14b

Notes

Maximum Delay Time With Module In Awake State

1a – Calculation
50 ms to debounce the input.
20 ms to process the input.
3 ms to turn on the output.

2a – Calculation
90 ms to debounce the input.
20 ms to process the input.
3 ms to turn on the output.

Maximum Delay Time With Module In Sleep State

1b – Calculation
50 ms to detect the switch has changed state
1 ms to wake up.
40 ms to debounce the input.
20 ms to process the input.
3 ms to turn on the output.

Notes

Maximum Delay Time With Module In Awake State	Maximum Delay Time With Module In Sleep State
3a – Calculation 20 ms FNOS process the message. 20 ms to process the input. 3 ms to turn on the output.	3b – Calculation 50 ms NM transmit alive message 50 ms to transmit Application message, perform function 20 ms to process the input. 3 ms to turn on the output.
4a – Calculation 50 ms to debounce the input. 20 ms to process the input. 1 ms to Transmit Application message, perform function	4b – Calculation 50 ms to detect the switch has changed state 1 ms to wake up. 40 ms to debounce the input. 20 ms to process the input. 50 ms NM transmit alive message 50 ms to transmit Application message, perform function
5a – Calculation (Assume network awake) 90 ms to debounce the input. 20 ms to process the input. 1 ms to Transmit Application message, perform function If network asleep add 100ms	
6a – Calculation 54 ms to detect the first RKE message (1st message +8% tolerance) 20 ms to process the input. 3 ms to turn on the output.	6b – Calculation 162 ms to detect the second RKE message (2nd message +8% tolerance) 20 ms to process the input. 3 ms to turn on the output.
7a (assume network awake) 54 ms to detect the first RKE message (1st message +8% tolerance) 20 ms to process the input. 1 ms to Transmit Application message, perform function	7b – Calculation 162 ms to detect the second RKE message (2nd message +8% tolerance) 20 ms to process the input 50 ms NM transmit alive message 50 ms to transmit Application message, perform function
13a – Calculation 20 ms FNOS process the message. 20 ms to process the input. 1 ms to Transmit Application message, perform function	13b – Calculation 50 ms NM transmit alive message 50 ms to transmit Application message, perform function 20 ms to process the input. 1 ms to Transmit Application message, perform function
14a – Calculation 20 ms FNOS process the message. 1 ms to Transmit Application message, perform function	14b – Calculation 20 ms FNOS process the message. TBD ms LIN Wake-up 1 ms to Transmit Application message, perform function.

8 – ALL MAXIMUM DELAY TIMES ARE IN MILLISECONDS

9 – FNOS polled once every 10 milliseconds
10 – The input / output task schedule is every 20 milliseconds

Notes Maximum Delay Time With Module In Awake State Maximum Delay Time With Module In Sleep State

11 – Multiple outputs - Outputs not affected by SDS Requirement EC-0004 (Multiple high current outputs controlled by the module, which require more than 10 amps through the module or through relays controlled by the module, that are required to turn ON at the same time, shall be staggered) shall meet the above times. When multiple high current outputs occur, the first output shall meet the times above. Subsequent outputs shall be governed by EC-0004.

12 – Actual transmission of CAN messages is dependent on transmit model (e.g. Periodic, Event, etc), and message attributes defined in the message list database. Calculations in this table refer to the availability of the data to be transmitted.

1.6.5 Order of Execution TBD

Order of execution is important to prevent momentary output glitches and to ensure consistent sets of related outputs.

This FS should be designed to group related outputs, including CAN signals, in the appropriate output processes. Only output processes should write CAN data to FNOS.

Software implementation shall comply with the requirements in Tables 1.6.5-1 and 1.6.5-2.

1.6.5.1 Order of Execution Requirements

Table 6 Overall Order of Execution

Rqm't Num.	Requirement
R: 1.6.5.1.1	The flow of data within this FS is generally organized from process to process in this order: input, feature, arbitrator, output. Within each feature category (e.g Exterior Lighting) all inputs shall be executed before a feature is executed.
R: 1.6.5.1.2	All features that feed an arbitrator shall be executed together as a group. This will ensure that the features operate on a single set of input values and provide a single consistent set of output values to downstream processes.
R: 1.6.5.1.3	The arbitrator(s) that feed an output shall be executed before the output is executed.
R: 1.6.5.1.4	Data shall be written to FNOS only as part of an output process.

Table 7 Internal Process Order of Execution

Rqm't Num.	Requirement
R: 1.6.5.1.5	Each (input, feature, arbitrator, and output) process shall be executed completely in a single time-slice.
R: 1.6.5.1.6	Each (input, feature, arbitrator, and output) process shall be executed atomically.
R: 1.6.5.1.7	Within every (input, feature, arbitrator, and output) process, data generally flows in the order in which decision tables and state transition diagrams are presented in this FS. For example, a decision table may feed a state transition diagram which may feed another decision table. The elements within a process shall be executed in the order of this internal data flow.

Format and Conventions

This document contains a large set of function specifications. There are three types: Input Functions, Core Functions, and Output Functions. Input functions are those that transform E/E sensor input states into input dataflows, output functions are those that transform output dataflows into E/E actuator output states, and core functions are those that transform input data flows into output data flows.

The function specifications interact with each other in the manner shown in the overall data flow diagram. The requirements within each function are allocated to each module by “superbubbles” in the overall data flow diagram.

Each function specification contains four elements: function description, context diagram, and a process specification. The function description cites the purpose of the function, the context diagram depicts the overall I/O of the function, and the process specification details the requirements allocated to the function. The process specifications are a set of numbered and indentured English statements, a decision table, and/or state transition diagrams (STD's).

Output functions also combine components together to form single output signals.

Core functions are generally reserved for those functions that implement features that span across multiple types of I/O components.

The requirements in this specification are partitioned into processes with data flowing between them. This partitioning is represented in the data flow diagrams. Each process is represented by a bubble. Data flows are represented by arrows, with the direction indicating the direction of the flow of information.

Within each process, the required functionality is described in the form of text, decision tables, state transition diagrams, and/or state transition tables.

State transition diagrams and tables contain four key elements: states, transitions, events, and actions. States represent a known condition within the model. Transitions represent the interaction of the states. Events represent the conditions which must be true for a transition to be taken. Actions represent the operations that must be accomplished when a transition is taken.

State transition diagrams use the following conventions: States are represented by rectangles. Transitions are represented by arrows. The events and actions for a transition are in text with the events listed before a "/" and the actions following the "/". The symbol "->" is an operator that indicates a transition of the data element to the state following the symbol from any other state.

Numbers enclosed by < > indicate a requirement number. The following convention is used to number requirements:

An OR condition constitutes separate requirements.

An AND condition is a single requirement.

Requirement numbering for State Transition Diagrams is as follows:
Source State -> Destination State . Requirement number where Requirement number is a sequential number for each requirement for all transitions from the source state to the destination state.

Timers in one State Transition Diagram are independent of timers in other State Transition Diagrams.

Special Symbols used in Finite State Machines

Symbol	Event or Action	Definition
<n>	Event	Requirement number <n>: uniquely identifies requirement #1 when transitioning between state A and state B. is assigned a unique requirement number. Example: <1>
=	Event	Equality:
<>	Event	Inequality:
>=	Event	Greater than or equal:
<=	Event	Less than or equal:
>	Event	Greater than:
<	Event	Less than:
-> →	Event	Transitions to: activates only on the transition from one value to the target value. Unless specified otherwise in the Finite State Machine, the state machine must look for the data transition to occur while it is in the state (or superstate) that has the -> as an exit condition. In modeling terms, this means that the transition flag is cleared upon entry to the state (or superstate). Special care must be taken when the -> event must be evaluated as part of a logical AND operation. .
&	Event	Boolean "AND":
|	Event	Boolean "OR":
=	Action	Assignment:
no event	Event	No event trigger
no action	Action	No action taken:
Mark event xyzzy	Action	Event in time: conceptual timing requirement – this action marks the event "xyzzy" on an imaginary timeline. Later referenced by Time since event
Time since event xyzzy	Event	Elapsed time: determines the amount of time that has elapsed since the last occurrence of the Mark event xyzzy

2. POWER REAR GATE/TRUNK

2.1 FEATURE BEHAVIOR SUMMARY

The Power Rear Gate/Trunk Feature automatically opens and closes the Rear Gate/Trunk upon operator request.

Power Open
The Power Rear Gate/Trunk Feature will initiate a gate/trunk open operation when all the following are met:

- the movement request is not inhibited (see Inhibit below) or locked out (see Lockout below)
- and the vehicle speed is below 5 kph
- and (the ignition is in Off or Accessory or the ignition is in Run and the transmission is in Park)
- and the operator activates one of the following inputs for the Rear Gate/Trunk
  - A double press on the Rear Gate/Trunk button on a remote keyfob
  - Pressing the master (overhead) open/close switch
  - **Option G1 Only:** Pressing the local (rear) open/close switch (located on the bottom of the Rear Gate/Trunk interior trim).

- and the Rear Gate/Trunk position is between the strut crossover point (typically 20 +/-5 degrees from the fully closed position) and fully closed.
- and the Engine_Start_Stop _Status is not in "ACTIVE" state

The Power Rear Gate/Trunk Feature also initiates a Rear Gate/Trunk open operation during a close operation (power reversal) when:

- an obstacle is detected (either primary obstacle detection or secondary obstacle detection)
  - and the vehicle speed is below 5 kph
  - and (the ignition is in Off or Accessory or the ignition is in Run and the transmission is in Park).

The Power Rear Gate/Trunk Feature stops powering the Rear Gate/Trunk open when:

- the operator activates an open/close input for the Rear Gate/Trunk while the Rear Gate/Trunk is opening (Rear Gate/Trunk may reverse direction, see Power Close below)
- or an obstacle is detected (primary obstacle detection only)
- or the Rear Gate/Trunk becomes fully opened. (Once the RGTM has determined the mechanical stop position, it will stop powering the Rear Gate/Trunk (3 +/-1) degrees before reaching that position.)
- or the Rear Gate/Trunk comes to a valid customer programmed position (Option L1).
- or a double press on the Rear Gate/Trunk button on a remote keyfob
- or Pressing the master (overhead) open/close switch
- **or Option G1 Only:** Pressing the local (rear) open/close switch (located on the bottom of the Rear Gate/Trunk interior trim)

The Power Rear Gate/Trunk Feature initiates a Rear Gate/Trunk close operation following stop operation when:

- a double press on the Rear Gate/Trunk button on a remote keyfob
- or Pressing the master (overhead) open/close switch
- **or Option G1 Only:** Pressing the local (rear) open/close switch (located on the bottom of the Rear Gate/Trunk interior trim)
  - and the vehicle speed is below 5 kph
  - and (the ignition is in Off or Accessory or the ignition is in Run and the transmission is in Park).

The Power Rear Gate/Trunk Feature suspends powering the Rear Gate/Trunk open when the ignition is in start. Hold Open Force is applied by the mechanical system during this period. Once the ignition is no longer in start, the motion will be resumed (subject to the above conditions for stopping motion).

Note: If the Rear Gate/Trunk completely stops, the drive motor is turned off. If the Rear Gate/Trunk reverses direction, the Hold Open Force is applied during the audible feedback before the drive motor is reversed.

Power Close

The Power Rear Gate/Trunk Feature will initiate a Rear Gate/Trunk close operation when all of the following are met:

- the movement request is not inhibited (see Inhibit below) or locked out (see Lockout below)
- and the vehicle speed is below 5 kph
- and (the ignition is in Off or Accessory or the ignition is in Run and the transmission is in Park)
- and the Rear Gate/Trunk position is between the strut crossover point (typically 20 +/-5 degrees from the fully closed position) and fully open.
- and the Engine_Start_Stop _Status is not in "ACTIVE" state
- and the operator activates one of the following inputs for the Rear Gate/Trunk
    - A double press on the Rear Gate/Trunk button on a remote keyfob
    - Pressing the master (overhead) open/close switch
    - **Option G1 Only:** Pressing the local (rear) open/close switch

The Power Rear Gate/Trunk Feature will wait for 1 second of audible feedback to sound before closing the Rear Gate/Trunk under the above conditions. Hold Open Force is applied during the audible feedback before closing.

The Power Rear Gate/Trunk Feature also initiates a Rear Gate/Trunk open operation during an close operation (power reversal) when:

- an obstacle is detected (either primary obstacle detection or secondary obstacle detection)

The Power Rear Gate/Trunk Feature stops powering the Rear Gate/Trunk closed when:

- an obstacle is detected – primary or secondary obstacle detection (Rear Gate/Trunk will reverse direction, see Power Open above)

  secondary obstacle detection is active until the Rear Gate/Trunk reaches the primary latched position.
- or the Rear Gate/Trunk becomes fully latched. (The drive motor is turned off when the secondary latch position is reached, then the cinch motor drives the Rear Gate/Trunk to the primary latch position.)
- or the exterior handle is pulled regardless of lockout (see below).

The Power Rear Gate/Trunk Feature suspends powering the Rear Gate/Trunk closed when the ignition is in start. Once the ignition is no longer in start, the motion will be resumed (subject to the above conditions for stopping motion). The audible feedback will stop sounding while the Rear Gate/Trunk is not powered then restart when power closing resumes.

Note: If the Rear Gate/Trunk completely stops, the drive motor is turned off. If the Rear Gate/Trunk reverses direction, the drive motor is reversed.

Lockout

Requests by the operator to initiate powered motion via the rear open/close switch and via manual unlatch will be ignored when the power Rear Gate/Trunk lockout has been activated. The master (overhead) open/close switch and the Keyfob will not be inhibited by the power Rear Gate/Trunk lockout. Also, requests for powered motion via the rear open/close switch will be ignored when the Rear Gate/Trunk is in either the primary or secondary latched position.

Inhibit
The Master Open/Close Switch will be inhibited when the Lock Inhibit Feature is activated.

- See the Lock Inhibit Feature in the BCM FS for details on activation and de-activation.

Drift Control

The Power Rear Gate/Trunk Drift Control feature is intended to detect that the Rear Gate/Trunk moves in the closed direction immediately following a power open operation, and bring the Rear Gate/Trunk to the closed position in a controlled manner.

When the power Rear Gate/Trunk feature finishes a power open operation, the Rear Gate/Trunk position is then monitored to detect that the gate is moving in close direction. The Rear Gate/Trunk position is then monitored to detect that the gate is moving. Once gate movement is detected, the following sequence will be followed:

- Apply Hold Open Force
- Start sounding an audible warning.
- After a short pause, initiate a power close operation at a reduced speed with obstacle detection e engaged.
- Once the gate reaches the latch, the audible warning will stop.
- Cinch the gate to the primary latch position.

If an obstacle is detected during the reduced speed close, the gate will reverse to the full open position. Once full open position is reached, Hold Open Force will be applied. After a short pause, another reduced speed power close operation will begin. If an obstacle is detected for multiple consecutive cycles, the Rear Gate/Trunk will stop operation on encountering the obstacle.

If the Rear Gate/Trunk is detected as moving in the close direction for multiple consecutive customer initiated cycles, the power Rear Gate/Trunk system will set a Diagnostic Trouble Code (DTC), and become disabled once the gate reaches the latch. The Rear Gate/Trunk will act as a manual gate until the system is reset by clearing the DTC , or by disconnecting and reconnecting power to the controller.

Note:

Drift Control should be disabled only in Self Test Routine.

Audible Feedback

The Power Rear Gate/Trunk Feature requests an audible warning be sounded for 3 seconds whenever:

- the Rear Gate/Trunk is requested to begin power closing
- or the Rear Gate/Trunk reverses to power opening due to an obstacle
- or the Rear Gate/Trunk stops opening due to an obstacle

The Power Rear Gate/Trunk Feature requests an audible warning be sounded for 1 second whenever the operator activates an open/close input while:

- the vehicle speed is at or above 5 kph
- or the ignition is in Run and the transmission is not in Park
- or the Battery Voltage is below the minimum operating voltage

Also, the audible warning will be continuously sounded for up to 5 minutes when the transmission is shifted out of park and/or vehicle speed becomes or exceeds 5 kph while the Rear Gate/Trunk is closing. The warning will stop sounding when the Rear Gate/Trunk reaches the latch or 5 minutes has elapsed since the audible feedback started or the transmission is shifted to park and vehicle is below 5 kph.

The audible warning will also be sounded continuously for up to 5 minutes whenever the Rear Gate/Trunk fails to close to the fully latched position after 20 seconds of powering in the close direction. The warning will stop if the Rear Gate/Trunk becomes fully latched or 5 minutes has elapsed since the audible feedback started.

The intent of the audible feedback is to alert persons in the area of the motion of the Rear Gate/Trunk and to alert the driver of the vehicle under the conditions above. The audible feedback must be audible within the area of motion of the Rear Gate/Trunk and at a distance of 1 meter outside that area while the Rear Gate/Trunk is fully open. The audible feedback must also be audible from the driver seat position while the Rear Gate/Trunk is either fully open or fully closed.

Operating Voltage Range
Except as noted above, the voltage range that the power Rear Gate/Trunk system must operate is as defined in SDS requirement EL-0058.

Programmable Stop (Option L1)

The Rear Gate/Trunk Open Angle could be programmed by the customer, using the Local (Rear) Open/Close Switch.
To set up a lower (than nominal) Open position you have to do the following:

- Start a power open operation by using keyfob or switch/handle
- Let the gate move till to the full open position or stop the gate near the desired position with pressing either one of the PLG switches or the keyfob (Option L2). Move the gate manually to the desired position. The desired angle must be above 25° or up to mechanical full open position.
- Press Local (Rear) Open/Close Switch and hold for approx. 3 sec. Confirmation beep occurs -> new position programming has been saved.
- Confirmation beep should sound from minimum desired angle (above 25°) to maximum open angle (full mechanical open position).

Engine Start Stop

Engine Start Stop system shuts down the engine and monitors stored electrical power. Engine Start Stop Status is monitored by the RGTM to synchronize desired operation of the Rear Gate/Trunk against Engine Start Stop system operation.

The Engine_Start_Stop_Status is created by processing CAN messages from powertrain. Processing of user requests for RGTM functionality is Ignored when Engine_Start_Stop_Status is ACTIVE until engine Autostart or Autostop actions occur**.** Current movement operations of the Gate or Trunk are allowed to finish before powertrain performs Engine Autostart or Autostop actions.

Manual Liftgate

For manual liftgate systems functionality is limited, the main operation for open/close the gate is done manually. These features are not included:
*Power Open/Close.
*Lockout.
*Inhibit.
*Drift Control.
*Audible Feedback.
*Programmable Stop (Option L1).
*Pinch Strip.
*Engine Start Stop.

Re-flash Scenarios Considerations

After re-flashing the module; the modules go through a hard reset, consequently all CAN signals are set to the default values based on the dbc files. In order to allow the re-flasing of the module, ECU´s on the bus should go to session where ECU's are not operational and stay in this status.
Ignition cycle is needed to refresh CAN signals of all ECU´s on the bus and allow normal operation of the module.

2.2 SUBSYSTEM OVERVIEW

Options

Option	Option Description	CD533	CD391 5DR	CD391 Wagon	C489
A2	Power Unlatch from Exterior Handle (From BFSL)	X	X	X	X
B1	Power Cinching Latch (From BFSL)		X	X	X
B2	Power Cinching Striker	X			
C1	Lock Inhibit Feature is standard. (From BFSL)	X	X	X	
D2	Keypad Control of RGT is not supported. (From BFSL)	X	X	X	
E1	Unlatch allowed while Rear Gate/Trunk locked. (From BFSL)	X	X	X	?
F1	MSCAN	X	X	X	X
G1	Local Open/Close Switch Supported	X	X	X	
G2	Local Open/Close Switch Not Supported				
G3	Exterior switch direct input supported	X	X	X	X
H1	Master Open/Close Switch Read by RGTM	X	X	X	X
J1	Moveable Rear Gate/Trunk Glass				
J2	Fixed Rear Gate/Trunk Glass		X	X	
K1	Message Center Lockout	X	X	X	
K2	Hardwired Lockout Switch				
L1	Programmable Stop		X	X	
L2	Power Stop		X	X	X
M1	Primary Obstacle Detection	X	X	X	
M2	Secondary Obstacle Detection		X	X	

Note: The Option G1, Local Open/Close Switch Supported, is known as Power Close Switch for Power Decklid applications and Rear Open/Close switch for Power Liftgate applications.

Table 8. Option Table

Calibrations

Parameter	Units	CD533	CD391		C489	CD 539N	CD 539C	CD 539E
			5DR	Wagon				
Minimum_Full_Open_Position	Degrees	60°	45°	60°	25°	50°	45°	70°
Entering_Secondary_Time	msec	200	200	200	500	500	500	500
RGT_Near_Latched_Time	msec	145	145	145	500	145	145	145
RGT_Latched_Time	msec							
RGT_Position_Near_Latch	Degrees							
Latch Actuation Time	msec	3300	3300	3300	3300	3300	3300	3300
RGT_Position_Out_Of_Range	Degrees	120	120	120	120	120	120	120
RGT_Crossover_Point	Degrees	20	20	20	20	20	20	20
Motor_EMF_Time	msec							
Motor_InRush_Time	msec	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined
Motor_Abort_Voltage	Volts	8	8	8	8	8	8	8
Encoder_Reference_Voltage	Volts	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined
PinchStrip_Reference_Voltage	Volts	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined
Release_Return_Duration	msec	700	700	700	TBD	TBD	TBD	TBD
Cinch Relax Duration	msec	1500	1500	1500	1500	1500	1500	1500
Cinch Return Voltage	Volts	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt
In_Secondary_Time	msec	500	500	500	500	500	500	500
Cinch_Overshoot_Voltage	Volts	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt	Vbatt
Release_Return_Delay_Duration	msec	NA	NA	NA	500	NA	NA	NA
Cinch_Return_Delay_Duration	msec	4000	4000	4000	1500	4000	4000	4000
Local_Switch_Present	PRESENT	NO	YES	YES	YES	YES	YES	YES
Rear Gate/Trunk_Glass_Ajar_Present	PRESENT	NO	NO	NO	NO	NO	NO	NO
Message_Center_Present	PRESENT	NO	YES	YES	YES			
Max_Drift_Count	Events	10	10	10	10	10	10	10
Drift_Time	msec	1500	500	500	500	500	500	500
Drift_Speed_High	msec	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined
Max_Drift_Close_Attempts	Attempts	4	4	4	4	4	4	4
Max_Drift_Hold_Time	msec	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined	Supplier Defined
DTC_Drift_Count_Events	Events	10	10	10	10	10	10	10
Pinch Strips Present	PRESENT	NO	YES	YES				
Position_Program_Time	msec	0	3000	3000	3000	3000	3000	3000
Position_Program_Present	---	NO	YES	YES	YES	YES	YES	YES
RGTM TYPE	---	TRUNK	GATE	GATE	GATE	GATE	GATE	GATE
Power Trunk Present		YES	NO	NO	NO	NO	NO	NO
Power Gate Present		NO	YES	YES	YES	YES	YES	YES
Power Stop Present		NO	YES	YES	YES	YES	YES	YES
CINCH MECHANISM	---	STRIKER	LATCH	LATCH	LATCH	LATCH	LATCH	LATCH
Pending_Rq_Time_CFG	msec	NA	0	0				
Max_Close_Delay_Time	msec	0	0	0	0	0	0	0
Fast_Chime_Decay_Rate	---	0.7	0.7	0.7	0.7	0.7	0.7	0.7
HW_Chime_Present	PRESENT	YES	NO	NO				
Chime_Present	PRESENT	YES	YES	YES	YES	YES	YES	YES
Looking_For_Drift_Time	msec	500	500	500				
Vehicle_Speed_Low_Limit	KpH	5	5	5	5	5	5	5
Start_Stop_Present	PRESENT	NO	YES	YES				
RKE_Interrupt_Time	msec	NO	3000	3000	NO			
Obstacle_Detection_Shut_Off_Angle	Degrees	1.3	NA	NA	NA			
RGT_System_Cfg	---	POWER	POWER	POWER	MANUAL	POWER	POWER	POWER
Latch_Supplier	--	STRATTEC	STRATTEC	STRATTEC	GECOM	STRATTEC	STRATTEC	STRATTEC
ECE_Market	--	NON_ECE	ECE	ECE	NON_ECE	NON_ECE	NON_ECE	ECE
Factory_Power_Op	--	OFF	OFF	OFF	ON			

Table 9. Calibration Table

Note: The above list is a minimum set of calibrations. The supplier is allowed to define other calibrations.

<1> All calibrations must be stored in Non-Volatile Memory. All calibrations in Table 9, and any supplier defined calibrations that are vehicle dependent must be included in a separate calibration file that is downloaded to the RGTM via Method 3 Configuration per the Module Programming and Configuration Design Specification.

Constraints on calibrations in addition to data dictionary ranges:

Entering_Secondary_Time allows the drive motor to continue driving to ensure secondary latch position is reached mechanically. RGT_Near_Latched_Time allows the Cinch Motor to continue to drive to ensure that primary latch position is reached mechanically in the case of a fault or missed pulse on the Detent Signal. RGT_Latched_Time also allows the Cinch Motor to continue to drive to ensure primary latch position is reached mechanically in the case of a fault on the Forkbolt Primary Switch Signal. RGT_Latched_Time plus the debounce time must be greater than the time that the detent switch is activated while entering secondary latch position.

Motor_InRush_Time needs to be longer than worst case voltage drop due to in-rush on any motor.

Motor_EMF_Time needs to be longer worst case than Motor Back EMF pulse width on any motor.

Motor_Abort_Voltage needs to be below 9.5 volts by at least the worst case voltage drop due to running current on any motor.

In_Secondary_Time must be long enough to ensure that the secondary position is reached from the point in travel that is considered near the latch according to the Position sensor at the slowest speed of the Rear Gate/Trunk under powered operation.

DTC_Drift_Count must be no larger than Max_Drift_Count. This prevents the condition of having the RGT disabled, but no DTC set.

2.2.1 Latch Nomenclature

There are several latch suppliers, each with unique naming conventions for parts of the latch, and therefore for the switches that monitor the latch. Table 10a is an attempt to map those names to a common nomenclature to be used through the rest of this document. (The following information is carried over from FS-BT4T-14B673-AB for continuity.) Sector Gear Open Position and Closed Position switches are replaced by Zero Position Switch for Strattec C32P Power Cinching Latch. Strattec C32P Power Cinching Latch is assumption of system latch content for power liftgates as of November 30 2010 and the cinching latch content of this specification is geared to this latch due to specific interface details for cinching and releasing with 4 switch logic and dual motor design.

	Dataflow Name			
Latch Supplier	Forkbolt_Primary_Signal	Forkbolt_Secondary_Signal	Detent_Signal	Centering_Switch_Signal
Intier	Ratchet Primary Switch	Ratchet Secondary Switch	Pawl Switch	Centering Switch
Gecom	Primary Switch	Secondary Switch	Pawl Switch	Neutral Switch
Strattec	1st Claw Switch	2nd Claw Switch	Pawl Switch	0-position Switch
Delphi	Forkbolt Primary Switch	Forkbolt Secondary Switch	Detent Switch	N/A

Table 10a. Cinching Latch Input Nomenclature (Rear Gate applications)

Power Striker/Decklatch Nomenclature

Power cinching of the trunk/decklid is accomplished by a pair of components consisting of Power Cinching Striker and Power Release Latch. Power Cinching Striker uses cinching motor to pull the release latch (attached to the trunk and latched to striker) in the closed direction until AJAR SWITCH is Not AJAR. PWM of the power source is needed to avoid striker malfunction. Release latch contains a unidirectional motor and AJAR position status switch. Table 3b contains Strattec Power Cinching Striker and Decklid Release Latch switch information.

	Dataflow Name			
Latch Supplier	Power Cinching Striker Position Switch	Power Cinching Striker Position Switch		Decklid Release Latch Switch
Strattec	Striker_Up_Signal	Striker_Down_Signal		AJAR_switch

Table 5b. Cinching Striker Input Nomenclature (CD 533 Rear Trunk application)

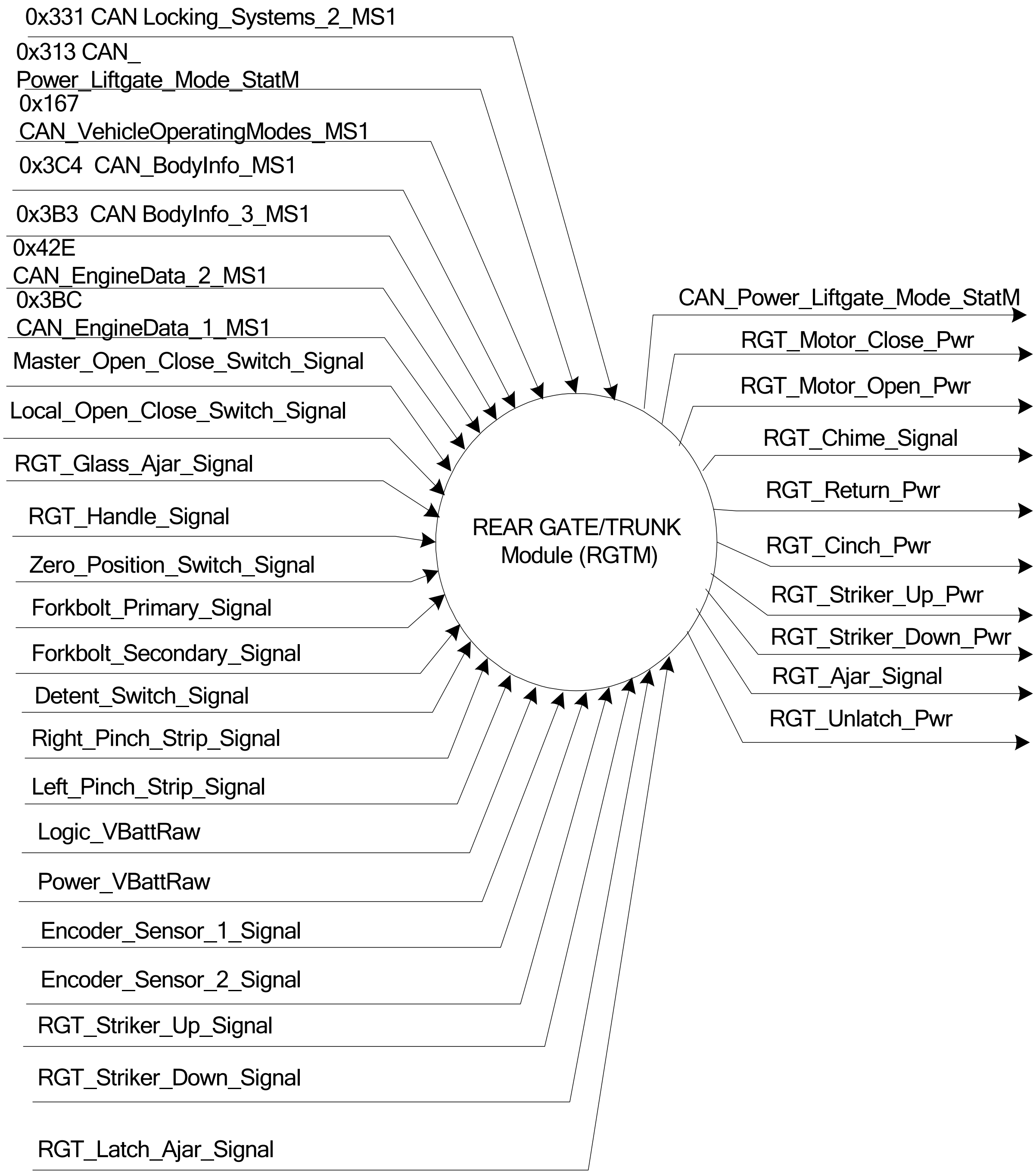


Figure 1. Context Diagram

2.3 FEATURE BEHAVIOR DETAIL

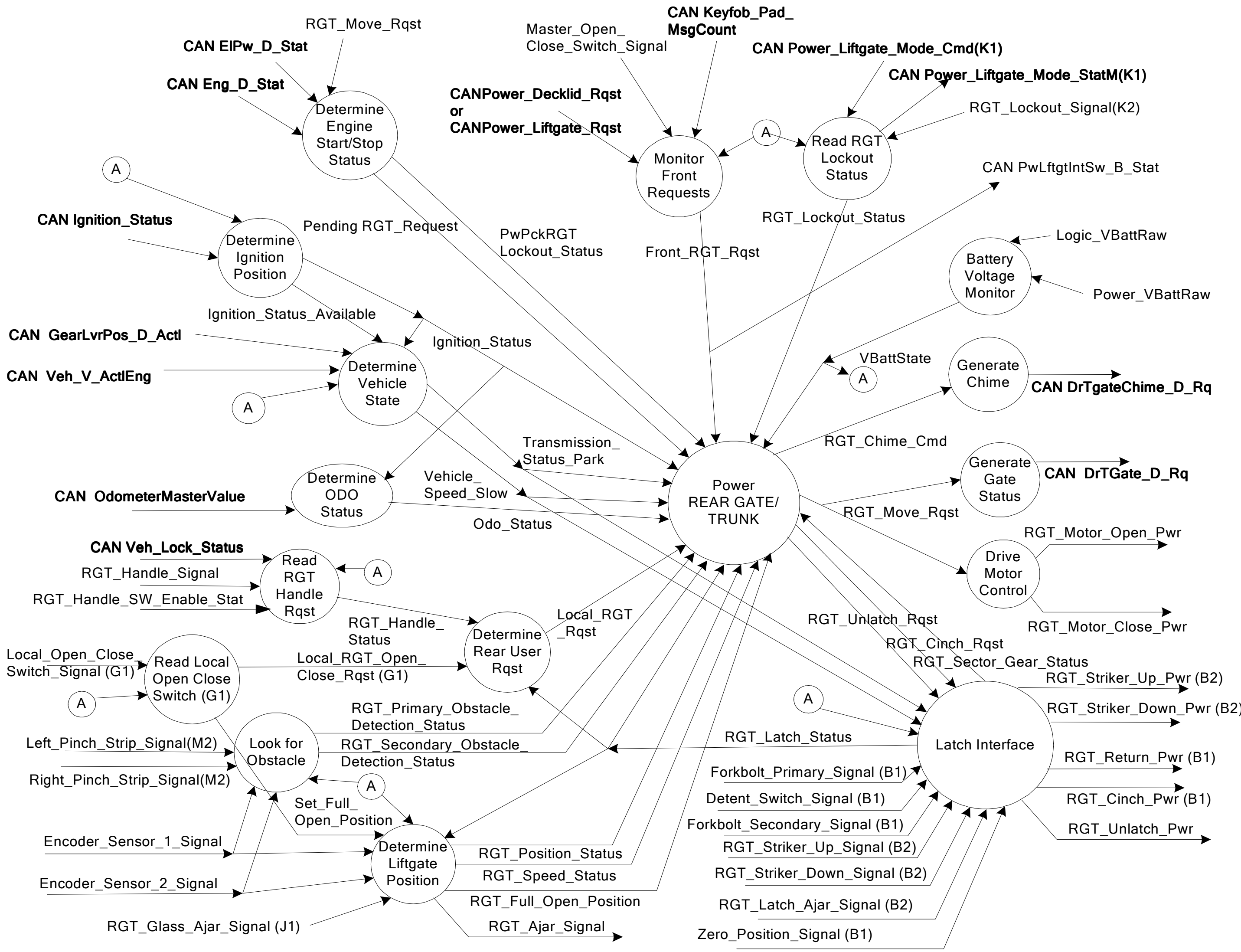


Figure 2. Data Flow Diagram – Overall

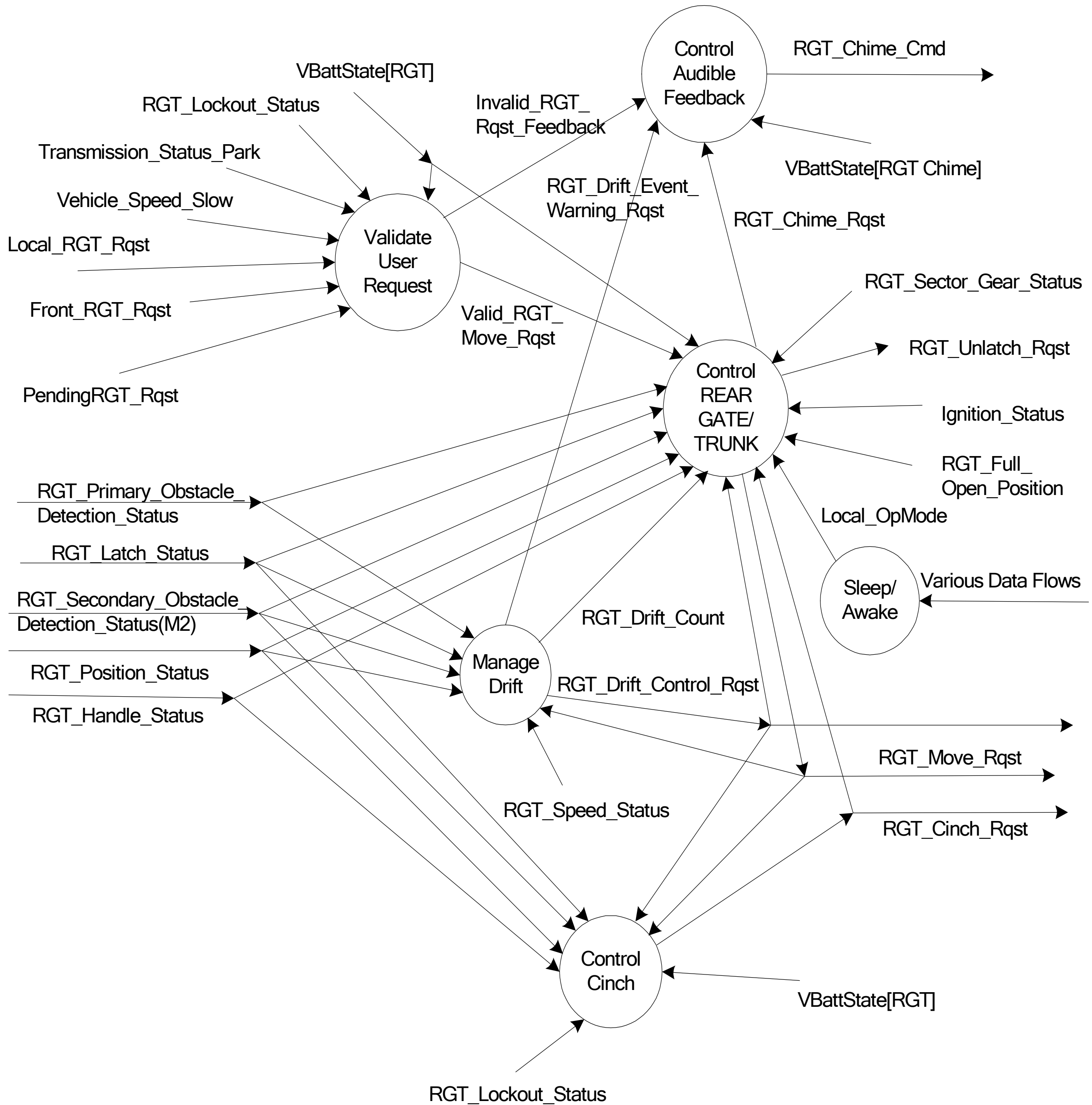


Figure 3. Power Rear Gate/Trunk Data Flow Diagram

2.3.1 Validate User Request

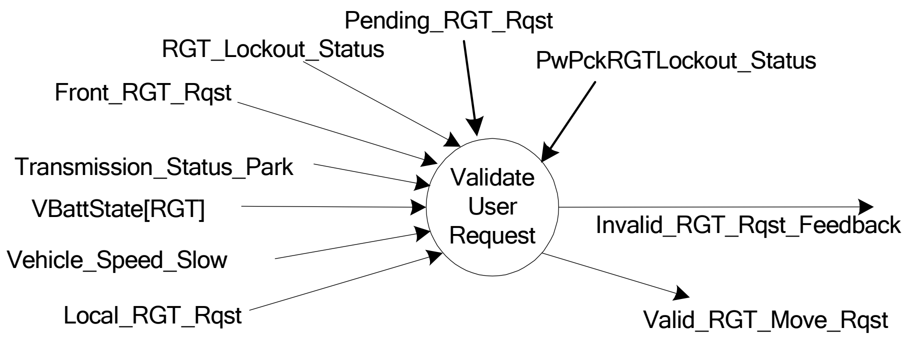


Figure 4. Validate User Request Data Flow Diagram

Rqmt No.	RGT_System_ Cfg	Transmission_ Status_Park	Vehicle_Speed _Slow	Front_RGT_Rq st	Local_RGT_Rq st	RGT_Lockout_ Status	VbattState [RGT]	Pending_ RGT_Rqst	PwPckRGTLoc kout_Status	Start_Stop_P ending_Time r_Status	Valid_RGT_ Move_ Rqst	Invalid_ RGT_Rqst_ Feedback	RGT_Prec ondition_C hanged
R: 2.3.1.1	Don't Care	NOT_PARK	Don't Care	INACTIVE	INACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	INACTIVE	TRUE
R: 2.3.1.2	Don't Care	NOT_PARK	Don't Care	ACTIVE	INACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.3	Don't Care	NOT_PARK	Don't Care	Don't Care	ACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.4	Don't Care	NOT_PARK	Don't Care	Don't Care	UNLATCH	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.5	Don't Care	PARK	FAST	INACTIVE	INACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	INACTIVE	TRUE
R: 2.3.1.6	Don't Care	PARK	FAST	ACTIVE	INACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.7	Don't Care	PARK	FAST	Don't Care	ACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.8	Don't Care	PARK	FAST	Don't Care	UNLATCH	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INHIBIT	ACTIVE	TRUE
R: 2.3.1.9	POWER	PARK	SLOW	ACTIVE	Don't Care	Don't Care	NORM_V	Don't Care	ALLOWED	Don't Care	ACTIVE	INACTIVE	FALSE
R: 2.3.1.10	POWER	PARK	SLOW	ACTIVE	Don't Care	Don't Care	NORM_V	Don't Care	NOT_ALLOWED	NOT_EXPIRED	INACTIVE	INACTIVE	FALSE
R: 2.3.1.11	POWER	PARK	SLOW	INACTIVE	Don't Care	Don't Care	NORM_V	ACTIVE	NOT_ ALLOWED	EXPIRED	ACTIVE	INACTIVE	FALSE
R: 2.3.1.12	POWER	PARK	SLOW	ACTIVE	Don't Care	Don't Care	Not(NORM_V)	Don't Care	Don't Care	Don't Care	INACTIVE	ACTIVE	FALSE
R: 2.3.1.13	POWER	PARK	SLOW	INACTIVE	ACTIVE	NOT_LOCKED	NORM_V	Don't Care	ALLOWED	Don't Care	ACTIVE	INACTIVE	FALSE
R: 2.3.1.14	POWER	PARK	SLOW	INACTIVE	ACTIVE	NOT_LOCKED	NORM_V	Don't Care	NOT_ ALLOWED	NOT_EXPIRED	INACTIVE	INACTIVE	FALSE
R: 2.3.1.15	POWER	PARK	SLOW	INACTIVE	INACTIVE	NOT_LOCKED	NORM_V	ACTIVE	NOT_ ALLOWED	EXPIRED	ACTIVE	INACTIVE	FALSE
R: 2.3.1.16	POWER	PARK	SLOW	INACTIVE	ACTIVE	NOT_LOCKED	Not(NORM_V)	Don't Care	Don't Care	Don't Care	INACTIVE	ACTIVE	FALSE
R: 2.3.1.17	POWER	PARK	SLOW	INACTIVE	ACTIVE	LOCKED	Don't Care	Don't Care	Don't Care	Don't Care	INACTIVE	ACTIVE	FALSE
R: 2.3.1.18	POWER	PARK	SLOW	INACTIVE	UNLATCH	NOT_LOCKED	NORM_V	Don't Care	ALLOWED	Don't Care	ACTIVE	INACTIVE	FALSE
R: 2.3.1.19	POWER	PARK	SLOW	INACTIVE	UNLATCH	NOT_LOCKED	NORM_V	Don't Care	NOT_ ALLOWED	NOT_EXPIRED	INACTIVE	INACTIVE	FALSE
R: 2.3.1.20	POWER	PARK	SLOW	INACTIVE	INACTIVE	NOT_LOCKED	NORM_V	UNLATCH	NOT_ ALLOWED	EXPIRED	ACTIVE	INACTIVE	FALSE
R: 2.3.1.21	POWER	PARK	SLOW	INACTIVE	UNLATCH	NOT_LOCKED	Not(NORM_V)	Don't Care	Don't Care	Don't Care	INACTIVE	ACTIVE	FALSE
R: 2.3.1.22	POWER	PARK	SLOW	INACTIVE	UNLATCH	LOCKED	NORM_V	Don't Care	ALLOWED	Don't Care	UNLATCH	INACTIVE	FALSE
R: 2.3.1.23	POWER	PARK	SLOW	INACTIVE	UNLATCH	LOCKED	NORM_V	Don't Care	NOT_ ALLOWED	NOT_EXPIRED	INACTIVE	INACTIVE	FALSE
R: 2.3.1.24	POWER	PARK	SLOW	INACTIVE	INACTIVE	LOCKED	NORM_V	UNLATCH	NOT_ ALLOWED	EXPIRED	UNLATCH	INACTIVE	FALSE
R: 2.3.1.25	POWER	PARK	SLOW	INACTIVE	Don't Care	LOCKED	NORM_V	UNLATCH	ALLOWED	Don't Care	UNLATCH	INACTIVE	FALSE
R: 2.3.1.26	POWER	PARK	SLOW	INACTIVE	UNLATCH	LOCKED	Not(NORM_V)	Don't Care	Don't Care	Don't Care	INACTIVE	ACTIVE	FALSE
R: 2.3.1.27	POWER	PARK	SLOW	INACTIVE	INACTIVE	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	INACTIVE	INACTIVE	FALSE
R: 2.3.1.28	POWER	PARK	SLOW	Don't Care	Don't Care	NOT_LOCKED	NORM_V	ACTIVE	ALLOWED	Don't Care	ACTIVE	INACTIVE	FALSE
R: 2.3.1.29	POWER	PARK	SLOW	INACTIVE	UNLATCH	NOT_LOCKED	NORM_V	ACTIVE	NOT_ ALLOWED	NOT_EXPIRED	INACTIVE	INACTIVE	FALSE
R: 2.3.1.30	POWER	PARK	SLOW	INACTIVE	INACTIVE	NOT_LOCKED	NORM_V	UNLATCH	NOT_ ALLOWED	EXPIRED	UNLATCH	INACTIVE	FALSE
R: 2.3.1.31	MANUAL	PARK	SLOW	INACTIVE	INACTIVE	NOT_LOCKED	NORM_V	Don't Care	Don't Care	Don't Care	INACTIVE	INACTIVE	FALSE
R: 2.3.1.32	MANUAL	PARK	SLOW	ACTIVE	INACTIVE	NOT_LOCKED	NORM_V	Don't Care	Don't Care	Don't Care	UNLATCH	INACTIVE	FALSE
R: 2.3.1.33	MANUAL	PARK	SLOW	INACTIVE	UNLATCH	NOT_LOCKED	NORM_V	Don't Care	Don't Care	Don't Care	UNLATCH	INACTIVE	FALSE
R: 2.3.1.34	MANUAL	PARK	SLOW	INACTIVE	ACTIVE	NOT_LOCKED	NORM_V	Don't Care	Don't Care	Don't Care	INACTIVE	INACTIVE	FALSE
R: 2.3.1.35	Clear DelayedRGT_Rqst after Evaluating this table.												

