1 HUD_Blind Spot Alert and Cross Traffic Alert – CGEA1.3

1.1 Functional Description

Blind Spot Alert (Side Detect or BLIS) is an added alert in the HUD to the BLIS warning in the mirror. This is a feature that alerts the driver when another vehicle (target vehicle) is in or will be entering an area to the side of the vehicle when the subject vehicle tries to perform a turn on that side. SODx modules owns the feature and the associated logic, HUD acts as a ”HMI Indicator” only. This is a feature that is similar to the alert that presents in the exterior mirror. The difference is that HUD Blind Spot Alert is only working in the flash state(when a “Flash” signal is received) when the vehicle intends to perform a turn, otherwise it will remain off even if the target vehicle is detected .

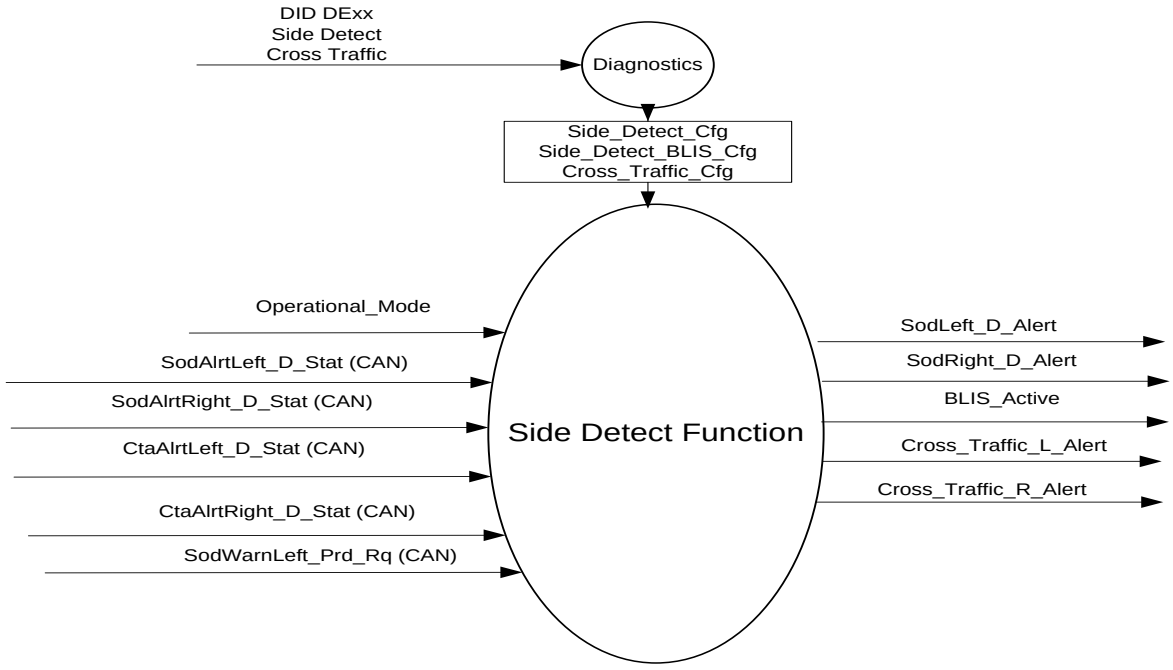
Cross Traffic Alert (CTA) is a convenience feature that aids the driver in assessing whether a vehicle is approaching from either the left or right while reversing out of a parking area. The feature is designed such that an alert is conveyed to the driver only when a target vehicle is approaching the subject vehicle. The subject vehicle must be in reverse, either stationary or backing up, and the target vehicle is moving towards the subject vehicle. Note that this system works in conjunction with the Rear Park Aid System.

The Blind Spot Alert and Cross Traffic Alert are separate, yet integrated features. The primary similarity between the two features is that the input signals for both features originate from the same side-mounted radar sensors. The primary difference between the features is that Blind Spot functions while the vehicle is in a forward gear, and Cross Traffic functions while the vehicle is in Reverse.

1.2 Interfaces

1.2.1 Interface Context Diagram (I/O Block Diagram)

Side Detect Function Context Diagram



1.2.2 Inputs

1.2.2.1 IR-REQ-302048/A-INTERNAL:

- Operational_Mode
- SodWarnLeft_Prd_Rq

1.2.2.2 MUX messages on the CAN bus from SODx:

BLIS and CTA Input Signals

1.2.2.2.1 SIG-REQ-302043/A-SodAlrtLeft_D_Stat

Signal Name	Size (bits)	Detailed Meaning	Units	Res.	Offset	State Encoded	Min	Max
SodAlrtLeft_D_Stat	2		SED	1	0		0 (0x0)	1 (0x3)
		Off				0x0		
		On				0x1		
		Flash				0x2		
		Bulb_Proveout				0x3		

1.2.2.2.2 SIG-REQ-302044/A-SodAlrtRight_D_Stat

Signal Name	Size (bits)	Detailed Meaning	Units	Res.	Offset	State Encoded	Min	Max
SodAlrtRight_D_Stat	2		SED	1	0		0 (0x0)	1 (0x3)
		Off				0x0		
		On				0x1		
		Flash				0x2		
		Bulb_Proveout				0x3		

