1 HUD Gear Shift Control Mirror - CGEA1.3

1.1 Functional Description

The purpose of the Gear shift control mirror is to show the Gear indication and Select Shift in HUD when user changes gear
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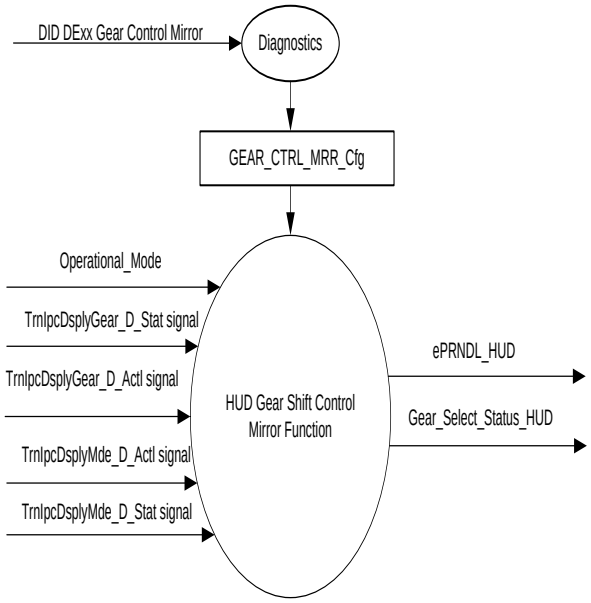
1.2 Interfaces

1.2.1 Interface Context Diagram (I/O Block Diagram)

Gear Shift Control Mirror Interface Context Diagram



1.2.2 Inputs

1.2.2.1 IR-REQ-304306/A-INTERNAL:

- Operational_Mode
- GEAR_CTRL_MRR_Cfg

1.2.2.2 MUX message on the CAN Bus

1.2.2.2.1 SIG-REQ-304297/A-TrnIpcDsplyGear_D_Stat Signal

Signal Name	Size (bits)	Pos. (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrnIpcDsplyGear_D_Stat	2	14		SED	1	0		0 (0x0)	3 (0x3)
			Blank_No_Display				0x0		
			On				0x1		
			Flash				0x2		

			Reserved_Blank_No_Display				0x3		

1.2.2.2.2 SIG-REQ-304298/A-TrnIpcDsplyGear_D_Actl Signal

Signal Name	Size (bits)	Pos. (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrnIpcDsplyGear_D_Actl	4	0		SED	1	0		0 (0x0)	15 (0xF)
			Neutral				0x0		
			1st_Gear				0x1		
			2nd_Gear				0x2		
			3rd_Gear				0x3		
			4th_Gear				0x4		
			5th_Gear				0x5		
			6th_Gear				0x6		
			7th_Gear				0x7		
			8th_Gear				0x8		
			9th_Gear				0x9		
			10th_Gear				0xA		
			11th_Gear				0xB		
			12th_Gear				0xC		
			13th_Gear				0xD		
			14th_Gear				0xE		
			No Gear				0xF		

1.2.2.2.3 SIG-REQ-304299/A-TrnIpcDsplyMde_D_Actl Signal

Signal Name	Size (bits)	Pos. (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrnIpcDsplyMde_D_Actl	3	0		SED	1	0		0 (0x0)	7 (0x7)
			Park				0x0		
			Reverse				0x1		
			Neutral				0x2		
			Drive				0x3		
			Sport				0x4		
			Manual 1 / Low				0x5		
			Manual 2				0x6		
			Manual 3				0x7		

1.2.2.2.4 SIG-REQ-304300/A-TrnIpcDsplyMde_D_Stat Signal

Signal Name	Size (bits)	Pos. (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrnIpcDsplyMde_D_Stat	2	14		SED	1	0		0 (0x0)	3 (0x3)
			Blank_No_Display				0x0		
			On				0x1		
			Flash				0x2		
			Reserved_Blank_No_Display				0x3		

1.2.3 IR-REQ-304311/A-Outputs

ePRNDL_HUD
Gear_Select_Status_HUD

1.3 Function/Performance

1.3.1 F-REQ-304312/A-Operational Modes

Mode	Differentiating Vehicle Conditions
Sleep Mode	Gear Shift Control Mirror OFF
Limited Mode	Gear Shift Control Mirror ON/OFF
Normal Mode	Gear Shift Control Mirror ON/OFF
Crank Mode	Gear Shift Control Mirror ON/OFF

1.3.2 Voltage Levels

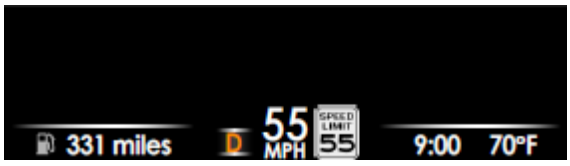
Refer to the HUD Features table located in HUD Operational Modes and Voltage Range Strategies Section in this SPSS.