Table 11. Validate User Request (with Lockout) Decision Table.

2.3.2 Control Rear Gate/Trunk

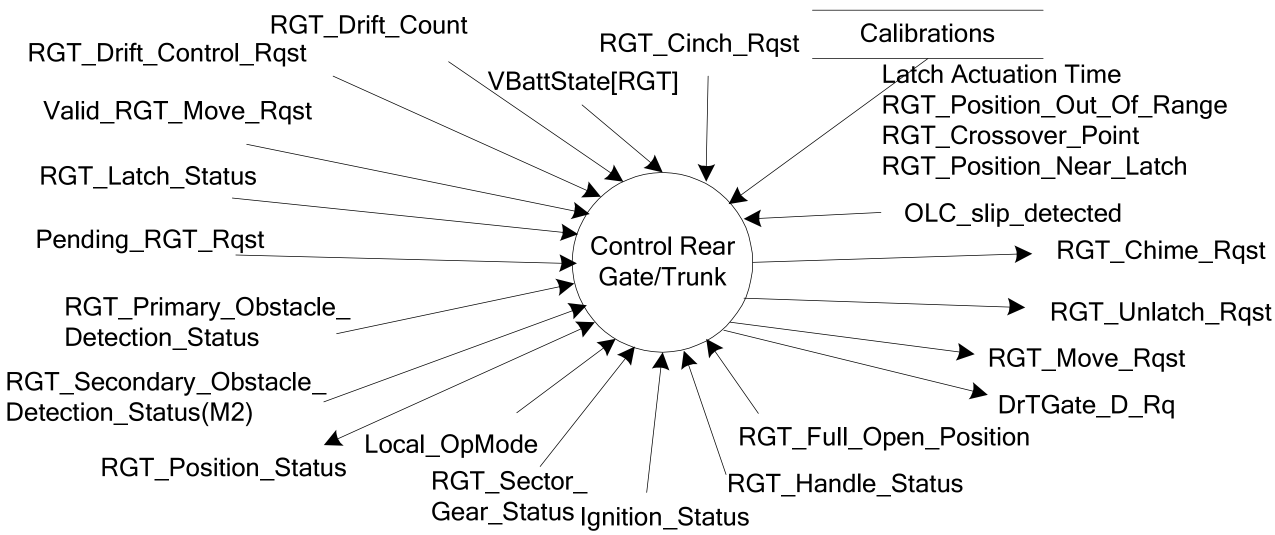


Figure 5. Control Rear Gate/Trunk Data Flow Diagram

DrTGate_D_Rq	State Encoded	CAN Message
NOT_MOVING	0x0	0x313 Power_Liftgate_Mode_StatM
OPENING	0x1	
CLOSING	0x2	
NotUsed	0x3	

Table 6.2 Report DrTGate_D_Rq signal status to MSCAN.

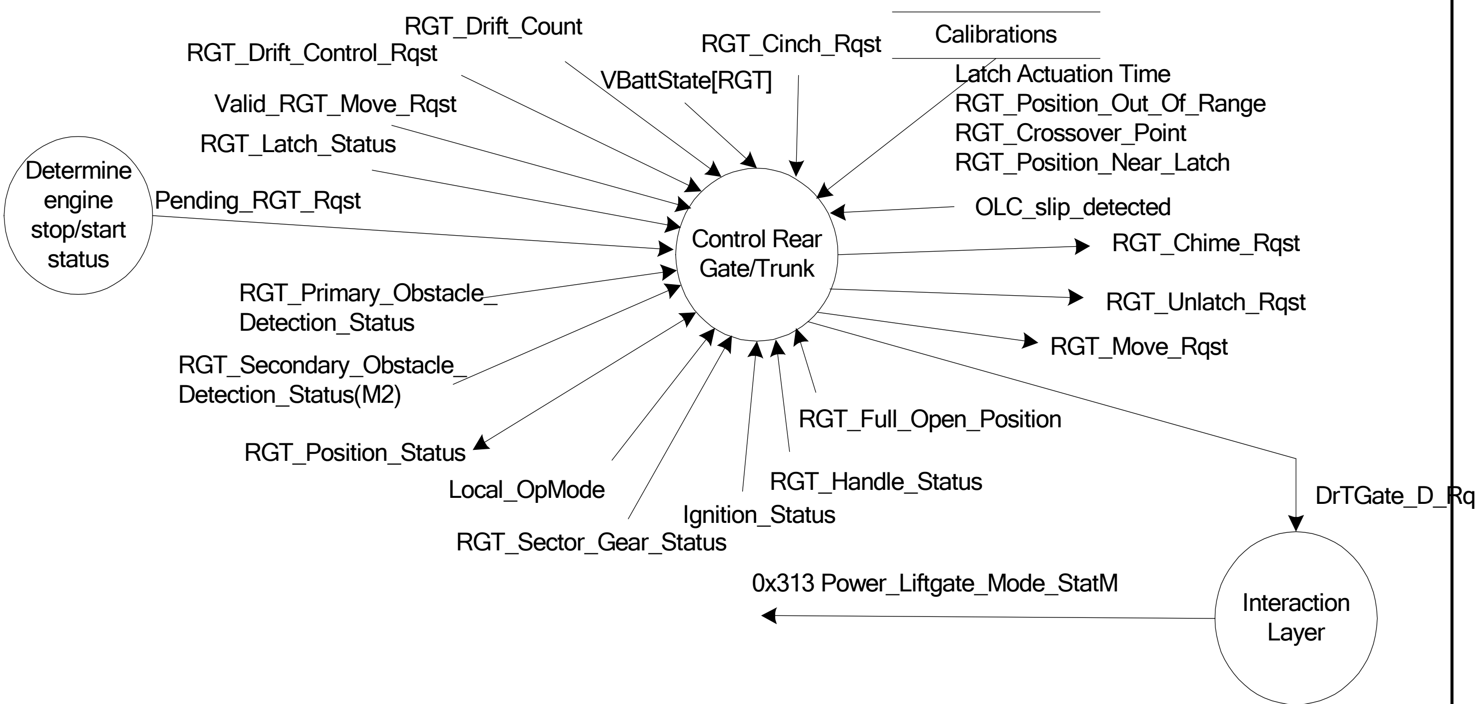


Figure 5.1 Control Rear Gate/ Trunk Data Flow Diagram (decomposed)

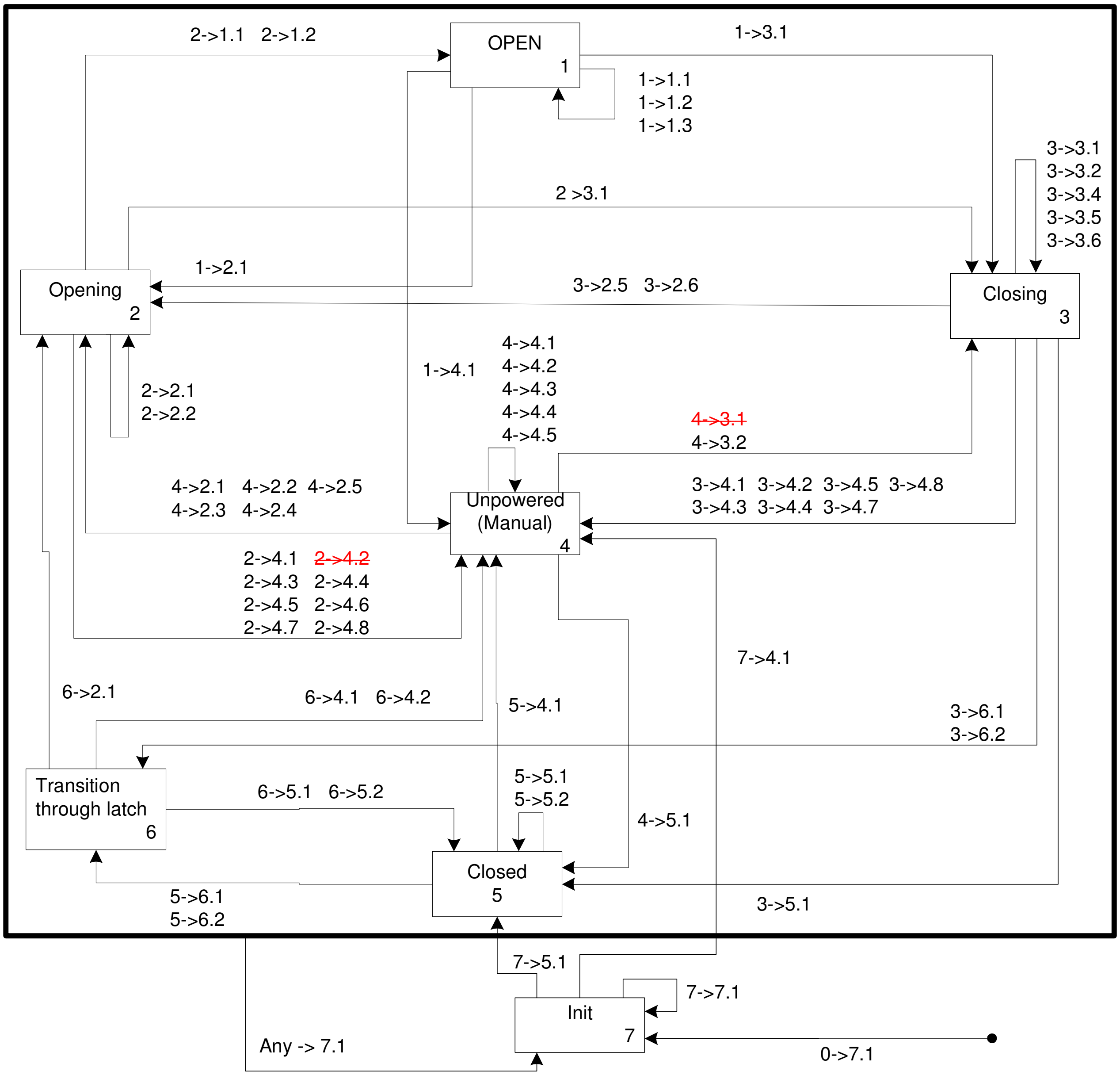


Figure 6. Control Rear Gate/Trunk State Transition Diagram

The transitions in the above STD are described in the table below:

<table>
<tr><th>Src</th><th>Dest</th><th>Event</th><th>Action</th></tr>
<tr><td>Any</td><td>7</td><td><1> Local_OpMode = SLEEP</td><td>RGT_Move_Rqst = NULL
RGT_Unlatch_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
DrTGate_D_Rq=NOT MOVING</td></tr>
<tr><td>0</td><td>7</td><td><1>Reset</td><td>RGT_Move_Rqst = NULL
RGT_Unlatch_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
DrTGate_D_Rq=NOT MOVING
RGT_Position_Manual_Resynch_Rqst = NOT_SYNCH</td></tr>
<tr><td>1</td><td>2</td><td><1> Valid_RGT_Move_Rqst -> ACTIVE
& VbattState[RGT] = NORM_V
& RGT_Drift_Control_Rqst = CLOSE | HOLD</td><td>RGT_Move_Rqst = OPEN
RGT_Unlatch_Rqst = UNLATCH
DrTGate_D_Rq=OPENING
Mark Event "Start_Unlatch"
Mark Event “Start Opening”</td></tr>
<tr><td>1</td><td>3</td><td><1>Valid_RGT_Move_Rqst -> ACTIVE
& RGT_Latch_Status = UNLATCHED | OPEN
& RGT_Secondary_Obstacle_Detection_Status = CLEAR
& VbattState[RGT] = NORM_V
& RGT_Drift_Control_Rqst = OPEN | NULL
& Ignition_Status <> START</td><td>RGT_Chime_Rqst = ACTIVE;
DrTGate_D_Rq=CLOSING
Mark Event "Start_Chime"
Mark Event “Start Closing”</td></tr>
<tr><td>1</td><td>1</td><td><1>Valid_RGT_Move_Rqst -> ACTIVE
& RGT_Latch_Status <> UNLATCHED
& RGT_Unlatch_Rqst = NULL</td><td>RGT_Unlatch_Rqst = UNLATCH
DrTGate_D_Rq=NOT MOVING
Mark Event "Start Unlatch"</td></tr>
<tr><td>1</td><td>1</td><td>RGT_Unlatch_Rqst = UNLATCH
& (<2>RGT_Latch_Status = UNLATCHED | OPEN
| <3>Time since Event "Start Unlatch" > Latch Actuation Time)</td><td>RGT_Unlatch_Rqst = NULL
DrTGate_D_Rq=NOT MOVING</td></tr>
<tr><td>1</td><td>4</td><td><1> RGT_Position_Status < (RGT_Full_Open_Position – 3 degrees)</td><td>DrTGate_D_Rq=NOT MOVING</td></tr>
<tr><td>1</td><td>7</td><td><4> RGT_Position_Manual_Resynch_Rqst = SYNCH</td><td>RGT_Position_Status = RGT_Position_Out_Of_Range
RGT_Position_Manual_Resynch_Rqst = NOT_ SYNCH
DrTGate_D_Rq=NOT MOVING</td></tr>
</table>

2	1	<1>(RGT_Position_Status >= RGT_Full_Open_Position & RGT_Position_Status < RGT_Position_Out_Of_Range) | (<2> Sleep_Recover_Flag = RECOVER & RGT_Primary_Obstacle_Detection_Status = OBSTACLE)	RGT_Move_Rqst = NULL RGT_Chime_Rqst = INACTIVE; RGT_Position_Status = RGT_Full_Open_Position DrTGate_D_Rq=NOT MOVING
2	2	<1>RGT_Unlatch_Rqst = UNLATCH & RGT_Latch_Status = UNLATCHED	RGT_Unlatch_Rqst = NULL DrTGate_D_Rq=OPENING
2	2	<2> Valid_RGT_Move_Rqst <> INHIBIT & Time Since Event "Start Chime" >= 3 seconds	RGT_Chime_Rqst = INACTIVE; DrTGate_D_Rq=OPENING
2	3	<1>Valid_RGT_Move_Rqst -> ACTIVE & RGT_Position_Status >=RGT_Crossover_Point & RGT_Position_Status < RGT_Position_Out_Of_Range & Time since Event "Start Opening" > 500 ms & RGT_Latch_Status = UNLATCHED | OPEN & VbattState[RGT] <> ABORT_V & Power_Stop = NOT_PRESENT	RGT_Move_Rqst = NULL RGT_Chime_Rqst = ACTIVE; Mark Event "Start_Chime" Mark Event "Start Closing" DrTGate_D_Rq=CLOSING
2	4	<1>RGT_Primary_Obstacle_Detection_Status = OBSTACLE & Sleep_Recover_Flag = OK	RGT_Move_Rqst = NULL RGT_Chime_Rqst = ACTIVE; Mark_Event "Start_Chime" DrTGate_D_Rq=NOT MOVING
2	4	(<3> Valid_RGT_Move_Rqst -> ACTIVE (& Power_Stop = NOT_PRESENT & RGT_Position_Status < RGT_Crossover_Point & Time since Event "Start Opening" > 500 ms) | (& Power_Stop = PRESENT & Time since Event "Start Opening" > 500 ms)) | <4> Time since Event "Start Opening" > 20 seconds | <6>VbattState[RGT] = ABORT_V |<8> RGT_Handle_Status -> ACTIVE	RGT_Move_Rqst = NULL RGT_Chime_Rqst = INACTIVE; DrTGate_D_Rq=NOT MOVING RGT_Stop_Direction_Status=OPEN
2	4	~~<2>Ignition_Status = START~~	~~RGT_Move_Rqst = NULL~~ ~~RGT_Last_Movement_Status = OPEN~~ ~~RGT_Chime_Rqst = INACTIVE;~~ ~~Mark Event "Crank Pause"~~ ~~DrTGate_D_Rq=NOT MOVING~~
2	4	<7>OLC_slip_detected = TRUE	RGT_Move_Rqst = NULL RGT_Chime_Rqst = ACTIVE; Mark_Event "Start_Chime" DrTGate_D_Rq=NOT MOVING
2	4	<5>Time since Event "Start_Unlatch" > Latch Actuation Time & RGT_Latch_Status <> UNLATCHED	RGT_Move_Rqst = NULL RGT_Unlatch_Rqst = NULL RGT_Chime_Rqst = INACTIVE; DrTGate_D_Rq=NOT MOVING

<table>
<tr><td>3</td><td>2</td><td><5> (RGT_Position_Status >RGT_Position_Near_Latch
& RGT_Position_Status < RGT_Position_Out_Of_Range
& (RGT_Latch_Status <> (UNLATCHED | OPEN)))
| <6>Time since Event “Start Manual Resync” > 1.5</td><td>RGT_Move_Rqst = OPEN;
RGT_Unlatch_Rqst = UNLATCH
RGT_Chime_Rqst = ACTIVE;
Mark_Event "Start_Chime";
Mark Event "Start_Unlatch"
Mark Event “Start Opening”
RGT_Position_Manual_Resynch_Rqst = SYNCH
DrTGate_D_Rq=OPENING</td></tr>
<tr><td>3</td><td>6</td><td><2>RGT_Secondary_Obstacle_Detection_Status <>CLEAR
| <3>RGT_Latch_Status = ERROR
| (<4>RGT_Primary_Obstacle_Detection_Status = OBSTACLE
& RGT_Latch_Status = UNLATCHED | OPEN)</td><td>RGT_Move_Rqst = NULL;
RGT_Unlatch_Rqst = UNLATCH
RGT_Last_Movement_Status = OPEN
RGT_Chime_Rqst = ACTIVE;
Mark_Event "Start_Chime";
Mark Event "Start_Unlatch"
Mark Event “Start Opening”
DrTGate_D_Rq=OPENING</td></tr>
<tr><td>3</td><td>6</td><td>(<1> Valid_RGT_Move_Rqst → Active
& Time since Event “Start Closing” > 500 milliseconds
& VbattState[RGT] <> ABORT_V
& Power_Stop = NOT_PRESENT</td><td>RGT_Move_Rqst = NULL
RGT_Unlatch_Rqst = UNLATCH
Mark Event "Start_Unlatch"
Mark Event “Start Opening”
RGT_Last_Movement_Status = OPEN
DrTGate_D_Rq=OPENING</td></tr>
<tr><td>3</td><td>3</td><td><1>Time Since Event "Start_Chime" >=
Max_Close_Delay_Time ~~1 second~~
& RGT_Move_Rqst = NULL</td><td>RGT_Move_Rqst = CLOSE</td></tr>
<tr><td>3</td><td>3</td><td><2>Time since Event "Start_Chime" >=
3 seconds & Valid_RGT_Move_Rqst <> INHIBIT</td><td>RGT_Chime_Rqst = INACTIVE;</td></tr>
<tr><td>3</td><td>3</td><td><4>RGT_Cinch_Rqst = CINCH</td><td>RGT_Move_Rqst = CINCH</td></tr>
<tr><td>3</td><td>3</td><td><5> Valid_RGT_Move_Rqst = INHIBIT</td><td>RGT_Chime_Rqst = ACTIVE;</td></tr>
<tr><td>3</td><td>3</td><td><6> RGT_Position_Status -> 0
& RGT_Latch_Status = UNLATCHED | OPEN)</td><td>Mark Event “Start Manual Resync”
DrTGate_D_Rq=CLOSING</td></tr>
<tr><td>~~3~~</td><td>4</td><td>~~<1>Ignition_Status = START~~</td><td>~~RGT_Move_Rqst = NULL~~
~~RGT_Last_Movement_Status = CLOSE~~
~~DrTGate_D_Rq=NOT MOVING~~
~~RGT_Chime_Rqst = INACTIVE;~~
~~Mark Event “Crank Pause”~~</td></tr>
<tr><td>3</td><td>4</td><td><2> Time since Event “Start Closing” > 20 seconds</td><td>RGT_Move_Rqst = NULL
RGT_Chime_Rqst = ACTIVE;
RGT_Movement_Timeout = TRUE
Mark Event “Close Timeout”
DrTGate_D_Rq=NOT MOVING</td></tr>
</table>

<table>
<tr><td>3</td><td>6</td><td><4> RGT_Handle_Status -> ACTIVE
& Power_Stop = NOT_PRESENT</td><td>RGT_Move_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
RGT_Unlatch_Rqst = UNLATCH
RGT_Last_Movement_Status = UNLATCH
Mark Event "Start Unlatch"
DrTGate_D_Rq=OPENING</td></tr>
<tr><td>3</td><td>4</td><td><4> VbattState[RGT] = ABORT_V</td><td>RGT_Move_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
RGT_Unlatch_Rqst = NULL
DrTGate_D_Rq=NOT MOVING</td></tr>
<tr><td>3</td><td>4</td><td><5>((Valid_RGT_Move_Rqst -> ACTIVE
& Time since Event "Start Closing" > 500 ms)
|<8> RGT_Handle_Status -> ACTIVE)
& Power_Stop = PRESENT</td><td>RGT_Move_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
RGT_Unlatch_Rqst = NULL
DrTGate_D_Rq=NOT MOVING
RGT_Stop_Direction_Status=CLOSE</td></tr>
<tr><td>3</td><td>5</td><td><1>RGT_Latch_Status = LATCHED</td><td>RGT_Move_Rqst = NULL
RGT_Chime_Rqst = INACTIVE;
Sleep_Recover_Flag = OK
DrTGate_D_Rq=NOT MOVING</td></tr>
<tr><td>4</td><td>2</td><td>Ignition_Status <> START
& VbattState[RGT] = NORM_V
& RGT_Drift_Count <= Max_Drift_Count
& (<1> RGT_Last_Movement_Status = OPEN
| <3>(RGT_Position_Status < RGT_Crossover_Point
& RGT_Last_Movement_Status=CLOSE)
| (Valid_RGT_Move_Rqst->ACTIVE
&(<2> RGT_Position_Status < RGT_Crossover_Point
| <4>RGT_Drift_Control_Rqst = CLOSE | HOLD
| <5> RGT_Stop_Direction_Status=CLOSE))</td><td>RGT_Move_Rqst = OPEN
RGT_Unlatch_Rqst = UNLATCH
RGT_Last_Movement_Status = NULL
Mark Event "Start_Unlatch"
Mark Event “Start Opening”
RGT_Movement_Timeout = FALSE
RGT_Chime_Rqst = INACTIVE;
RGT_Stop_Direction_Status=NULL
RGT_Chime_Rqst = ACTIVE;
RGT_Last_Movement_Status = NULL
DrTGate_D_Rq=OPENING</td></tr>
<tr><td>4</td><td>3</td><td>(<1>Valid_RGT_Move_Rqst -> ACTIVE
& (RGT_Drift_Control_Rqst = OPEN | NULL
| <3> RGT_Stop_Direction_Status=OPEN
| <4> RGT_Position_Status >=RGT_NearFullOpen_Point)
| <2> RGT_Last_Movement_Status = CLOSE))
& Ignition_Status <> START
& RGT_Position_Status >=RGT_Crossover_Point
& RGT_Position_Status < RGT_Position_Out_Of_Range
& RGT_Latch_Status = UNLATCHED | OPEN
& VbattState[RGT] = NORM_V
& RGT_Drift_Count <= Max_Drift_Count</td><td>Mark_Event "Start_Chime"
RGT_Movement_Timeout = FALSE
Mark Event “Start Closing”
RGT_Stop_Direction_Status=NULL
DrTGate_D_Rq=CLOSING</td></tr>
<tr><td>4</td><td>4</td><td><1>Time since Event “Crank Pause” >25 seconds</td><td>RGT_Move_Rqst = NULL;
RGT_Last_Movement_Status = NULL</td></tr>
<tr><td>4</td><td>4</td><td><2> Time since Event "Start_Chime" >= 3 seconds
& RGT_Movement_Timeout = FALSE</td><td>RGT_Chime_Rqst = INACTIVE</td></tr>
<tr><td>4</td><td>4</td><td><3> Time since Event “Close Timeout” > 5 minutes
& RGT_Movement_Timeout = TRUE</td><td>RGT_Movement_Timeout = FALSE
DrTGate_D_Rq=NOT MOVING
RGT_Chime_Rqst = INACTIVE;</td></tr>
</table>

4	4	<4> RGT_Latch_Status = UNLATCHED | <5> Time Since Event "Start Unlatch" > Latch_Actuation_Time	RGT_Unlatch_Rqst = NULL
4	5	<1>RGT_Latch_Status <> UNLATCHED	RGT_Chime_Rqst = INACTIVE; DrTGate_D_Rq=NOT MOVING
4	7	<6> RGT_Position_Manual_Resynch_Rqst = SYNCH | (OLC_slip_detected = TRUE & RGT_Chime_Rqst = INACTIVE)	RGT_Position_Status = RGT_Position_Out_Of_Range RGT_Position_Manual_Resynch_Rqst = NOT_ SYNCH OLC_slip_detected = FALSE DrTGate_D_Rq=NOT MOVING
5	4	<1> Time since Event "Manual_Unlatch" > 250 ms	DrTGate_D_Rq=NOT MOVING
5	5	<1> RGT_Latch_Status = LATCHED -> not(LATCHED)	Mark Event "Manual_Unlatch"
5	5	<2> RGT_Latch_Status -> LATCHED	Sleep_Recovery_Flag = OK RGT_Movement_Timeout = FALSE RGT_Last_Movement_Status = NULL
5	5	<3> Time since Event "Start_Chime" >= 3 seconds & RGT_Movement_Timeout = FALSE	RGT_Chime_Rqst = INACTIVE
5	5	<4> Time since Event “Close Timeout” > 5 minutes & RGT_Movement_Timeout = TRUE	RGT_Movement_Timeout = FALSE RGT_Chime_Rqst = INACTIVE; DrTGate_D_Rq=NOT MOVING
5	6	<1>Valid_RGT_Move_Rqst -> ACTIVE & Ignition_Status <> START & VbattState[RGT] = NORM_V	RGT_Unlatch_Rqst = UNLATCH Mark Event "Start_Unlatch" Mark Event “Start Opening” RGT_Last_Movement_Status = OPEN DrTGate_D_Rq=OPENING RGT_Chime_Rqst = INACTIVE; RGT_Movement_Timeout = FALSE If RGT_Position_Resynch_Rqst = SYNCH & RGT_Latch_Status = LATCHED { RGT_Position_Status = 0 RGT_Position_Resynch_Rqst = NULL}
5	6	<2> Valid_RGT_Move_Rqst -> UNLATCH	RGT_Unlatch_Rqst = UNLATCH Mark Event "Start_Unlatch" RGT_Last_Movement_Status = UNLATCH RGT_Chime_Rqst = INACTIVE RGT_Movement_Timeout = FALSE If RGT_Position_Resynch_Rqst = SYNCH & RGT_Latch_Status = LATCHED { RGT_Position_Status = 0 RGT_Position_Resynch_Rqst = NULL}

6	2	<1> Power Trunk Present=YES & (RGT_Latch_Status=UNLATCHED) <2>Power Gate Present=YES & (RGT_Latch_Status = <3>UNLATCHED | <4>BEFORE_SECONDARY | <5>MIDLATCH |<6>BEFORE_PRIMARY & RGT_Sector_Gear_Status = NEUTRAL & RGT_Last_Movement_Status = OPEN & VBattState[RGT] <> ABORT_V & RGT_Drift_Count <= Max_Drift_Count	RGT_Move_Rqst = OPEN RGT_Last_Movement_Status = NULL DrTGate_D_Rq=OPENING
6	4	RGT_Latch_Status = UNLATCHED & (<1> RGT_Last_Movement_Status = UNLATCH | <2>RGT_Drift_Count > Max_Drift_Count)	RGT_Unlatch_Rqst = NULL RGT_Last_Movement_Status = NULL DrTGate_D_Rq=NOT MOVING
6	5	<1>Time since Event "Start_Unlatch" > Latch Actuation Time | <2> VbattState[RGT] = ABORT_V	RGT_Unlatch_Rqst = NULL RGT_Last_Movement_Status = NULL RGT_Move_Rqst = NULL DrTGate_D_Rq=NOT MOVING
7	4	<1> RGT_Position_Status < RGT_Full_Open_Position & RGT_Latch_Status <> LATCHED & Local_OpMode = AWAKE & Position_Program_Present = NOT_PRESENT	Sleep_Recover_Flag = RECOVER DrTGate_D_Rq=NOT MOVING
7	5	<1>RGT_Position_Status <= RGT_Position_Near_Latch & RGT_Latch_Status = LATCHED & Local_OpMode = AWAKE	Sleep_Recover_Flag = OK DrTGate_D_Rq=NOT MOVING
7	7	<1> RGT_Position_Status > RGT_Position_Near_Latch & RGT_Latch_Status = LATCHED	DrTGate_D_Rq=NOT MOVING (Note: This transition explicitly states that the state machine will remain in the Init State when the position and the latch state do not agree.)

Table 12. Transition Table for Control Rear Gate/Trunk State Transition Diagram

2.3.3 Control Cinch (C32P Cinching Latch)

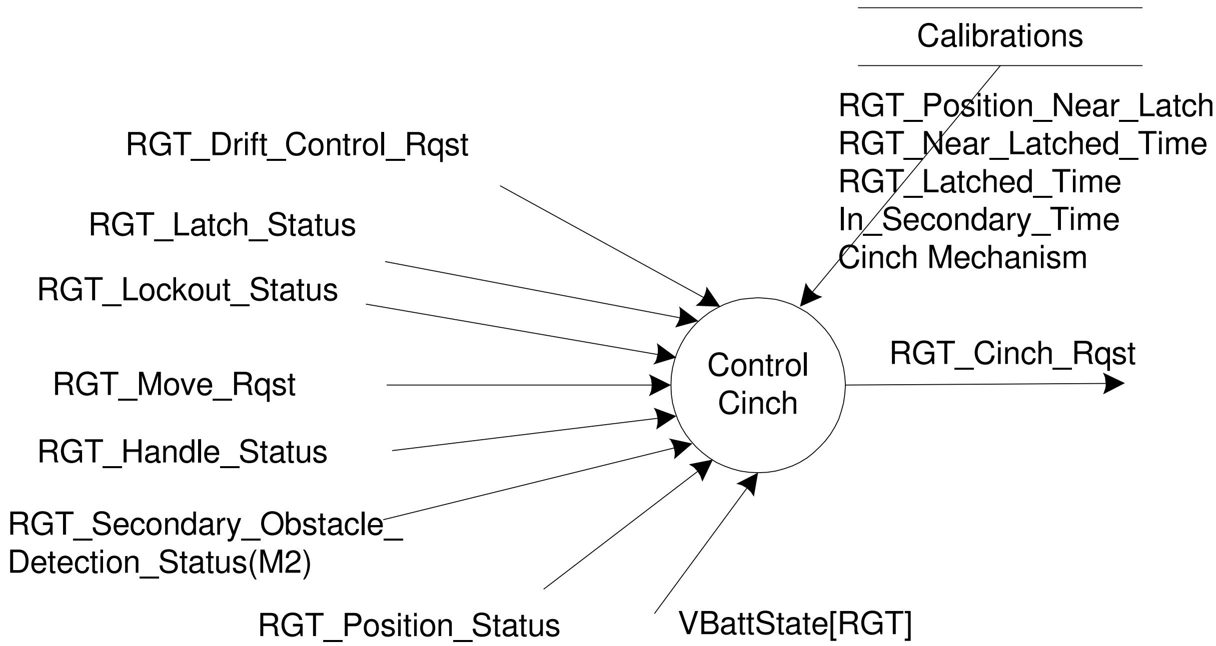


Figure 7. Control Cinch Data Flow Diagram

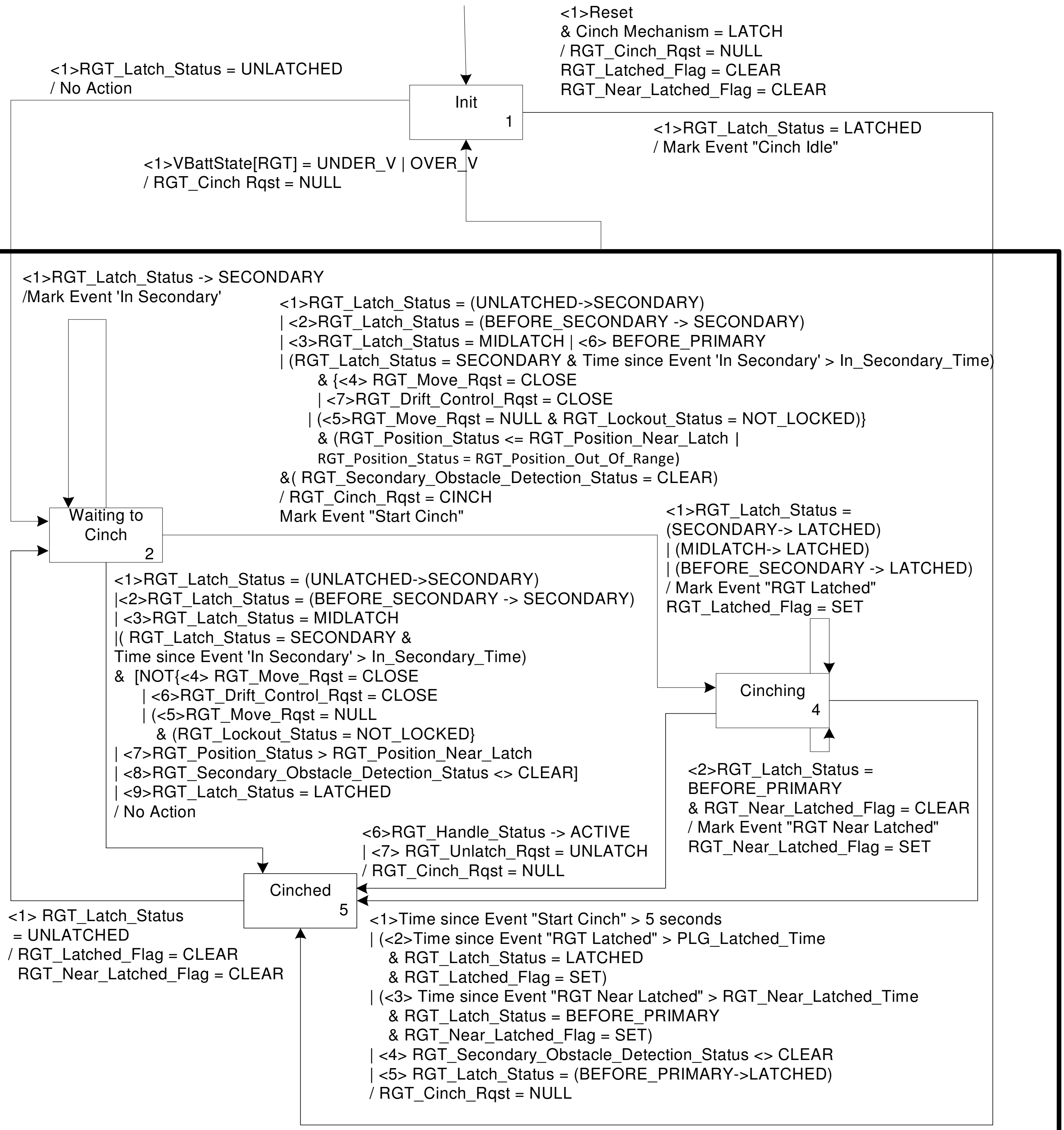


Figure 8. Control Cinch State Transition Diagram (Strattec C32P Cinching Latch)

2.3.4 Control Cinch (Cinching Striker)

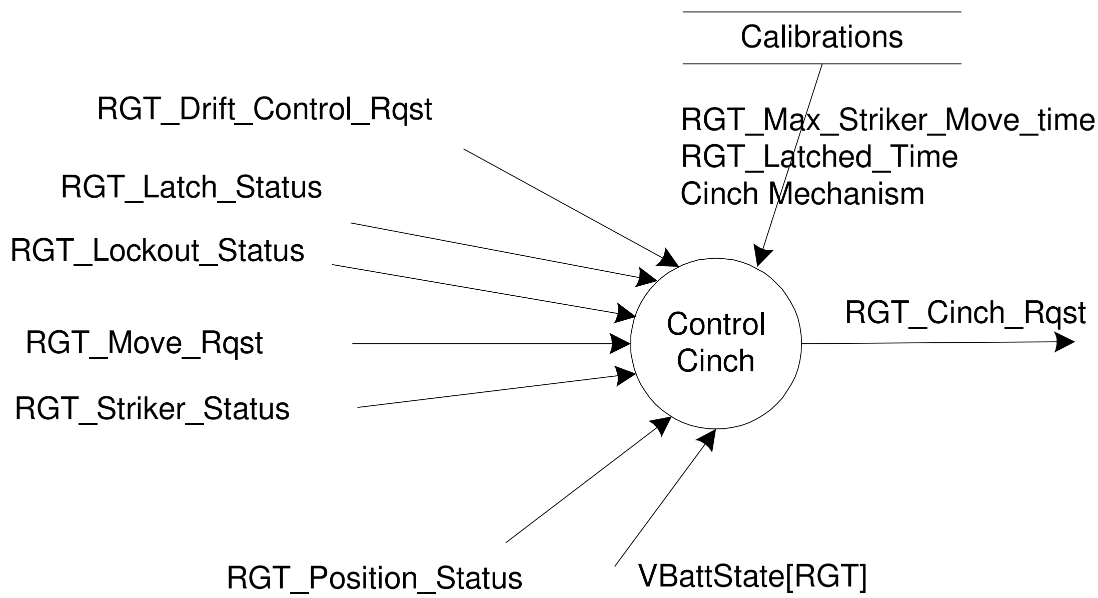


Figure 9. Control Cinch Data Flow Diagram

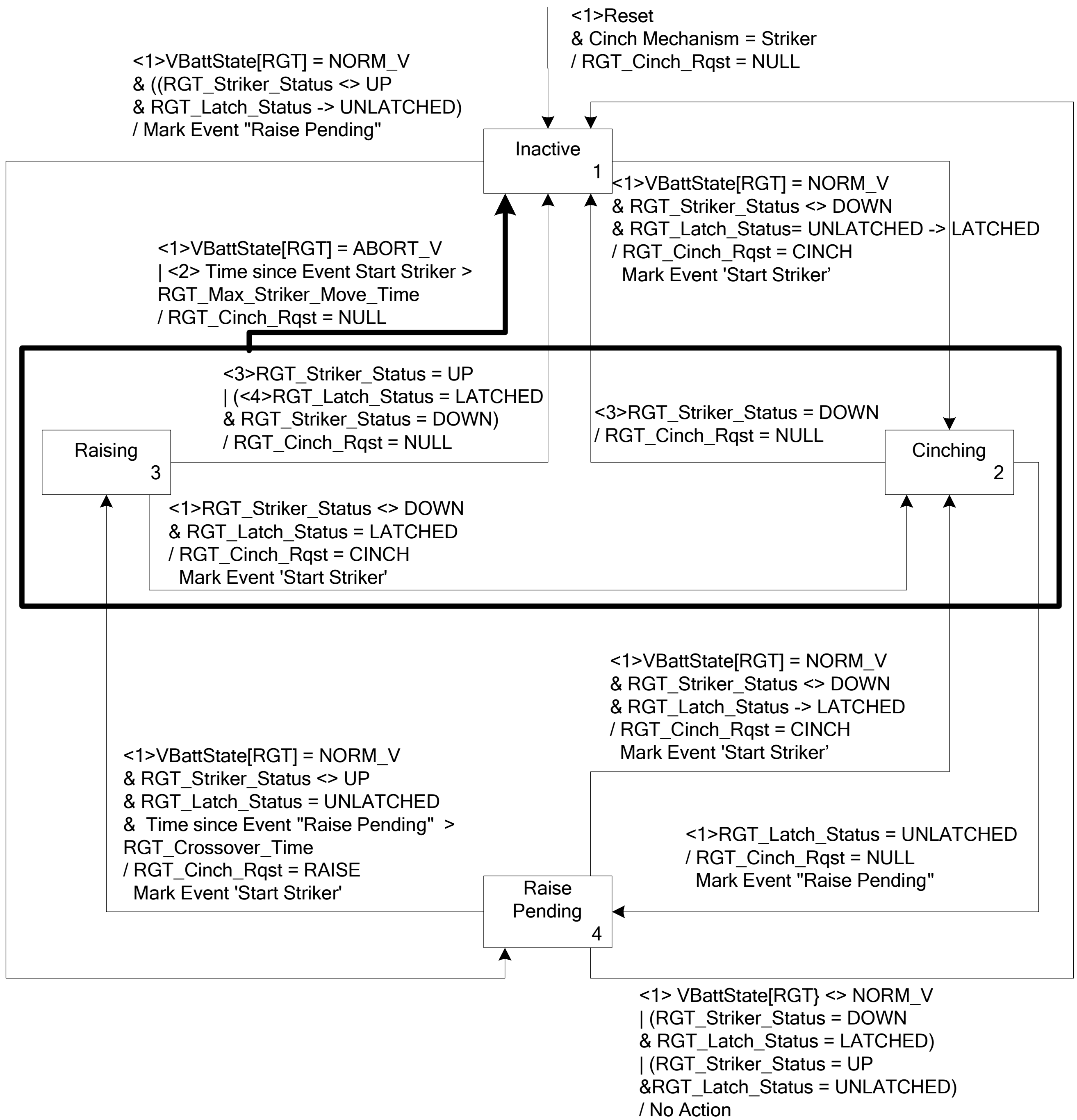


Figure 10. Control Cinch State Transition Diagram (Cinching Striker)

2.3.5 Control Audible Feedback

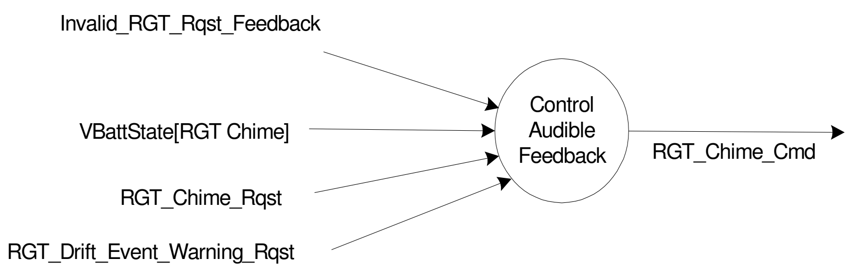


Figure 11. Control Audible Feedback Data Flow Diagram

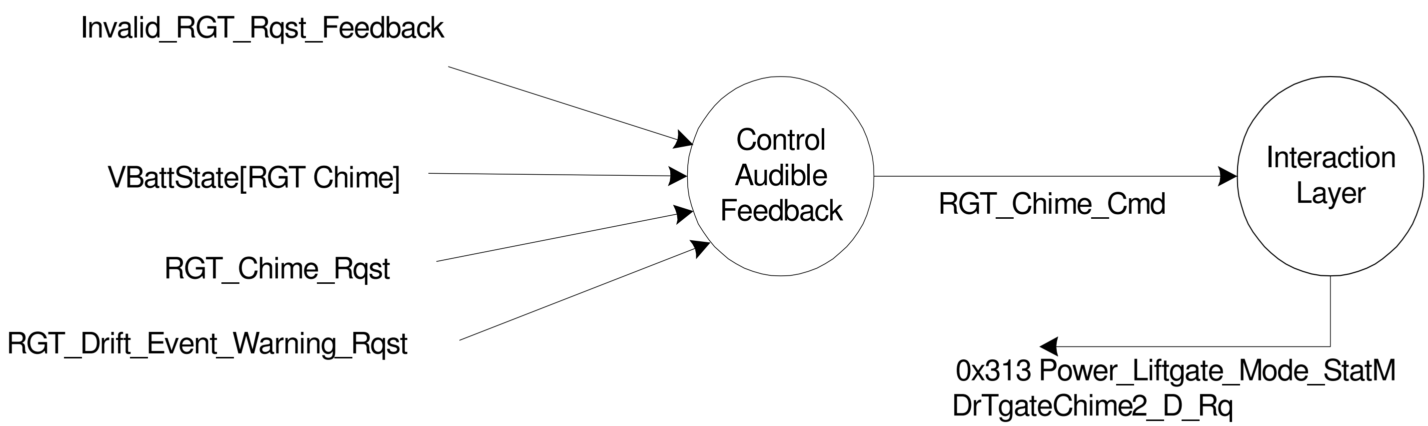


Figure 11.1. Control Audible Feedback Data Flow Diagram (Decomposed)

2.3.5.1 RGTM Audible Feedback

The RGTM shall generate a hardwired chime or transmit a CAN command to the audio system to request audible feedback depending of the HW_Chime_Present and Chime_Present calibrations, see scenarios included in the Table 8.1.

Rqmt No.	Condition	Chime command to use	Description	DrTgateChime2_D_Rq
R: 2.3.5.1.1	Open request	OFF	None	0x0
R: 2.3.5.1.2	Close Request	LONG	DNA B	0x1
R: 2.3.5.1.3	Obstacle detected (including Pinchstrip activation)	LONG	DNA B	0x1
R: 2.3.5.1.4	Memory height program switch feedback	SHORT	1 KHz, 1s	0x2
R: 2.3.5.1.5	When pre-conditions change during operation	LONG	DNA B – repeated	0x4
R: 2.3.5.1.6	When a customer request is rejected due to pre-conditions	SHORT	1 KHz, 1s	0x2
R: 2.3.5.1.7	Drift control – Hatch closing error state	FAST	DNA C – repeated	0x3

Table 8.1 List of possible chime commands for RGTM and determination of DrTgateChime2_D_Rq signal

The signal **DrTgateChime2_D_Rq** has to be updated based on this table, HW_Chime_Present and Chime_Present calibrations. The command shall be sent to the MS CAN by transmitting the signal **DrTgateChime2_D_Rq,** contained in the **CAN message 0x313 Power_Liftgate_Mode_StatM.**

The signal **DrTgateChime2_D_Rq** has to send the “ON” state to start the chime and then the “OFF” state to stop the chime. This command has to keep the “ON” state for a calculated period of time, this time is calculated using the number of repetitions, duration of the chime and 2 sec. timer in case another chime is playing, then sends the “OFF state”. To calculate the number of time for “ON” state see next table:

Chime	Time	Repetitions	2 sec Timer (recommended)	Duration ON state
Ford DNA B	900 ms	3	2000 msec	4700 msec
Lincoln DNA B	750 ms	3	2000 msec	4250 msec

Table 8.2 Chime durations for RGTM and determination of DrTgateChime2_D_Rq signal

The chime command will be sent according to the state transition diagram illustrated in Figure 12 and Table 8.3.

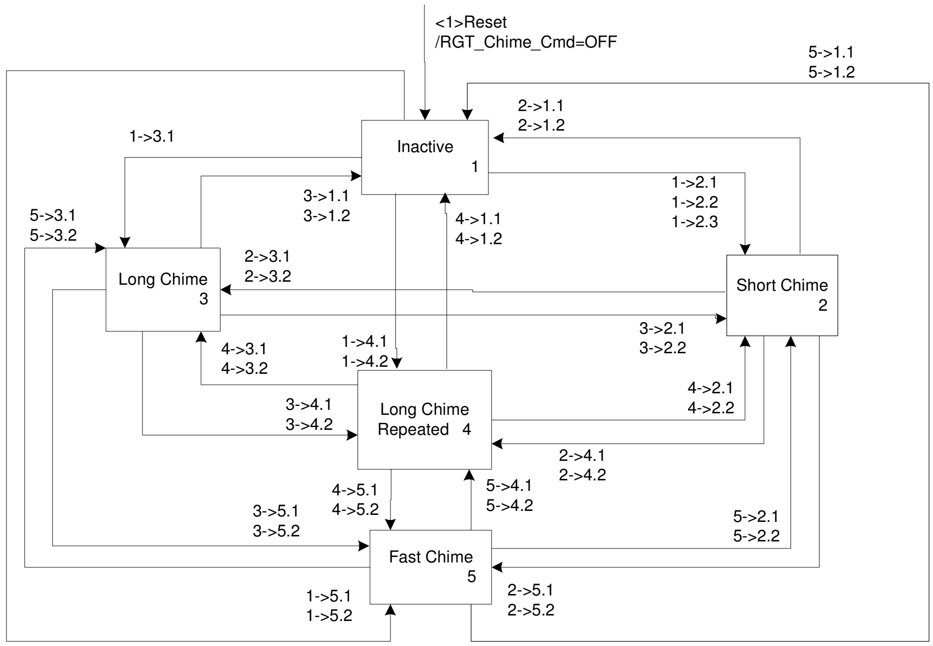


Figure 12. Control Audible Feedback State Transition Diagram

Src	Dest	Event	Action
Any	1	Reset	RGT_Chime_Cmd = OFF DrTgateChime2_D_Rq=0
1	2	<1>Invalid_RGT_Rqst_Feedback -> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime“
1	2	<2>Invalid_RGT_Rqst_Feedback -> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime“ DrTgateChime2_D_Rq=0x2
1	2	<3> RGT_Chime_Rqst -> ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =FALSE &Chime_Present =TRUE & RGT_Precondition_Changed<>TRUE	RGT_Chime_Cmd= SHORT Mark Event " Start Short Chime“ DrTgateChime2_D_Rq=0x2
1	3	<1> RGT_Chime_Rqst -> ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =TRUE &Chime_Present =TRUE & RGT_Precondition_Changed<>TRUE	RGT_Chime_Cmd= LONG Mark Event "Start Long Chime“

1	4	<1> RGT_Chime_Rqst =->ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =TRUE &Chime_Present =TRUE & RGT_Precondition_Changed=TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime“
1	4	<2> RGT_Chime_Rqst =->ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & VBattState[RGT Chime] = NORM_V & HW_Chime =FALSE &Chime_Present =TRUE & RGT_Precondition_Changed=TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime“ DrTgateChime2_D_Rq=0x4
1	5	<1>RGT_Drift_Event_Warning_Rqst -> ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime“
1	5	<2>RGT_Drift_Event_Warning_Rqst -> ACTIVE & Invalid_RGT_Rqst_Feedback <> ACTIVE & VBattState[RGT Chime] = NORM_V &HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime“ DrTgateChime2_D_Rq=0x3
2	1	<1>(Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = INACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF
2	1	<2>(Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = INACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF DrTgateChime2_D_Rq=0
2	3	<1>Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & RGT_Precondition_Changed<>TRUE	RGT_Chime_Cmd= LONG Mark Event "Start Long Chime“
2	3	<2>Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & RGT_Precondition_Changed<>TRUE	RGT_Chime_Cmd= LONG Mark Event "Start Long Chime“ DrTgateChime2_D_Rq=0x1
2	4	<1>Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & RGT_Precondition_Changed=TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime"
2	4	<2>Time since Event "Start Short Chime" > 1 second & RGT_Chime_Rqst = ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & RGT_Drift_Event_Warning_Rqst <> ACTIVE & RGT_Precondition_Changed=TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime" DrTgateChime2_D_Rq=0x4
2	5	<1>Time since Event "Start Short Chime" > 1 second & RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime“
2	5	<2>Time since Event "Start Short Chime" > 1 second & RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime“ DrTgateChime2_D_Rq=0x3
3	1	<1> RGT_Chime_Rqst = INACTIVE & RGT_Drift_Event_Warning_Rqst = INACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF

3	1	<2> RGT_Chime_Rqst = INACTIVE & RGT_Drift_Event_Warning_Rqst = INACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF DrTgateChime2_D_Rq=0
3	2	<1>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime"
3	2	<2>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime" DrTgateChime2_D_Rq=0x2
3	4	<1> RGT_Chime_Rqst =->ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE & RGT_Precondition_Changed->TRUE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG_REPEATED
3	4	<2> RGT_Chime_Rqst =->ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE & RGT_Precondition_Changed->TRUE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG_REPEATED DrTgateChime2_D_Rq=0x4
3	5	<1> RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime"
3	5	<2> RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime" DrTgateChime2_D_Rq=0x3
4	1	<1> RGT_Chime_Rqst = INACTIVE & RGT_Drift_Event_Warning_Rqst = INACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF
4	1	<2> RGT_Chime_Rqst = INACTIVE & RGT_Drift_Event_Warning_Rqst = INACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF DrTgateChime2_D_Rq=0
4	2	<1>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime"
4	2	<1>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =FALSE & Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime" DrTgateChime2_D_Rq=0x2
4	~~3~~	~~<1> RGT_Chime_Rqst = ACTIVE~~ ~~& RGT_Drift_Event_Warning_Rqst = <>ACTIVE~~ ~~& RGT_Precondition_Changed<>TRUE~~	~~RGT_Chime_Cmd= LONG~~ ~~DrTgateChime2_D_Rq=0x1~~
4	5	<1> RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime"
4	5	<2> RGT_Drift_Event_Warning_Rqst = ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = FAST Mark_Event"Start Fast Chime" DrTgateChime2_D_Rq=0x3
5	1	<1>(RGT_Drift_Event_Warning_Rqst = INACTIVE & RGT_Chime_Rqst = INACTIVE & HW_Chime =TRUE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF
5	1	<2>(RGT_Drift_Event_Warning_Rqst = INACTIVE & RGT_Chime_Rqst = INACTIVE & HW_Chime =FALSE &Chime_Present =TRUE & (Time since Event "Start Long Chime" > 5 minutes | VBattState[RGT Chime] <> NORM_V)	RGT_Chime_Cmd = OFF DrTgateChime2_D_Rq=0
5	2	<1>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime"

5	2	<2>Invalid_RGT_Rqst_Feedback -> ACTIVE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd = SHORT Mark Event "Start Short Chime" DrTgateChime2_D_Rq=0x2
5	3	<1> RGT_Chime_Rqst = ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE & RGT_Precondition_Changed<>TRUE & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG Mark Event "Start Long Chime"
5	3	<2> RGT_Chime_Rqst = ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE & RGT_Precondition_Changed<>TRUE & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG Mark Event "Start Long Chime" DrTgateChime2_D_Rq=0x1
5	4	<1> RGT_Chime_Rqst =-> ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE **& RGT_Precondition_Changed->TRUE** & HW_Chime =TRUE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime"
5	4	<2> RGT_Chime_Rqst =-> ACTIVE & RGT_Drift_Event_Warning_Rqst = <>ACTIVE **& RGT_Precondition_Changed->TRUE** & HW_Chime =FALSE &Chime_Present =TRUE	RGT_Chime_Cmd= LONG_REPEATED Mark Event "Start Long Chime" DrTgateChime2_D_Rq=0x4

Table 8.4 RGTM Chime Decision Table

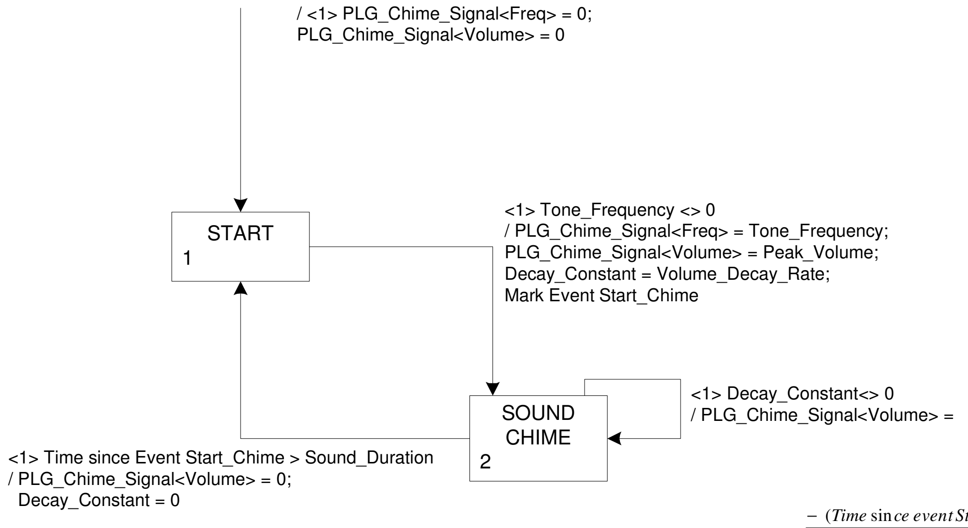
2.3.5.2 Hardwired Chime

The following requirements describe the desired sound characteristics of the chime to be generated. The actual electrical signal that is generated to achieve the desired chime sounds is supplier defined.

Rqmt No.	RGT_Chime_Cmd	Tone_Frequency (Hz)	Volume_Decay_Rate	Sound_Duration (sec)
R: 2.3.5.2.1	OFF	0	0	0
R: 2.3.5.2.2	SHORT	1000 (+/- 100)	0	1 (+/- 0.1)
R: 2.3.5.2.3	LONG	740 (+/- 75)	0.7	1 (+/- 0.1)
R: 2.3.5.2.4	LONG_REPEATED	740 (+/- 75)	0.7	1 (+/- 0.1)
R: 2.3.5.2.5	FAST	740 (+/- 75)	Fast_Chime_Decay_Rate	0.25 (+/- 0.025)

Table 13.4 Chime Characteristics Decision Table

Note: Multiple sound units make up a LONG chime or a FAST chime. The above table describes the characteristics of a single sound unit.



$$Peak\_Volume * e^{\frac{-(Time\ since\ event\ Start\_Chime)}{Decay\_Constant}}$$

Figure 75. Generate Chime Sound State Transition Diagram

Peak Volume is defined as the maximum loudness as defined in the MPLELC SDS (Rqmt No. EF-0156).

2.3.6 Sleep/Awake

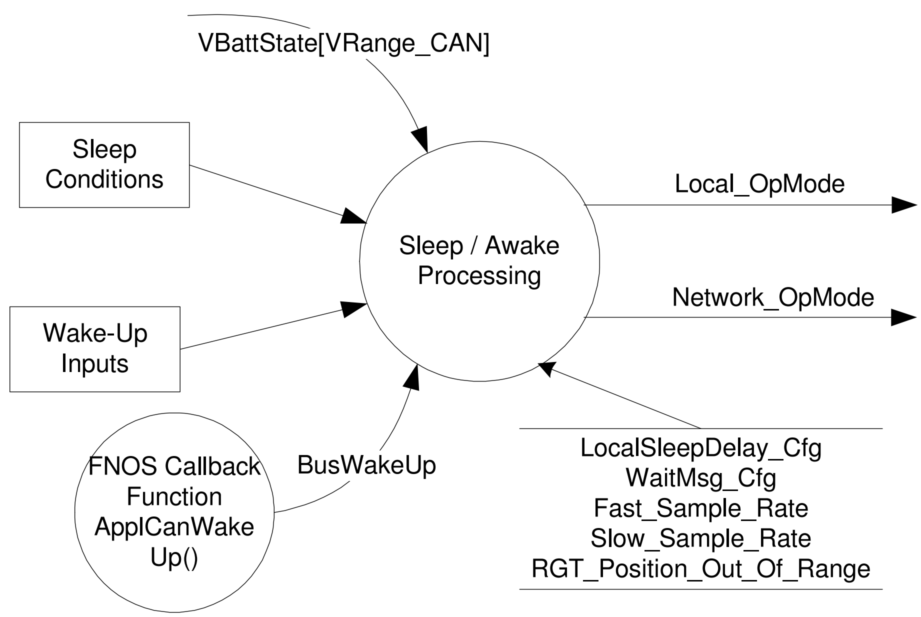


Figure 13. Sleep Awake Data Flow Diagram 1

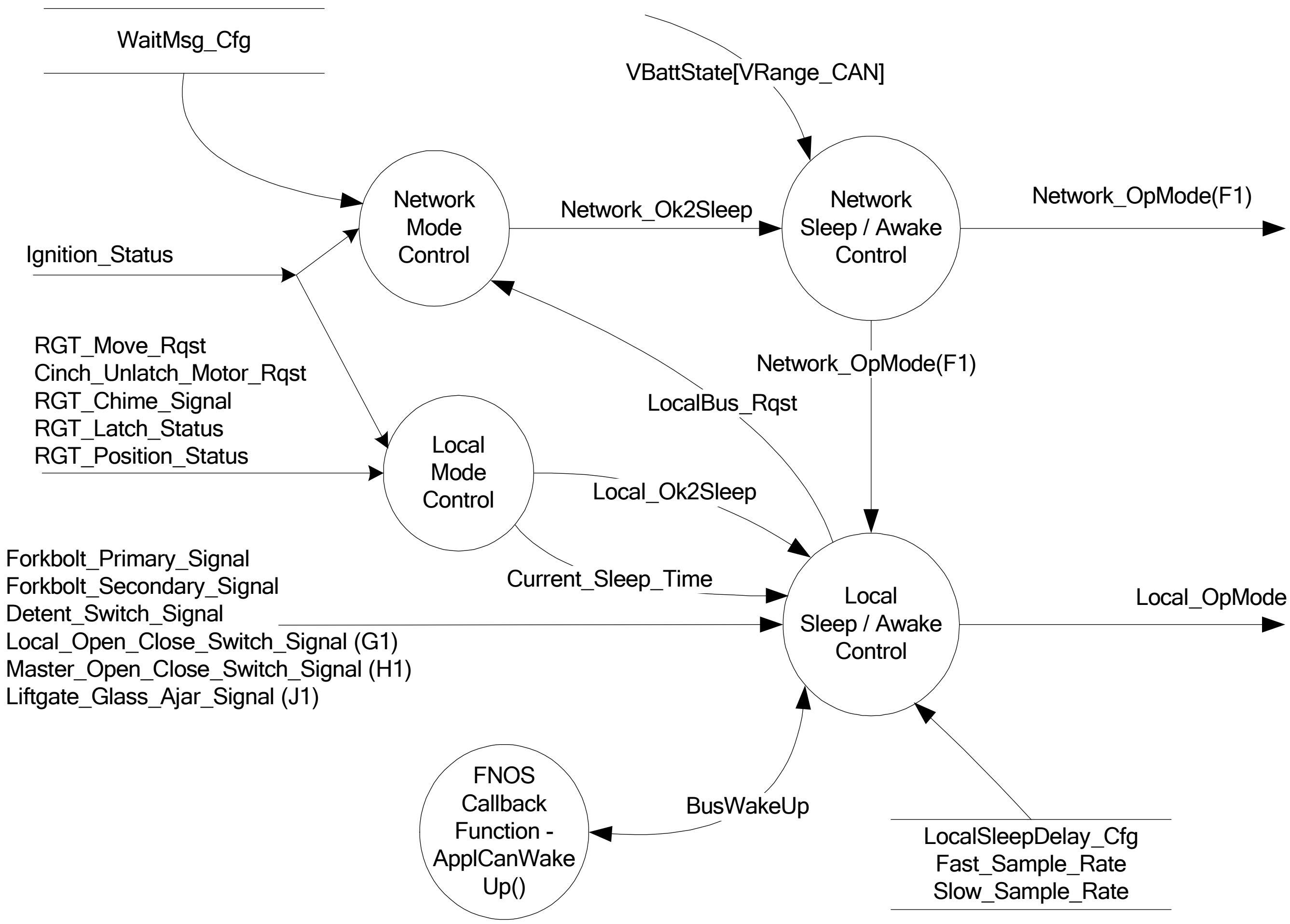


Figure 14. Sleep Awake Data Flow Diagram 2 (Decomposed)

2.3.6.1 Wake-Up Inputs

The Wake-Up inputs events / conditions shown in Table 14 define wake-up events. Unless specified otherwise, any change in a dataflow or circuit is a wake-up event. The *Enable* column defines when the input can cause a wakeup.

Rqmt No.	Dataflow or Circuit	Enable
R: 2.3.6.1.1	Forkbolt_Primary_Signal	Always
R: 2.3.6.1.2	Forkbolt_Secondary_Signal	Always
R: 2.3.6.1.3	Detent_Switch_Signal	Always
R: 2.3.6.1.4	Local_Open_Close_Switch_Signal	Option G1 ONLY
R: 2.3.6.1.5	Master_Open_Close_Switch_Signal	Always
R: 2.3.6.1.6	Liftgate_Glass_Ajar_Signal	Option J1 ONLY
R: 2.3.6.1.7	Liftgate_Handle_Status	Always
R: 2.3.6.1.8	Decklid_Ajar_Switch_Signal	Always

Table 14. Wake Up Inputs

2.3.6.2 Local Mode Control

Rqmt No.	Ignition_ Status	RGT_Mo ve_ Rqst	Cinch_ Unlatch_ Motor_Rqst	RGT_Chim e_Signal	RGT_Positio n _Status	RGT_Latch _ Status	Local_Ok 2Sleep	Current_ Sleep_ Time
R: 2.3.6.2.1	RUN | START | ACC	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	NOSLEEP	No Change
R: 2.3.6.2.2	OFF	Not(NULL)	Don't Care	Don't Care	Don't Care	Don't Care	NOSLEEP	No Change
R: 2.3.6.2.3	OFF	NULL	Not(NULL)	Don't Care	Don't Care	Don't Care	NOSLEEP	No Change
R: 2.3.6.2.4	OFF	NULL	NULL	> 0 Volume	Don't Care	Don't Care	NOSLEEP	No Change
R: 2.3.6.2.5	OFF	NULL	NULL	0 Volume	< RGT_Position _Out_Of_Range	UNLATCHED | OPEN	SLEEP	6 Hrs
R: 2.3.6.2.6	OFF	NULL	NULL	0 Volume	>= RGT_Position _Out_Of_Range	UNLATCHED | OPEN	SLEEP	10 sec
R: 2.3.6.2.7	OFF	NULL	NULL	0 Volume	Don't Care	Not (UNLATCHED | OPEN)	SLEEP	10 sec
R: 2.3.6.2.8	On | Reset						NOSLEEP	10 Sec

Table 15. Local Mode Control Table

2.3.6.3 Local Sleep / Awake Control

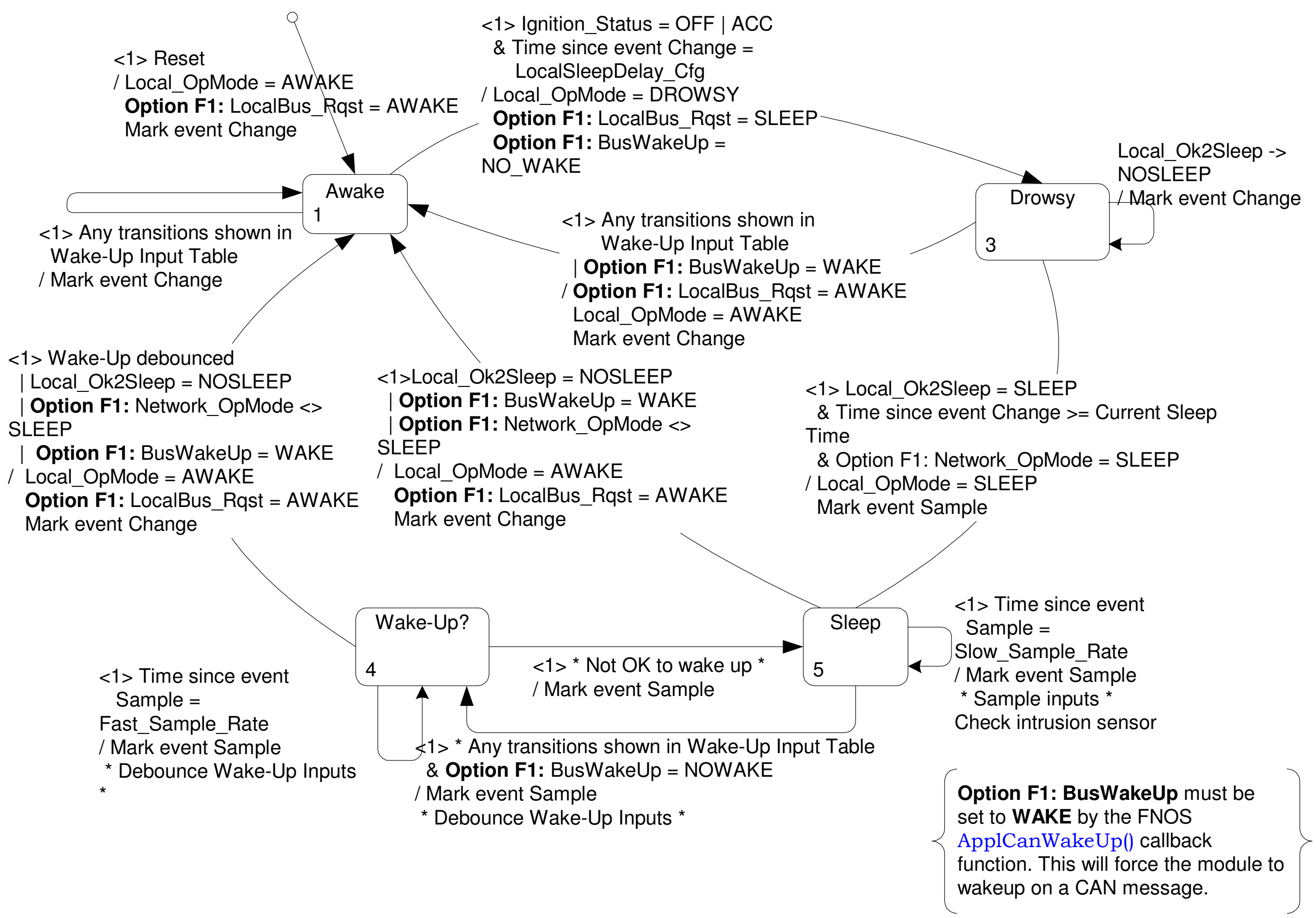


Figure 15. Local Sleep Awake Control State Transition Diagram

2.3.6.4 Network Mode Control

Rqmt No.	Ignition_ Status	LocalBus_Rqst	ComboBus_Rqst
R: 2.3.6.4.1	RUN | START	Don't Care	NETAWAKE
R: 2.3.6.4.2	OFF | ACC	AWAKE	NETAWAKE
R: 2.3.6.4.3	OFF | ACC	SLEEP	NETSLEEP
R: 2.3.6.4.4	On Reset		NETSLEEP

Table 16. Network Mode Control Table

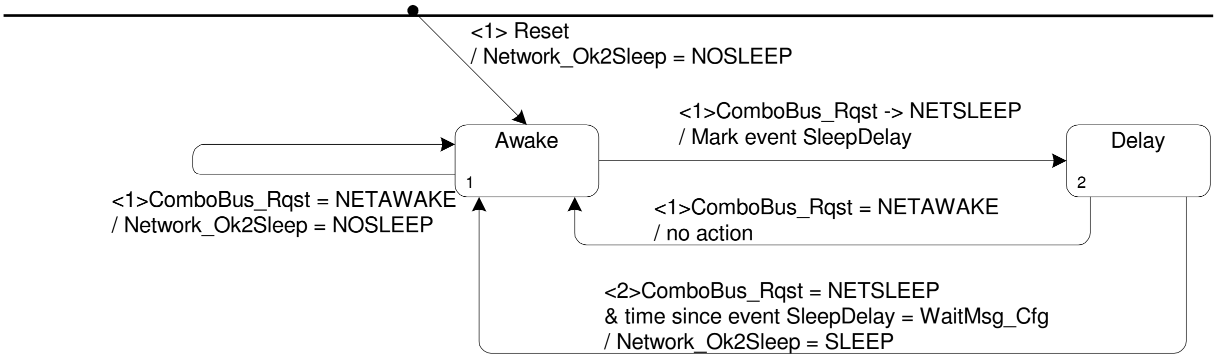


Figure 16. Network Sleep Delay State Transition Diagram

2.3.6.5 Network Sleep / Awake Control

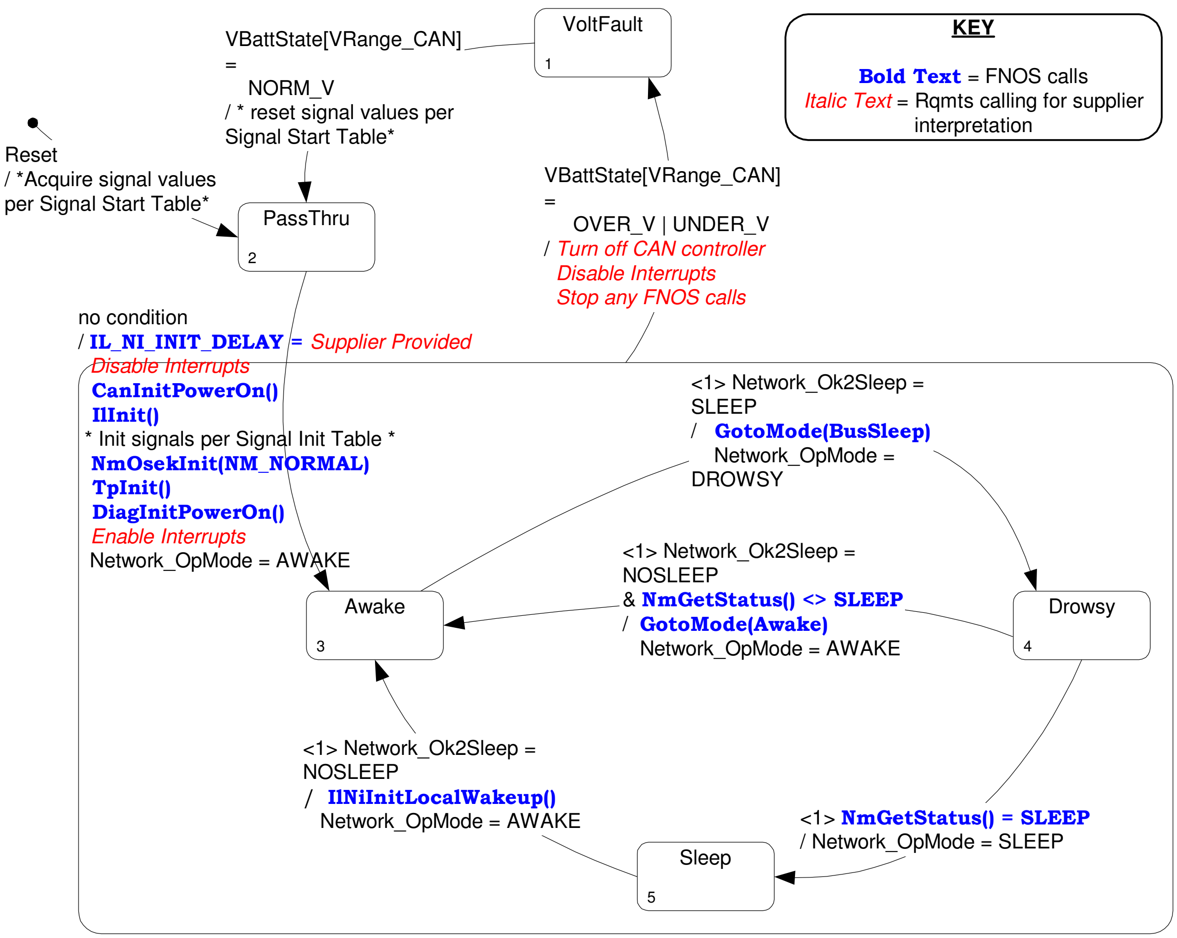


Figure 17. Network Sleep Awake Control State Transition Diagram

2.3.7 Manage Drift

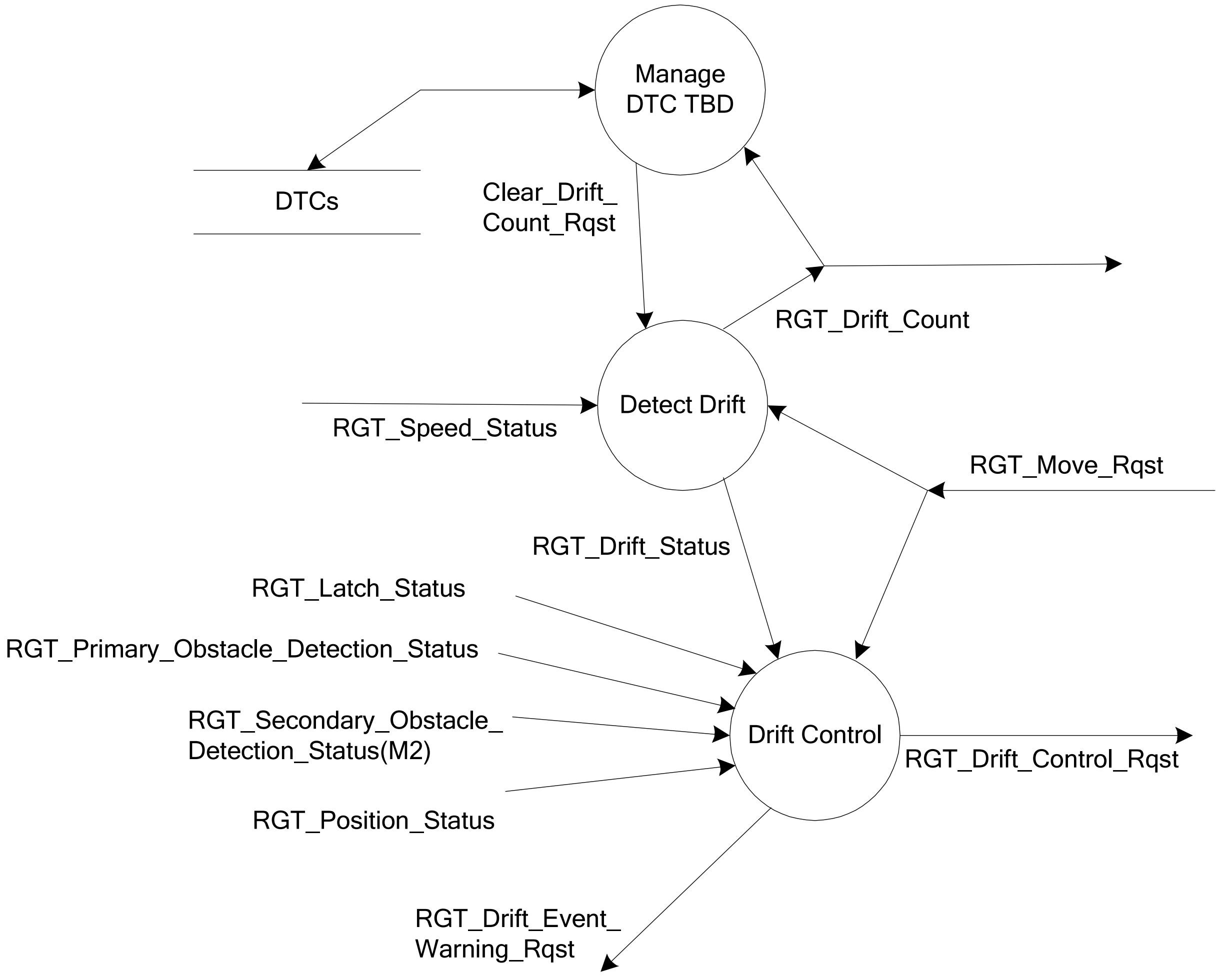


Figure 18. Manage Drift Data Flow Diagram

2.3.7.1 Detect Drift

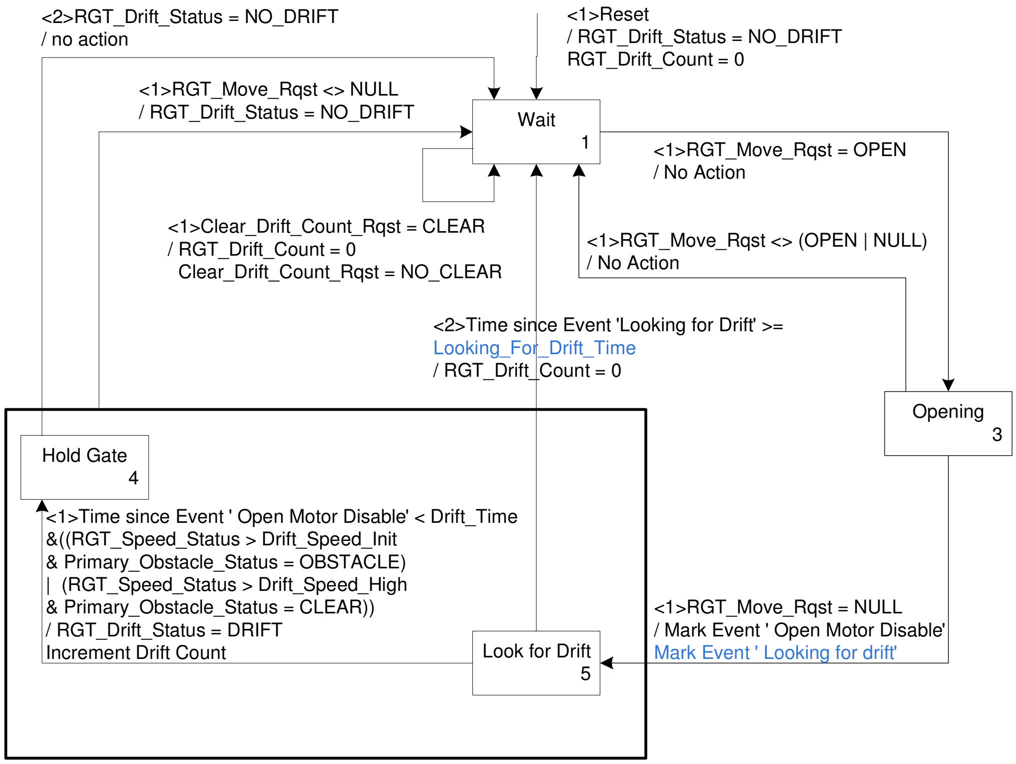


Figure 19. Detect Drift State Machine

2.3.7.2 Control Drift

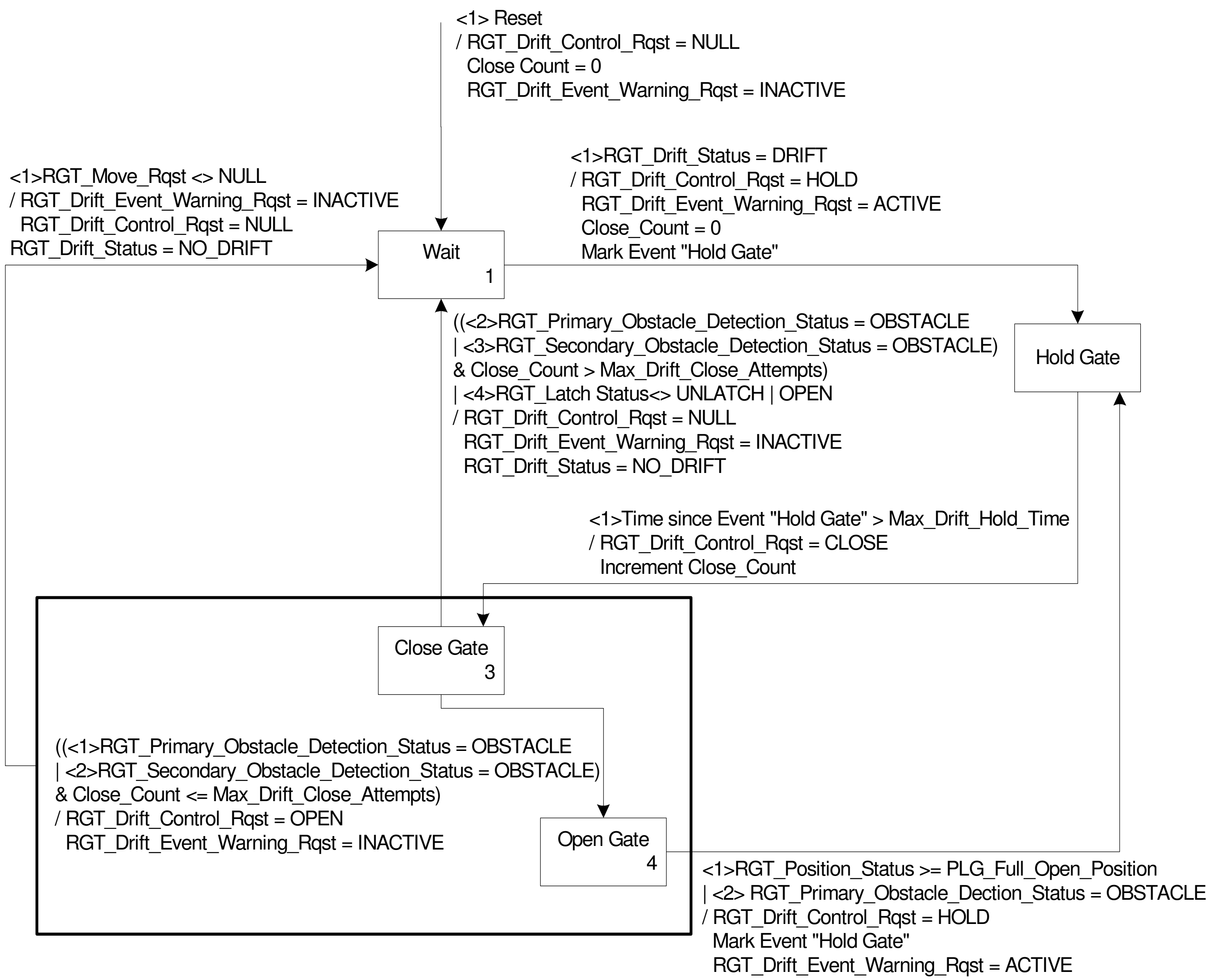


Figure 20. Drift Control State Transition Diagram

2.3.7.3 Manage Drift Control DTC

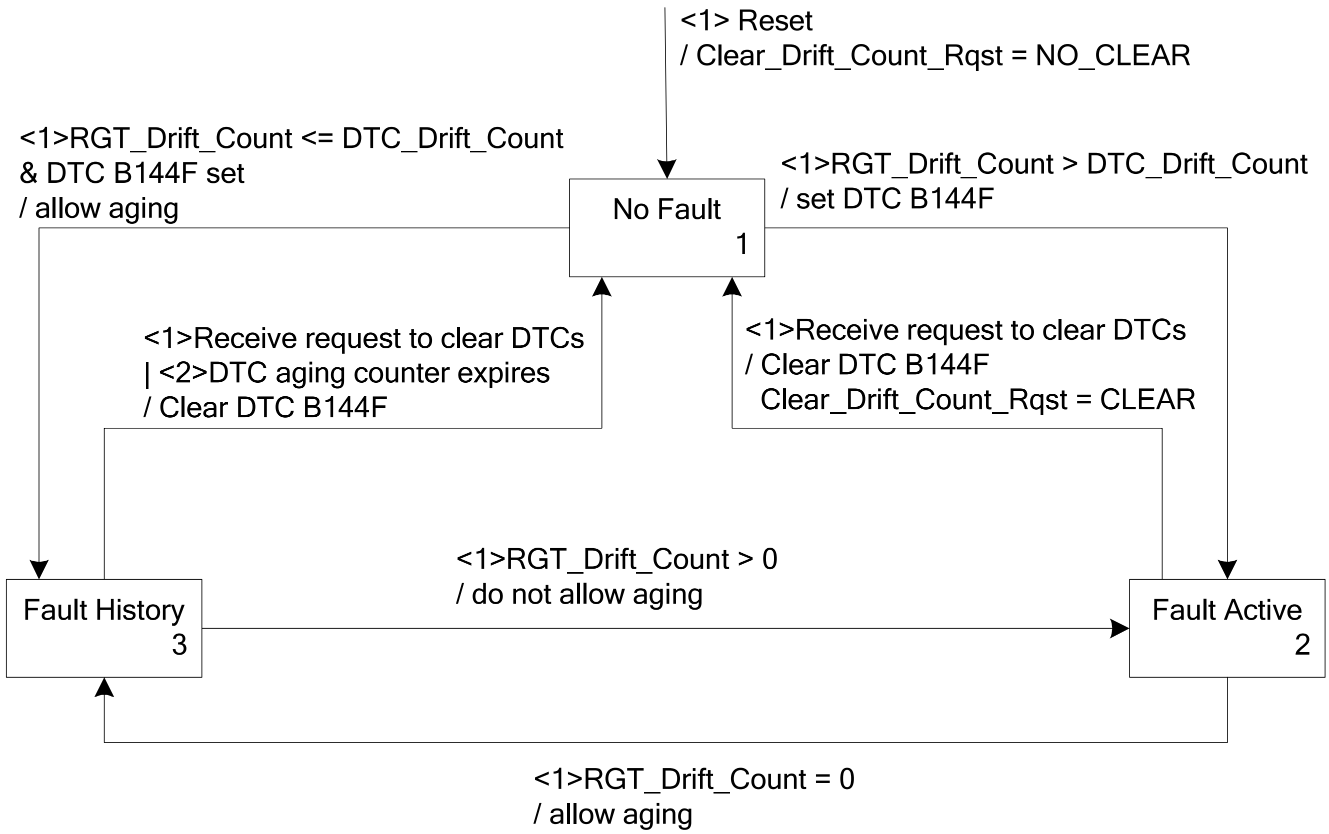


Figure 21. Manage Drift Control DTC State Transition Diagram.

2.3.8 Manual Operation for Broken Torsion Bars

This section describes operation when the Torsion Bars are broken. When Torsion Bars are broken the decklid should work manually, below are some descriptions of how RGTM should operate under this condition, decklid should open and close manually. When decklid is full open position user should be able to close the decklid.

Opening Current Limit Shutoff

Adjust the Actuator current so a broken Torsion Bar (TB) is current and time limited and therefore will not open the Deck-lid.
This has the advantage of Re-flashing the fleet without changing out mechanical parts, and allowing the Deck-lid to pass two test for broken TB Tests.
This allows for manual closing of a fully functioning Deck-lid.

Open Amperage Test

Current Draw goes to 18 to 19A when one of the Torsion Bars is removed. On an open-event set a limit on Current Draw to 14.5 amps in a 1sec window.
If the amperage limit is exceeded, then close the Deck-lid, and set a DTC for a Broken Torsion Rod/Strut.
Set the DTC for Broken TB after any combination of eleven SM and Open Amperage failures and inactivate the Power Decklid.

Torsion Bar Management Test

If the Deck-lid passes the Open Amperage Test, then at Full Open test using Strut Management for 1.5 Seconds.
If the Deck-lid does not fall during this time then turn off SM, so the gate can be closed manually, since the gate will have passed two tests for a broken Torsion Bar.
Set the DTC for Broken TB after any combination of eleven SM and Open Amperage failures and inactivate the Power Deck-lid.

Operation after detecting broken Torsion Bar (phase 2)
This section descibres operation when system has detected broken Torsion Bar.
If Torsion Bar is detected the RGTM should monitor the drift control after 1.5 seconds, then set a DTC for a Broken Torsion Rod/Strut. If decklid is in full open position by user (manually) then Strut Management should be ON and keep this condition until unit is repaired. Precautions should be taken for slamming shut of the decklid.