1.3.3 Human-Machine Interface

1.3.3.1 Visual

1.3.3.1.1 Indicator Graphics / Display Format

1.3.3.1.1.1 Gear Shift Graphics



1.3.3.1.1.2 Select Shift Graphics

1.3.3.2 Audio

None.

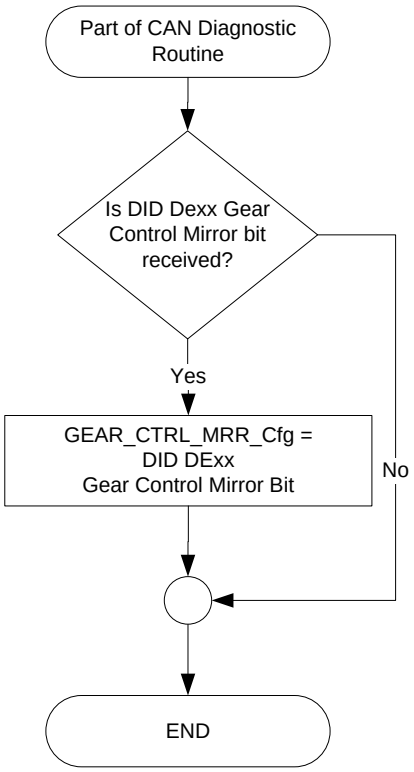
1.3.4 PFM-REQ-304310/A-System Accuracy

The state matrix in REQ-304302 and REQ-304303 shall be executed within 100msec on the reception of any of the signals.

1.3.5 Operation: Performance and Functional

1.3.5.1 Subsystem Algorithm Flowchart / State Diagram

1.3.5.1.1 F-REQ-304301/A-Flowchart



1.3.5.1.2 F-REQ-304302/A-State Matrix for ePRNDL_HUD

Operational_Mode	GEAR_CTRL_MRR_Cfg	TrnIpcDsplyMde_D_Actl Signal	TrnIpcDsplyMde_D_Stat Signal	ePRNDL_HUD	Display Graphics
Normal or Crank	Enabled	Park (P) 0x0	On 0x1	P	
	Enabled	Reverse (R) 0x1	On 0x1	R	
	Enabled	Neutral (N) 0x2	On 0x1	N	
	Enabled	Drive (D) 0x3	On 0x1	D	Gear_Select_Status_HUD
	Enabled	Sport 0x4	On 0x1	S	Gear_Select_Status_HUD
	Enabled	Manual_1_Low 0x5	On 0x1	Blank	Blank
	Enabled	Manual_2 0x6	On 0x1	Blank	Blank
	Enabled	Manual_3 0x7	On 0x1	Blank	Blank
	Enabled	X (in between states)	Blank_No_Display 0x0, or Flash 0x2, or Reserved_Blank_No_Display 0x3	Blank	Blank
All Other Cases				Blank	Blank

1.3.5.1.3 F-REQ-304303/B-State Matrix for Gear_Select_Status_HUD

Operational_Mode	GEAR_CTRL_MRR_Cfg	TrnIpcDsplyGear_D_Actl Signal	TrnIpcDsplyGear_D_Stat Signal	Gear_Select_Status_HUD	
Normal or Crank	Enabled	X	Blank_No_Display (0x00) or Reserved_Blank_No_Display (0x03)	S or D depending on **ePRNDL_HUD**	 or 
	Enabled	Neutral (0x0)	On (0x1)	Blank	
	Enabled	Neutral (0x0)	Flash (0x2)	Blank	 *
	Enabled	1st_Gear (0x1)	On (0x1)	1	
	Enabled	1st_Gear (0x1)	Flash (0x2)	1 - Flash	 *
	Enabled	2nd_Gear (0x2)	On (0x1)	2	
	Enabled	2nd_Gear (0x2)	Flash (0x2)	2 - Flash	 *
	Enabled	3rd_Gear (0x3)	On (0x1)	3	
	Enabled	3rd_Gear (0x3)	Flash (0x2)	3 - Flash	 *
	Enabled	4th_Gear (0x4)	On (0x1)	4	
	Enabled	4th_Gear (0x4)	Flash (0x2)	4 - Flash	 *
	Enabled	5th_Gear (0x5)	On (0x1)	5	
	Enabled	5th_Gear (0x5)	Flash (0x2)	5 - Flash	 *
	Enabled	6th_Gear (0x6)	On (0x1)	6	
	Enabled	6th_Gear (0x6)	Flash (0x2)	6 - Flash	 *
	Enabled	7th_Gear (0x7)	On (0x1)	7	
	Enabled	7th_Gear (0x7)	Flash (0x2)	7 - Flash	 *
	Enabled	8th_Gear (0x8)	On (0x1)	8	
	Enabled	8th_Gear (0x8)	Flash (0x2)	8 - Flash	 *
	Enabled	9th_Gear (0x9)	On (0x1)	9	
	Enabled	9th_Gear (0x9)	Flash (0x2)	9 - Flash	 *
	Enabled	10th_Gear (0xA)	On (0x1)	10	
	Enabled	10th_Gear (0xA)	Flash (0x2)	10 - Flash	 *
	Enabled	11th_Gear (0xB)	On (0x1)	11	TBD
	Enabled	11th_Gear (0xB)	Flash (0x2)	11 - Flash	TBD*