2.4 INTERFACES

2.4.1 Determine Vehicle State

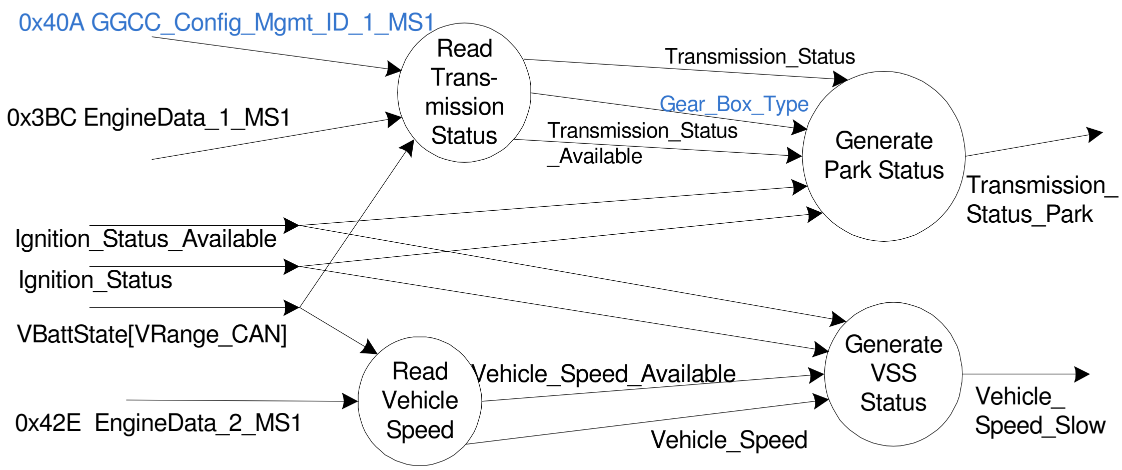


Figure 22. Determine Vehicle State Data Flow Diagram

2.4.1.1 Read Transmission Status

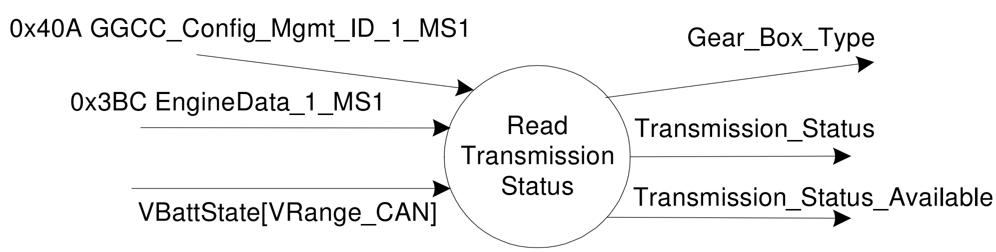


Figure 23. Read Transmission Status Data Flow Diagram 1

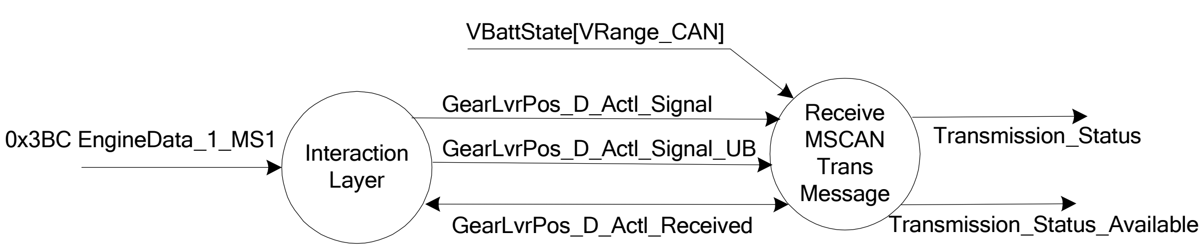


Figure 24. Read Transmission Status Data Flow Diagram 2 (Decomposed)

Rqmt No.	GearLvrPos_D_Actl_Signal	Values	_Transmission_Status
R: **2.4.1.1.1**	Park	0x0	PARK
R: **2.4.1.1.2**	Reverse	0x1	REVERSE
R: **2.4.1.1.3**	Neutral	0x2	NEUTRAL
R: **2.4.1.1.4**	Drive	0x3	DRIVE
R: **2.4.1.1.5**	Sport_DriveSport	0x4	DRIVE
R: **2.4.1.1.6**	Low	0x5	DRIVE
R: **2.4.1.1.7**	First	0x6	DRIVE
R: **2.4.1.1.8**	Second	0x7	DRIVE
R: **2.4.1.1.9**	Third	0x8	DRIVE
R: **2.4.1.1.10**	Fourth	0x9	DRIVE
R: **2.4.1.1.11**	Fifth	0xA	DRIVE
R: **2.4.1.1.12**	Sixth	0xB	DRIVE
R: **2.4.1.1.13**	Undefined_Treat_as_Fault	0xC	NEUTRAL
R: **2.4.1.1.14**	Undefined_Treat_as_Fault	0xD	NEUTRAL
R: **2.4.1.1.15**	Unknown_Position	0xE	NEUTRAL
R: **2.4.1.1.16**	Fault	0xF	NEUTRAL
R: **2.4.1.1.17**	Any Other State	OTHER	NEUTRAL

Table 12. Translation of GearLvrPos_D_Actl values to Transmission Status values

CAN ID	CAN Message	Signal	Range
0x3BC	EngineData_1_MS1	GearLvrPos_D_Actl	0-FF

Table 12.1 Source for GearLvrPos_D_Actl_Signal

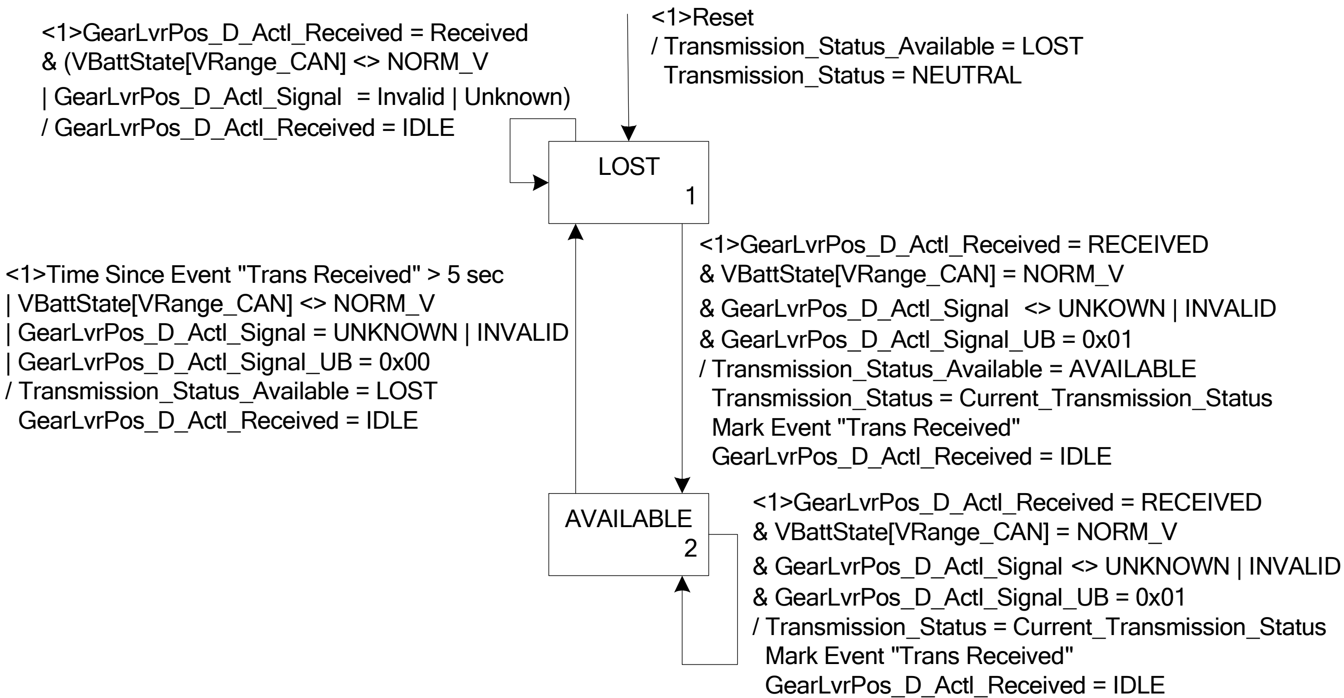


Figure 25. Receive MSCAN Trans Message State Transition Diagram

CAN ID	CAN Message	Signal	CAN Signal	Transmission_ Status _Available
0x3BC	EngineData_1_MS1	GearLvrPos_D_Actl_Received	DISABLED	AVAILABLE
			ENABLED	LOST

Table 12.2 Source for GearLvrPos_D_Actl_Received

2.4.1.1.1 Read Gear Box Type

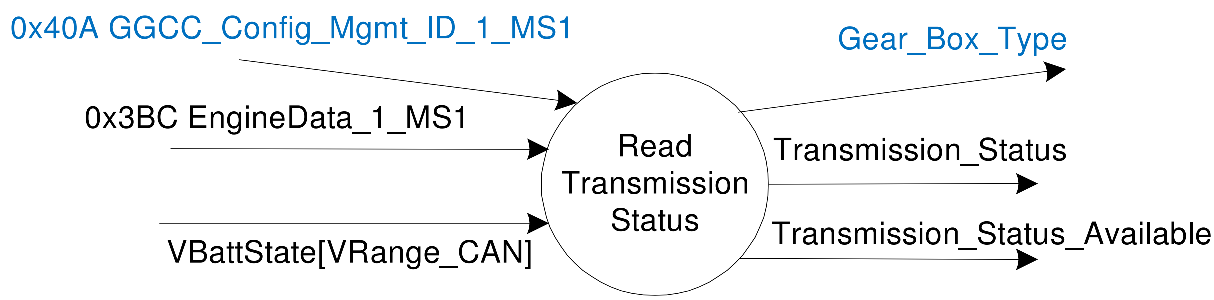


Figure 23a. Read Gear Box Type Flow Diagram 1

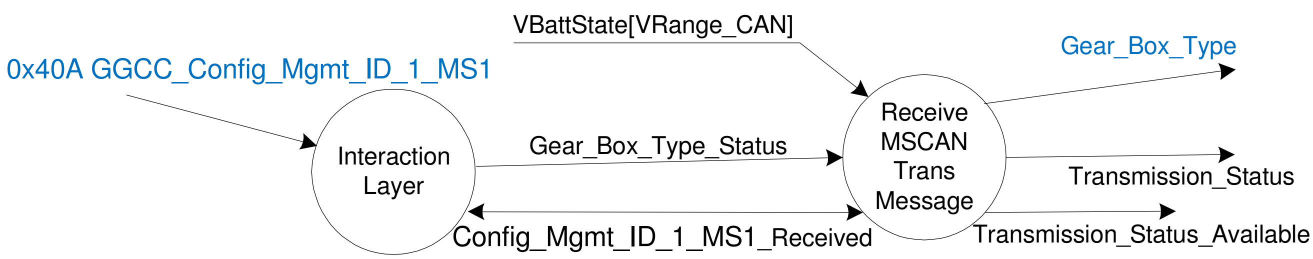


Figure 24a. Read Gear Box Type (Decomposed)

The Gear Box type information is contained in CAN signal 0x40A. The Table 9.3 contains the decoded gear box type, to store in Gear_Box_Type_Status variable according to the received information from powertrain.

CAN ID	CAN MESSAGE	MESSAGE INFORMATION																						Gear_Box_Type_Status
		BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6								BYTE 7								BYTE 8	
							BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0		
0X40A	GGCC_Config_Mgmt_ID_1_MS3	C1	10	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	0	0	0	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	LOST
		C1	10	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	0	0	1	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	MANUAL
		C1	10	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	0	1	0	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	AUTOMATIC
		C1	10	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	0	1	1	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	LOST
		C1	10	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	1	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	Don´t care	LOST

Table 12.3 Gear Box Type Decode

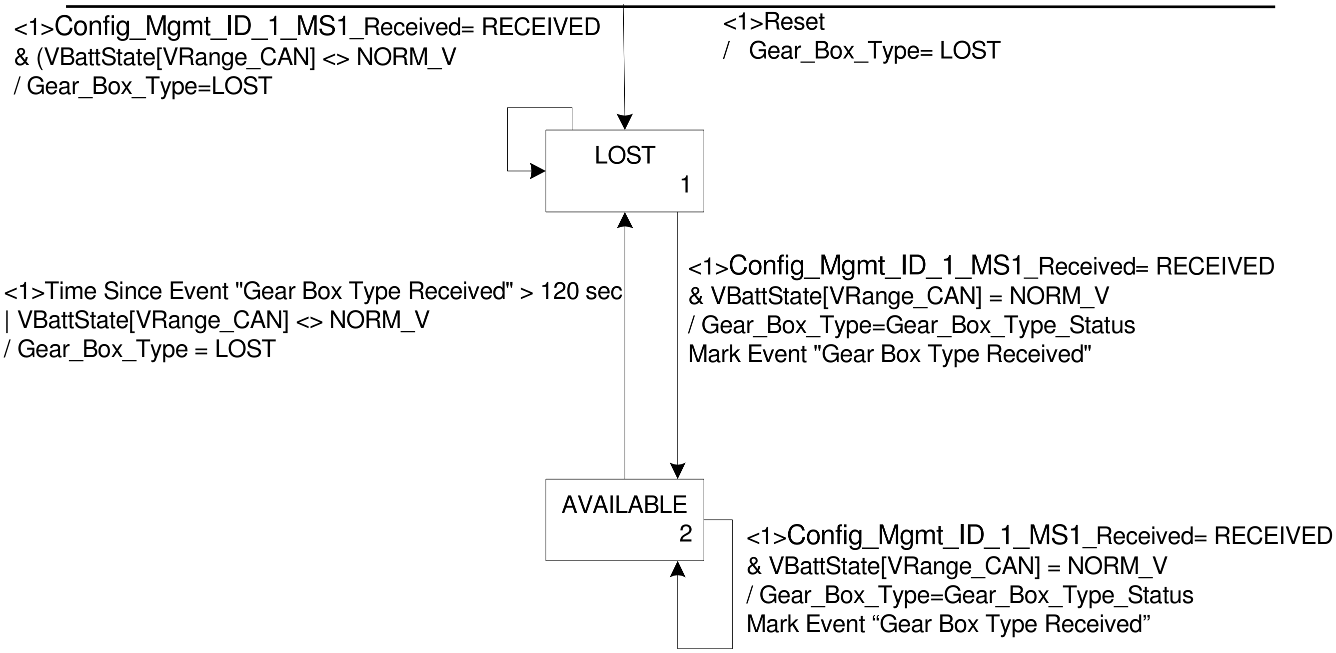


Figure 25a. Receive MSCAN Gear Box Type State Transition Diagram

2.4.2 Determine ODO status

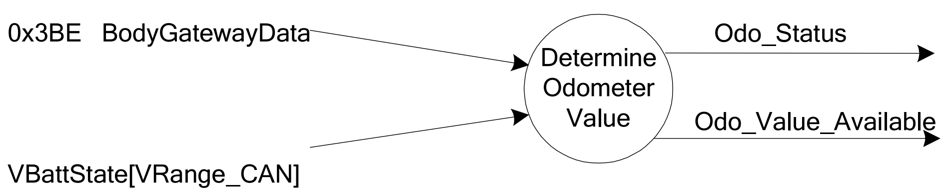


Figure 26. Determine Odometer Value Data Flow Diagram 1

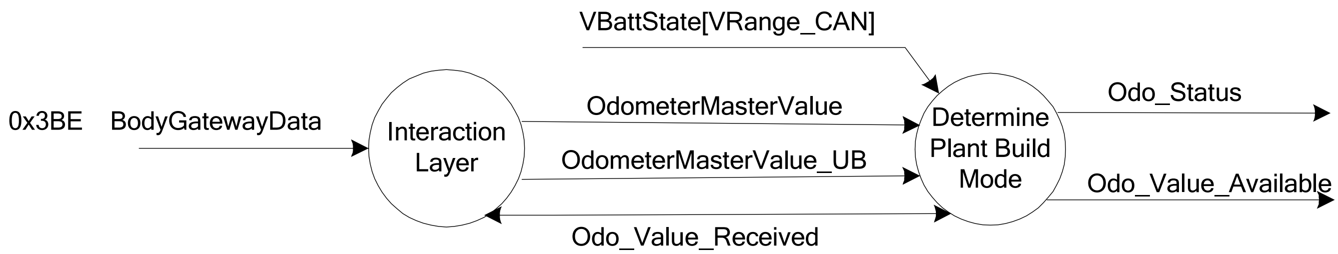


Figure 27. Determine Odometer Value Data Flow Diagram 2 (Decomposed)

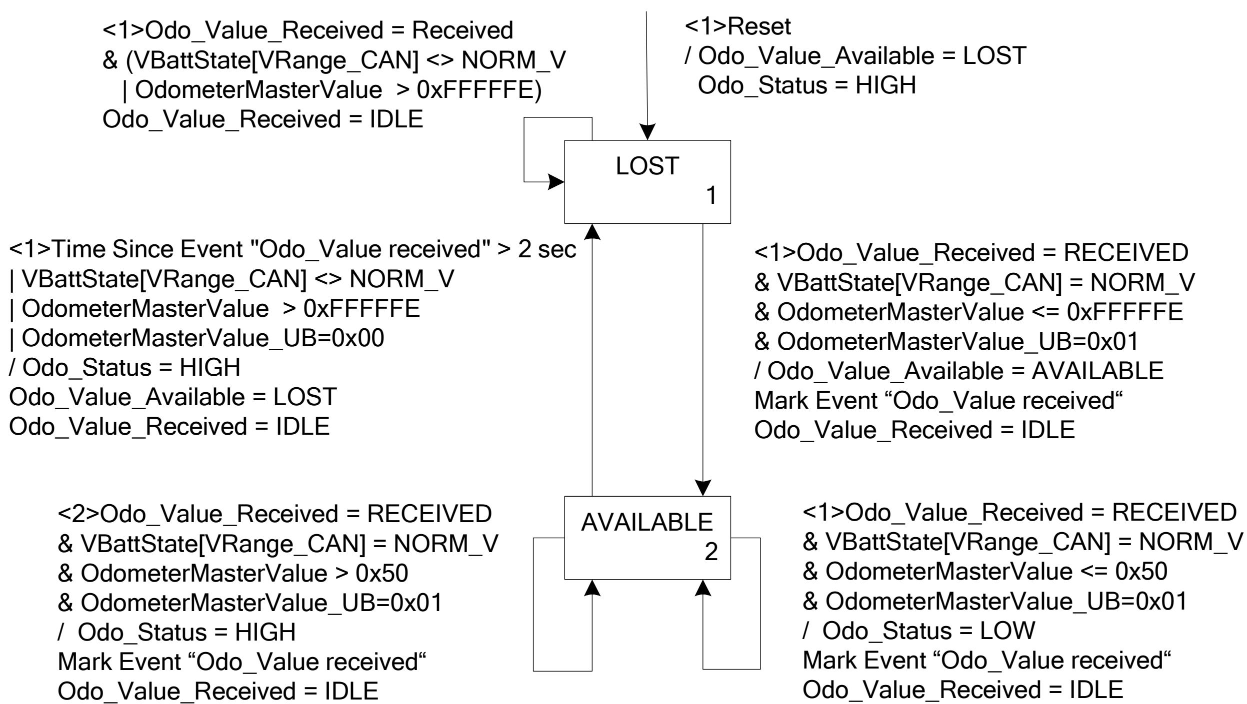


Figure 28. Determine Plant Build Mode Transition Diagram

2.4.3 Generate Park Status

The following table applies only for Normal mode:

Rqmt No.	Ignition_ Status	Ignition_ Status_ Available	Transmission_Status	Transmission_ Status _ Available	Odo_Status	Gear_Box_ Type	Vehicle_ Speed_ Slow	Transmission _ Status_Park	Comment
R: 2.4.3.1	RUN | START	AVAILABLE	PARK	AVAILABLE	don't care	AUTOMATIC	SLOW	PARK	
R: 2.4.3.2	RUN | START	AVAILABLE	REVERSE | NEUTRAL | DRIVE	AVAILABLE	don't care	AUTOMATIC	SLOW	NOT_PARK	
R: 2.4.3.3	RUN | START	AVAILABLE	don't care	LOST	don't care	AUTOMATIC	SLOW	NOT_PARK	Fault 1
R: 2.4.3.4	OFF | ACC	AVAILABLE	PARK	AVAILABLE	don't care	AUTOMATIC	SLOW	PARK	
R: 2.4.3.5	OFF | ACC	AVAILABLE	NEUTRAL	AVAILABLE	LOW	AUTOMATIC	SLOW	PARK	
R: 2.4.3.6	OFF | ACC	AVAILABLE	NEUTRAL	AVAILABLE	HIGH	AUTOMATIC	SLOW	NOT_PARK	
R: 2.4.3.7	OFF | ACC	AVAILABLE	REVERSE | DRIVE	AVAILABLE	don't care	AUTOMATIC	SLOW	NOT_PARK	Fault – except EPRNDL
R: 2.4.3.8	OFF | ACC	AVAILABLE	don't care	LOST	don't care	AUTOMATIC	SLOW	PARK	
R: 2.4.3.9	don't care	LOST	PARK	AVAILABLE	don't care	AUTOMATIC	SLOW	PARK	Fault
R: 2.4.3.10	don't care	LOST	REVERSE | NEUTRAL | DRIVE	AVAILABLE	don't care	AUTOMATIC	SLOW	NOT_PARK	Fault
R: 2.4.3.11	don't care	LOST	don't care	LOST	don't care	AUTOMATIC	SLOW	NOT_PARK	Fault
R: 2.4.3.12	don't care	don't care	don't care	don't care	don't care	MANUAL	SLOW	PARK	
R: 2.4.3.13	don't care	don't care	don't care	don't care	don't care	MANUAL	FAST	NOT_PARK	
R: 2.4.3.14	don't care	don't care	don't care	don't care	don't care	LOST	don't care	NOT_PARK	

Table 13.1 Generate Park Status Decision Table

The following table applies only for Factory Mode:

Rqmt No.	Ignition_ Status	Transmission_ Status	Odo_ Status	Gear_Box_ Type	Vehicle_ Speed_ Slow	Transmission_ Status_Park	Comment
R: 2.4.3.15	don't care	PARK | NEUTRAL	LOW	AUTOMATIC	SLOW	PARK	
R: 2.4.3.16	don't care	REVERSE | DRIVE	LOW	AUTOMATIC	SLOW	NOT_PARK	
R: 2.4.3.17	don't care	don't care	HIGH	AUTOMATIC	SLOW	NOT_PARK	
R: 2.4.3.18	don't care	don't care	don't care	AUTOMATIC	FAST	NOT_PARK	
R: 2.4.3.19	don't care	don't care	don't care	MANUAL	SLOW	PARK	
R: 2.4.3.20	don't care	don't care	don't care	MANUAL	FAST	NOT_PARK	
R: 2.4.3.21	don't care	don't care	don't care	LOST	don't care	PARK	

Table 13.2. Generate Park Status in Factory Mode

2.4.4 Read Vehicle Speed

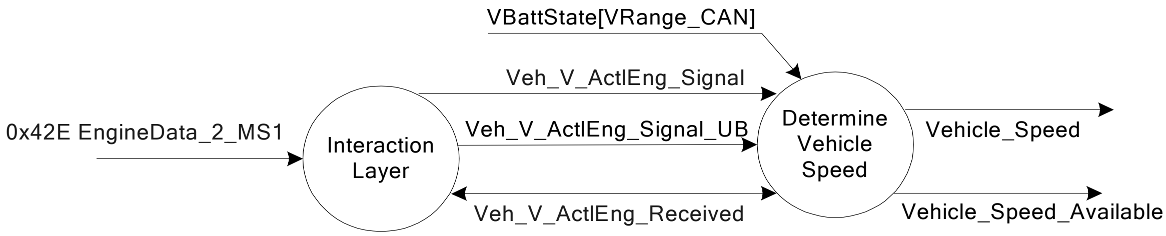


Figure 29. Read Vehicle Speed Data Flow Diagram 2 (Decomposed)

2.4.4.1 Determine Vehicle Speed

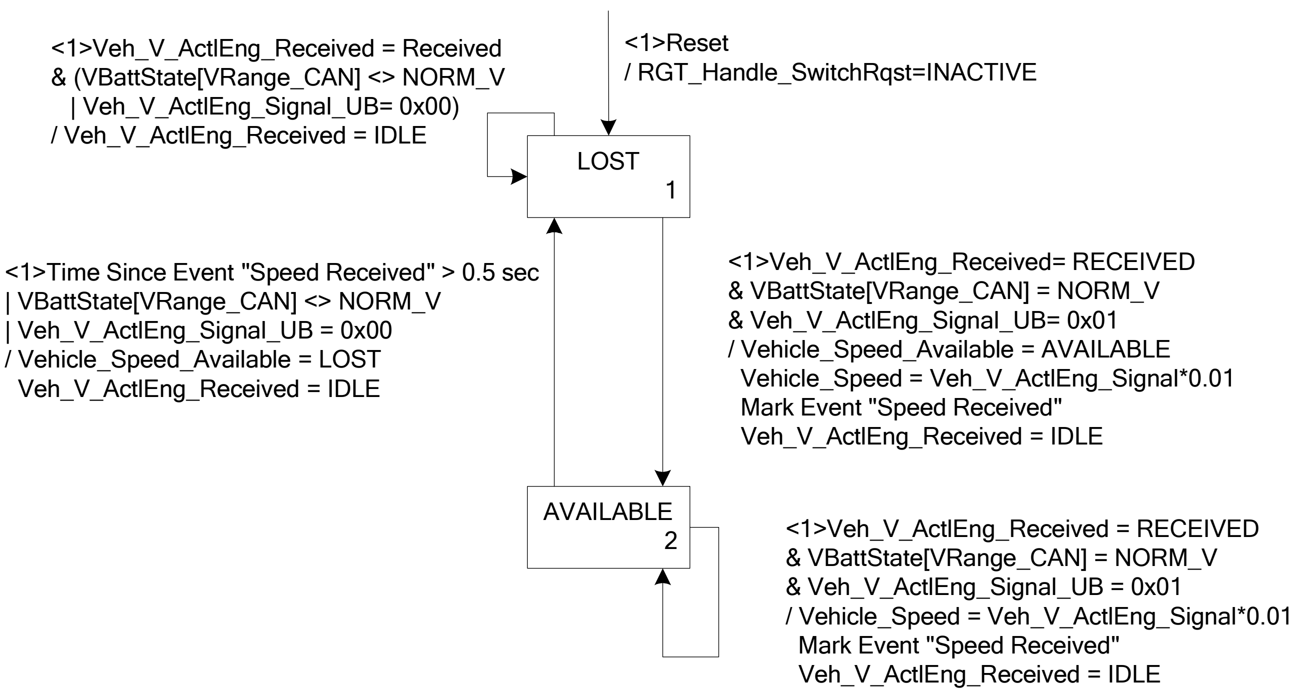


Figure 30. Determine Vehicle Speed State Transition Diagram

2.4.4.2 Generate Vehicle Speed Status

Vehicle speed hysteresis will feature two possible calibrations depending on the type of gear box installed in the vehicle: Manual transmission or Automatic transmission, refer to Table 4.

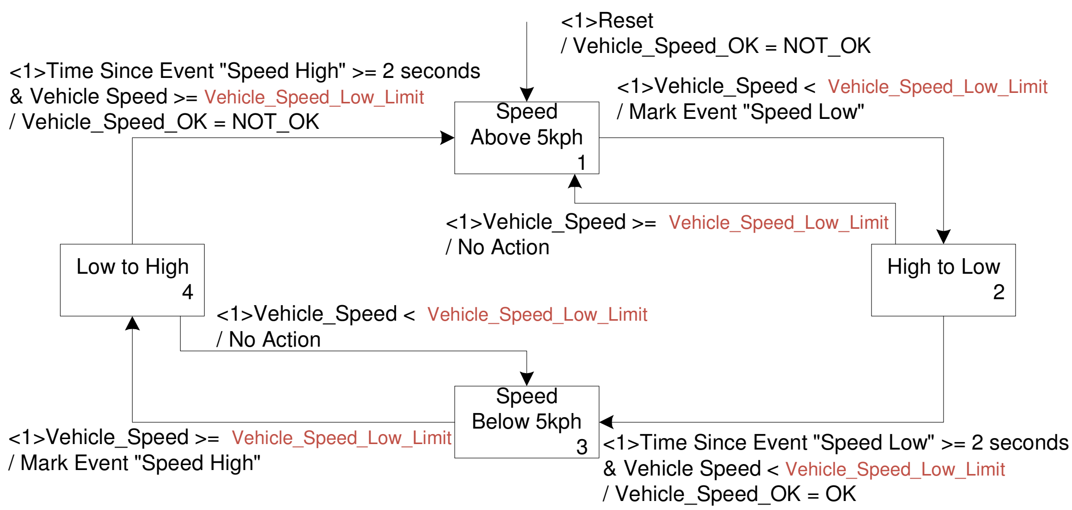


Figure 31. Vehicle Speed Hysteresis State Machine

Rqmt No.	Ignition_Status	Ignition_Status	Vehicle_ Speed_OK	Vehicle_ Speed_ Available	Vehicle_Speed_ Slow
R: 2.4.4.2.1	RUN | START	AVAILABLE	OK	AVAILABLE	SLOW
R: 2.4.4.2.2	RUN | START	AVAILABLE	NOT_OK	AVAILABLE	FAST
R: 2.4.4.2.3	RUN | START	AVAILABLE	don't care	LOST	FAST
R: 2.4.4.2.4	OFF | ACC	AVAILABLE	OK	AVAILABLE	SLOW
R: 2.4.4.2.5	OFF | ACC	AVAILABLE	NOT_OK	AVAILABLE	FAST
R: 2.4.4.2.6	OFF | ACC	AVAILABLE	don't care	LOST	SLOW
R: 2.4.4.2.7	don't care	LOST	OK	AVAILABLE	SLOW
R: 2.4.4.2.8	don't care	LOST	NOT_OK	AVAILABLE	FAST
R: 2.4.4.2.9	don't care	LOST	don't care	LOST	FAST

Table 14. Generate VSS Signal Decision Table

CAN ID	CAN Message	Signal	Units	Range
0x42E	EngineData_2_MS1	Veh_V_ActlEng	KPH	**0-655.35 (0000 xFFFF)**

Table 14.1. Source VSS Signal Decision Table

2.4.5 Monitor Front Requests

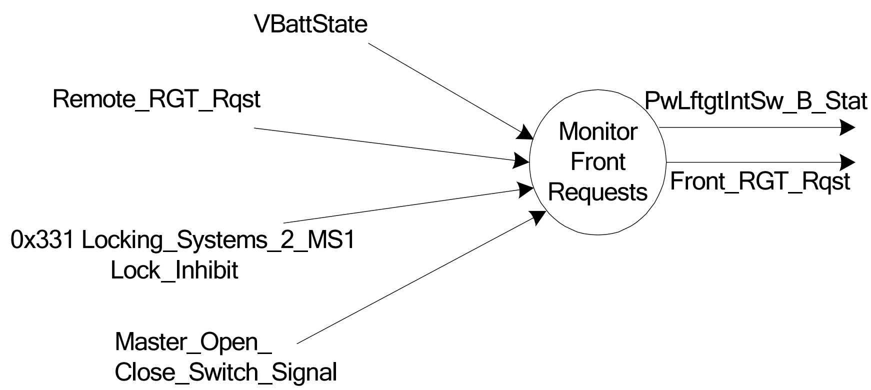


Figure 32. Monitor Front Requests Data Flow Diagram 1

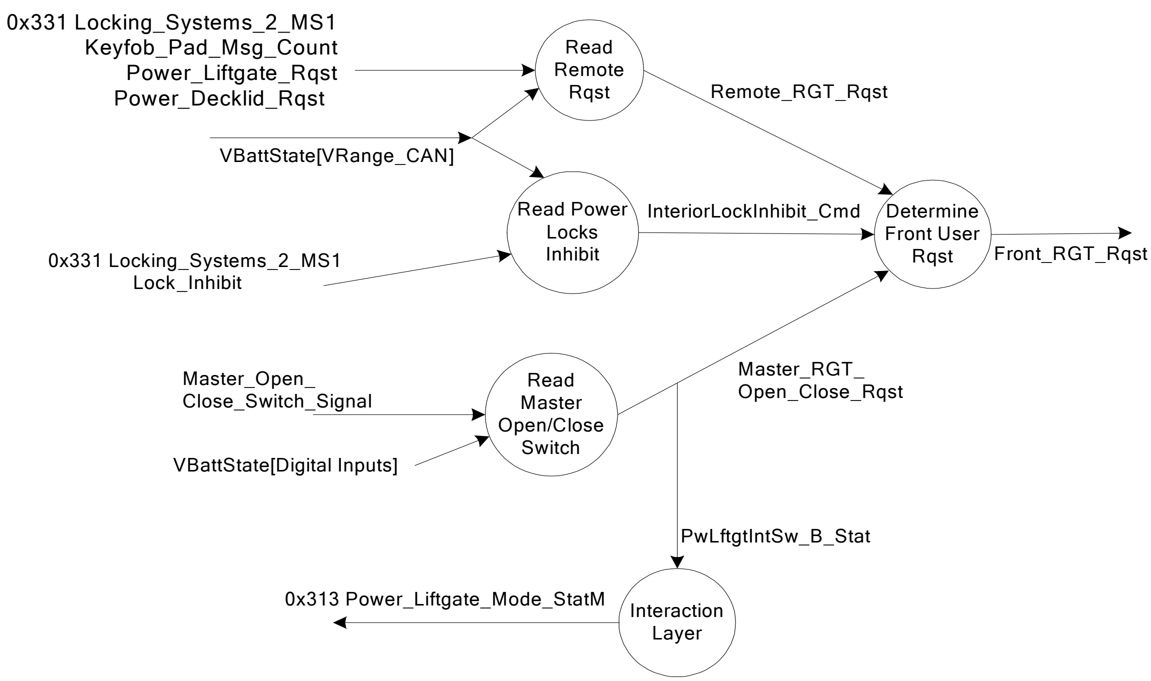


Figure 33. Monitor Front Requests Data Flow Diagram 2 (Decomposed)

2.4.5.1 Master Open/Close Switch

The Master_Open_Close_Switch_Signal is a wakeup input to the RGTM.

1) The input to the RGTM (Master_Open_Close_Switch_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The RGTM shall sample the Master_Open_Close_Switch_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) The RGTM shall be capable of detecting a change in value (either rising edge or falling edge) of the Master_Open_Close_Switch_Signal while the RGTM is asleep.

4) When the RGTM is asleep and Master_Open_Close_Switch_Signal changes value, the RGTM shall temporarily awaken within 50 milliseconds and debounce Master_Open_Close_Switch_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set Master_RGT_Open_Close_Rqst to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

5) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Master_Open_Close_Switch_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).

6) The RGTM shall set Master_RGT_Open_Close_Status = ACTIVE when all consecutive samples of Master_Open_Close_Switch_Signal indicate a closed circuit for a time period of at least 45 (+/- 11) milliseconds (V < 2.2 volts). The RGTM shall transmit signal PwLftgtIntSw_B_Stat = 0x1 (PRESSED) over CAN.

7) The RGTM shall set Master_RGT_Open_Close_Status = INACTIVE when all consecutive samples of Master_Open_Close_Switch_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds (V > 8.0 volts). The RGTM shall transmit signal PwLftgtIntSw_B_Stat = 0x0 (NULL) over CAN.

8) The RGTM shall set Master_RGT_Open_Close_Status = UNKNOWN upon a module reset and whenever VBattState[Digital Input] <> NORM_V. The RGTM signal shall transmit signal PwLftgtIntSw_B_Stat = 0x0 (NULL) over CAN.

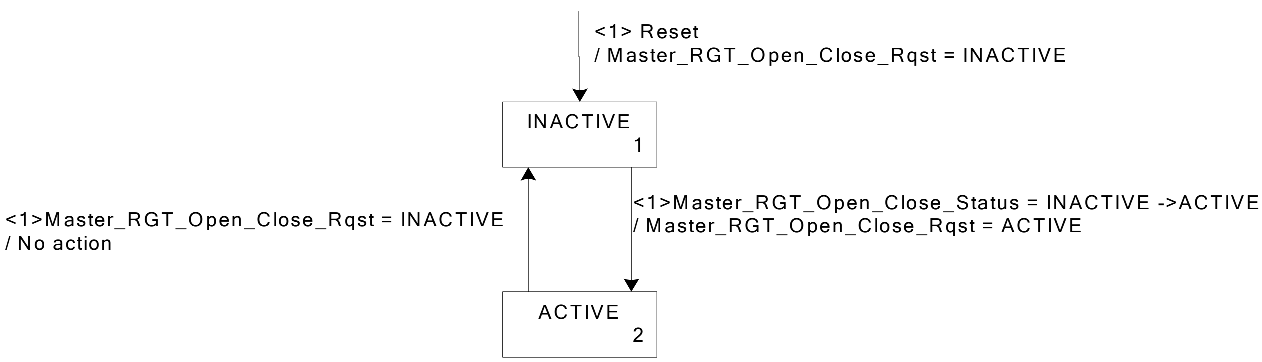


Figure 34. Read Master Switch State Machine

2.4.5.1.1 IP Center Stack Switch Availability

The master Switch has to operate accordingly with the market it is intended. The purpose is to inhibit operation in the cases where the gubernamental regulations avoid the release of the trunk. It is better explained in the decision table for ECE_Inhibit_RGT signal that shows when to inhibit the operation of the RGT.

Rqmt No.	Market_ECE	Vehicle_Lock_Status_Signal	Ignition_Status	ECE_Inhibit_RGT	Comments
R: **2.4.5.1.1.1**	ECE	LOCKED	OFF |ACC	INHIBIT	
R: **2.4.5.1.1.2**	ECE	NOT_LOCKED	OFF | ACC	NO_INHIBIT	
R: **2.4.5.1.1.3**	ECE	Don´t care	RUN | START	NO_INHIBIT	Auto Trans Only
R: **2.4.5.1.1.4**	NON_ECE	LOCKED	don´t care	NO_INHIBIT	
R: **2.4.5.1.1.5**	NON_ECE	NOT_LOCKED	don´t care	NO_INHIBIT	

Table 15 Decision table for ECE_Inhibit_RGT signal.

Specifications for European Market:

If the center stack switch is pressed periodically by the user with a high frequency this must not lead to consecutive trigger events but shall be detected as misuse.

Consecutive signal edges of the center stack switch signal appearing within a period shorter than t=1000ms after a “stop” trigger must be recognized as misuse and therefore must be ignored.

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	RGT_Mode_Cfg
0x313	Power_Liftgate_Mode_StatM	PwLftgtIntSw_B_Stat	Null	0x0	NULL
			Pressed	0x1	PRESSED

Table 16 States for signal PwLftgtIntSw_B_Stat (TX signal from RGTM to CAN).

2.4.5.2 Read Remote Request (Key Fob/Hands Free)

Remote request is handled by the RGT module, a CAN signal is send by the BCM that indicates if RGT has to Power Open/Close the decklid/liftgate. This signal can come from 2 different devices, a Key Fob or a Hands Free module. Key Fob allows open/close the Liftgate/Decklid, normally the Key Fob have a specific button to handle the Liftgate/Decklid. Hands Free allows open/close the Liftgate/Decklid just by a gentle kicking motion under the rear bumper if car is equipped with this feature.

Specifications for European Market:

Interruption by the user:
Disable RKE after tailgate operation interrupt by the user, this is for safety reasons:
After interrupting the tailgate operation by the tailgate button on the remote key fob, following start requests by the key fob must be ignored for a certain period of time, the value of this time depends on RKE_Interrupt_Time that has a value of 3 seconds. This is necessary to avoid unintended tailgate operation if the customer presses the button uncontrolled.
The Timer value should be calibratable.

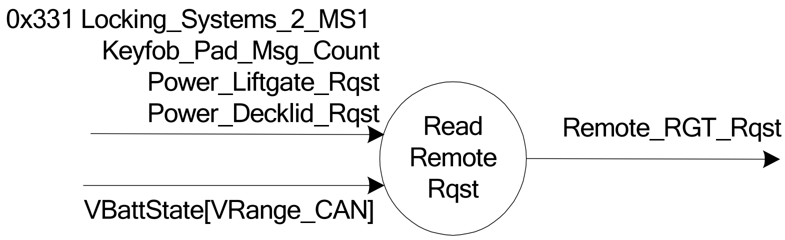


Figure 35. Read Remote Request Data Flow Diagram 1

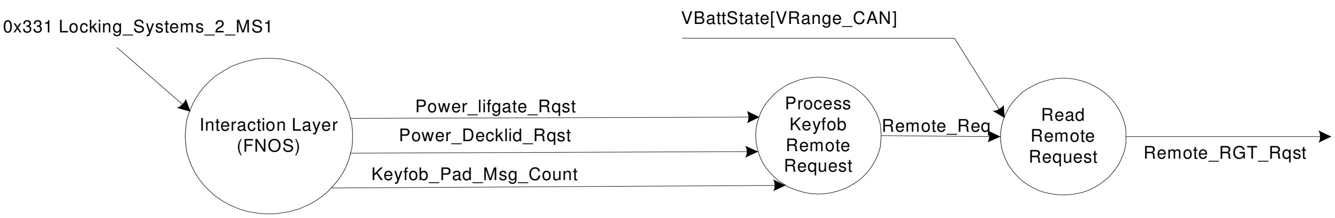


Figure 36. Read Remote Request Data Flow Diagram 2 (Decomposed).

Rqmt No.	Power Trunk Present	Power Liftgate Present	Power_Liftgate_ Rqst	Power_Decklid_ Rqst	Remote_Req
R: 2.4.5.2.1	NO	YES	0X0	IGNORE	NULL
R: 2.4.5.2.2	NO	YES	0X1	IGNORE	ACTIVE
R: 2.4.5.2.3	YES	NO	IGNORE	0X0	NULL
R: 2.4.5.2.4	YES	NO	IGNORE	0X1	ACTIVE

Table 16.1 Decision Table for received MSCAN Remote Req from Key fob

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded
0x331	Locking_Systems_2_MS1	Power_Decklid_Rqst	NULL	0x0
			ACTIVE	0x1
0x331	Locking_Systems_2_MS1	Power_Liftgate_Rqst	NULL	0x0
			ACTIVE	0x1

Table 16.2 MSCAN message source for Remote_Req input from Key fob

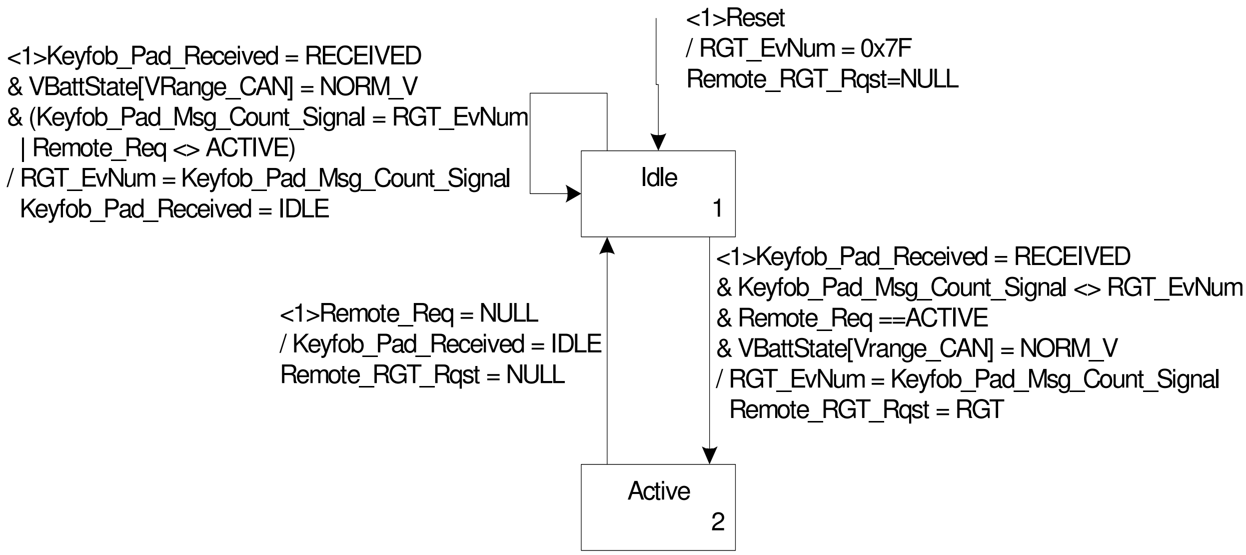


Figure 37. Receive MSCAN KeyfobPad Message - State Transition Diagram

CAN ID	CAN Message	Signal	Units	Range	Keyfob_Pad_ Msg_Count
0x331	Locking_Systems_2_MS1	Keyfob_Pad_Msg_Count	COUNTS	0 - 255	**0 - 255**

Table 16.3 MSCAN message source for Keyfob_Pad_Msg_Count input

2.4.5.3 Read Power Locks Inhibit

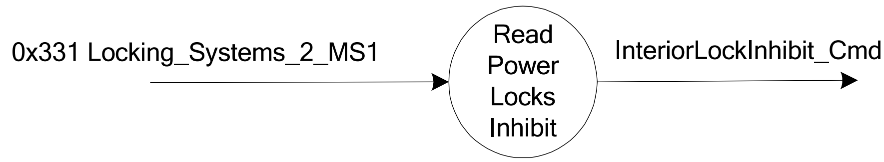


Figure 38. Read Power Locks Inhibit Data Flow Diagram

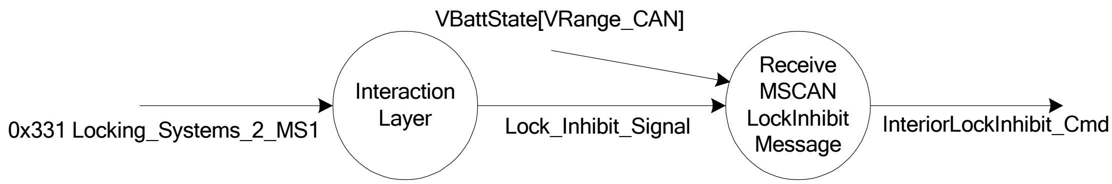


Figure 39. Interior Lock Inhibit Data Flow Diagram 2 (Decomposed)

Rqmt No.	LockInhibit_Signal	VbattState[Vrange_CAN]	InteriorLockInhibit_Cmd
R: 2.4.5.3.1	Don't Care	Not(NORM_V)	INHIBIT
R: 2.4.5.3.2	INHIBIT	NORM_V	INHIBIT
R: 2.4.5.3.3	NO_INHIBT	NORM_V	NO_INHIBIT

Table 17. Decision Table For InteriorLockInhibit_Cmd for NON ECE Market.

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	LockInhibit_ Signal
0x331	Locking_Systems_2_MS1	LockInhibit	No_Inhibit	0x0	NO_INHIBT
			Inhibit	0x1	INHIBIT

Table 17.2 Source for Lock_Inhibit_Signal

2.4.5.4 Determine Front User Request

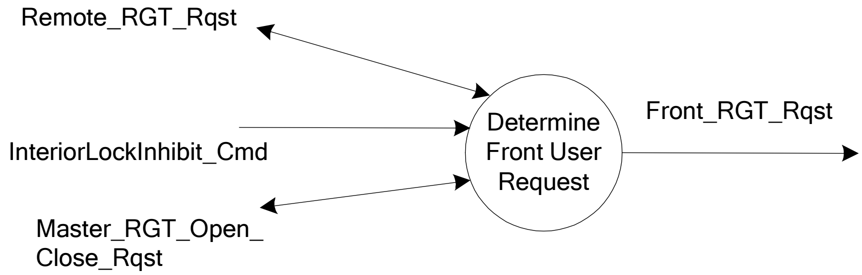


Figure 40. Determine Front User Request Data Flow Diagram

Rqmt No.	Master_RGT_Open_Close_Rqst	InteriorLockInhibit_Cmd	Remote_RGT_Rqst	ECE_Inhibit_RGT	Front_RGT_Rqst
R: 2.4.5.4.1	INACTIVE	don´t care	NULL	don´t care	INACTIVE
R: 2.4.5.4.2	INACTIVE	don´t care	RGT	don´t care	ACTIVE
R: 2.4.5.4.3	ACTIVE	don´t care	RGT	don´t care	ACTIVE
R: 2.4.5.4.4	ACTIVE	NO_INHIBIT	NULL	NO_INHIBIT	ACTIVE
R: 2.4.5.4.5	ACTIVE	INHIBIT	NULL	NO_INHIBIT	INACTIVE
R: 2.4.5.4.6	ACTIVE	NO_INHIBIT	NULL	INHIBIT	INACTIVE
R: 2.4.5.4.7	ACTIVE	INHIBIT	NULL	INHIBIT	INACTIVE
R: 2.4.5.4.9	After evaluation of this table, set Remote_RGT_Rqst = NULL and Master_RGT_Open_Close_Rqst = INACTIVE.				

Table 18. Determine Front User Request - Decision Table

2.4.6 Local (Rear) Open/Close Switch

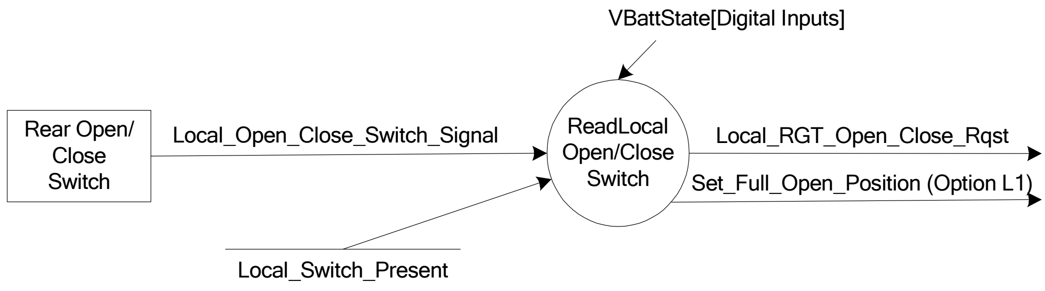


Figure 41. Read Local Open/Close Switch Data Flow Diagram

The Local_Open_Close_Switch_Signal is a wakeup input to the RGTM.

If Local_Switch_Present = PRESENT, apply 1 through 9 below:

1) The input to the RGTM (Local_Open_Close_Switch_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The RGTM shall sample the Local_Open_Close_Switch_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) The RGTM shall be capable of detecting a change in value (either rising edge or falling edge) of the Local_Open_Close_Switch_Signal while the RGTM is asleep.

4) When the RGTM is asleep and Local_Open_Close_Switch_Signal changes value, the RGTM shall temporarily awaken within 50 milliseconds and debounce Local_Open_Close_Switch_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set Local_RGT_Open_Close_Rqst to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

5) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Local_RGT_Open_Close_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).
6) The RGTM shall set Local_RGT_Open_Close_Status = ACTIVE when all consecutive samples of Local_Open_Close_Switch_Signal indicate ground (a closed circuit) for a time period of at least 45 (+/- 11) milliseconds (V < 2.2 volts).
7) The RGTM shall set Local_RGT_Open_Close_Status = INACTIVE when all consecutive samples of Local_Open_Close_Switch_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds (V > 8.0 volts).
8) The RGTM shall set Local_RGT_Open_Close_Status = UNKNOWN upon a module reset and whenever VBattState[Digital Input] <> NORM_V.
9) If Local_Switch_Present = NOT_PRESENT, the RGTM shall set Local_RGT_Open_Close_Status = INACTIVE.

Specifications for European Market:

If the local (rear) switch is pressed periodically by the user with a high frequency this must not lead to consecutive trigger events but shall be detected as misuse.

Consecutive signal edges of the center stack switch signal appearing within a period shorter than t=1000ms after a "stop" trigger must be recognized as misuse and therefore must be ignored.

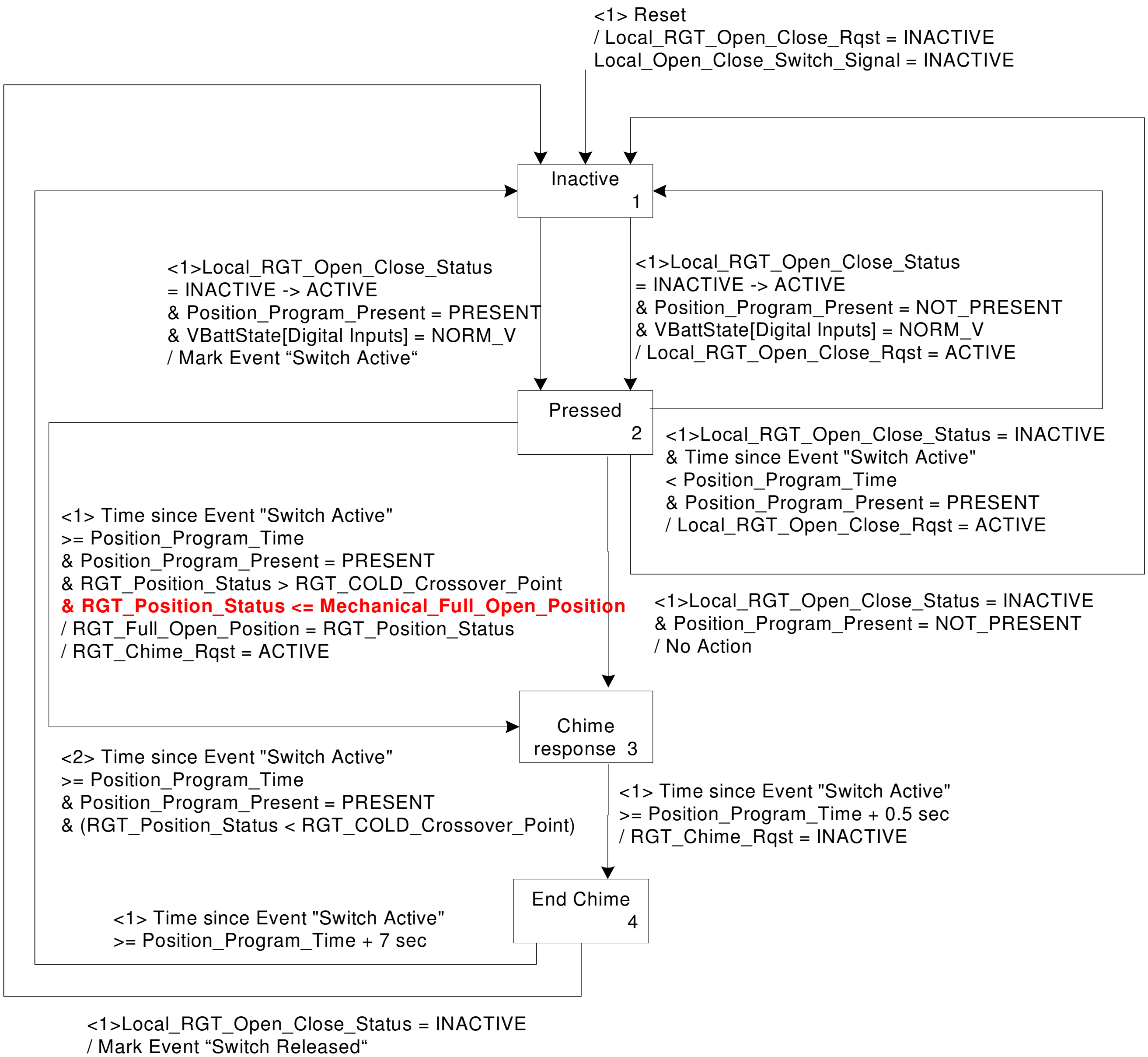


Figure 42. Read Local Switch State Machine

2.4.7 Read Rear Gate/Trunk Handle Request

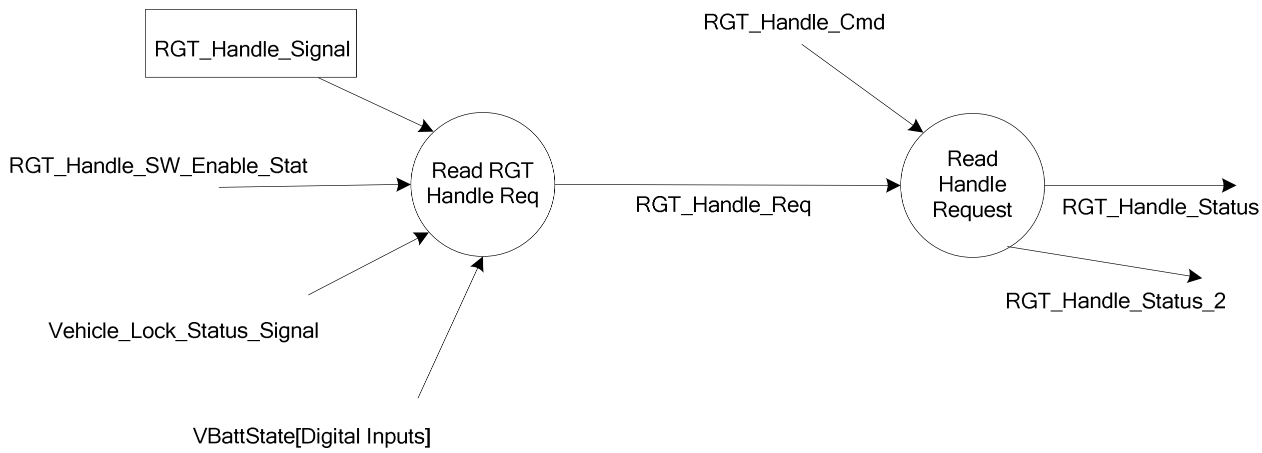


Figure 43. Read Rear Gate/Trunk Handle Request Data Flow Diagram

2.4.7.1 Read RGT Handle Signal

The RGT_Handle_Signal is a wakeup input to the RGTM.

1) The input to the RGTM (RGT_Handle _Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The RGTM shall sample the RGT_Handle_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) The RGTM shall be capable of detecting a change in value (either rising edge or falling edge) of the RGT_Handle_Signal while the RGTM is asleep.

4) When the RGTM is asleep and RGT_Handle_Signal changes value, the RGTM shall temporarily awaken within 50 milliseconds and debounce RGT_Handle_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set RGT_Handle_Status to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

5) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Handle_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).

6) The RGTM shall set RGT_Handle_Switch_Status = ACTIVE when all consecutive samples of RGT_Handle_Signal indicate Ground (a closed circuit) for a time period of at least 45 (+/- 11) milliseconds (V< 2.2 volts).

7) The RGTM shall set RGT_Handle_Switch_Status = INACTIVE when all consecutive samples of RGT_Handle_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds (V > 8.0 volts).

8) The RGTM shall set RGT_Handle_Switch_Status = UNKNOWN upon a module reset and whenever VBattState[Digital Input] <> NORM_V.

Specifications for European Market:

If the handle switch is pressed periodically by the user with a high frequency this must not lead to consecutive trigger events but shall be detected as misuse.

Consecutive signal edges of the center stack switch signal appearing within a period shorter than t=1000ms after a “stop” trigger must be recognized as misuse and therefore must be ignored.

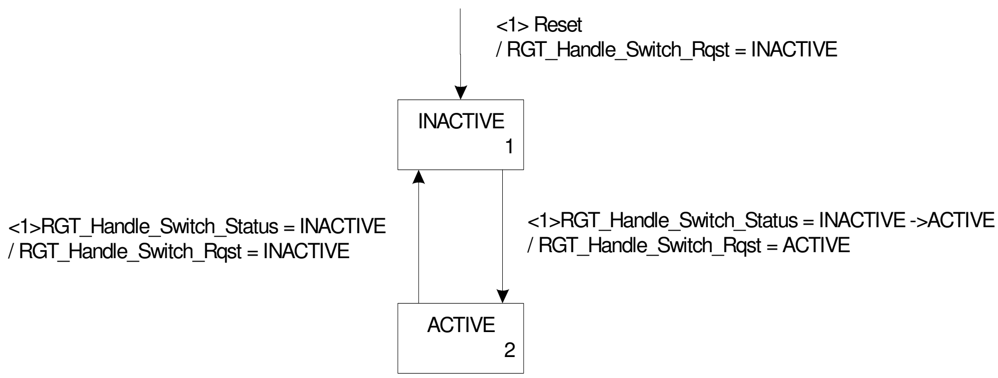


Figure 44. Read RGT Handle Switch Status

Handle Request:

Handle request is the result of the evaluation of switch status, lock status and handle request signals. The type of the Liftgate Power or Manual or Manual with soft close should decide what signals are needed to let Open/Close the liftgate:

For Power Liftgate, signal with the switch status should be used to determine if Liftgate should OPEN/CLOSE.

Section 2.4.7.1.1.1 determines the use of this CAN signal. See table 19_A for more reference on the interaction of the signals.

For Manual Liftgate, lock status is needed to determine if Liftgate should OPEN/CLOSE.

Section 2.4.7.1.2 determines the use of this signal. See table 19_B for more reference on the interaction of the signals.

Programs can have both types of Liftgate: Manual and Power.

Above conditions apply when LifeCyc_Mode_Signal is NORMAL, when LifeCyc_Mode_Signal in in FACTORY mode see table 19_C.

PROGRAM	POWER	MANUAL
CD533	X	
C489	X	X

Table 19. Program with type of Liftgate

Rqmt No.	RGT_Handle_ Switch_Rqst	RGT_Handle_SW _Enable_Stat	LifeCyc_Mode_Signal	RGT_Handle_Req
R: 2.4.7.1.1	INACTIVE	Don't Care	NORMAL	INACTIVE
R: 2.4.7.1.2	ACTIVE	ENABLED	NORMAL	ACTIVE
R: 2.4.7.1.3	ACTIVE	DISABLED	NORMAL	INACTIVE

Table 19_A. Determine RGT_Handle_Req for Power Liftgate - decision table

Rqmt No.	RGT_Handle_ Switch_Rqst	Veh_Lock_Status	LifeCyc_Mode_Signal	RGT_Handle_Req
R: 2.4.7.1.4	INACTIVE	Don't Care	NORMAL	INACTIVE
R: 2.4.7.1.5	ACTIVE	UNLOCK_ALL	NORMAL	ACTIVE
R: 2.4.7.1.6	ACTIVE	Not (UNLOCK_ALL)	NORMAL	INACTIVE

Table 19_B. Determine RGT_Handle_Req for Manual Liftgate - decision table

Rqmt No.	RGT_Handle_ Switch_Rqst	RGT_Handle_SW Enable_Stat	Veh_Lock_Status	LifeCyc_Mode_Signal	RGT_Handle_Req
R: 2.4.7.1.7	INACTIVE	Don´t care	Don't Care	FACTORY	INACTIVE
R: 2.4.7.1.8	ACTIVE	ENABLED	Don't Care	FACTORY	ACTIVE
R: 2.4.7.1.9	ACTIVE	DISABLED	UNLOCK_ALL	FACTORY	ACTIVE
R: 2.4.7.1.10	ACTIVE	DISABLED	Not (UNLOCK_ALL)	FACTORY	ACTIVE

Table 19_C. Determine RGT_Handle_Req in Factory Mode - decision table

2.4.7.1.1.1 Read RGT Handle Switch Enabled Status

The signal **DrTgateExtSwMde_B_Stat** is send by the BCM and represents the status of the exterior liftgate switch send in a CAN message. This signal is only send when the BCM has the configuration for Power Liftgate. When BCM has the configuration for Manual Liftgate, this signal is not send in a CAN message and should not used as a condition to determine RGT operation.

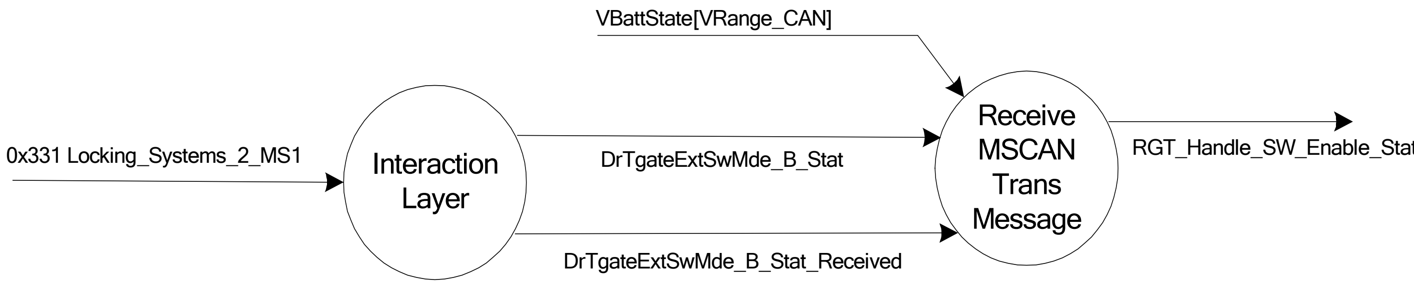


Figure 44a. Read RGT Handle Switch CAN Enabled Status Data Flow Diagram

Rqmt No.	DrTgateExtSwMde_B_Stat	VbattState [Vrange_CAN]	RGT_Handle_SW_ Enable_Stat
R: **2.4.7.1.1.1**	Don't Care	Not(NORM_V)	No Change
R: **2.4.7.1.1.2**	ENABLED	NORM_V	ENABLED
R: **2.4.7.1.1.3**	DISABLED	NORM_V	DISABLED

Table 19.1 Read RGT Handle Switch CAN Enabled Status - Decision Table.

2.4.7.1.2 Read Vehicle Lock Status

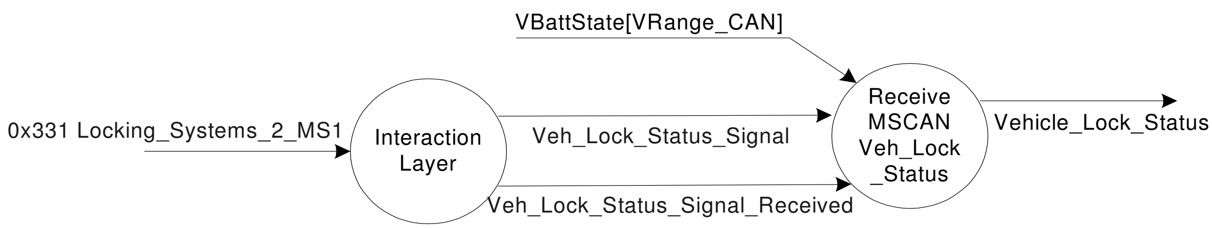


Figure 44B – Read Vehicle Lock Status

Rqmt No.	Veh_Lock_Status_ Signal	VbattState[Vrange_CAN]	Vehicle_Lock_Status
R: **2.4.7.1.2.1**	Don't Care	Not(NORM_V)	No Change
R: **2.4.7.1.2.2**	Unlocked	NORM_V	INACTIVE
R: **2.4.7.1.2.3**	Locked	NORM_V	ACTIVE

Table 19.2 . Read Vehicle Lock Status - Decision Table

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	Veh_Lock _Status_Signal
0x331	Locking_Systems_2_MS1	Veh_Lock_Status	LOCK_DBL	0x0	LOCKED
			LOCK_ALL	0x1	LOCKED
			UNLOCK_ALL	0x2	UNLOCKED
			UNLOCK_DRV	0x3	LOCKED

Table 19.3 Source for Vehicle_Lock_Status_Signal

2.4.7.2 Read Handle Request

Rqmt No.	RGT_Handle_ Req	RGT_Handle_ Cmd	RGT_Handle_ Status	RGT_Handle_Status_2
R: **2.4.7.2.1**	INACTIVE	INACTIVE	INACTIVE	INACTIVE
R: **2.4.7.2.2**	ACTIVE	Don't Care	ACTIVE	ACTIVE
R: **2.4.7.2.2**	INACTIVE	ACTIVE	ACTIVE	ACTIVE

Table 19.4 . Read RGT Handle Request - Decision Table

2.4.7.2.1 Read RGT Handle CAN Request

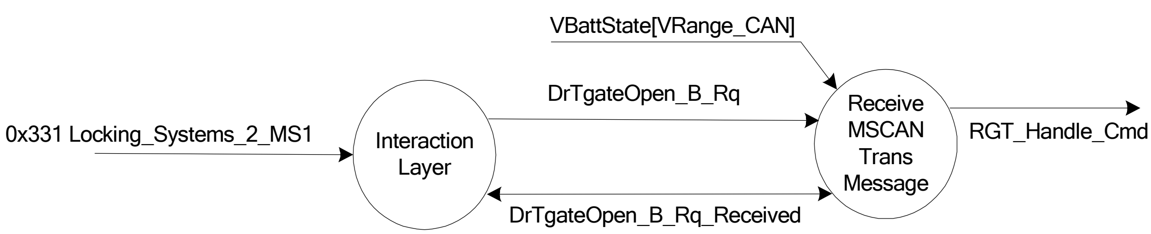


Figure 45. Read RGT Handle CAN Request Data Flow Diagram

Rqmt No.	DrTgateOpen_B_Rq	VbattState[Vrange_CAN]	RGT_Handle_Cmd
R: **2.4.7.2.1.1**	Don't Care	Not(NORM_V)	No Change
R: **2.4.7.2.1.2**	RELEASE	NORM_V	INACTIVE
R: **2.4.7.2.1.3**	NULL	NORM_V	ACTIVE

Table 19.5 Read Rear Gate/Trunk Handle CAN Request - Decision Table

2.4.7.2.2 Determine Rear User Request

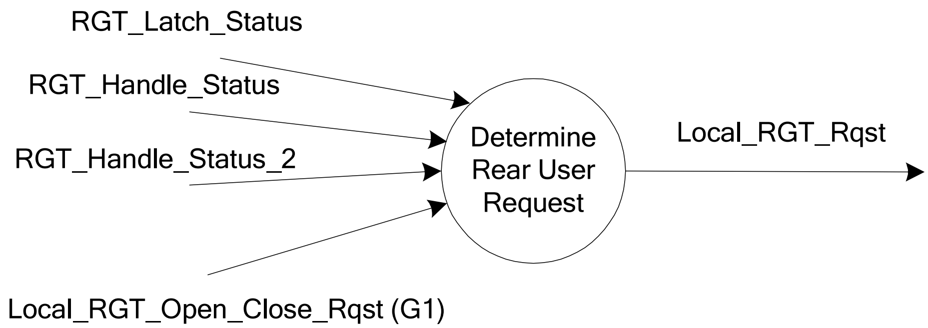


Figure 46. Determine Rear User Request Data Flow Diagram

Rqmt No.	Local_RGT_Open_Close_ Rqst (G1)	RGT_Latch_Status	RGT_Handle_Status	RGT_Handle_ Status_2	Local_RGT_ Rqst
R: 2.4.7.1 (optionG1)	ACTIVE	UNLATCHED	Don't Care	Don't Care	ACTIVE
R: 2.4.7.2 (option G1)	ACTIVE	not(UNLATCHED)	INACTIVE	INACTIVE	INACTIVE
R: 2.4.7.3	Don't Care	not(UNLATCHED)	ACTIVE	ACTIVE	UNLATCH
R: 2.4.7.4	INACTIVE	UNLATCHED	ACTIVE	INACTIVE	ACTIVE
R: 2.4.7.5	INACTIVE	Don't Care	INACTIVE	INACTIVE	INACTIVE
R: 2.4.7.6	After evaluation of this table, set Local_RGT_Rqst = INACTIVE and RGT_Handle_Status_2 = INACTIVE				

Table 20. Determine Rear User Request –decision table

2.4.8 Read Power Rear Gate/Trunk Lockout

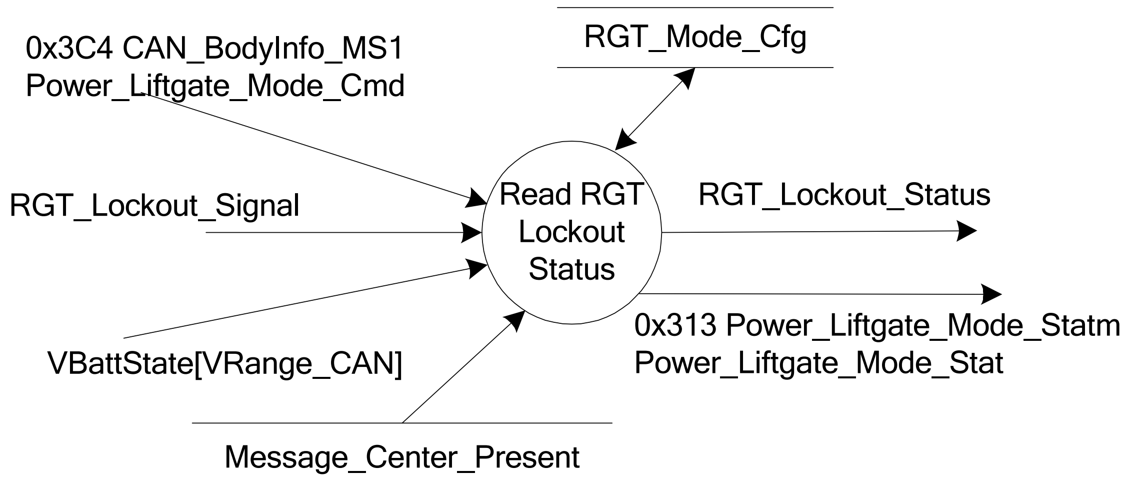


Figure 48. Read RGT Lockout Status Data Flow Diagram 1

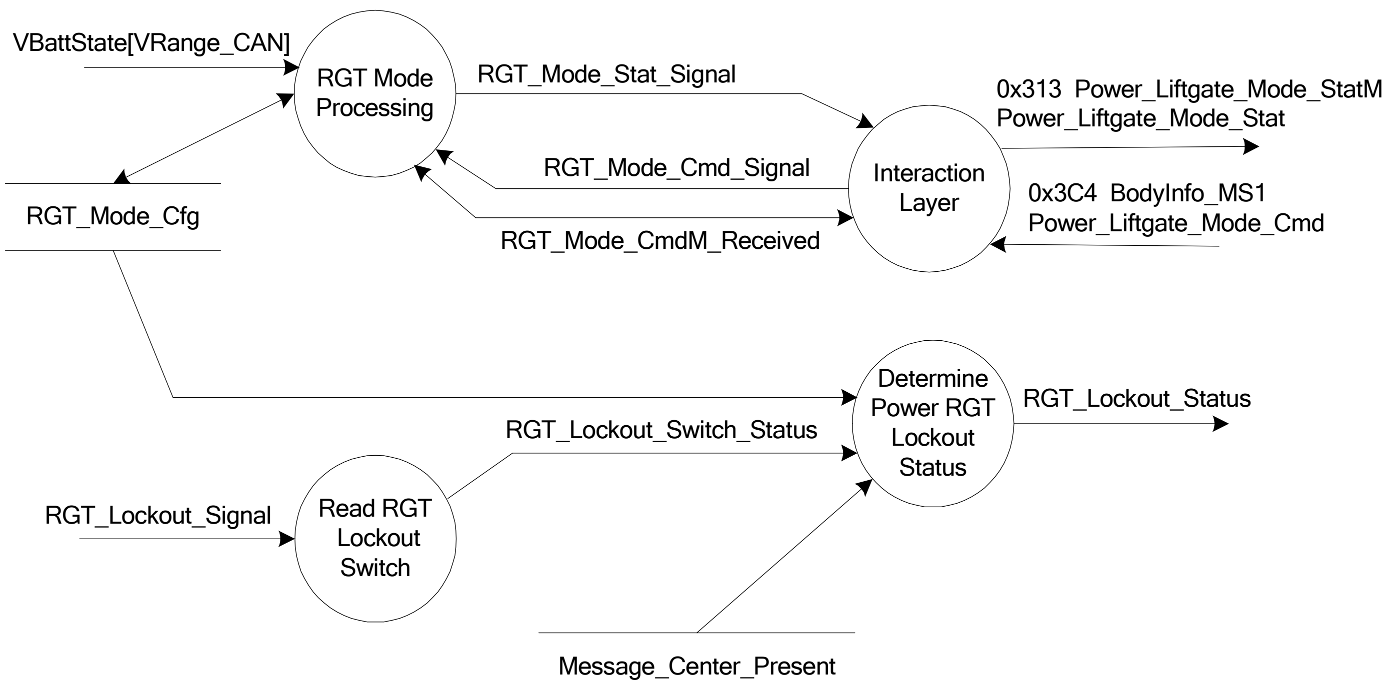


Figure 49. Read RGT Lockout Status Data Flow Diagram 2 (Decomposed)

2.4.8.1 Read Power Rear Gate/Trunk Lockout Status

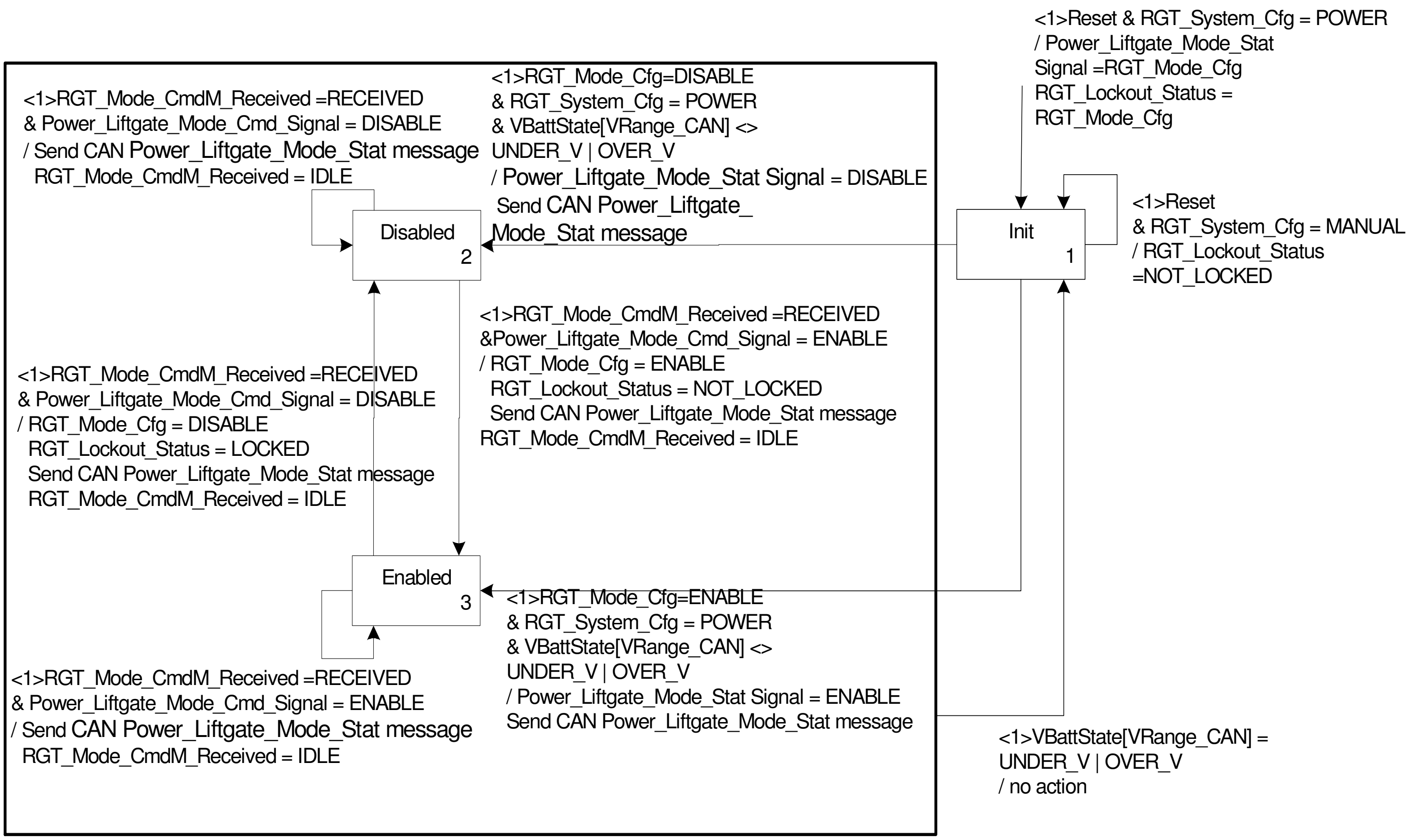


Figure 50. RGT Mode Processing State Transition Diagram

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded
0x313	Power_Liftgate_Mode_Statm	Power_Liftgate_Mode_Stat	Disabled	0x0
			Enabled	0x1
			Unused	0x2
			Not Supported	0x3

Figure 20.1 Possible values to report in signal Power_Liftgate_Mode_Stat

2.4.8.2 Read Power Rear Gate/Trunk Lockout Status

The RGT_Lockout_Signal is NOT a wakeup input to the RGTM.

1) The input to the RGTM (RGT_Lockout_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The RGTM shall sample the RGT_Lockout_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Lockout_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).

4) The RGTM shall set RGT_Lockout_Status =NOT_ LOCKED when all consecutive samples of RGT_Lockout_Signal indicate a closed circuit for a time period of at least 45 (+/- 11) milliseconds (V < 2.2 volts).

5) The RGTM shall set RGT_Lockout_Status = LOCKED when all consecutive samples of RGT_Lockout_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds (V > 8.0 volts).

6) The RGTM shall set RGT_Lockout_Status = LOCKED upon a module reset, or upon coming out of sleep.

7) The RGTM shall set RGT_Lockout_Status = NOT_LOCKED when RGT_System_Cfg = MANUAL.

2.4.8.3 Determine Power Rear Gate/Trunk Lockout Status

Rqmt. No	Message_Center_ Present	RGT_Lockout_ Switch_Status	RGT_Mode_Cfg	RGT_Lockout_Status
R: 2.4.9.3.1	NOT_PRESENT	LOCKED	Don't Care	LOCKED
R: 2.4.9.3.2	NOT_PRESENT	UNLOCKED	Don't Care	UNLOCKED
R: 2.4.9.3.3	PRESENT	Don't Care	LOCKED	LOCKED
R: 2.4.9.3.4	PRESENT	Don't Care	UNLOCKED	UNLOCKED

Table 21 – Determine Power Liftgate Lockout Status

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	RGT_Mode_Cfg
0x3C4	BodyInfo_MS1	Power_Liftgate_Mode_Cmd	DISABLED	0x0	~~UNLOCKED~~ LOCKED
			ENABLED	0x1	~~LOCKED~~ UNLOCKED

Table 21.1 Source for RGT_Mode_Cfg

2.4.9 Look for Obstacle

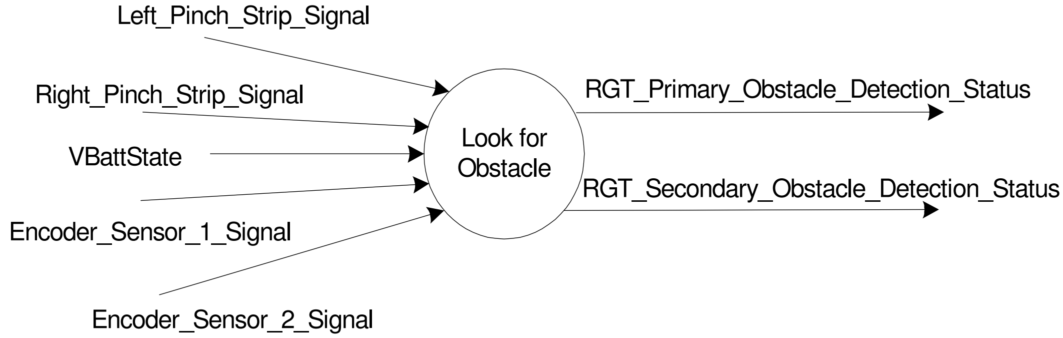


Figure 51. Look For Obstacle Data Flow Diagram 1

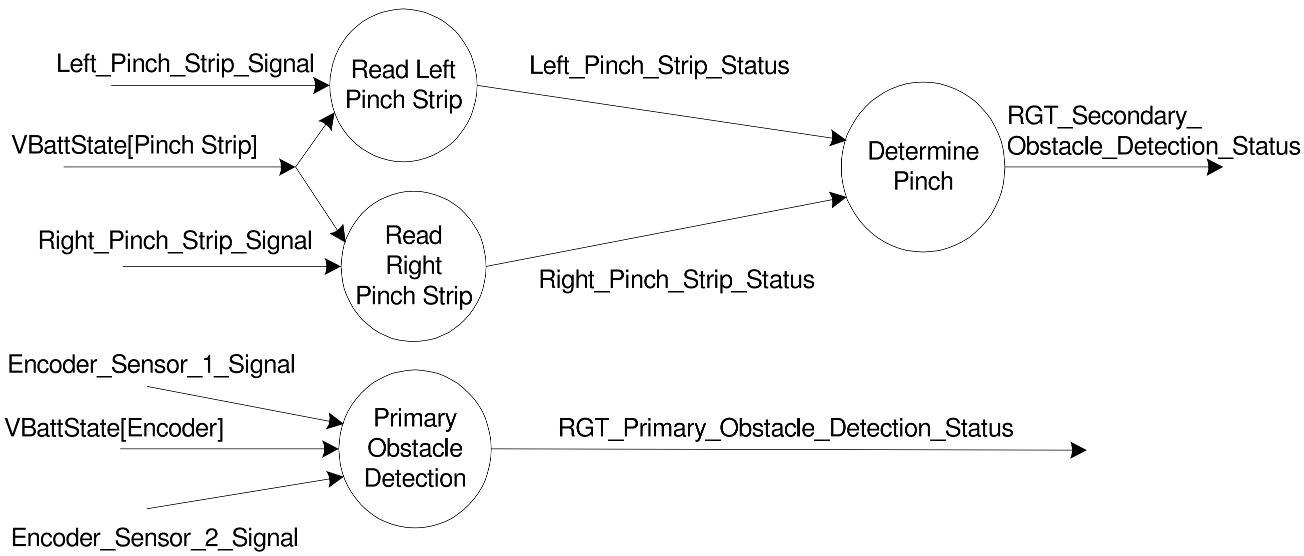


Figure 52. Look For Obstacle Data Flow Diagram 2 (Decomposed)

2.4.9.1 Read Left Pinch Strip

<**R:** 2.4.9.1.1> When Left_Pinch_Strip_Signal is at a level that represents a resistance <= 2500 ohms at the pinch strip for at least 2 consecutive samples, the RGTM shall set Left_Pinch_Strip_Status = PINCHED.

< **R:** 2.4.9.1.2> When Left_Pinch_Strip_Signal is at a level that represents a resistance >= 2500 ohms but < 10500 ohms at the pinch strip for at least 2 consecutive samples, the RGTM shall set Left_Pinch_Strip_Status = NOT_PINCHED.

< **R:** 2.4.9.1.3> When Left_Pinch_Strip_Signal is at a level that represents a resistance >= 10500 ohms at the pinch strip for at least 2 consecutive samples, the RGTM shall set Left_Pinch_Strip_Status = ERROR.

< **R:** 2.4.9.1.4>The RGTM shall detect an obstacle via the Left Pinch Strip during a power close operation such that the Rear Gate/Trunk does not exert a force greater than 200 N with a spring rate of 10 N/mm.

< **R:** 2.4.9.1.5> The RGTM shall sample the Left_Pinch_Strip_Signal with a sample period of no more than 11 milliseconds and no less than 5 milliseconds while the RGTM is awake (Software Requirement #0044).

< **R:** 2.4.9.1.6> If VbattState[Pinch Strip] <> NORM_V at the time a sample of Left_Pinch_Strip_Signal is taken, then that sample is to be considered >= 10500 ohms (Software Requirement #0066).

2.4.9.2 Read Right Pinch Strip

< **R:** 2.4.9.2.1> When Right_Pinch_Strip_Signal is at a level that represents a resistance <= 2500 ohms at the pinch strip strip for at least 2 consecutive samples, the RGTM shall set Right_Pinch_Strip_Status = PINCHED.

< **R:** 2.4.9.2.2> When Right_Pinch_Strip_Signal is at a level that represents a resistance >= 2500 ohms but < 10500 ohms at the pinch strip for at least 2 consecutive samples, the RGTM shall set Right_Pinch_Strip_Status = NOT_PINCHED.

< **R:** 2.4.9.2.3> When Right_Pinch_Strip_Signal is at a level that represents a resistance >= 10500 ohms at the pinch strip for at least 2 consecutive samples, the RGTM shall set Right_Pinch_Strip_Status = ERROR.

< **R:** 2.4.9.2.4>The RGTM shall detect an obstacle via the Right Pinch Strip during a power close operation such that the Rear Gate/Trunk does not exert a force greater than 200 N with a spring rate of 10 N/mm.

< **R:** 2.4.9.2.5> The RGTM shall sample the Right_Pinch_Strip_Signal with a sample period of no more than 11 milliseconds and no less than 5 milliseconds while the RGTM is awake (Software Requirement #0044).

< **R:** 2.4.9.2.6> If VbattState[Pinch Strip] <> NORM_V at the time a sample of Right_Pinch_Strip_Signal is taken, then that sample is to be considered >= 10500 ohms (Software Requirement #0066).

2.4.9.3 Determine Pinch

Rqmt No.	Left_Pinch_Strip_Status	Right_Pinch_Strip_Status	RGT_Secondary_Obstacle_Detection_Status
R: 2.4.9.3.1	PINCHED	PINCHED	OBSTACLE
R: 2.4.9.3.2	PINCHED	ERROR	ERROR
R: 2.4.9.3.3	PINCHED	NOT_PINCHED	OBSTACLE
R: 2.4.9.3.4	ERROR	PINCHED	ERROR
R: 2.4.9.3.5	ERROR	ERROR	ERROR
R: 2.4.9.3.6	ERROR	NOT_PINCHED	ERROR
R: 2.4.9.3.7	NOT_PINCHED	PINCHED	OBSTACLE
R: 2.4.9.3.8	NOT_PINCHED	ERROR	ERROR
R: 2.4.9.3.9	NOT_PINCHED	NOT_PINCHED	CLEAR
R: 2.4.9.3.10	Validation of this table should be executed only if PinchStrips_Present = PRESENT, otherwise set RGT_Secondary_Obstacle_Detection_Status = CLEAR		

Table 22. Determine Pinch Decision Table

< **R:** 2.4.9.3.11> > The RGTM shall set RGT_Secondary_ Obstacle_Detection_Status = CLEAR when RGT_System_Cfg = MANUAL.

2.4.9.4 Primary Obstacle Detection

This strategy is supplier defined.

< **R:** 2.4.9.4.1>The RGTM shall detect an obstacle in the path of Rear Gate/Trunk travel during either a power open or power close operation such that the Rear Gate/Trunk does not exert a force greater than 200 N with a spring rate of 10 N/mm.

Note: A stretch objective is set to 100 N at the same spring rate.

< **R:** 2.4.9.4.2> When an obstacle is detected, the RGTM shall set RGT_Primary_Obstacle_Detection_Status = OBSTACLE.

< **R:** 2.4.9.4.3> When no obstacle has been detected, the RGTM shall set RGT_Primary_Obstacle_Detection_Status = CLEAR.

< **R:** 2.4.9.4.4> When VbattState[Encoder] = UNDER_V | OVER_V, the RGTM shall set RGT_Primary_Obstacle_Detection_Status = OBSTACLE.

Note:

Obstacle Detection should be OFF when RGTM is in closing direction and the position of the Decklid (degress) is less than Obstacle_Detection_Shut_Off_Angle value; this requirement is only for Decklids.