	Enabled	12th_Gear (0xC)	On (0x1)	12	TBD
	Enabled	12th_Gear (0xC)	Flash (0x2)	12 - Flash	TBD*
	Enabled	13th_Gear (0x6D)	On (0x1)	13	TBD
	Enabled	13th_Gear (0xD)	Flash (0x2)	13 - Flash	TBD*
	Enabled	14th_Gear (0xE)	On (0x1)	14	TBD
	Enabled	14th_Gear (0xE)	Flash (0x2)	14 - Flash	TBD*
All Other Cases				Blank	Blank

1.3.5.2 Operation Description (supports algorithm flowchart /state diagram)

1.3.5.2.1 F-REQ-304304/A-Gear selection control mirror:

HMI logic shall trigger gear selection control mirror when the value of ePRNDL_HUD changes to any value other than “Blank”. The value corresponding to ePRNDL_HUD shall be displayed in HMI.

1.3.5.2.2 F-REQ-304305/A-Shift control mirror:

HMI Logic shall trigger select shift control mirror when the value of Gear_Select_Status_HUD changes to any value other than “Blank”. The Flash will behave the same way as On for HUD.

1.3.5.3 FS-REQ-304313/A- Function Safety Classification (EMC)

B

1.3.5.4 NVM-REQ-304307/A- Memory Storage

Parameter Name	Description	Value at Battery Connect	Value at Module Wake-up
GEAR_CTRL_MRR_Cfg	Configuration for Gear Control mirror	Use stored value	Use stored value
ePRNDL_HUD	Control Mirror Value for Gear Indication	Blank	Blank
Gear_Select_Status_HUD	Control Mirror value for Shift indication	Blank	Blank
Operational_Mode	4 state indicator for HUD operational mode	Limited	Limited, Normal or Crank
TrnIpcDsplyGear_D_Actl Signal	CAN signal sent from the PCM	Neutral (0x0)	Neutral (0x0)
TrnIpcDsplyGear_D_Stat Signal	CAN signal sent from the PCM	Blank_No_Display (0x0)	Blank_No_Display (0x0)
TrnIpcDsplyMde_D_Actl Signal	CAN signal sent from the PCM	Park (0x00)	Park (0x00)
TrnIpcDsplyMde_D_Stat Signal	CAN signal sent from the PCM	Blank_No_Display (0x0)	Blank_No_Display (0x0)

1.4 Error Handling

1.4.1 Missing Message Strategy

1.4.1.1 Missing Reference:

The signals will be declared missing as per the Diagnostics section of this SPSS.

1.4.1.2 States and History:

DTCs states and history will be determined as per the Diagnostics section of this SPSS.

1.5 Diagnostics

1.5.1 Self-Test

None

1.5.2 Engineering Test Mode

Reference section “Dealer / Engineering Test Mode (ETM)”

1.5.3 Part II Performance

1.5.3.1 DTC-REQ-304308/A-Supported Diagnostic Trouble Codes (DTCs)

DTCs shall be logged as per the diagnostic section of this SPSS.

DTC	Description
C10000	Lost communication with PCM

1.5.3.2 DCR-REQ-304309/A-DID DExx

Block Num	Block Description	Size (bits)	Type	Byte(s)	Bits	State: Description	"0"	"1"	Default	Comments/ Information
PACKETED BLOCKS										
$xx	Option Content (B&A)	32	1	*	*	Gear Control Mirror	Disabled	Enabled	Enabled	
*Byte and bit location to be identified in Part II Specification for this cluster										

1.6 Reference Specification

NA

1.7 Revision History

SPSS Module Revision History

Revision Level	Name	Change Description	Date
1.0	A. Mathai	Initial Release	5/15/2014
1.1	A. Mathai	Updated Graphics	7/28/2014
1.2	A. Mathai	Updated Table 3 to show “S” when no select shift gear available. Also clarified Flash to be treated same way as On.	8/06/2015
1.3	A. Mathai	Updated according to the new concept of showing SSI in Drive and Park	2/09/2016
1.4	P.Denduku	Initial VSEM RM Release	04/03/2018
1.5	ilopezla	This update was made by A. Mathai on ~~5/15/2014~~ 4/20/2016 but was not reflected in the VSEM STSS v1.4 Corrected REQ -304303 -TrnlpcDsplyGear_D_Actl values from 6th to 14th gear	2/3/2019
1.6	ilopezla	Correcting date in version 1.5 “Change Description” column	2/3/2019