2.4.10 Determine Rear Gate/Trunk Position

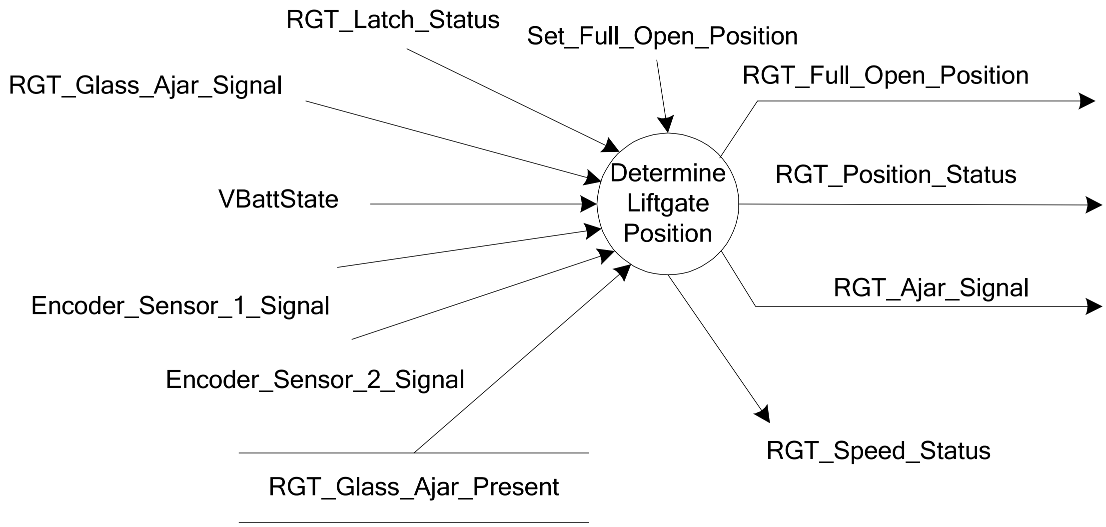


Figure 53. Determine Rear Gate/Trunk Position Data Flow Diagram 1

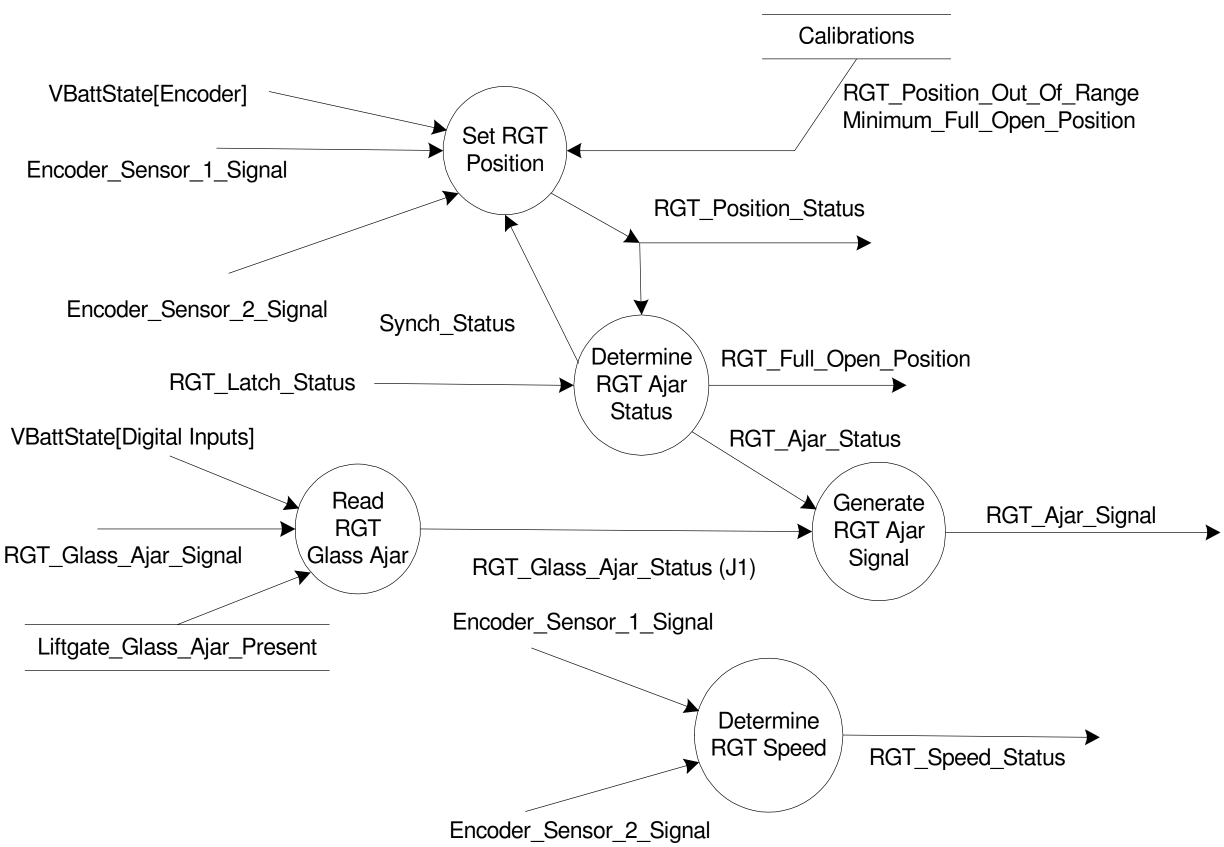


Figure 54. Determine Rear Gate/Trunk Position Data Flow Diagram 2 (Decomposed)

2.4.10.1 Set Rear Gate/Trunk Position

< **R:** 2.4.10.1.1>RGT_Position_Status is an angular representation of the position of the Rear Gate/Trunk as determined by counting pulses from Encoder Sensor 1. RGT_Position_Status = 0 when the Rear Gate/Trunk is fully closed and latched.

< **R:** 2.4.10.1.2> The RGTM shall set RGT_Position_Status = 0 when Synch_Status -> SYNCH, OR when RGT_Latch_Status = LATCHED, AND RGT_Position_Status = RGT_Position_Out_Of_Range.

< **R:** 2.4.10.1.3> The RGTM shall set RGT_Position_Status = 0 when the module goes to the sleep state.

< **R:** 2.4.10.1.4 > The RGTM shall set RGT_Position_Status = RGT_Position_Out_Of_Range on module Reset.

< **R:** 2.4.10.1.5 > For self rising systems the RGTM shall set RGT_Full_Open_Position = Mechanical_Full_Open_Position – 3 degrees and for counter balanced systems the RGTM shall set RGT_Full_Open_Position = Mechanical_Full_Open_Position - 0.5 degrees. (**Except Option L1**).

(Option L1) Once the user starts learning the gate maximum opening angle, the EEprom location will contain the learned Full_Open_Position information. This is kept and restored after reset / power-up.

< **R:** 2.4.10.1.6> The RGTM shall set RGT_Position_Status = RGT_Position_Out_Of_Range when VbattState[Encoder] = UNDER_V | OVER_V

Mechanical_Full_Open_Position is determined by a supplier defined strategy.

< **R:** 2.4.10.1.7> The RGTM shall set Mechanical_Full_Open_Position to Minumum_Full_Open_Position if the mechanical stop position has not yet been determined.

< **R:** 2.4.10.1.8> The RGTM shall set RGT_Position_Status = 0 when RGT_System_Cfg = MANUAL.

2.4.10.2 Determine Rear Gate/Trunk Ajar Status

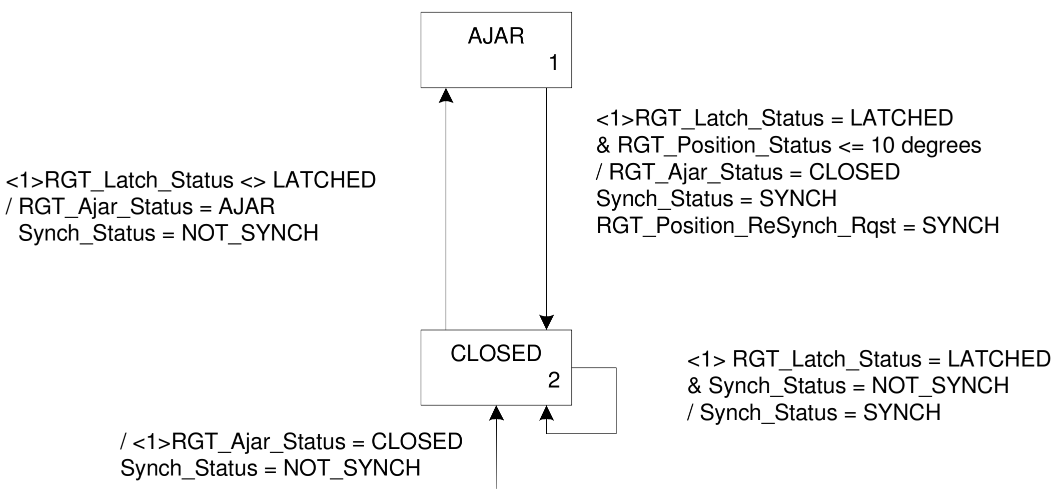


Figure 55. Determine Rear Gate/Trunk Ajar Status Data Flow Diagram

2.4.10.3 Read Rear Gate/Trunk Glass Ajar Signal

The RGT_Glass_Ajar_Signal is a wakeup input to the RGTM.

If RGT_Glass_Ajar_Present = PRESENT, apply 1 through 8 below:

1) The input to the RGTM (RGT_Glass_Ajar_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The RGTM shall sample the RGT_Glass_Ajar_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) The RGTM shall be capable of detecting a change in value (either rising edge or falling edge) of the RGT_Glass_Ajar_Signal while the RGTM is asleep.

4) When the RGTM is asleep and RGT_Glass_Ajar_Signal changes value, the RGTM shall temporarily awaken within 50 milliseconds and debounce RGT_Glass_Ajar_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set RGT_Glass_Ajar_Status to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

5) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Glass_Ajar_Signal is taken, then that sample is to be considered invalid (Software Requirement #0066). RGT_Glass_Ajar_Status will not change state, and the number of consecutive samples for debounce must be restarted.

6) The RGTM shall set RGT_Glass_Ajar_Status = CLOSED when all consecutive samples of RGT_Glass_Ajar_Signal indicate a closed circuit for a time period of at least 45 (+/- 11) milliseconds (V < 2.2 volts).

7) The RGTM shall set RGT_Glass_Ajar_Status = AJAR when all consecutive samples of RGT_Glass_Ajar_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds (V > 8.0 volts).

8) The RGTM shall set RGT_Glass_Ajar_Status = AJAR upon a module reset.

9) If RGT_Glass_Ajar_Present = NOT_PRESENT, the RGTM shall set RGT_Glass_Ajar_Status = CLOSED.

2.4.10.4 Generate Rear Gate/Trunk Ajar Signal

< **R:** **2.4.10.4.1**> The RGTM shall set RGT_Ajar_Signal = Ground whenever:

RGT_Ajar_Status = CLOSED
AND RGT_Glass_Ajar_Status = CLOSED.

< **R:** **2.4.10.4.2**> The RGTM shall set RGT_Ajar_Signal = Open Circuit whenever:

RGT_Ajar_Status = AJAR
OR RGT_Glass_Ajar_Status = AJAR.

< **R:** **2.4.10.4.3**> The state of RGT_Ajar_Signal is independent of Local_OpMode.

< **R:** **2.4.10.4.4**> The RGTM shall set RGT_Ajar_Signal = Open Circuit upon module reset.

2.4.10.5 Determine Rear Gate/Trunk Speed

This strategy is supplier defined.

2.4.10.6 Handle Mechanical Overload Clutch slip

< **R:** **2.4.10.6.1**> Set “OLC_slip_detected = TRUE” when the Slip detection algorithm detects a slipping clutch.

2.4.11 Power Drive Unit

2.4.11.1 Drive Motor Control

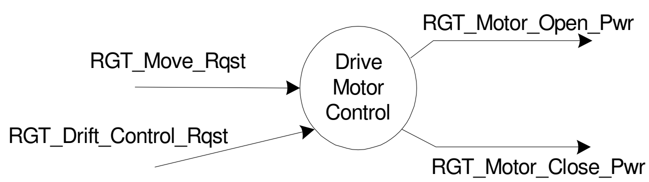


Figure 56. Drive Motor Control Data Flow Diagram

Rqmt No.	RGT_Move _Rqst	RGT_Drift_ Control_Rqst	RGT_Motor_ Open_ Pwr	RGT_Motor_ Close_ Pwr
R: **2.4.11.1.1**	CLOSE	Don't Care	Ground *	Vbatt
R: **2.4.11.1.2**	OPEN	Don't Care	Vbatt	Ground *
R: **2.4.11.1.3**	NULL	NULL	Ground	Ground
R: **2.4.11.1.4**	CINCH	Don't Care	Ground	Ground
R: **2.4.11.1.5**	NULL	HOLD	TBD	TBD
R: **2.4.11.1.6**	NULL	CLOSE	Ground *	Vbatt
R: **2.4.11.1.7**	NULL	OPEN	Vbatt	Ground *

Table 23. Drive Motor Control Decision Table

< **R:** 2.4.11.1.8> Pulse Width Modulation is used to control the speed of the Rear Gate/Trunk. The speed of the Rear Gate/Trunk is determined by the rate of change in the Rear Gate/Trunk position as measured by the Encoder Sensors. The strategy for speed control is defined by the supplier.

< **R:** 2.4.11.1.9> The opening/closing operation shall complete within the time(s) specified in the Latch SDS.

2.4.12 Latch Interface (Strattec C32P Power Cinching Latch)

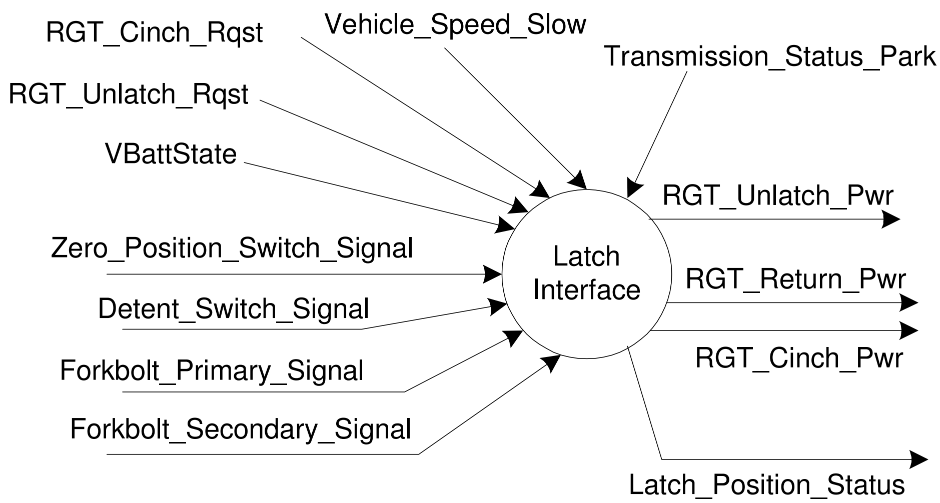


Figure 58. Latch Interface Data Flow Diagram 1

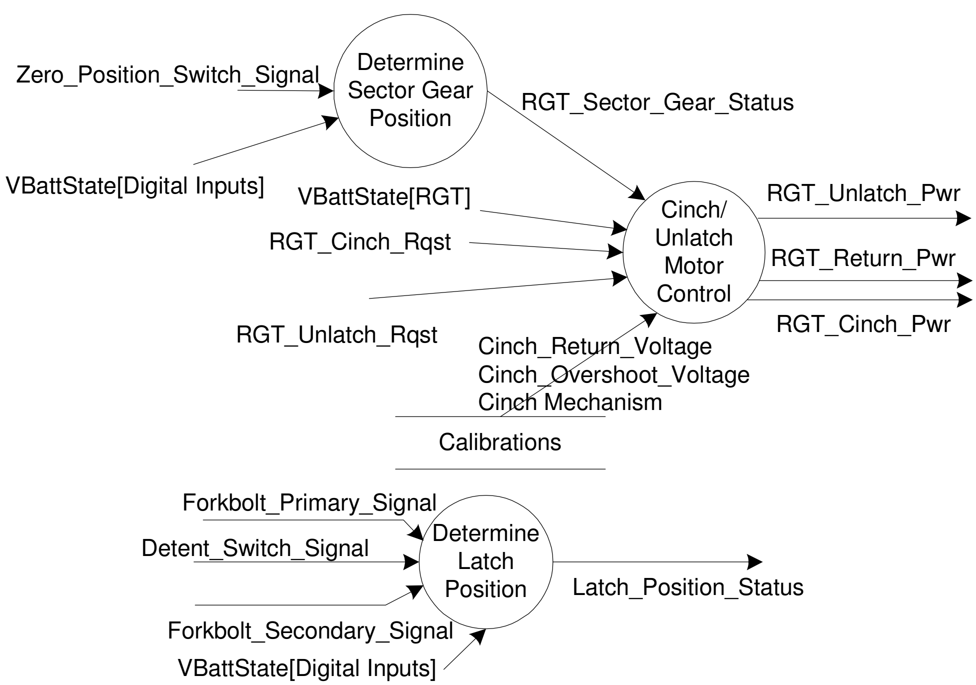


Figure 59. Latch Interface Data Flow Diagram 2 (Decomposed)

Strattec C32P Power Cinching Latch Operation details

Tables 24 and 25 Assumption: Switch actuation matches Strattec Sept 24 2010 Presentation. These tables detail controller actions related to latch state, showing when to Start Cinching and Stop Cinching Motor activation.

1st Claw switch: N.O. sw , 2nd Claw switch: N.O. sw, Pawl switch : NC sw, 0 position Switch: N.O. switch to GND in latch as discussed in Oct 4 2010 Ford Webex meeting.

Controller switch interface : Switch pulled high inside RGTM, resulting in switch activation states shown in Tables 24 and 25 for corresponding latch states.

Cinching and Reversing Process Strattec C32P Latch (open -> Closed -> Reversed)

Latch State Number		Latch Status	M2 = Cinch Motor	M1 = Release Motor	S4 = 0 position switch (N.O.)	S3 = Detent Switch (N.C.)	S2 = 2nd Claw Switch (N.O.)	S1 = 1st Claw Switch (N.O.)
		Open	0	0	0	1	1	1
1		2nd claw switch => switch to 0	0	0	0	1	0	1
2	Mechanical Secondary Position	Pawl switch => switch to 0	0	0	0	0	0	1
3		Activate Cinch Motor	1	0	0	0	0	1
4		0-Position switch => switch to 1	1	0	1	0	0	1
5		Pawl switch => switch to 1	1	0	1	1	0	1
6		1st claw switch => switch to 0	1	0	1	1	0	0
7	Mechanical Primary Position	Pawl switch => switch to 0	1	0	1	0	0	0
8		Stop Activate Cinch Motor	0	0	1	0	0	0
9		Activate Reverse Cinch Motor	-1	0	1	0	0	0
10		0-Position switch => switch to 0	-1	0	0	0	0	0
11		Stop Reverse Cinch Motor	0	0	0	0	0	0
		Closed and Reversed	0	0	0	0	0	0

Table Legend : **1/0 = Motor Activated/not Activated Status 1/0= Switch Active/Not Active**

Table 24. Strattec C32P Cinching Latch Power Cinch Process.

Power Releasing Process Strattec C32P Latch
(Closed -> Open)

Latch State Number	Latch Status	M2 = Cinch Motor	M1 = Release Motor	S4 = 0 position sw (N.O.)	S3 = Detent Switch (N.C.)	S2 = 2nd Claw Switch (N.O.)	S1 = 1st Claw Switch (N.O.)	Notes
	Latch Closed	0	0	0	0	0	0	
1	Activate Release Motor	0	1	0	0	0	0	Release Motor Activation time= 500msec
2	Pawl switch => switch to 1	0	1	0	1	0	0	
3	1st claw switch => switch to 1	0	1	0	1	0	1	
4	Pawl switch => switch to 0	0	1	0	0	0	1	
5	Pawl switch => switch to 1	0	1	0	1	0	1	
6	2nd claw switch => switch to 1	0	1	0	1	1	1	
7	Stop Activate Release Motor	0	0	0	1	1	1	
	Latch Open	0	0	0	1	1	1	

Table Legend: 1/0 = Motor Activated/Not Actuated Status 1/0 Switch Active/Not Active

Notes:

- Release memory lever will hold latch in open state until striker is removed, re-introduced again to latch

- No Release operation permitted while cinching

Table 25. Strattec C32P Cinching Latch Power Release Process

NOTE_1: Table 25 shows the latch status switches transition through states from LATCH CLOSED to LATCH OPEN during power release process. A mechanical snow load memory lever HOLDS THE LATCH IN OPEN STATE FOLLOWING RELEASE MOTOR ACTUATION, until the striker is removed from the latch and re-introduced into the latch.

NOTE_2: To Power Open, the Module has to evaluate only Pawl Switch. Primary and Secondary switches should not be used by the system in the logic to power open.

2.4.12.1 Determine Latch Position

This section applies for Strattec C32P Power Cinching Latch and for GECOM latch.

The Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal are wake-up inputs to the RGTM.

1) The RGTM shall sample the inputs Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

2) The RGTM shall sample the Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal with a sample period of no more than 50 milliseconds while the RGTM is asleep (Software Requirement #0056).

3) The RGTM shall sample each of the above signals at the same time to prevent excessive sampling error.

4) The RGTM shall combine the samples of each of the above signals according to the Determine Latch Position Decision Table to produce Latch_Position_Signal.

5) The input to the RGTM (Latch_Position_Signal) shall be debounced for between 34 and 56 milliseconds to determine Latch_Position_Status (Software Requirement #0045).

6) When the RGTM is asleep and a sample of Latch_Position_Signal is different than previous samples, the RGTM shall temporarily awaken and debounce Latch_Position_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set Latch_Position_Status to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

7) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Latch_Position_Signal is taken, then that sample is to be considered ERROR (Software Requirement #0066).

8) The RGTM shall set Latch_Position_Status to the current value of Latch_Position_Signal when at least 5 consecutive samples of Latch_Position_Signal are the same.

Rqmt No.	Forkbolt_ Primary_Signal (NO)	Forkbolt_ Secondary_Signal (NO)	Detent_Switch _ Signal (NC)	Latch_Position_Signal
R: 2.4.12.1.1	Not Active	Not Active	Active	BEFORE_PRIMARY
R: 2.4.12.1.2	Not Active	Not Active	Not Active	LATCHED (Primary)
R: 2.4.12.1.3	Not Active	Active	DON'T CARE	ERROR
R: 2.4.12.1.4	Active	Not Active	Active	BEFORE_SECONDARY
R: 2.4.12.1.5	Active	Not Active	Not Active	SECONDARY
R: 2.4.12.1.6	SEE NOTE	SEE NOTE	SEE NOTE	UNLATCHED
R: 2.4.12.1.7	Not Active	Not Active	Active	OPEN
R: 2.4.12.1.8	DON'T CARE	DON'T CARE	DON'T CARE	CINCHING/REVERSING

Table 26. Determine Latch Position Decision Table (Strattec C32P Power Cinching Latch).

NOTE : Table 25 shows the latch status switches transition through states from LATCH CLOSED to LATCH OPEN during power release process. A mechanical snow load memory lever HOLDS THE LATCH IN OPEN STATE FOLLOWING RELEASE MOTOR ACTUATION, until the striker is removed from the latch and re-introduced into the latch.

Switch activation condition -> logic level by switch type

Not Active = 0/NC 1/NO switch, Active = 1/NC 0/NO switch

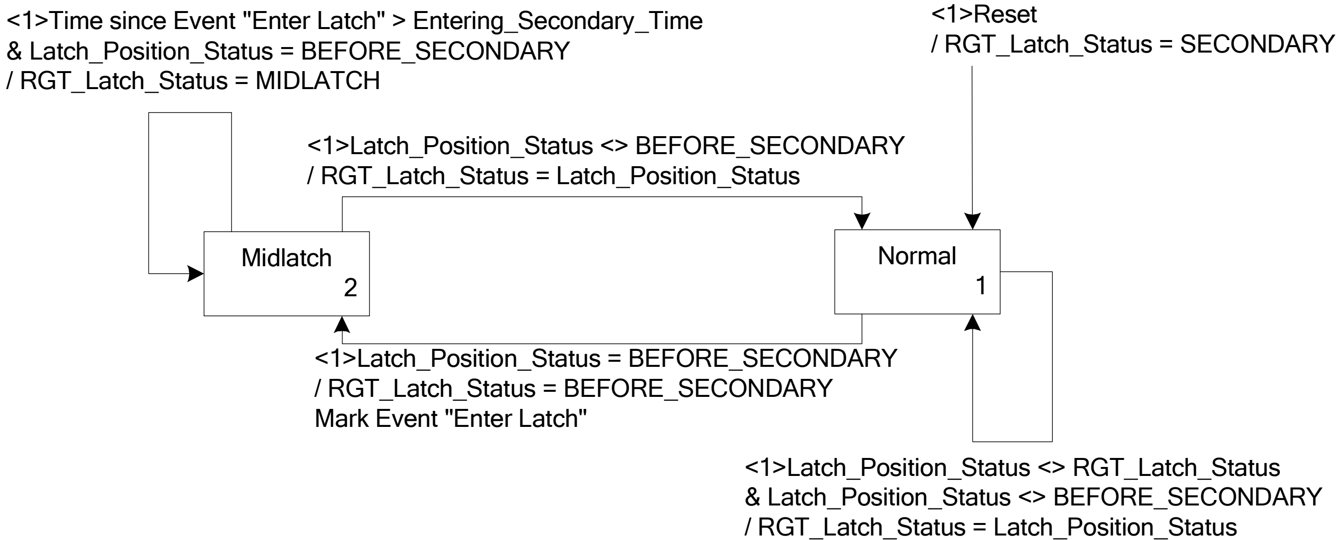


Figure 60. Determine RGT_Latch_ Status State Transition Diagram

2.4.12.2 Cinch/Unlatch Motor Control (Strattec C32P cinching latch)

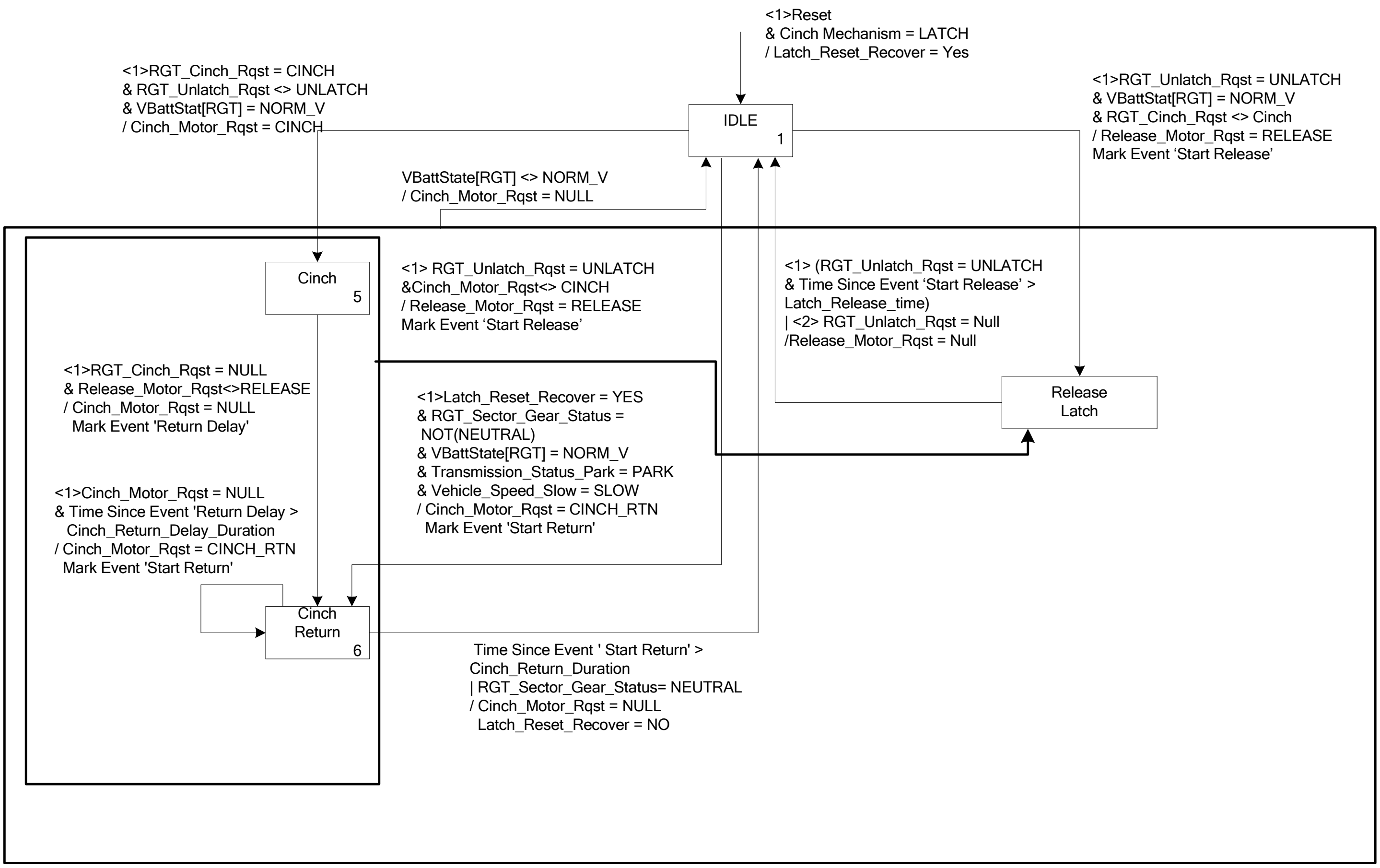


Figure 61 – Cinch/Release Motor Control State Transition Diagram

Rqmt No.	RGT_Cinch_Rqst	RGT_Cinch_Pwr	RGT_Return_Pwr
R: 2.4.12.2.1	CINCH	Vbatt*	Ground
R: 2.4.12.2.2	NULL	Ground	Ground
R: 2.4.12.2.3	CINCH_RTN	Ground	Vbatt*

Table 27. Cinch Motor Decision Table

Rqmt No.	Release_Motor_Rqst	RGT_Unlatch_Pwr
R: 2.4.12.2.4	NULL	Ground
R: 2.4.12.2.5	RELEASE	Vbatt*

Table 28. Release Motor Decision Table

< **R:** 2.4.12.2.6> The ground circuit may be PWM'ed to regulate the RMS voltage output to the unlatch actuator (supplier defined).

Unlatch Relax Duration is the time for the Latch Motor to be driven in the reverse direction to get to the Park position. This value must be stored in non-volatile memory.

< **R:** 2.4.12.2.7> The cinching operation shall complete within the time(s) specified in the Latch SDS.

< **R:** 2.4.12.2.8> During CINCH_RETURN, the PWM duty shall be set such that the RMS voltage applied is equal to Cinch Return Voltage.

2.4.12.3 Determine Sector Gear Position

Strattec C32P Latch contains a 'Zero position switch' to indicate status of latch cinching mechanism. The Zero_Position_Switch_Signal and Detent_Switch_Signal switch states are combined with commanded RGT_Cinch_Pwr and RGT_Return_Pwr of the latch Cinch Motor to define Sector_Gear_Position_Signal.

The Sector_Gear_Position_Signal is NOT a wake-up input to the RGTM.

1) The RGTM shall sample the input Zero_Position_Switch_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) The RGTM shall sample each of the above signals at the same time to prevent excessive sampling error.

4) The RGTM shall assign Sector_Gear_Position_Signal according to Determine Sector Gear Position Decision Table.

5) The input to the RGTM (Sector_Gear_Position_Signal) shall be debounced for between 34 and 56 milliseconds to determine Latch_Zero_Position_Status (Software Requirement #0045).

7) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Sector_Gear_Position_Signal is taken, then that sample is to be considered the same as the previous valid sample (Software Requirement #0066).

8) The RGTM shall set RGT_Sector_Gear_Status to the current value of Sector_Gear _Position_Signal when at least 5 consecutive samples of Sector_Gear_Position_Signal are the same.

Rqmt No.	Detent_Switch_Signal (NC)	Zero_Position_ Switch_Signal (NO)	RGT_Cinch_Pwr	RGT_Return_Pwr	Sector_Gear_Position_ Signal
R: 2.4.12.3.1	INACTIVE	INACTIVE	Ground	Ground	NEUTRAL
R: 2.4.12.3.2	ACTIVE	ACTIVE	Vbatt*	Ground	NOT(NEUTRAL)
R: 2.4.12.3.3	INACTIVE	ACTIVE	Ground	Vbatt*	NOT(NEUTRAL)

Note: Inactive = 0/NC 1/NO, Active = 1/NC 0/NO

Table 29. Determine Sector Gear Position Decision Table.

2.4.13 Power Latch/Striker Interface (Strattec MDD Latch/ Cinching Striker)

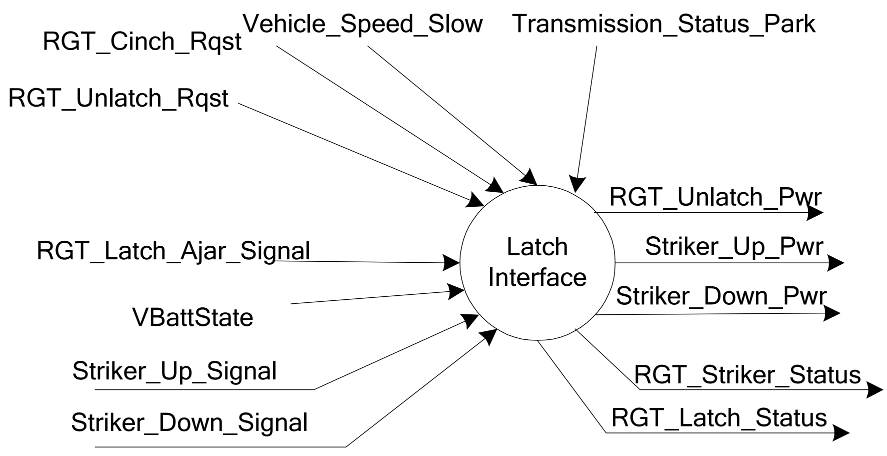


Figure 62. Latch Interface Data Flow Diagram 1

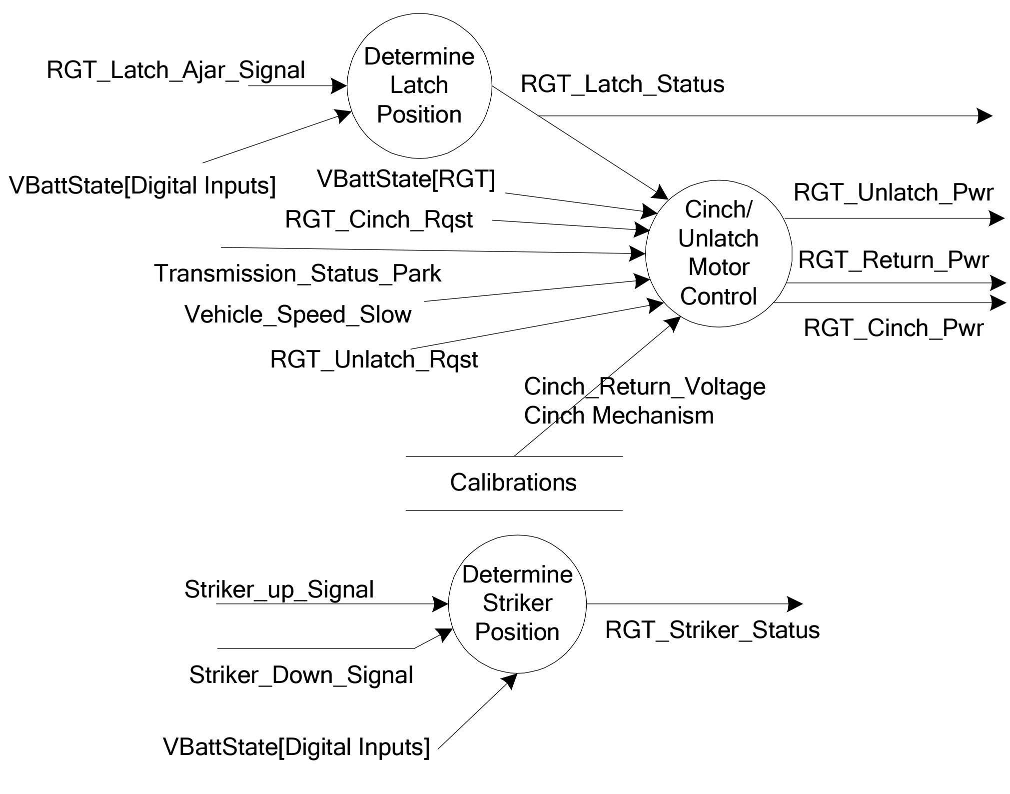


Figure 63. Latch Interface Data Flow Diagram 2 (Decomposed)

2.4.13.1 Determine Latch Position (Strattec MDD latch /cinching striker)

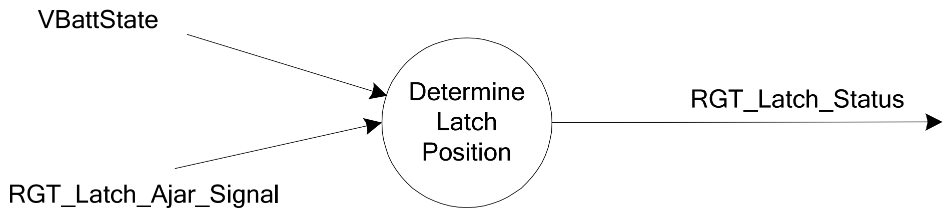


Figure 64. Determine Latch Position Data Flow Diagram

The RGT_Latch_Ajar_Signal, is wake-up input to the RGTM.

1) The RGTM shall sample the RGT_Latch_Ajar_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0055).

2) The RGTM shall sample the RGT_Latch_Ajar_Signal with a sample period of no more than 50 milliseconds while the RGTM is asleep (Software Requirement #0045).

3) The RGTM shall be capable of detecting a change in value (either rising edge or falling edge) of the RGT_Latch_Ajar_Signal while the RGTM is asleep..

5) The Latch status input to the RGTM (RGT_Latch_Ajar_Signal) shall be debounced for between 34 and 56 milliseconds to determine RGT_Latch_Ajar_Status (Software Requirement #0056).

6) When the RGTM is asleep and a sample of RGT_Latch_Ajar_Signal is different than previous samples, the RGTM shall temporarily awaken and debounce RGT_Latch_Ajar_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the RGTM shall set RGT_Latch_Ajar_Signal to the new state and remain awake. Otherwise, the RGTM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

7) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Latch_Ajar_Signal is taken, then that sample is to be considered no change from last sample (Software Requirement #0066).

8) The RGTM shall set RGT_Latch_Status to the current value of RGT_Latch_Ajar_Signal when at least 5 consecutive samples of RGT_Latch_Ajar_Signal are the same.

9) The RGTM shall set RGT_Latch_Status = LATCHED when all consecutive samples of RGT_Latch_Ajar_Signal indicate a closed circuit for a time period of at least 45 (+/- 11) milliseconds.

10) The RGTM shall set RGT_Latch_Status = UNLATCHED when all consecutive samples of RGT_Latch_Ajar_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds.

11) The RGTM shall set RGT_Latch_Status = UNKNOWN upon a module reset.

12) The RGTM shall set RGT_Latch_Status = UNKNOWN whenever VbattState[Digital Inputs] <> NORM_V

2.4.13.2 Determine Striker Position(Strattec MDD latch /cinching striker)

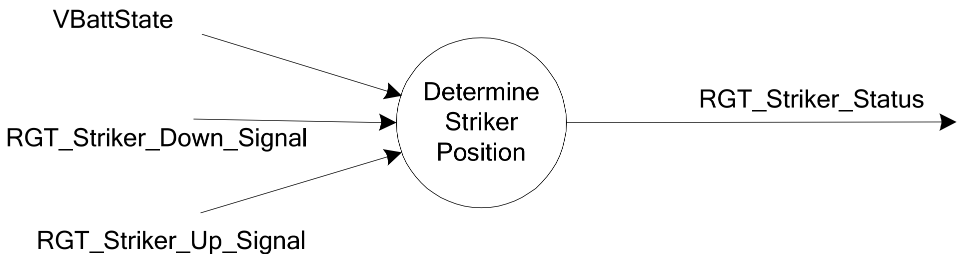


Figure 65. Determine Striker Position Data Flow Diagram

2.4.13.2.1 RGT Striker Up Switch

The RGT_Striker_Up_Signal is NOT a wakeup input to the RGTM.

1) The input to the RGTM (RGT_Striker_Up_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0056).

2) The RGTM shall sample the RGT_Striker_Up_Signal with a sample period of no more than 11 milliseconds while the PDLM is awake (Software Requirement #0044).

3) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Striker_Up_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).

4) The RGTM shall set RGT_Striker_Up_Status = UP when all consecutive samples of RGT_Striker_Up_Signal indicate a closed circuit for a time period of at least 45 (+/- 11) milliseconds.

5) The RGTM shall set RGT_Striker_Up_Status = NOT_UP when all consecutive samples of PDL_Striker_Up_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds.

6) The RGTM shall set RGT_Striker_Up_Status = NOT_UP upon a module reset.

2.4.13.2.2 RGT Striker Down Switch

The RGT_Striker_Down_Signal is NOT a wakeup input to the RGTM.

1) The input to the RGTM (RGT_Striker_Down_Signal) shall be debounced for between 34 and 56 milliseconds (Software Requirement #0045).

2) The PDLM shall sample the RGT_Striker_Down_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake (Software Requirement #0044).

3) If VbattState[Digital Inputs] <> NORM_V at the time a sample of RGT_Striker_Down_Signal is taken, then that sample is to be considered open circuit (Software Requirement #0066).

4) The RGTM shall set RGT_Striker_Down_Status = DOWN when all consecutive samples of RGT_Striker_Down_Signal indicate an open circuit for a time period of at least 45 (+/- 11) milliseconds.

5) The RGTM shall set RGT_Striker_Down_Status = NOT_DOWN when all consecutive samples of PDL_Striker_Down_Signal indicate an closed circuit for a time period of at least 45 (+/- 11) milliseconds.

6) The RGTM shall set RGT_Striker_Down_Status = NOT_DOWN upon a module reset.

2.4.13.2.3 Striker Status

Rqmt No.	RGT_Striker_Up_Status	RGT_Striker_Down_Status	RGT_Striker_Status
R: 2.4.13.2.3.1	UP	NOT_DOWN	UP
R: 2.4.13.2.3.2	NOT_UP	NOT_DOWN	MID
R: 2.4.13.2.3.3	UP	DOWN	MID
R: 2.4.13.2.3.4	NOT_UP	DOWN	DOWN

Table 30. Striker Status Decision Table

2.4.13.3 Cinch Motor Control (Strattec MDD latch /cinching striker)

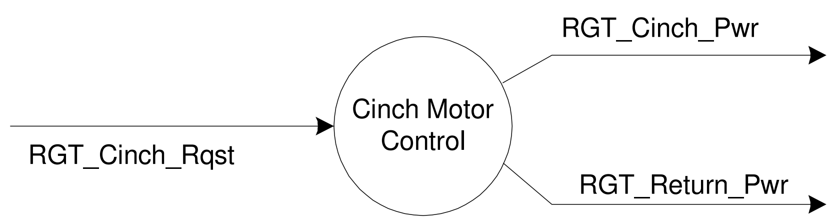


Figure 66 – Cinch/Uncinch Motor Control Data Flow Diagram

Rqmt No.	Cinch Mechanism	RGT_Cinch_Rqst	RGT_Cinch_Pwr	RGT_Return_Pwr
R: 2.4.13.3.1	Striker	CINCH	Vbatt	Ground
R: 2.4.13.3.2	Striker	RAISE	Ground	Vbatt
R: 2.4.13.3.3	Striker	NULL	Ground	Ground
R: 2.4.13.3.4	Latch	Don't Care	Ground	Ground

Table 31. Cinch Motor Decision Table.

< **R:** 2.4.13.3.5> The ground circuit may be PWM'ed to regulate the RMS voltage output to the unlatch actuator (supplier defined).

< **R:** 2.4.13.3.6> The cinching operation shall complete within the time(s) specified in the Latch SDS.

< **R:** 2.4.13.3.7> During CINCH_RETURN, the PWM rate shall be set such that the RMS voltage applied is equal to Cinch Return Voltage.

2.4.13.3.1 Release Solenoid Control (Strattec MDD latch /cinching striker)

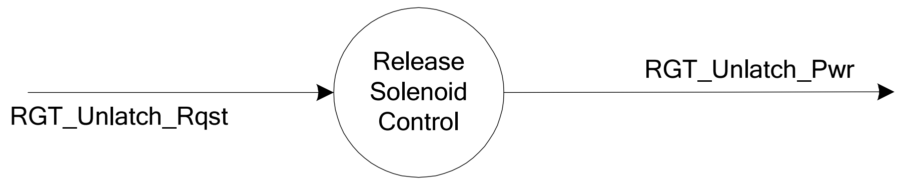


Fig 67 Release Solenoid Dataflow Diagram

Rqmt No.	Cinch Mechanism	RGT_Unlatch_Rqst	RGT_Unlatch_Pwr
R: 2.4.13.3.1.1	Striker	UNLATCH	Vbatt
R: 2.4.13.3.1.2	Striker	NULL	Open Circuit
R: 2.4.13.3.1.3	Latch	Don't Care	Open Circuit

Table 32 Release Solenoid Decision Table

2.4.14 Battery Voltage Monitor

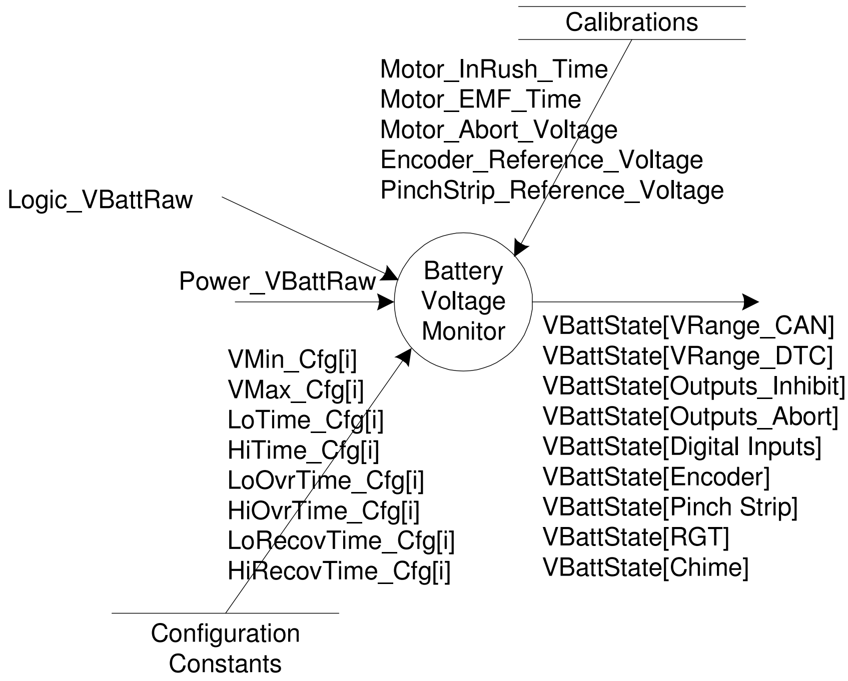


Figure 68. Battery Voltage Monitor Data Flow Diagram

Each defined *Voltage Range* must be evaluated using this state machine.

Rqmt No.	Current State	Event	Action	Next State
R: 2.4.14.1	Any	Power-up or Reset & VBattRaw > Vmax_Cfg[I]	VbattState[I] = HI_V Mark event EXIT_NORM[I]	HI_VOLT
R: 2.4.14.2	Any	Power-up or Reset & VBattRaw < Vmin_Cfg[I]	VbattState[I] = LO_V Mark event EXIT_NORM[I]	LO_VOLT
R: 2.4.14.3	Any	Power-up or Reset & VBattRaw ≤ Vmax_Cfg[I] & VBattRaw ≥ Vmin_Cfg[I]	VbattState[I] = NORM_V	NORM_VOLT
R: 2.4.14.4	NORM_VOLT	VBattRaw > Vmax_Cfg[I]	VbattState[I] = HI_V Mark event EXIT_NORM[I]	HI_VOLT
R: 2.4.14.5		VBattRaw < Vmin_Cfg[I]	VbattState[I] = LO_V Mark event EXIT_NORM[I]	LO_VOLT
R: 2.4.14.6	HI_VOLT	VBattRaw ≤ Vmax_Cfg[I]	Mark event ENTER_NORM[I]	WAIT NORM FROM HI
R: 2.4.14.7		Time since event EXIT_NORM[I] >= HiOvrTime_Cfg[I]	VbattState[I] = OVER_V	OVER_VOLT
R: 2.4.14.8	WAIT NORM FROM HI	VBattRaw > Vmax_Cfg[I]	(no action)	HI_VOLT
R: 2.4.14.9		Time since event ENTER_NORM[I] = HiTime_Cfg[I]	VbattState[I] = NORM_V	NORM_VOLT
R: 2.4.14.10	LO_VOLT	VBattRaw ≥ Vmin_Cfg[I]	Mark event ENTER_NORM[I]	WAIT NORM FROM LO
R: 2.4.14.11		Time since event EXIT_NORM[I] >= LoOvrTime_Cfg[I]	VbattState[I] = UNDER_V	UNDER_VOLT
R: 2.4.14.12	WAIT NORM FROM LO	VBattRaw < Vmin_Cfg[I]	(no action)	LO_VOLT
R: 2.4.14.13		Time since event ENTER_NORM[I] = LoTime_Cfg[I]	VbattState[I] = NORM_V	NORM_VOLT
R: 2.4.14.14	OVER_VOLT	VBattRaw ≤ Vmax_Cfg[I]	Mark event ENTER_NORM[I]	WAIT NORM FROM OVER
R: 2.4.14.15	WAIT NORM FROM OVER	VBattRaw > Vmax_Cfg[I]	(no action)	OVER_VOLT
R: 2.4.14.16		Time since event ENTER_NORM[I] = HiRecovTime_Cfg[I]	VbattState[I] = NORM_V	NORM_VOLT
R: 2.4.14.17	UNDER_VOLT	VBattRaw ≥ Vmin_Cfg[I]	Mark event ENTER_NORM[I]	WAIT NORM FROM UNDER
R: 2.4.14.18	WAIT NORM FROM UNDER	VBattRaw < Vmin_Cfg[I]	(no action)	UNDER_VOLT
R: 2.4.14.19		Time since event ENTER_NORM[I] = LoRecovTime_Cfg[I]	VbattState[I] = NORM_V	NORM_VOLT

Table 33 – Finite State Machine for Vbatt Monitor

< **R:** 2.4.14.20> The RGTM shall sample Logic_VBattRaw and Power_VBattRaw with a sample period of no more than 5 milliseconds while the RGTM is awake (Software Requirement #0066).

2.4.14.1 Defined Voltage Ranges

2.4.14.1.1 MS CAN Interface

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.1.1	Vmin_Cfg[Vrange_CAN]	8.0 volts	Minimum voltage for operating MS CAN.
R: 2.4.14.1.1.2	Vmax_Cfg[Vrange_CAN]	16.0 volts	Maximum voltage for operating MS CAN.
R: 2.4.14.1.1.3	LoTime_Cfg[Vrange_CAN]	15 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.1.4	HiTime_Cfg[Vrange_CAN]	15 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.1.5	LoOvrTime_Cfg[Vrange_CAN]	20 *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.1.6	HiOvrTime_Cfg[Vrange_CAN]	160 *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.1.7	LoRecovTime_Cfg[Vrange_CAN]	200 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.1.8	HiRecovTime_Cfg[Vrange_CAN]	200 *m*sec	Recovery time to NORM_V from OVER_V

Table 34 – *Voltage Range* Configuration for MS CAN

2.4.14.1.2 DTC Logging

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.2.1	Vmin_Cfg[Vrange_DTC]	9.5 volts	Minimum voltage for DTC reporting
R: 2.4.14.1.2.2	Vmax_Cfg[Vrange_DTC]	16.0 volts	Maximum voltage for DTC reporting
R: 2.4.14.1.2.3	LoTime_Cfg[Vrange_DTC]	15 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.2.4	HiTime_Cfg[Vrange_DTC]	15 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.2.5	LoOvrTime_Cfg[Vrange_DTC]	5 *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.2.6	HiOvrTime_Cfg[Vrange_DTC]	5 *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.2.7	LoRecovTime_Cfg[Vrange_DTC]	2,000 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.2.8	HiRecovTime_Cfg[Vrange_DTC]	2,000 *m*sec	Recovery time to NORM_V from OVER_V

Table 35 – *Voltage Range* Configuration for DTC Logging

Note: This voltage range applies to all DTCs except battery voltage out of range DTCs.

2.4.14.1.3 Motor Outputs

This Voltage Range uses Power_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.3.1	Vmin_Cfg[Outputs_Inhibit]	9.5 volts	Minimum voltage for operating motor outputs
R: 2.4.14.1.3.2	Vmax_Cfg[Outputs_Inhibit]	16 volts	Maximum voltage for operating motor outputs
R: 2.4.14.1.3.3	LoTime_Cfg[Outputs_Inhibit]	15 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.3.4	HiTime_Cfg[Outputs_Inhibit]	15 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.3.5	LoOvrTime_Cfg[Outputs_Inhibit]	Motor_InRush_Time *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.3.6	HiOvrTime_Cfg[Outputs_Inhibit]	Motor_EMF_Time *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.3.7	LoRecovTime_Cfg[Outputs_Inhibit]	1000 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.3.8	HiRecovTime_Cfg[Outputs_Inhibit]	1000 *m*sec	Recovery time to NORM_V from OVER_V

Table 36 – *Voltage Range* Configuration for Motor Outputs – Inhibit Operation

This Voltage Range uses Power_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.3.9	Vmin_Cfg[Outputs_Abort]	Motor_Abort_Voltage volts	Minimum voltage for operating motor outputs
R: 2.4.14.1.3.10	Vmax_Cfg[Outputs_ Abort]	16 volts	Maximum voltage for operating motor outputs
R: 2.4.14.1.3.11	LoTime_Cfg[Outputs_ Abort]	15 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.3.12	HiTime_Cfg[Outputs_ Abort]	15 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.3.13	LoOvrTime_Cfg[Outputs_ Abort]	Motor_InRush_Time *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.3.14	HiOvrTime_Cfg[Outputs_ Abort]	Motor_EMF_Time *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.3.15	LoRecovTime_Cfg[Outputs_ Abort]	1000 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.3.16	HiRecovTime_Cfg[Outputs_ Abort]	1000 *m*sec	Recovery time to NORM_V from OVER_V

Table 37 – *Voltage Range* Configuration for Motor Outputs – Abort Operation

2.4.14.1.4 Digital Inputs

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.4.1	Vmin_Cfg[Digital Inputs]	8volts	Minimum voltage for reading digital inputs
R: 2.4.14.1.4.2	Vmax_Cfg[Digital Inputs]	16 volts	Maximum voltage for reading digital inputs
R: 2.4.14.1.4.3	LoTime_Cfg[Digital Inputs]	5 msec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.4.4	HiTime_Cfg[Digital Inputs]	5 msec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.4.5	LoOvrTime_Cfg[Digital Inputs]	15 msec	LO_V too long, enter UNDER_V (Keep less than debounce.)
R: 2.4.14.1.4.6	HiOvrTime_Cfg[Digital Inputs]	15 msec	HI_V too long, enter OVER_V (Keep less than debounce.)
R: 2.4.14.1.4.7	LoRecovTime_Cfg[Digital Inputs]	1000 msec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.4.8	HiRecovTime_Cfg[Digital Inputs]	1000 msec	Recovery time to NORM_V from OVER_V

Table 38 – *Voltage Range* Configuration for Motor Outputs – Inhibit Operation

2.4.14.1.5 Encoder

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.5.1	Vmin_Cfg[Encoder]	Encoder_Reference_Voltage volts	Minimum voltage for reading encoder
R: 2.4.14.1.5.2	Vmax_Cfg[Encoder]	16 volts	Maximum voltage for reading encoder
R: 2.4.14.1.5.3	LoTime_Cfg[Encoder]	5 msec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.5.4	HiTime_Cfg[Encoder]	5 msec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.5.5	LoOvrTime_Cfg[Encoder]	15 msec	LO_V too long, enter UNDER_V
R: 2.4.14.1.5.6	HiOvrTime_Cfg[Encoder]	15 msec	HI_V too long, enter OVER_V
R: 2.4.14.1.5.7	LoRecovTime_Cfg[Encoder]	1000 msec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.5.8	HiRecovTime_Cfg[Encoder]	1000 msec	Recovery time to NORM_V from OVER_V

Table 39 – *Voltage Range* Configuration for Motor Outputs – Inhibit Operation

2.4.14.1.6 Pinch Strip

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.6.1	Vmin_Cfg[Pinch Strip]	PinchStrip_Reference_ Voltage volts	Minimum voltage for reading pinch strip
R: 2.4.14.1.6.2	Vmax_Cfg[Pinch Strip]	16 volts	Maximum voltage for reading pinch strip
R: 2.4.14.1.6.3	LoTime_Cfg[Pinch Strip]	5 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.6.4	HiTime_Cfg[Pinch Strip]	5 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.6.5	LoOvrTime_Cfg[Pinch Strip]	15 *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.6.6	HiOvrTime_Cfg[Pinch Strip]	15 *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.6.7	LoRecovTime_Cfg[Pinch Strip]	1000 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.6.8	HiRecovTime_Cfg[Pinch Strip]	1000 *m*sec	Recovery time to NORM_V from OVER_V

Table 40 – *Voltage Range* Configuration for Motor Outputs – Inhibit Operation

2.4.14.1.7 Power Rear Gate/Trunk Feature

VbattState[RGT] is determined by combining the VbattState[Outputs_Inhibit] and VbattState[Outputs_Abort] and VbattState[Digital Inputs] and VbattState[Encoder] and VbattState[Pinch Strip]:

Rqmt. No	VbattState [Outputs_ Abort]	VbattState [Outputs_Inhibit]	VbattState [Digital Inputs]	VbattState [Encoder]	VbattState [Pinch Strip]	VbattState [RGT]
R: 2.4.14.1.7.1	UNDER_V	Don't Care	Don't Care	Don't Care	Don't Care	ABORT_V
R: 2.4.14.1.7.2	NORM_V	UNDER_V | OVER_V	UNDER_V | OVER_V	Don't Care	Don't Care	ABORT_V
R: 2.4.14.1.7.3	NORM_V	UNDER_V | OVER_V	NORM_V | HI_V | LO_V	UNDER_V | OVER_V	Don't Care	ABORT _V
R: 2.4.14.1.7.4	NORM_V	UNDER_V | OVER_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	UNDER_V | OVER_V	ABORT _V
R: 2.4.14.1.7.5	NORM_V	UNDER_V | OVER_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	INHIBIT_V
R: 2.4.14.1.7.6	NORM_V	NORM_V | HI_V | LO_V	UNDER_V | OVER_V	Don't Care	Don't Care	ABORT _V
R: 2.4.14.1.7.7	NORM_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	UNDER_V | OVER_V	Don't Care	ABORT _V
R: 2.4.14.1.7.8	NORM_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	UNDER_V | OVER_V	ABORT _V
R: 2.4.14.1.7.9	NORM_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	NORM_V | HI_V | LO_V	NORM_V
R: 2.4.14.1.7.10	OVER_V	Don't Care	Don't Care	Don't Care	Don't Care	ABORT_V

Table 41 - Determine VbattState[RGT]

2.4.14.1.8 Chime

This Voltage Range uses Logic_VBattRaw as VBattRaw in the state machine.

Rqmt No.	Dataflow/Other	Value	Description
R: 2.4.14.1.8.1	Vmin_Cfg[RGT Chime]	8volts	Minimum voltage for operating chime
R: 2.4.14.1.8.2	Vmax_Cfg[RGT Chime]	16 volts	Maximum voltage for operating chime
R: 2.4.14.1.8.3	LoTime_Cfg[RGT Chime]	5 *m*sec	Recovery time to NORM_V from LO_V
R: 2.4.14.1.8.4	HiTime_Cfg[RGT Chime]	5 *m*sec	Recovery time to NORM_V from HI_V
R: 2.4.14.1.8.5	LoOvrTime_Cfg[RGT Chime]	15 *m*sec	LO_V too long, enter UNDER_V
R: 2.4.14.1.8.6	HiOvrTime_Cfg[RGT Chime]	15 *m*sec	HI_V too long, enter OVER_V
R: 2.4.14.1.8.7	LoRecovTime_Cfg[RGT Chime]	1000 *m*sec	Recovery time to NORM_V from UNDER_V
R: 2.4.14.1.8.8	HiRecovTime_Cfg[RGT Chime]	1000 *m*sec	Recovery time to NORM_V from OVER_V

Table 42 – *Voltage Range* Configuration for Motor Outputs – Inhibit Operation

2.4.15 Determine Ignition Status

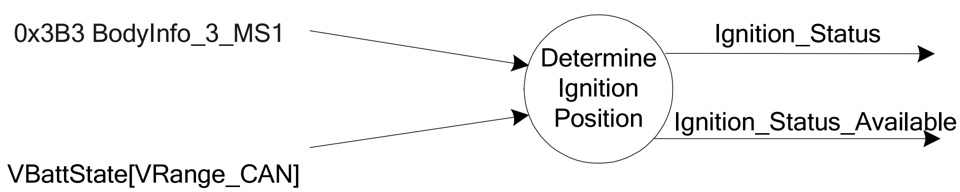


Figure 69. Determine Ignition Position Data Flow Diagram 1

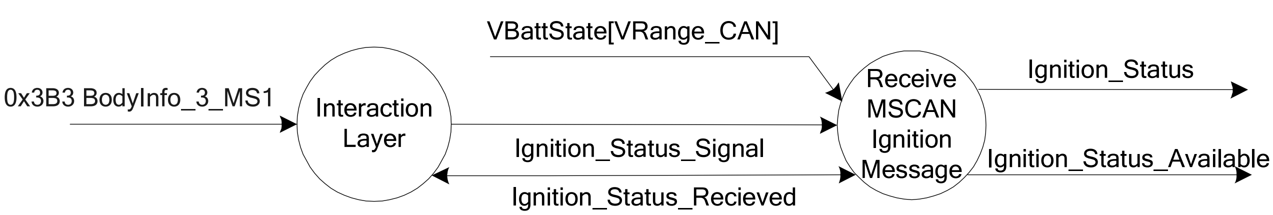


Figure 70. Determine Ignition Position Data Flow Diagram 2 (Decomposed)

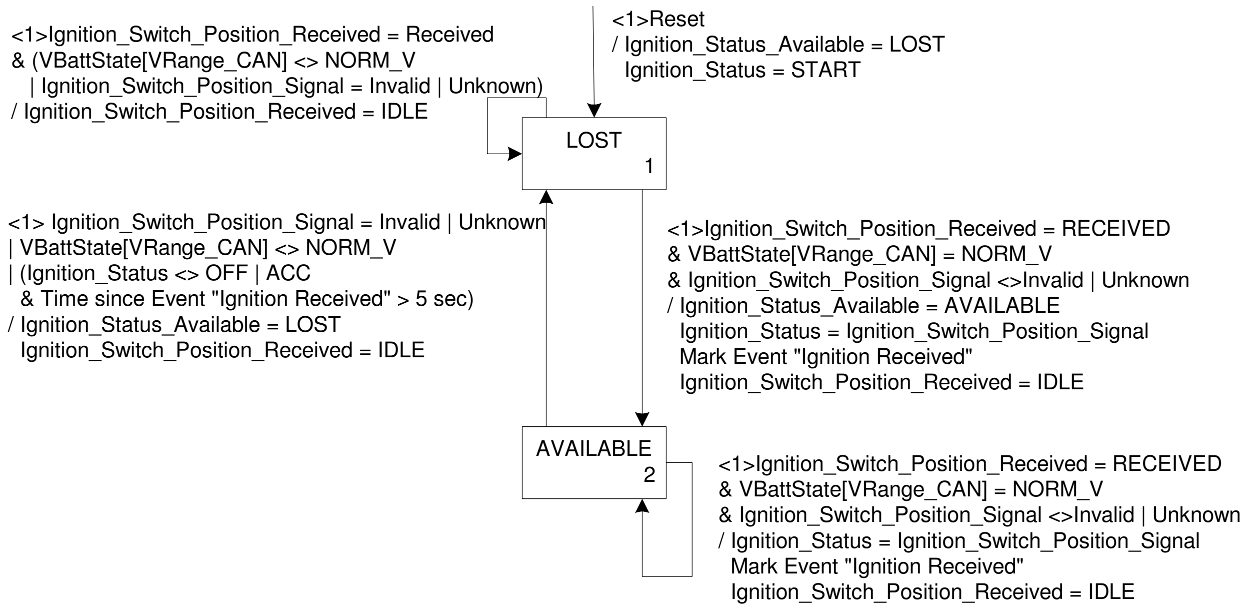


Figure 71. Receive MSCAN Ignition Message State Transition Diagram

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	Ignition_Switch_ Position_Signal
0x3B3	BodyInfo_3_MS1	Ignition_Status	Unknown	0x0	UNKNOWN
			Off	0x1	OFF
			Accessory	0x2	ACC
			Run	0x4	RUN
			Start	0x8	START
			Invalid	0xF	INVALID

Table 43. Source for Ignition_Switch_Position_Signal.

2.4.16 Determine Engine Start Stop Status

The Start/Stop feature shall be enabled upon the Start_Stop_Present configuration.
The following directions should be followed to Stop/Start systems from North America and Europe programs:

North America Market:
The Override timer (Pending_Rq_Time_CFG) for the Liftgate delay should be set to 2 secs

EU Market:
The Override timer (Pending_Rq_Time_CFG) for the Liftgate delay should be set to 0 secs
For Europe, Power liftgate should be activated if Stop in Neutral + Stop in Park.

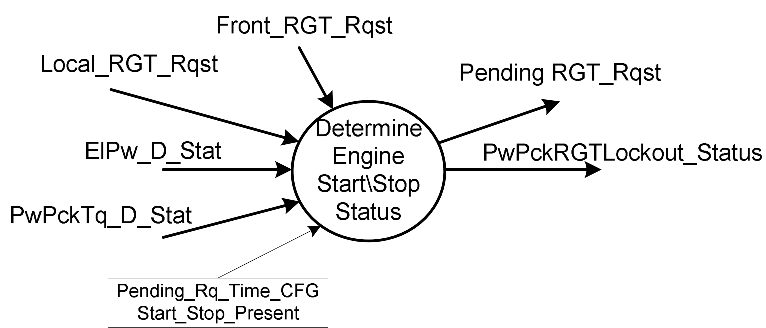


Figure 72 Determine Engine Start Stop Status Data Flow Diagram

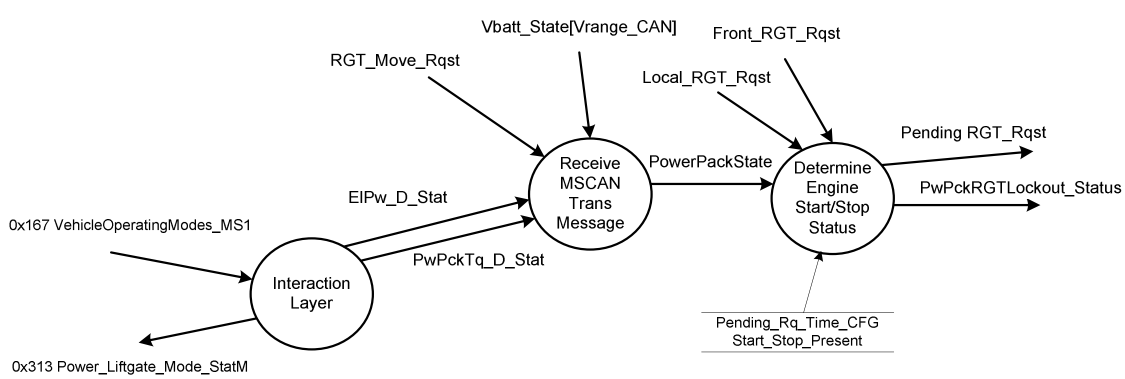


Figure 73 Determine Engine Start Stop Status Data Flow Diagram (Decomposed)

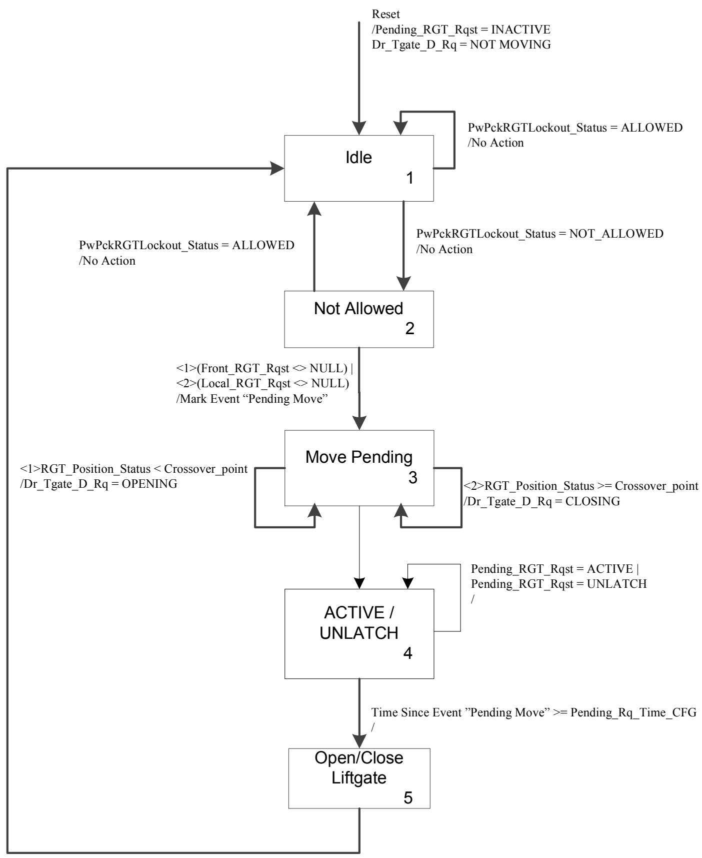


Figure 74. Determine Engine Start Stop Status Transition Diagram

Rqmt No.	Pending_Rq_Time_CFG	Start_Stop_Pending_Timer_ Status
R: 2.4.16.1	Pending_move < Pending_Rq_Time_CFG	NOT_EXPIRED
R: 2.4.16.2	Pending_move >= Pending_Rq_Time_CFG	EXPIRED

Table 44. Decision Table for Start_Stop_Pending_Timer_Status

Rqmt No.	PwPckTq_D_Stat	ElPw_D_Stat	PowerPackState	PwPckRGTLockout_Status
R: 2.4.16.3	OFF_NO_TQ	Don't Care	OFF	ALLOWED
R: 2.4.16.4	START_IN_PROGRESS	Don't Care	STARTING	NOT_ALLOWED
R: 2.4.16.5	ON_NO_TQ	Don't Care	REMOTE_STARTING	ALLOWED
R: 2.4.16.6	ON_TQ_AVAILABLE	SUPPORTED	RUNNING	ALLOWED
R: 2.4.16.7	ON_TQ_AVAILABLE	NOT_SUPPORTED	AUTOSTOP	NOT_ALLOWED
R: 2.4.16.8	ON_TQ_AVAILABLE	IMMINENT	AUTOSHUTDOWN	NOT_ALLOWED
R: 2.4.16.9	ON_TQ_AVAILABLE	EVENT_IN_PROGRESS	AUTOSTART	NOT_ALLOWED
R: 2.4.16.10	ON_TQ_AVAILABLE	FAULT | NOT_USED1 | NOT_USED2 | NOT_USED3	RUNNING	ALLOWED

Table 45. Decision Table for PwPckRGTLockout_Status

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	PwPckTq_D_Stat
0x167	VehicleOperatingModes_MS1	PwPckTq_D_Stat	PwPckOff_TqNotAvailable	0x0	OFF _NO_TQ
			PwPckOn_TqNotAvailable	0x1	ON_ NO_TQ
			StartInPrgrss_TqNotAvail	0x0	START_IN_PROGRESS
			PwPckOn_TqAvailable	0x1	ON_TQ_AVAILABLE

Table 46. Source for PwPckTq_D_Stat

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	ElPw_D_Stat
0x167	VehicleOperating Modes_MS1	ElPw_D_Stat	Not_Supported	0x0	NOT_SUPPORTED
			Supported	0x1	SUPPORTED
			Not_Supported_Imminent	0x2	IMMINENT
			LV_Event_In_Progress	0x3	EVENT_IN_PROGRESS
			Fault_Limited	0x4	FAULT
			NotUsed_1	0x5	NOT_USED1
			NotUsed_2	0x6	NOT_USED2
			NotUsed_3	0x7	NOT_USED3

Table 47. Source for ElPw_D_Stat

Rqmt No.	PwPckRGTLockout_Status	Front_RGT_Rqst	Local_RGT_Rqst	Pending_RGT_Rqst
R: 2.4.16.11	NOT_ALLOWED	INACTIVE	INACTIVE	INACTIVE
R: 2.4.16.12	NOT_ALLOWED	ACTIVE	INACTIVE	ACTIVE
R: 2.4.16.13	NOT_ALLOWED	INACTIVE	ACTIVE	ACTIVE
R: 2.4.16.14	NOT_ALLOWED	INACTIVE	UNLATCH	UNLATCH
R: 2.4.16.15	NOT_ALLOWED	ACTIVE	ACTIVE	INACTIVE
R: 2.4.16.16	ALLOWED	Don't Care	Don't Care	INACTIVE

Table 48. Decision Table for Pending_RGT_Rqst

2.4.17 Manual Liftgate / Power Cinch Module.

The Manual Liftgate/Power Cinch Feature automatically releases/latches the liftgate.

Close operation
The power cinch should operate when the liftgate is manually closed to the secondary latch position, then the cinch motor drives the liftgate to the primary latch position.

Lockout – Default value = Not_Locked for Manual Gate Systems.

Inhibit – Default value = Not_Inhibit for Manual Gate System

Drift Control - Not Applicable for Manual Gate System since no motor is used to power open/close the liftgate.

Operating Voltage Range
Except as noted above, the voltage system must operate is as defined in SDS requirement EL-0058.

Programmable Stop (Option L1) - Not Applicable for Manual Gate System since no motor is used to power open/close the liftgate.

2.4.17.1 Determine Latch position (GECOM latch)

The Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal are wake-up inputs to the PLGM.

1) The PLGM shall sample the inputs Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal with a sample period of no more than 11 milliseconds while the PLGM is awake (Software Requirement #0044).

2) The PLGM shall sample the Forkbolt_Secondary_Signal, Forkbolt_Primary_Signal, and Detent_Switch_Signal with a sample period of no more than 50 milliseconds while the PLGM is asleep (Software Requirement #0056).

3) The PLGM shall sample each of the above signals at the same time to prevent excessive sampling error.

4) The PLGM shall combine the samples of each of the above signals according to the Determine Latch Position Decision Table to produce Latch_Position_Signal.

5) The input to the PLGM (Latch_Position_Signal) shall be debounced for between 34 and 56 milliseconds to determine Latch_Position_Status (Software Requirement #0045).

6) When the PLGM is asleep and a sample of Latch_Position_Signal is different than previous samples, the PLGM shall temporarily awaken and debounce Latch_Position_Signal with the awake sample period (max 11 milliseconds). If the debounced signal verifies a change of state, the PLGM shall set Latch_Position_Status to the new state and remain awake. Otherwise, the PLGM shall return to the sleep mode within 2 minutes (Software Requirement #0055).

7) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Latch_Position_Signal is taken, then that sample is to be considered ERROR (Software Requirement #0066).

8) The PLGM shall set Latch_Position_Status to the current value of Latch_Position_Signal when at least 5 consecutive samples of Latch_Position_Signal are the same.

Req #	Forkbolt_ Primary_Signal	Forkbolt_ Secondary_Signal	Detent_Switch_ Signal	Latch_Position_Signal
2.4.17.1.1	INACTIVE	INACTIVE	INACTIVE	BEFORE_PRIMARY
2.4.17.1.2	INACTIVE	INACTIVE	ACTIVE	LATCHED
2.4.17.1.3	INACTIVE	ACTIVE	INACTIVE	ERROR
2.4.17.1.4	INACTIVE	ACTIVE	ACTIVE	ERROR
2.4.17.1.5	ACTIVE	INACTIVE	INACTIVE	BEFORE_SECONDARY
2.4.17.1.6	ACTIVE	INACTIVE	ACTIVE	SECONDARY
2.4.17.1.7	ACTIVE	ACTIVE	INACTIVE	UNLATCHED
2.4.17.1.8	ACTIVE	ACTIVE	ACTIVE	OPEN

Table 49. Determine GECOM Latch Position Decision Table.

Req#	Valid_RGT_Move_Request	RGT_Unlatch_Request
2.4.17.1.9	ACTIVE	UNLATCH
2.4.17.1.10	INACTIVE	NULL
2.4.17.1.11	UNLATCH	UNLATCH
2.4.17.1.12	INHIBIT	NULL

Table 50. Determine PLG_Cinch_Request Decision table

2.4.17.2 Cinch/Unlatch Motor Control (GECOM Latch)

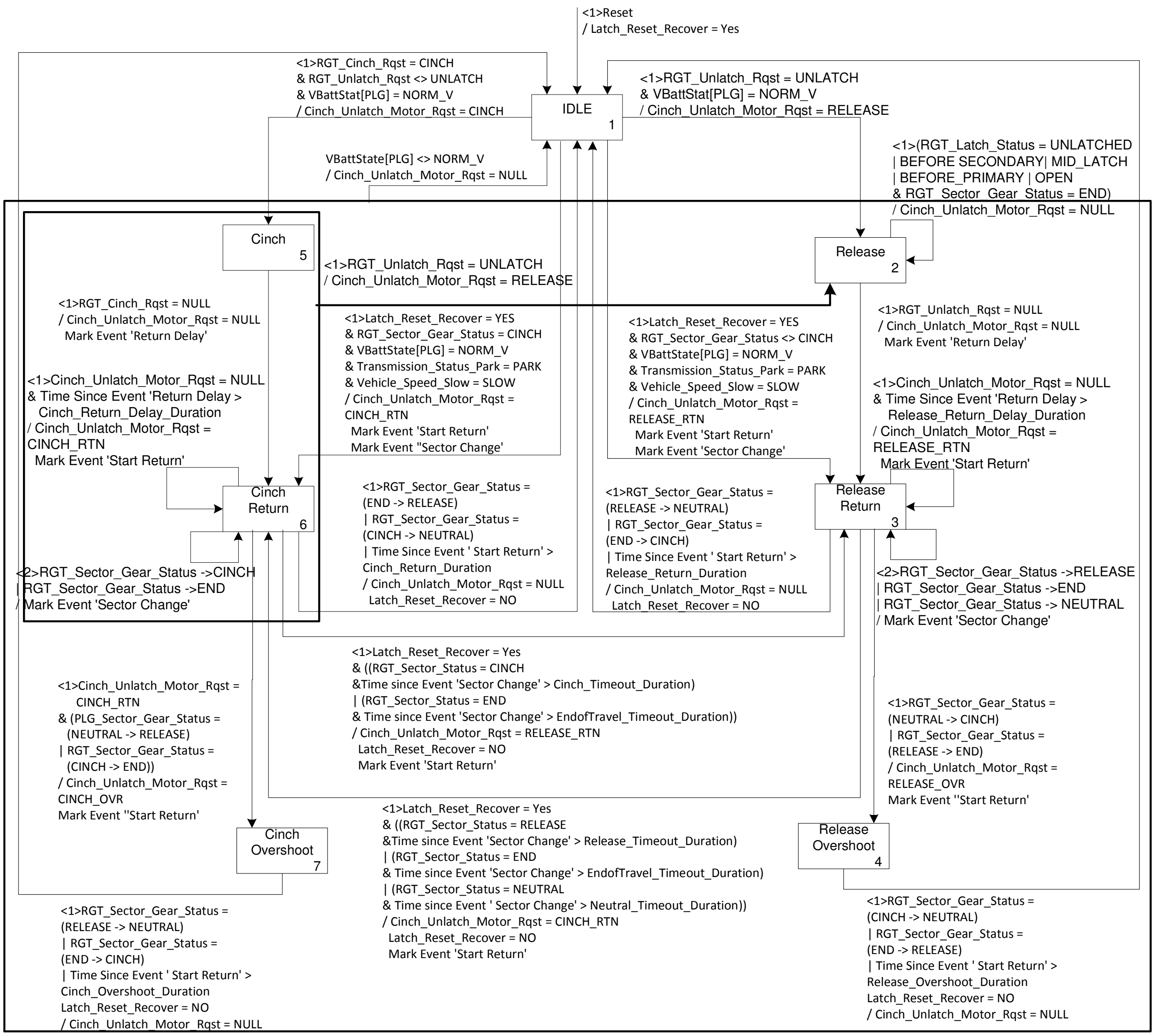


Figure 75. Cinch/Unlatch Control State Transition Diagram

Req #	Cinch_Unlatch_Motor_Rqst	RGTM_Cinch_Pwr	RGTM_Unlatch_Pwr
R: 2.4.17.2.1	CINCH	Vbatt*	Ground
R: 2.4.17.2.2	NULL	Ground	Ground
R: 2.4.17.2.3	RELEASE	Ground	Vbatt*
R: 2.4.17.2.4	RELEASE_RTN	Vbatt*	Ground
R: 2.4.17.2.5	CINCH_RTN	Ground	Vbatt*
R: 2.4.17.2.6	CINCH_OVR	Vbatt*	Ground
R: 2.4.17.2.7	RELEASE_OVR	Ground	Vbatt*

Table 51. Cinch/Unlatch Motor Decision Table

<5> The ground circuit may be PWM'ed to regulate the RMS voltage output to the unlatch actuator (supplier defined).

Unlatch Relax Duration is the time for the Latch Motor to be driven in the relax direction to get to the Park position. This value must be stored in non-volatile memory.

<6> The cinching operation shall complete within the time(s) specified in the Latch SDS.

<8> During CINCH_RETURN, the PWM rate shall be set such that the RMS voltage applied is equal to Cinch Return Voltage.

<11> During CINCH_OVR, the PWM rate shall be set such that the RMS voltage applied is equal to Cinch_Overshoot_Voltage.

2.4.17.3 Determine Sector Gear Position

The Sector_Open_Switch_Signal and Sector_Close_Switch_Signal are NOT wake-up inputs to the RGTM.

1) The RGTM shall sample the inputs Sector_Open_Switch_Signal, Sector_Close_Switch_Signal with a sample period of no more than 11 milliseconds while the RGTM is awake.

3) The RGTM shall sample each of the above signals at the same time to prevent excessive sampling error.

4) The RGTM shall combine the samples of each of the above signals according to the Determine Sector Gear Position Decision Table to produce Sector_Gear_Position_Signal.

5) The input to the RGTM (Sector_Gear_Position_Signal) shall be debounced for between 34 and 56 milliseconds to determine PLG_Sector_Gear_Status.

7) If VbattState[Digital Inputs] <> NORM_V at the time a sample of Sector_Gear_Position_Signal is taken, then that sample is to be considered the same as the previous valid sample.

8) The RGTM shall set RGT_Sector_Gear_Status to the current value of Sector_Gear_Position_Signal when at least 5 consecutive samples of Sector_Gear_Position_Signal are the same.

Req #	Sector_Open_ Switch_Signal	Sector_Close_ Switch_Signal	Sector_Gear_Position_ Signal
R: 2.4.17.3.1	INACTIVE	INACTIVE	NEUTRAL
R: 2.4.17.3.2	INACTIVE	ACTIVE	RELEASE
R: 2.4.17.3.3	ACTIVE	INACTIVE	CINCH
R: 2.4.17.3.4	ACTIVE	ACTIVE	END

Table 52. Determine Sector Gear Position Decision Table.

2.4.18 Factory Mode

Factory Mode is used to determine the stages of the vehicle lifecycle. This lifecycle is presented in three stages:

Factory – car in production.

Transport – car in storage.

Normal – customer delivery and use.

Interaction of factory mode with the external switch is explicit in table 16 of this document.

When value of signal LifeCycMde_D_Actl is FACTORY the RGTM should:

- Does not permit powered decklid / liftgate operation. Power operation should be allowed only for Self Test Mode.
- Release of the latch if a valid RGTM configuration is loaded into the ECU (not default configuration).
- Release the decklid/liftgate latch with master open/close switch and exterior switch independent of all lockouts.
- Release the decklid/liftgate latch when central configuration data (manual/automatic transmission) is lost.
- Shut-face switch is not operational.

This mode will interact with ODO signal, and will check for 80 KM as a safeguard for exiting Factory Mode. Factory mode is in message BodyInfo_3 in the signal LifeCycMode_D_Actl:

CAN ID	CAN Message	Signal	Detailed Meaning	State Encoded	LifeCyc_Mode_Signal
0x3B3	BodyInfo_3_MS1	LifeCycMde_D_Actl	Normal	0x0	NORMAL
			Factory	0x1	FACTORY
			NA	0x2	NA
			Transport	0x3	TRANSPORT

Table 53. Determine Life Cycle Mode Table.

Rqmt No.	LifeCycMde_D_Actl	Odo_Status	LifeCyc_Mode_Signal
R: 2.4.18.1	NORMAL	LOW	NORMAL
R: 2.4.18.2	NORMAL	HIGH	NORMAL
R: 2.4.18.3	FACTORY	LOW	FACTORY
R: 2.4.18.4	FACTORY	HIGH	NORMAL
R: 2.4.18.5	TRANSPORT	LOW	NORMAL
R: 2.4.18.6	TRANSPORT	HIGH	NORMAL

Table 54. Determine Life Cycle Mode Signal.

2.4.18.1 Exit Criteria for Factory Mode.

To exit Factory Mode these are the conditions:

- **<R: 2.4.18.7>** In case of missing message for more than 30 secs. See figure 76.
- If odometer of the vehicle exceeds 80 Kms.

Allow Power Open/Close while Factory Mode:

If Factory_Power_Op = ON and Self Test Mode routine is Finished successfully in the opening direction. This operation should not be interrupted; if opening is interrupted Self Test routine must be re-run. After Self Test routine has finished the Lifgate learned full open position height and PLG should allow power open/close operation.

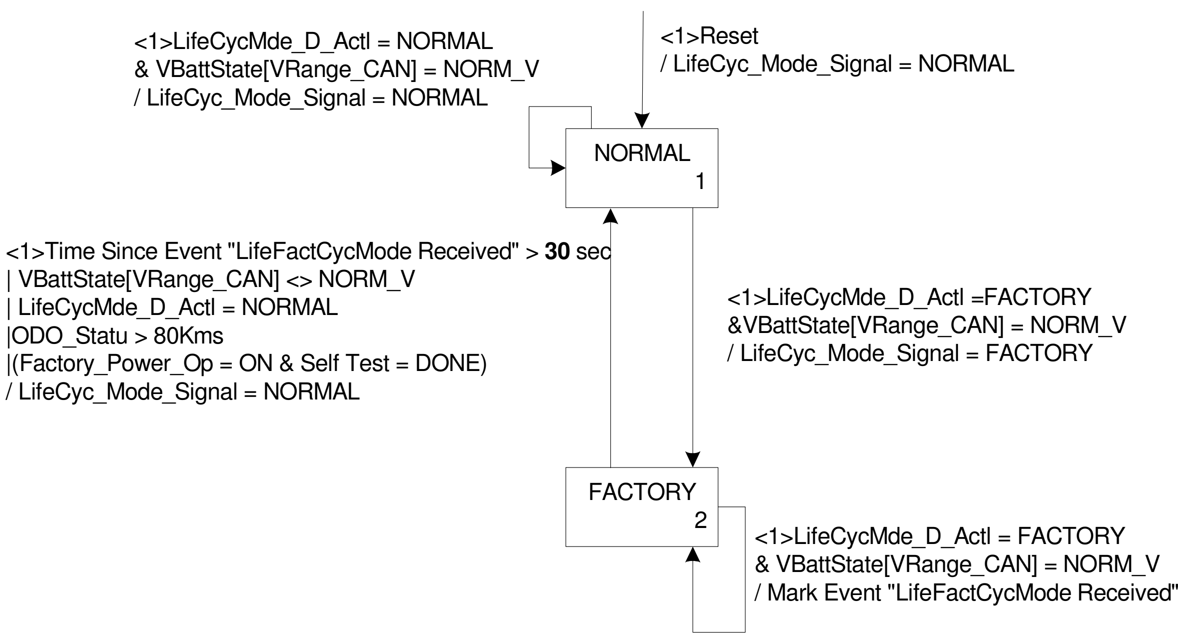


Figure 76. Life Cycle Mode Message State Transition Diagram

2.4.19 Self Test Mode.

Self Test Mode is a Control Routine Type 2. Its control routine number is 0x0202. The purpose of this routine is to Cycle the liftgate to Open/Close position and detemine if the module is working properly. Self Test Mode is a Learn Cycle for the PLG, this mode should allow the PLG to program the height of the liftgate.

During Self Test Mode when the lift gate reach the full mechanical open position the PLG should learn the length if it was not learned, in the case when the PLG was learned before the PLG should re-learn the gate length.

The operation of the routine is based in 3 steps:

1. The ECU will unlatch and cycle the rear gate/trunk from fully close position to fully open position.
2. Following a pause of 1 second, the rear gate/trunk is powered close to fully closed position.
3. If the fault(s) is (are) detected, self-test is aborted and on-demand DTC(s) is (are) logged.

To start the operation of the Self Test mode, the liftgate needs:

1. Rear gate/trunk must be in the fully latch position (latch is primary position)

The exit criteria for Self Test Mode if any of the following is TRUE:

DYNAMIC TEST

1. ECU does not receive a diagnostic message every 5 seconds.
2. Receipt of SID $32 "stopRoutineByLocalIdentifier ” message
3. Park Signal from CAN is NOT_PARK
4. Ignition Start Signal from CAN is START or INVALID
5. VSS Signal from CAN is > 5kph
6. Left or Right Pinch Strip(s) status is Pinched
7. Primary obstacle Or Secondary Obstacle Detected
8. Clutch Overtemperature detected
9. VBATT_LC out of range
10. VBATT_HC out of range
11. Latch Error
12. Test is not completed in 20 seconds (time out)

STATIC TEST

1. Gate is fully closed (Latch is fully latched).
2. Sector gear status
3. Latch motor circuit is not shorted to ground or battery
4. Gate motor circuit is not shorted to ground or battery
5. Left or Right Pinch Strips are not Pinched or shorted.
6. Ignition Signal from CAN is not available
7. Ignition Start Signal from CAN is START or INVALID
8. Park Signal from CAN not available
9. Park Signal from CAN is NOT PARK
10. VSS Signal from CAN is not available
11. VSS Signal from CAN is > 5kph
12. VBATT_LC out of range
13. VBATT_HC out of range
14. Self-Test Completed

2.4.20 Learn Cycle.

Learn cycle determines the height of the tailgate for the open position, this height determines how far the tailgate should open when power open operation is requested by master switch, key fob or handle switch. Learn cycle should be allowed under these two conditions: Normal mode and Factory mode.

FACTORY MODE:

1. Valid Config file is needed to allow learn cycle.
2. If not valid config tailgate should not allow learn cycle.
3. Learn Cycle is triggered running self test at any time.
4. In case of a battery disconnection (power on reset), learned open position should be stored.
5. To start learn cycle tailgate need to be fully closed and run only Self Test routine.

Only for Power Lifgate:

6. In case of Programmable Stop (Option L1), Position_Program_Present calibration tells if this option is enabled or not:
   - In case Position_Program_Present = NO; after self test is done successfully, learn position should be learned when gate opens to full open position. In case of a power on reset learned position should be stored. To relearn the tailgate position to full open position it´s necessary to run Self-Test.
   - In case Position_Program_Present = YES; after learn by Self Test routine if a Programmable liftgate height is set different from a full open position, in case of a power on reset the height should not be modified. To relearn to full mechanical open position it´s necessary to run Self Test.
   - If Position_Program_Present = YES: after Learn by Self Test routine if a Programmable liftgate height is NOT set, in case of a power on reset the learned position should be full open position and this position should be stored after power on reset. To relearn the tailgate position to full open position it´s necessary to run Self-Test again.

NORMAL MODE:

1. Valid Config file is needed to allow learn cycle.
2. Open_Cycle is triggered when tailgate is manually close to fully latched position and power open to full open position by master switch, key fob or handle switch.
3. For first Learn Cycle in this mode, tailgate need to be fully closed and run only Self Test routine.
4. After first learn cycle; Self Test should trigger learn cycle again. For Open_Cycle should not trigger learn cycle.
5. In case programmed before only Self Test triggers learn cycle, for details go to step 7.
6. In case of a battery disconnection (power on reset), height for open position should be stored.

Only for Power Liftgate:

7. In case of Programmable Stop (Option L1), Position_Program_Present calibration tells if this option is enabled or not:
   - In case Position_Program_Present = NO; learn position should be learned when gate opens to full open position after doing self test. In case of a power on reset learned position should be stored. To relearn the tailgate position to full open position it´s necessary to run self test.
   - In case Position_Program_Present = YES; after first learn cycle by doing self test; if a Programmable liftgate height is set different from a full open position, in case of a power on reset the height should not be modified. To relearn to full mechanical open position it´s necessary to run Self-Test.
   - If Position_Program_Present = YES: After first Learn Cycle by doing self test; if a Programmable liftgate height is NOT set, in case of a power on reset the learned position should be full open position and should be stored. To relearn the tailgate position to full open position it´s necessary to run Self-Test.

2.4.21 PLG Action Table

Next table represents the action taken by the module depending on the program, life cycle, learn and configuration file status.

PROGRAM	ACTIVATION	INITIAL PLG POSITION	LIFECYCLE STATUS	LEARN STATUS	CONFIG FILE STATUS	ACTION
CD533	Any PLG button	Closed	Factory	Not Learned	Default Config	Latch release only, no power open.
CD533	Manual to striker	Open	Factory	Not Learned	Default Config	Latch power cinch when put back to striker.
CD533	Any PLG button	Closed	Normal	Learned	Valid Config	Latch release and power open.
CD533	Any PLG button	Open	Normal	Learned	Valid Config	Power Close
CD533	Manual to striker	Open	Normal	Learned	Valid Config	Latch power cinch when put back to striker.
CD533	Any PLG button	Don´t care	Factory|Normal	Don´t care	Valid Config	Retain learn info on power reset.
CD539N	Any PLG button	Don´t care	Factory	Not Learned	Default Config	No latch release, no power open
CD539N	Any PLG button	Don´t care	Factory	Not Learned	Valid Config	No latch release, no power open
CD539N	Any PLG button	Don´t care	Normal	Not Learned	Default Config	No latch release, no power open
CD539N	Any PLG button	Closed	Normal	Not Learned	Valid Config	Latch release and power open.
CD539N	Manual to striker	Open	Normal	Not Learned	Valid Config	Only cinches when put back to striker.
CD539N	Any PLG button	Closed	Normal	Learned	Valid Config	Latch release and power open.
CD539N	Any PLG button	Open	Normal	Learned	Valid Config	Power Close
CD539N	Manual to striker	Open	Normal	Learned	Valid Config	Latch power cinch when put back to striker.
CD539N	Any PLG button	Don´t care	Factory|Normal	Don´t care	Valid Config	Retain learn info on power reset.
C489 soft|power	Any PLG button	Closed	Factory	Not Learned	Default Config	Latch release only, no power open.
C489 soft|power	Manual to striker	Open	Factory	Not Learned	Default Config	Latch power cinch (provided that the latch has been power released first)
C489 soft|power	Manual to striker	Open	Factory	Not Learned	Default Config	Latch power cinch (does not care if gate was previously open or closed for manual & Power
C489 soft|power	Any PLG button	Don´t care	Factory|Normal	Don´t care	Valid Config	Retain learn info on power reset.
C489 soft	Any PLG button	Closed	Normal	Not Learned	Valid Config	Latch release only.
C489 soft	Any PLG button	Open	Normal	Not Learned	Valid Config	Latch power cinch.
C489 power	Any PLG button	Closed	Factory	Learned	Valid Config	Latch release only, no power open.
C489 power	Manual to striker	Open	Factory	Learned	Valid Config	Latch power cinch when put back to striker.
C489 power	Any PLG button	Open	Factory	Learned	Valid Config	No Power Close
C489 power	Any PLG button	Closed	Normal	Not Learned	Valid Config	Latch release and power open.
C489 power	Manual to striker	Open	Normal	Not Learned	Valid Config	Latch power cinch when put back to striker.
C489 power	Any PLG button	Open	Normal	Not Learned	Valid Config	Power Close

3. DATA DICTIONARY

Dataflow Name	**Definition**	**Attributes**
BusWakeUp	Used to inform the network sleep/awake FSM and the local sleep/awake FSM that the MS CAN bus has been awakened from an incoming message. AWAKE – Network has woken up SLEEP – Network is asleep and hasn't woken up	Type: Internal – Discrete Default: AWAKE
CAN_TesterPhysicalReqRGTM	Diagnostic Tester physical request to RGTM.	Type : MSCAN Send On Change
CAN_TesterPhysicalResRGTM	RGTM Physical response to Diagnostic Tester.	Type : MSCAN Send On Change
CAN_ BodyGatewayData	MSCAN message containing Odometer Value, and Odometer Value updated Bit (UB) from the IP Cluster. Message ID : 0x3BE Signals : OdometerMasterValue OdometerMasterValue_UB	Type : MSCAN Transmit Model: Event Periodic Transmit Rate: 100 msec ←Send On Change ← No Send Type
CAN_EngineData_1_MS1	MSCAN message containing Auto transmission gear selected info. Message ID: 0x3BC Signals: GearLvrPos_D_Actl_Signal GearLvrPos_D_Actl_Signal_UB	Type: MSCAN Transmit Model: Fixed Periodic Transmit Rate: 50 msec No Send Type
CAN EngineData_2_MS1	MSCAN message containing vehicle speed info. Message ID: 0X42E Signals: VEH_V_ActlEng_Signal	Type: MSCAN Transmit Model: Fixed Periodic Transmit Rate: 50 msec No Send Type
CAN EngineData_2_MS1	MSCAN message containing vehicle speed info. Message ID: 0X42E Signals: VEH_V_ActlEng_Signal_UB	Type: MSCAN Transmit Model: Fixed Periodic Transmit Rate: 50 msec No Send Type
CAN_BODYINFO_3_MS1	MSCAN message containing Ignition Switch state info. Unknown - 0x0 Off - 0x1 Accessory - 0x2 Run - 0x4 Start - 0x8 Invalid - 0xF Message ID: 0x3B3 Signals: Ignition_Status	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 500 msec No Send Type

Dataflow Name	Definition	Attributes
CAN_Locking_Systems2_MS1	MSCAN message containing info on whether interior switches should be inhibited. No_Inhibit - 0x0 Inhibit - 0x1 Message ID: 0x331 Signals: LockInhibit_Signal	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec No Send Type
CAN_ Locking_Systems2_MS1	MSCAN message containing requests for Power Decklid function. Null - 0x0 Active - 0x1 Message ID: 0x331 Signals: Power_Decklid_Rqst	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec No Send Type
CAN_ Locking_Systems2_MS1	MSCAN message containing requests for Power Liftgate function. Null - 0x0 Active - 0x1 Message ID: 0x331 Signals: Power_Liftgate_Rqst	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec No Send Type
CAN_ Locking_Systems2_MS1	MSCAN message containing Keypad Message Counts. Bits : 8 Start Bit : 8 Minimum : 0 (0x0) Maximum : 255 (0xFF) Message ID : 0x331 Signal : Keyfob_Pad_Msg_Count	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec No Send Type
CAN_ Locking_Systems2_MS1	MSCAN message containing Vehicle Lock Status. LOCK_DBL - 0x0 LOCK_ALL - 0x1 UNLOCK_ALL - 0x2 UNLOCK_DRV - 0x3 Message ID: 0x331 Signals: Veh_Lock_Status	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec No Send Type
CAN_BodyInfo_MS1	MSCAN message containing info on the requested state of the lockout from the message center. Enable – 0x0 Disable – 0x1 Message ID: 0x3C4 Signals: Power_Liftgate_Mode_Cmd , Power_Liftgate_Mode_Cmd_UB	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 200 msec < Send on change < No Send Type

Dataflow Name	**Definition**	**Attributes**
CAN Power_Liftgate_Mode_StatM	MSCAN message containing info on **3.4.1.1 Chime attribute to be sent.** Off - 0x0 Long - 0x1 Short - 0x2 Fast - 0x3 Message ID: 0x313 Signals: DrTgateChime_D_Rq	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec Send on Change
CAN Power_Liftgate_Mode_StatM	MSCAN message containing info on Power Liftgate Interior Switch state. Null – 0x0 Pressed – 0x1 Message ID: 0x313 Signals : PwLftgtIntSw_B_Stat	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec Send on Change
CAN Power_Liftgate_Mode_StatM	MSCAN message containing info on power liftgate Enable Disable status acknowledgement from RGTM. Disabled - 0x0 Enabled - 0x1 Unused - 0x2 Not_Supported - 0x3 Message ID: 0x313 Signals : Power_Liftgate_Mode_Stat	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec Send on Change
CAN Power_Liftgate_Mode_StatM	MSCAN message containing info on gate status for Locking and Start Stop Not_Moving - 0x0 Opening - 0x1 Closing - 0x2 Not_Used - 0x3 Message ID: 0x313 Signals: DrTGate_D_Rq	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 1000 msec Send on Change

Dataflow Name	Definition	Attributes
CAN VehicleOperatingModes_MS1	CAN message containing vehicle operating mode information relating to Start Stop operation. Message ID: 0x167 Signals: ElPw_D_Stat, ElPw_D_Stat_UB, PwPckTq_D_Stat, PwPckTq_D_Stat_UB ,Eng_D_Stat, Eng_D_Stat_UB	Type : MSCAN Transmit Model: Event Periodic Transmit Rate: 10 msec No Send Type
Cinch_Overshoot_Voltage	Calibratible parameter to indicate the effective voltage to drive the latch motor during cinch overshoot return.	Type: Internal – Continuous Units: volts Default: TBD
Cinch Relax Duration	Calibratible Parameter to set the amount of time to drive the latch motor to return it to the center position from the cinch position. Range: 0 to 2000 milliseconds When set to 0, indicates no return from cinch.	Type: Internal – Continuous Units: milliseconds Default: 1500
Cinch_Return_Delay_Duration	Calibratable parameter for delay from a cinch operation to a cinch return operation. Range: 0 – 400 msec	Type: Internal – Continuous Default: 200 msec.
Cinch_Return_Voltage	Calibratible parameter to indicate the effective voltage to drive the latch motor during cinch return.	Type: Internal – Continuous Units: volts Default: TBD
Cinch_Unlatch_Motor_Rqst	Indicates the direction of latch motor movement requested. CINCH – drive motor to cinch latch RELEASE – drive motor to release latch NULL – no request RELEASE_RTN – drive motor to return from release operation CINCH_RTN – drive motor to return from cinch operation. RELEASE_OVR – drive motor back to neutral after overshooting a release return. CINCH_OVR – drive motor back to neutral after overshooting a cinch return.	Type: Internal – Discrete Default: NULL
Clear_Drift_Count_Rqst	Indicates that the DTC to disable the RGT has been cleared by a diagnostic tool. CLEAR – reset drift event count NO_CLEAR – do not reset drift event count	Type: Internal – Discrete Default: NO_CLEAR

Dataflow Name	Definition	Attributes
Close_Count	Counts number of consecutive close attempts made by the drift control algorithm. Range: 0 – 10 attempts	Type: Internal – Continuous Default: 0
ComboBus_Rqst	Indicates whether the network sleep conditions have been satisfied. Once this is NETSLEEP, there is an extra delay imposed by "WaitMsg_Cfg" NETAWAKE - Local conditions have not been met for letting the bus go to sleep NETSLEEP - Local conditions have been met - the bus can no attempt to sleep	Type: Internal – Discrete Default: NETAWAKE
Current_Sleep_Time	Indicates the amount of time that must elapse before the module can go to sleep. 10 sec or 6 hrs	Type: Internal – Discrete Default: 10 sec.
Decay_Constant	Used to capture the currently active volume decay rate for chime. 0 – no decay (tone) 0.7 – decay for 1 second chime	Type: Internal – Discrete Default: 0
Detent_Switch_Signal	Provides feedback on the state of the latch pawl (detent lever). Open Circuit – switch is Active Ground – switch is Not Active	Type: Physical Input – Discrete
Drift_Speed_High	Calibratible parameter to indicate the gate speed threshold to trigger a drift event. Range: TBD	Type: Internal – Continuous Default: TBD
Drift_Time	Calibratible parameter to indicate how long after the end of an open cycle to look for a drift event. Range: 1-1000 msec	Type: Internal – Continuous Default: TBD
DrTGate_D_Rq	Indicates if the power lift gate function has been requested back through the interaction layer.	Type : Unknown
DrTgateChime_D_Rq	CAN Signal request to sound a chime to indicate either a closing or opening operation or an obstacle detected while closing. See “RGTM Audible Feedback” ACTIVE – Sound chime INACTIVE – do notsound chime	Type: Internal – Discrete Default: INACTIVE
DrTgateChime_D_Rq_UB	Update Bit signal for Gateway functionality.	Type : Unknown
DTC_Drift_Count	Calibratible parameter to determine the number of consecutive open cycles resulting in drift events that can occur before disabling the RGT operation and setting a DTC. Range: 1 – 1000	Type: Internal – Continuous Default: TBD

Dataflow Name	Definition	Attributes
ECE_Inhibit_RGT	Signal that indicates when master open/close switch has to operate depending on the type or market (NA y EU) INHIBIT – Master Switch is not allowed to move the RGT NOT_INHIBIT – Master Switch allowed to move the RGT	
ElPw_D_Stat	MSCAN signal indicating the power pack supporting the 12V bus with energy, supporting but about to stop, not supporting and undergoing a large power draw (e.g. starting MHEV ICE), or in a fault limited support mode. Used to communicate AutoStop	Type : Internal-Discrete
Encoder_Reference_Voltage	Calibratible parameter to set lower threshold at which the encoder can be read reliably.	Type: Internal – Continuous Units: volts Default: 8
Encoder_Sensor_1_Signal	Pulse train signal that indicates the relative position of the Rear Gate/Trunk.	Type: Physical Input – Pulse Train
Encoder_Sensor_2_Signal	Pulse train signal that is phase shifted from sensor 1 to indicate direction of movement.	Type: Physical Input – Pulse Train
Entering_Secondary_Time	Calibratible Parameter to set the amount of time to continue to drive the drive motor once the before secondary latch position has been detected.	Type: Internal – Continuous Units: milliseconds Default: 200
Factory_Power_Op	Calibratable Parameter to set when the module should exit Factory Mode after Self Test Mode	Type: Internal Default: OFF
Fast_Chime_Decay_Rate	Calibratible Parameter to set the decay rate of the fast chime. Range: 0 – 1	Type: Internal – Continuous Default: 0.7
Fast_Sample_Rate	Indicates the sample rate for debouncing digital inputs while awake. Range: 1 – 11 msec	Type Internal – Continuous Default: Supplier defined.
Forkbolt_Primary_Signal	Provides feedback on the position of the forkbolt (ratchet). Active when in the primary state. Open circuit – the switch is Not Active Ground –the switch is Active	Type: Physical Input – Discrete
Forkbolt_Secondary_Signal	Provides feedback on the position of the forkbolt (ratchet). Active when in the primary or secondary state. Open circuit – the switch is Not Active Ground –the switch is Active	Type: Physical Input – Discrete

Dataflow Name	**Definition**	**Attributes**
Front_RGT_Rqst	Indicates a request for movement via either the keyfob or the overhead open/close switch. Lock Inhibit is considered in state determination. ACTIVE – request for movement from front of vehicle INACTIVE – no request for movement	Type: Internal – Discrete Default: INACTIVE
HiOvrTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is higher than Vmax_Cfg for that voltage range to be considered OVER_V.	Type: Internal – Continuous Units: msec
HiRecovTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is lower than Vmax_Cfg for that voltage range to be considered NORM_V after being OVER_V.	Type: Internal – Continuous Units: msec
HiTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is lower than Vmax_Cfg for that voltage range to be considered NORM_V after being HI_V.	Type: Internal – Continuous Units: msec
Ignition_Status_Available	Indicates whether the CAN message for Ingition Position is correctly being received. AVAILABLE – message is being received LOST – message is invalid or lost	Type: Internal – Discrete Default: LOST
Ignition_Switch_Position_Received	Notification from FNOS interaction layer to indicate when a Ignition_Switch_Position_Msg is received. RECEIVED – a message has been received since the last time the application cleared the notification. IDLE – no message received (notification cleared)	Type: Internal – Discrete Default IDLE
Ignition_Switch_Position_Signal	CAN signal from FNOS interaction layer to indicate ignition position. Unknown – 0x0 Off – 0x1 Acc – 0x2 Run – 0x4 Start – 0x8 Invalid – 0xF, or any other state	Type: FNOS signal Default: Unknown
In_Secondary_Time	Calibratible parameter to ensure latch is truly in Secondary before starting a cinch.	Type: Internal – Continuous Units: milliseconds Default: 500

Dataflow Name	Definition	Attributes
InteriorLockInhibit_Cmd	Determines whether interior switches should allow power operation to gain access to vehicle. INHIBIT – interior switches disabled. NO_INHIBIT – interior switches enabled.	Type: Internal – Discrete Default: NULL
Invalid_RGT_Rqst_Feedback	Provides a request to provide a short tone to customer to indicate that the preconditions for movement are not correct. ACTIVE – request to provide tone INACTIVE – no request to provide tone	Type: Internal – Discrete Default: INACTIVE
KeyfobPad_Msg_Count_Signal	CAN signal from FNOS interaction layer. Rolling counter to distinguish new data from repeated messages. 0 to 0xFF	Type: Internal – Discrete Default: 0x7F
KeyfobPad_Msg_Received	Notification from FNOS interaction layer to indicate when a KeyfoPad_Msg is received. RECEIVED – a message has been received since the last time the application cleared the notification. IDLE – no message received (notification cleared)	Type: Internal – Discrete Default IDLE
Latch Actuation Time	Calibratible Parameter to set the maximum amount of time to drive the unlatch actuator.	Type: Internal – Continuous Units: milliseconds Default: 3000
Latch_Position_Signal	Combines forkbolt secondary, forkbolt primary and detent switch samples LATCHED – in primary position BEFORE_SECONDARY – entering secondary position or moving between secondary and primary. SECONDARY – in secondary position BEFORE_PRIMARY – entering primary position UNLATCHED – out of latch ERROR – unknown state	Type: Internal – Discrete Default: SECONDARY
Latch_Position_Status	Debounced state of forkbolt secondary, forkbolt primary and detent switches LATCHED – in primary position BEFORE_SECONDARY – entering secondary position or moving between secondary and primary. SECONDARY – in secondary position BEFORE_PRIMARY – entering primary position UNLATCHED – out of latch ERROR – unknown state	Type: Internal – Discrete Default: SECONDARY

Dataflow Name	Definition	Attributes
Left_Pinch_Strip_Signal	Signal to indicate a pinch on the left side of the Rear Gate/Trunk. PINCHED – an obstacle is pinched NOT_PINCHED – no obstacle is pinched ERROR – the signal is not in a valid range.	Type: Physical Input Units: Ohms
Left_Pinch_Strip_Status	Logical state of the left pinch strip debounced over number of samples.. PINCHED – an obstacle is pinched NOT_PINCHED – no obstacle is pinched ERROR – the signal is not in a valid range.	Type: Internal – Discrete Default: PINCHED
Local_Ok2Sleep	Indicates when local conditions have been met to attempt to enter sleep mode (must also wait for network sleep). NOSLEEP - Local Sleep conditions haven't been met, do not attempt to enter sleep mode SLEEP - Local sleep conditions have been met - ok to attempt to enter sleep mode (must wait for network sleep).	Type: Internal – Discrete Default: NOSLEEP
Local_Open_Close_Switch_Signal	Provides a request for Rear Gate/Trunk movement from the rear of the vehicle. Will be also used for customizing a programmable RGT Open Position if pressed longer than 3s. - Open Circuit – no action - (Ground < 3s) followed by Open Circuit – request for movement - (3s < Ground < 10s) followed by Open Circuit – request for programmable Position	Type: Physical Input – Discrete
Local_OpMode	Defines the state of the microprocessor awake/sleep modes. AWAKE - Microprocessor is awake and is will not attempt to enter SLEEP state yet. Network is also awake. All features are active. DROWSY - Microproceessor is awake, but the network is not needed so it may or may not be asleep. All features are active. SLEEP - Microprocessor and network is asleep (low power mode). Some of the features are still active	Type: Internal – Discrete Default: AWAKE

Dataflow Name	**Definition**	**Attributes**
Local_RGT_Open_Close_Rqst	Indicates a valid change on the local switch from Ground to Open Circuit has been detected. After Ground was detected less than 3s. ACTIVE – request for movement INACTIVE – no request for movement	Type: Internal – Discrete Default: INACTIVE
Local_RGT_Open_Close_Status	Indicates the logical state of the rear open/close switch. ACTIVE – request for movement INACTIVE – no request for movement UNKNOWN – switch has not been debounced	Type: Internal – Discrete Default: UNKNOWN
Local_RGT_Rqst	Indicates a request for movement from either the rear open/close switch or the Rear Gate/Trunk handle. ACTIVE – request for power open INACTIVE – no request for movement UNLATCH – request to unlatch only	Type: Internal – Discrete Default: INACTIVE
Local_Switch_Present	Calibration to enable or disable the rear switch input. PRESENT – rear switch enabled. NOT_PRESENT – rear switch disabled.	Type: Internal – Discrete Default: NOT_PRESENT
LocalBus_Rqst	Controls when the network can enter sleep according to the Local Sleep/Awake FSM. Also allows the local sleep/wake FSM to wake up the bus due to a hardwired wakeup input. AWAKE - Network must wake up or stay awake SLEEP - Network can go to sleep if all sleep criteria are met	Type: Internal – Discrete Default: AWAKE
LocalSleepDelay_Cfg	Minimum amount of time that the microprocessor and network will stay awake before attempting to enter sleep mode. Any change to a wakeup input will reset this timer. Range: 0 - 120 seconds	Type: Internal – Discrete Default: 5 seconds
LockInhibit_Signal	MSCAN signal from FNOS interaction layer to indicate whether interior switches are inhibited. INHIBIT – ignore master switch NO_INHIBIT – allow master switch to operate	Type: Internal – Discrete Default: NO_INHIBIT
Logic_VBattRaw	Battery voltage that powers the logic circuits in the module. Range: 0 – 24 volts.	Type: Physical Input – Continuous
LoOvrTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is lower than Vmin_Cfg for that voltage range to be considered UNDER_V.	Type: Internal – Continuous Units: msec

Dataflow Name	**Definition**	**Attributes**
LoRecovTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is higher than Vmin_Cfg for that voltage range to be considered NORM_V after being UNDER_V.	Type: Internal – Continuous Units: msec
LoTime_Cfg	Array of configuration values to indicate the amount of time that battery voltage is higher than Vmin_Cfg for that voltage range to be considered NORM_V after being LO_V.	Type: Internal – Continuous Units: msec
Master_Open_Close_Switch_Signal	Provides a request for Rear Gate/Trunk movement from the driver seat. Open Circuit – no request for movement Ground – request for movement	Type: Physical Input – Discrete
Master_RGT_Open_Close_Status	Indicates the logical state of the overhead (master) open/close switch. ACTIVE – request for movement INACTIVE – no request for movement UNKNOWN – switch has not been debounced	Type: Internal – Discrete Default: UNKNOWN
Master_RGT_Open_Close_Rqst	Indicates a change on the master switch to active has been detected. ACTIVE – request for movement INACTIVE – no request for movement	Type: Internal – Discrete Default: INACTIVE
Max_Drift_Close_Attempts	Calibratible parameter to indicate the number of consecutive close attempts the drift control algorithm will make. Range: 0 – 9 attempts	Type: Internal – Continuous Default: TBD
Max_Drift_Count	Calibratible parameter that indicates the number of consecutive cycles that can occur before the RGT operation is disabled. Range: 1-1000	Type: Internal – Continuous Default: TBD
Max_Drift_Hold_Time	Calibratible parameter that determines the length of the pause between catching the gate with Max Dynamic Braking and starting the controlled power close. Range: 1-2000 msec	Type: Internal – Continuous Default: TBD
Mechanical_Full_Open_Position	Threshold value on RGT_Position_ Status that represents the learned mechanical stop position. Range: 60-100 degrees	Type: Internal – Continuous Default: Same as RGT_Position_Out_Of_Range
Message_Center_Present	Calibration to determine whether the vehicle uses the message center or a hardwired switch to provide Rear Gate/Trunk lockout capability. PRESENT – use message center NOT_PRESENT – use hardwired switch	Type: Internal – Discrete Default: PRESENT
Minimum_Full_Open_Position	Threshold value on RGT_Position_ Status that represents the lowest position that can be learned. Range: 60-90 degrees	Type: Internal – Continuous Default: 75 degrees

Dataflow Name	Definition	Attributes
Motor_Abort_Voltage	Voltage threshold on Power_Vbatt below which the module will abort any operation in progress. Range: 7-9.5 volts	Type: Internal – Continuous Default: 8 volts
Motor_EMF_Time	Calibratible parameter to set the amount of time that Power_Vbatt needs to be above Vmax_Cfg to be considered OVER_V. Range: 5-50 msec	Type: Internal – Continuous Default: 5 msec
Motor_InRush_Time	Calibratible parameter to set the amount of time that Power_Vbatt needs to be below Vmin_Cfg to be considered UNDER_V. Range: 5-100 msec	Type: Internal – Continuous Default: 5 msec
Network_Ok2Sleep	Indicates when network conditions have been met to attempt to enter sleep mode. NOSLEEP - Network Sleep conditions haven't been met, do not attempt to enter sleep mode SLEEP - Network sleep conditions have been met - ok to attempt to enter sleep mode (must await agreement by other nodes).	Type: Internal – Discrete Default: NOSLEEP
Network_OpMode	Indicates if the network is asleep or awake. AWAKE - Network is awake and will not attempt to enter sleep mode yet. DROWSY - Network is no longer needed and is attempting to enter sleep mode. SLEEP - Network is asleep.	Type: Internal – Discrete Default: AWAKE
OdometerMasterValue	CAN signal from FNOS interaction layer containing the Odometer value. Range: 0-0xFFFFFE 0xFFFFFF is considered invalid	Type: Internal – Discrete Default: 0xFFFFFF
Odo_Status	Indicates the status of the vehicle odometer relative to a constant breakpoint.	Type: Internal – Discrete Default: HIGH
Odo_Value_Available	Indicates whether the CAN message for OdometerMasterValue is correctly being received. AVAILABLE – message is being received LOST – message is invalid or lost	Type: Internal – Discrete Default: LOST

Dataflow Name	Definition	Attributes
Odo_Value_Received	Notification from FNOS interaction layer to indicate when a OdometerMasterValue is received. RECEIVED – a message has been received since the last time the application cleared the notification. IDLE – no message received (notification cleared)	Type: Internal – Discrete Default IDLE
OLC_slip_detected	Indicates whether a Overload clutch slip has been detected. TRUE – slip detected FALSE – no slip detected	Type: Internal – Discrete Default: FALSE
Pending_RGT_Rqst	Created by validating front and rear user requests against PwPckRGTLockout_Status. Used for movement inhibit during Start/Stop situations where RGT movement must be delayed during vehicle power interruption and restarts until proper vehicle power is available for RGT operation.	Type : Internal - Discrete
PinchStrip_Reference_Voltage	Calibratible parameter to set lower threshold at which the pinch strips can be read reliably.	Type: Internal – Continuous Units: volts Default: 8
RGT_Sector_Gear_Status	Logical state of the sector gear position. CINCH – sector gear is in cinching. RELEASE – sector gear is in releasing. NEUTRAL – sector gear is in neutral. END – sector gear is at one end of travel.	Type: Internal – Discrete Default: NEUTRAL
PwPckRGTLockout_Status	Variable used for RGT inhibit during Start/Stop situations where RGT movement must be delayed during vehicle power interruption and restarts.	Type : Internal - Discrete
RGT_Ajar_Signal	Indicates the state of the latch to the SJB. Open Circuit – Rear Gate/Trunk is ajar Ground – Rear Gate/Trunk is closed	Type: Physical Output- Discrete Default: Open Circuit
RGT_Ajar_Status	Indicates whether the latch is in the primary latched position or not. AJAR – not in primary latch CLOSED – in primary latch	Type: Internal – Discrete Default: AJAR
RGT_Glass_Ajar_Present	Calibration to determine whether the vehicle has fixed glass or flip glass on the Rear Gate/Trunk. PRESENT – flip glass NOT_PRESENT – fixed glass	Type: Internal – Discrete Default: NOT_PRESENT

Dataflow Name	**Definition**	**Attributes**
RGT_Glass_Ajar_Signal	Indicates whether the RGT glass is ajar/open or closed. Open Circuit – glass is ajar Ground – glass is closed	Type: Physical Input – Discrete
RGT_Glass_Ajar_Status	Indicates the logical state of the Rear Gate/Trunk glass. AJAR – glass is ajar CLOSED – glass is closed	Type: Internal – Discrete Default: AJAR
RGT_Handle_Cmd	Logic Signal to request a handle activation based on CAN signal. UNKNOWN – CAN Signal not yet received. ACTIVE – Request to activate Rear Gate/Trunk. INACTIVE – No Request.	Type: Internal – Discrete Default: UNKNOWN
RGT_Handle_Signal	Provides a request to unlatch the gate from the exterior handle. Open Circuit – no request Vbatt – request to unlatch	Type: Physical Input – Discrete
RGT_Handle_Rqst	Indicates a change on the RGT handle to active has been detected. ACTIVE – request for movement INACTIVE – no request for movement	Type: Internal – Discrete Default: INACTIVE
RGT_Handle_Status	Indicates logical state of the Rear Gate/Trunk handle signal. ACTIVE – request to unlatch INACTIVE – no request UNKNOWN – signal has not been debounced	Type: Internal – Discrete Default: UNKNOWN
RGT_Handle_D_Req	CAN Signal to request a “handle activation” of the Rear Gate/Trunk. RELEASE – Request activation. NULL – No request.	Type: Internal – Discrete Default: NULL
RGT_Handle_Switch_Rqst	Derived from the logical state of RGT_Handle_Switch_Status in **“Read RGT Handle Switch Status”** state machine figure.	Type: Internal – Discrete
RGT_Handle_Switch_Status	Debounced signal version of “RGT_Handle_Signal”. (Valid 45msec +/- 11msec)	Type: Internal – Discrete
RGT_Chime_Cmd	Indicates the desired state of the chime. SHORT – request a short beep LONG – request chime for as long as active. NONE – no request for chime sound	Type: Internal – Discrete Default: NONE
RGT_Chime_Signal	Signal to drive the chime speaker.	Type: Physical Output – Modulated Tone frequency: 1000 Hz or 740 Hz
RGT_Chime_Rqst	Sent to initiate chime	Type :

Dataflow Name	Definition	Attributes
RGT_Cinch_Pwr	Drives latch cinching motor in the cinching direction. Vbatt – apply battery to Cinch side of motor Ground – apply to the Return side of the motor	Type: Physical Output – Discrete
RGT_Return_Pwr	Drives latch cinching motor in the returning direction. (opposite of cinching direction) Vbatt – apply battery to Return side of motor Ground – Apply to the Cinch side the motor	Type: Physical Output – Discrete
RGT_Cinch_Rqst	Indicates a request to cinch the latch CINCH – request to cinch NULL – no request	Type: Internal – Discrete Default: NULL
RGT_Crossover_Point	Threshold value on RGT_Position_ Status that represents the position at which the liftstruts change direction. Range: 10-30 degrees	Type: Internal – Continuous Default: 20 degrees
RGT_Drift_Count	Number of consecutive open cycles that have resulted in drift events. Range: 0-1000	Type: Internal – Continuous Default: 0
RGT_Drift_Control_Rqst	Request by the drift control algorithm to control the drive unit. NULL – no request HOLD – turn on Max Dynamic Brake OPEN – power open gate CLOSE – power close gate	Type: Internal – Discrete Default: NULL
RGT_Drift_Event_Warning_Rqst	Request for a fast chime by the drift control algorithm. ACTIVE – request for fast chime INACTIVE – no request	Type: Internal – Discrete Default: NULL
RGT_Drift_Status	Indicates whether a drift event has been detected. DRIFT – event detected NO_DRIFT – no event detected	Type: Internal – Discrete Default: NO_DRIFT
RGT_EvNum	Holds the value of the rolling count last received in CAN_KeyfobPad_Msg. Range: 0-FF counts	Type: Internal – Discrete Default: 7F
RGT_Full_Open_Position	Threshold on RGT_Position_Status at which an open operation will stop. Range: 55-100 degrees	Type: Interrnal – Continuous Default: same as RGT_Position_Out_Of_Range
RGT_COLD_Crossover_Point	Minimum RGT_Position_Status at which in worst case condition (COLD) Programmable Position could be accepted	Type: Internal – Continuous Default: 25 degrees
RGT_FET_Current	Indicates the amount of current value to detect the FET_OVER_CURRENT.	Type: Internal – Continuous Default: 40 Amps

Dataflow Name	Definition	Attributes
RGT_FET_Over_Current_Time	Calibratable parameter to set the amount of time that RGT current needs to be above RGT_FET_Current to be considered FET OVER CURRENT and set the short to battery DTC. Range: 0 – 600 msec, 2.5 millisecond ticks	Type: Internal – Continuous Units: milliseconds Default: 10 msec (4 counts)
RGT_Handle_SW_Enable_Stat	CAN signal based on validation of DrTgateExtSwMde_B_Stat signal with Vbatt. Indicates status of inhibit rear handle switch. Enabled – TBD Disabled - TBD	CAN Signal (TBD)
RGT_Last_Movement_Status	Used internally to remember the direction of travel during a crank/pause event. CLOSE – Rear Gate/Trunk was moving in close direction OPEN – Rear Gate/Trunk was moving in the open direction UNLATCH – Rear Gate/Trunk was requested to unlatch only NULL – Rear Gate/Trunk was not moving	Type: Internal – Discrete Default: NULL
RGT_Latched_Flag	Indicates that the primary position has been reached during a cinch operation. SET – primary has been detected CLEAR – primary not detected	Type: Internal – Discrete Default: CLEAR
RGT_Latched_Time	Calibratible Parameter to set the amount of time to continue to cinch the latch once the primary latch position has been detected.	Type: Internal – Continuous Units: milliseconds Default: 200
RGT_Latch_Status	Indicates the state of the latch (combines forkbolt secondary, forkbolt primary and detent) LATCHED – in primary position BEFORE_SECONDARY – entering secondary position SECONDARY – in secondary position MIDLATCH – between secondary and primary BEFORE_PRIMARY – entering primary position UNLATCHED – out of latch OPEN – Out of latch and pawl dropped ERROR – unknown state	Type: Internal – Discrete Default: SECONDARY
RGT_Lockout_Signal	Signal to indicate whether the Rear Gate/Trunk rear controls are locked out or not. Open Circuit – locked Ground – not locked	Type: Physical Input – Discrete

Dataflow Name	Definition	Attributes
RGT_Lockout_Status	Indicates the logical state of the RGT lockout switch. LOCKED – rear controls inoperative NOT_LOCKED – rear control operative	Type: Internal – Discrete Default: LOCKED
RGT_Mode_Cfg	Used to store the state of the RGT lockout in case of reset. ENABLE – Allow rear control to operate gate. DISABLE – inhibit rear controls.	Type: Internal – Discrete Default: None Stored in NVM.
RGT_Motor_Close_Pwr	Signal to drive the motor in the downward direction. Ground – not driving down Vbatt – driving down	Type: Physical Output – Discrete Default: Ground
RGT_Motor_Open_Pwr	Signal to drive the motor in the upward direction. Ground – not driving up Vbatt – driving up	Type: Physical Output – Discrete Default: Ground
RGT_Movement_Timeout	Indicates that the drive motor has timed out without reaching the end of travel. TRUE – motor timed out FALSE – motor not timed out	Type: Internal – Discrete Default: FALSE
RGT_Move_Rqst	Indicates a request to drive the Rear Gate/Trunk. OPEN – drive Rear Gate/Trunk open CLOSE – drive Rear Gate/Trunk closed NULL – no request CINCH – Rear Gate/Trunk is being cinched to finish a close operation	Type: Internal – Discrete Default: NULL
RGT_Position_Near_Latch	Threshold value on RGT_Position_ Status that represents the position at which the module will consider the gate away from the latch Range: 2-10 degrees	Type: Internal – Continuous Default: 5 degrees
RGT_Near_Latched_Flag	Indicates that the before primary position has been reached during a cinch operation. SET – before primary has been detected CLEAR – before primary not detected	Type: Internal – Discrete Default: CLEAR
RGT_Near_Latched_Time	Calibratable Parameter to set the amount of time to continue to drive the cinch motor once the before primary latch position has been detected.	Type: Internal – Continuous Units: milliseconds Default: 1000
RGT_Position_Out_Of_Range	Threshold value on RGT_Position_ Status that represents a position that cannot be reached. Range: 110 – 130 degrees	Type: Internal – Continuous Default: 120 degrees

Dataflow Name	Definition	Attributes
RGT_Position_Resynch_Rqst	Request from the Control Rear Gate/Trunk FSM to set the RGT_Position_Status back to zero because a power open operation is about to begin from the Closed state. SYNCH – Request to synchronize position. NULL – No request	Type: Internal – Discrete Default: NULL
RGT_Position_Status	Angular representation of Rear Gate/Trunk position, based on Encoder Sensor input. Range: 0 – 130 degrees	Type: Internal – Continuous Units: Degrees Default: 0
RGT_Primary_Obstacle_Detection_Status	Indicates whether an obstacle has been detected, based on the speed of the Rear Gate/Trunk. OBSTACLE – an obstacle has been detected CLEAR – no obstacle has been detected	Type: Internal – Discrete Default: OBSTACLE
RGT_Secondary_Obstacle_Dection_Status	Combines right and left pinch statuses to indicate whether a pinch has been detected. OBSTACLE – an obstacle has been detected CLEAR – no obstacle has been detected ERROR – one of the signals is not in a valid range.	Type: Internal – Discrete Default: OBSTACLE
RGT_Sector_Gear_Status	Logical state of the sector gear position. CINCH – sector gear is in cinching. RELEASE – sector gear is in releasing. NEUTRAL – sector gear is in neutral. END – sector gear is at one end of travel.	Type: Internal – Discrete Default: NEUTRAL
RGT_Speed_Status	Angular representation of gate speed based on Encoder Pulse Width. Range: TBD	Type: Internal – Continuous Default: TBD
RGT_ Striker_UP_Signal	Signal indicating position of Power Striker used in Power Trunk vehicles. Closed Striker Up Switch – Striker in Up Position	Type: Internal – Discrete
RGT_ Striker_Down_Signal	Signal indicating position of Power Striker used in Power Trunk vehicles. Closed Striker Down Switch – Striker in Down Position	Type: Internal – Discrete
RGT_System_Cfg	Indicates the configuration of the system: MANUAL : For systems where gate open/close manually. POWER : For systems where gate open/close powered.	Type: Internal - Discrete

Dataflow Name	Definition	Attributes
RGT_Unlatch_Pwr	Signal to drive the latch motor in the unlatch (release) direction. Vbatt – drive the unlatch motor in the release direction. Ground – do not drive the motor	Type: Physical Output – Discrete Default: Ground
RGT_Unlatch_Rqst	Indicates a request for the latch to be released. UNLATCH – request to release NULL – no request	Type: Internal – Discrete Default: NULL
Position_Program_Time	Calibratible parameter that determines how long the customer must push the Local Switch to program the Rear Gate/Trunk hight. Releasing the switch before this time is a movement request. Range: 1-5000 msec	Type: Internal – Continuous Default: 3000ms
Position_Program_Present	Calibration to enable or disable Programmable Stop feature NOT_PRESENT – Local switch only for movement	Type: Internal – Discrete Default: NOT_PRESENT
Power_VBattRaw	Battery voltage that powers the high current circuits in the module. Range: 0 – 24 volts.	Type: Physical Input – Continuous
PwPckTq_D_Stat	MSCAN signal that indicates if the power pack is a motive (wheel torque producing) or non-motive (non-wheel torque producing) mode. It also indicates to if a transition from a non-motive to a motive mode is in progress.	Type : Unknown
Release_Return_Delay_Duration	Calibratable parameter for delay from a release operation to a release return operation. **For GECOM latch Only** Range: 0 – 2000 msec	Type: Internal – Continuous Default: 500 msec.
Release_Return_Duration	Calibratible Parameter to set the maximum amount of time to drive the latch motor to return it to the neutral position from the release position. Range: 20 to 1000 milliseconds	Type: Internal – Continuous Units: milliseconds Default: 700
Remote_RGT_Rqst	Indicates a request for movement from MSCAN. RGT – request for movement NULL – no request	Type: Internal – Discrete Default: NULL
Remote_RGT_Signal	CAN signal from FNOS interaction layer indicating a request for movement via keyfob. NULL – 0x0 ACTIVE – 0x1	Type: Internal – Discrete Default: NULL

Dataflow Name	**Definition**	**Attributes**
Right_Pinch_Strip_Signal	Signal to indicate a pinch on the right side of the Rear Gate/Trunk. PINCHED – an obstacle is pinched NOT_PINCHED – no obstacle is pinched ERROR – the signal is not in a valid range.	Type: Physical Input Units: Ohms
Right_Pinch_Strip_Status	Logical state of the right pinch strip debounced over number of samples. PINCHED – an obstacle is pinched NOT_PINCHED – no obstacle is pinched ERROR – the signal is not in a valid range.	Type: Internal – Discrete Default: PINCHED
Sector_Close_Switch_Signal	Signal that indicates whether the latch motor has moved the sector gear into the Releasing region. Open Circuit – sector gear is either in neutral or cinching. Ground – sector gear is in either releasing or end of travel.	Type: Physical Input – Discrete
Sector_Gear_Position_Signal	Combines Sector Gear Close Switch Signal and Sector Gear Open Switch Signal samples. CINCH – sector gear is in cinching. RETURN – sector gear is in returning. NEUTRAL – sector gear is in neutral. END – sector gear is at one end of travel.	Type: Internal – Discrete Default: NEUTRAL
Sector_Open_Switch_Signal	Signal that indicates whether the latch motor has moved the sector gear into the Cinching region. Open Circuit – sector gear is either in neutral or releasing. Ground – sector gear is in either cinching or end of travel.	Type: Physical Input – Discrete
Sleep_Recover_Flag	Used to indicate that the gate needs to recover position. RECOVER – position needs to be recovered OK – position is OK.	Type: Internal – Discrete Default: RECOVER
Slow_Sample_Rate	Indicates the sample rate for debouncing digital inputs while asleep. Range: 1 – 50 msec	Type: Internal – Continuous Default: Supplier defined.
Sound_Duration	Indicates the time that a sound unit is to be active on the chime. 0 sec– no chime sound 1 sec – chime for 1 second	Type: Internal – Continuous Default: 0 sec
Synch_Status	Flag to indicate when to reset the power Rear Gate/Trunk position to zero. SYNCH – reset position NOT_SYNCH – do not reset position	Type: Internal – Discrete Default: NOT_SYNCH

Dataflow Name	Definition	Attributes
Tone_Frequency	Indicates the pitch of the chime sound 0 Hz – no chime sound 750 Hz – Chime 1000 Hz – Tone	Type: Internal – Discrete Default: 0 Hz
Transmission_Status	Logical state of the transmission position PARK REVERSE NEUTRAL DRIVE LOW	Type: Internal – Discrete Default: NEUTRAL
Transmission_Status_Available	Indicates whether the CAN message for transmission position is correctly being received. AVAILABLE – message is being received LOST – message is invalid or lost	Type: Internal – Discrete Default: LOST
Transmission_Status_Park	Indicates whether the transmission is known to be in Park. PARK – transmission is in park NOT_PARK – transmission is not in park, or is unknown.	Type: Internal – Discrete Default: NOT_PARK
Valid_RGT_Move_Rqst	Request to move the Rear Gate/Trunk that has been validated via Park, VSS, lockout and inhibit. ACTIVE – valid request INACTIVE – no request or invalid request. UNLATCH- unlatch request INHIBIT – movement inhibited	Type: Internal – Discrete Default: INACTIVE
VbattState	Array of values to indicate the state of the battery voltage relative to the operating limits. NORM_V – In normal operating range HI_V – above VMax for a short duration LO_V – below VMin for a short duration UNDER_V – below VMin for too long OVER_V – above VMax for too long INHIBIT_V – outside range to start operation ABORT_V – outside range to continue operation	Type: Internal – Discrete Default: UNDER_V
Vehicle_Lock_Status	Reported vehicle lock status through the CAN bus validated against Vbatt(VrangeCAN)	Type : Internal Discrete
Vehicle_Access_RqstM	CAN Message to contain Rear Gate/TrunkHandle_D_Req	Type: MSCAN Transmit Model: Event Periodic Transmit Rate: 100 millisecond
Vehicle_Speed	Logical absolute value of the vehicle speed.	Type: Internal – Continuous Units: kph Default: 0

Dataflow Name	Definition	Attributes
Vehicle_Speed_Available	Indicates whether the CAN message for vehicle speed is correctly being received. AVAILABLE – message is being received LOST – message is invalid or lost	Type: Internal – Discrete Default: LOST
Vehicle_Speed_OK	Indicates whether the Vehicle Speed is above 5 kph for more than 2 seconds, or is lost. OK – below 5 kph and available NOT_OK – above 5 kph or not available	Type: Internal – Discrete Default: NOT_OK
Vehicle_Speed_Slow	Indicates whether vehicle speed is known to be below 5 kph SLOW – vehicle speed is below 5 kph FAST – vehicle speed is above 5 kph or is unknown	Type: Internal – Discrete Default: FAST
VMax_Cfg	Array of values to indicate the upper limit of the operating voltage ranges. Range: 14 – 24 Volts	Type: Internal – Continuous Default: 16 volts
VMin_Cfg	Array of values to indicate the lower limit of the operating voltage ranges. Range: 5 – 10 Volts	Type: Internal – Continuous Default: 8 volts
Volume_Decay_Rate	Indicates the time constant of the exponential decay of the chime volume. 0 – no decay, either no sound, or tone 0.7 – decay for a chime sound	Type: Internal – Continuous Default: 0
VSS_Signal	Signal to the RGTM to reflect the state of Vehicle_Speed_Slow Ground – vehicle speed is slow Open Circuit – vehicle speed is not slow	Type: physical signal
WaitMsg_Cfg	Amount of time the network sleep/awake FSM waits after getting the OK for sleep before actually requesting the network to sleep Range: 0 - 10 seconds	Type: Internal – Continuous Default: 600 msec