1.2.2.2.3 SIG-REQ-302045/A-SodWarnLeft_Prd_Rq

Signal Name	Size (bits)	Detailed Meaning	Units	Res.	Offset	State Encoded	Min	Max
SodWarnLeft_Prd_Rq	7		millisecond	1	0		0(0x0)	127 (0x7F)

1.2.2.2.4 SIG-REQ-302046/A-CtaAlrtLeft_D_Stat

Signal Name	Size (bits)	Detailed Meaning	Units	Res.	Offset	State Encoded	Min	Max
CtaAlrtLeft_D_Stat	1		SED	1	0		0 (0x0)	1 (0x1)
		Lamp_Off				0x0		
		Lamp_On				0x1		

1.2.2.2.5 SIG-REQ-302047/A-CtaAlrtRight_D_Stat

Signal Name	Size (bits)	Detailed Meaning	Units	Res.	Offset	State Encoded	Min	Max
CtaAlrtRight_D_Stat	1		SED	1	0		0 (0x0)	1 (0x1)
		Lamp_Off				0x0		
		Lamp_On				0x1		

1.2.3 IR-REQ-302049/A-Outputs

- SodLeft_D_Alert
- SodRight_D_Alert
- Cross_Traffic_L_Alert
- Cross_Traffic_R_Alert
- BLIS_Active

1.3 Function/Performance

1.3.1 F-REQ-302050/A-Operational Modes

Current Operating Mode	Functionality in Current Operating Mode
Sleep Mode	Blind Spot Monitor Control Function Text Message Disabled
Limiting Mode	Blind Spot Monitor Control Function Text Message Disabled
Normal Mode	Blind Spot Monitor Control Function Text Message Enabled / Disabled
Crank Mode	Blind Spot Monitor Control Function Text Message Disabled

1.3.2 Voltage Levels

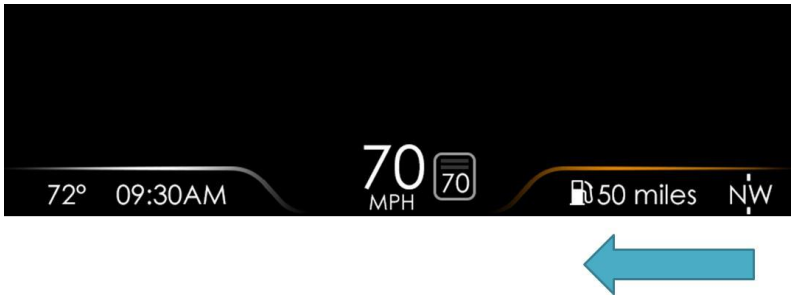
Refer to the HUD Feature table located in the Operational Modes and Voltage Range section in this SPSS.

1.3.3 Human-Machine Interface

1.3.3.1 Visual

1.3.3.1.1 Indicator Graphics / Display Format

BLIS example:



The above example shows a condition where the right turn signal is on and blind spot warning on the mirror is active.

1.3.3.1.2 CTA example:

TBD

1.3.3.1.3 Indicator Color Coordinates

BLIS: Amber - Reference SDS IL-0017/IS-0379
CTA: TBD

1.3.3.1.4 Indicator Characteristics

BLIS: Animated (refer to the HMI animation file “blindspot in HUD”).
CTA: Telltale

1.3.3.2 Audio

None.

1.3.3.3 Switch Control Logic

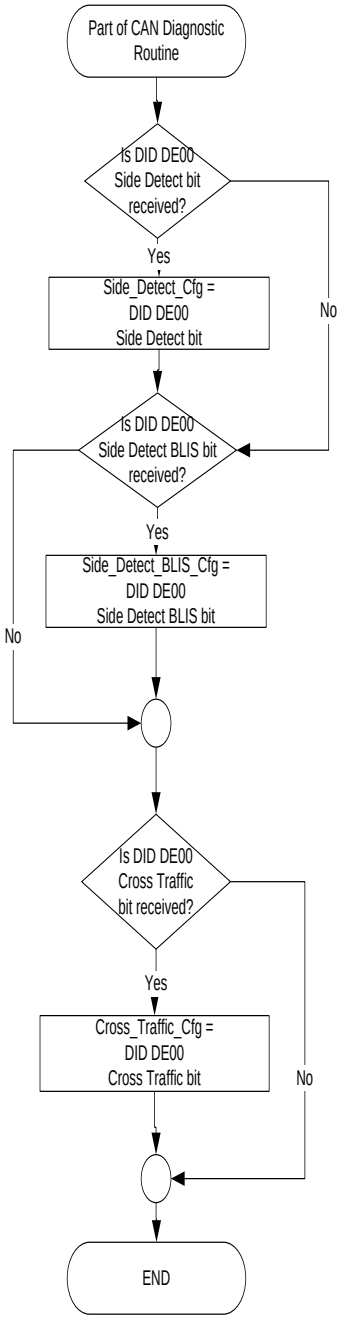
None

1.3.4 PFM-REQ-302055/A-System Accuracy

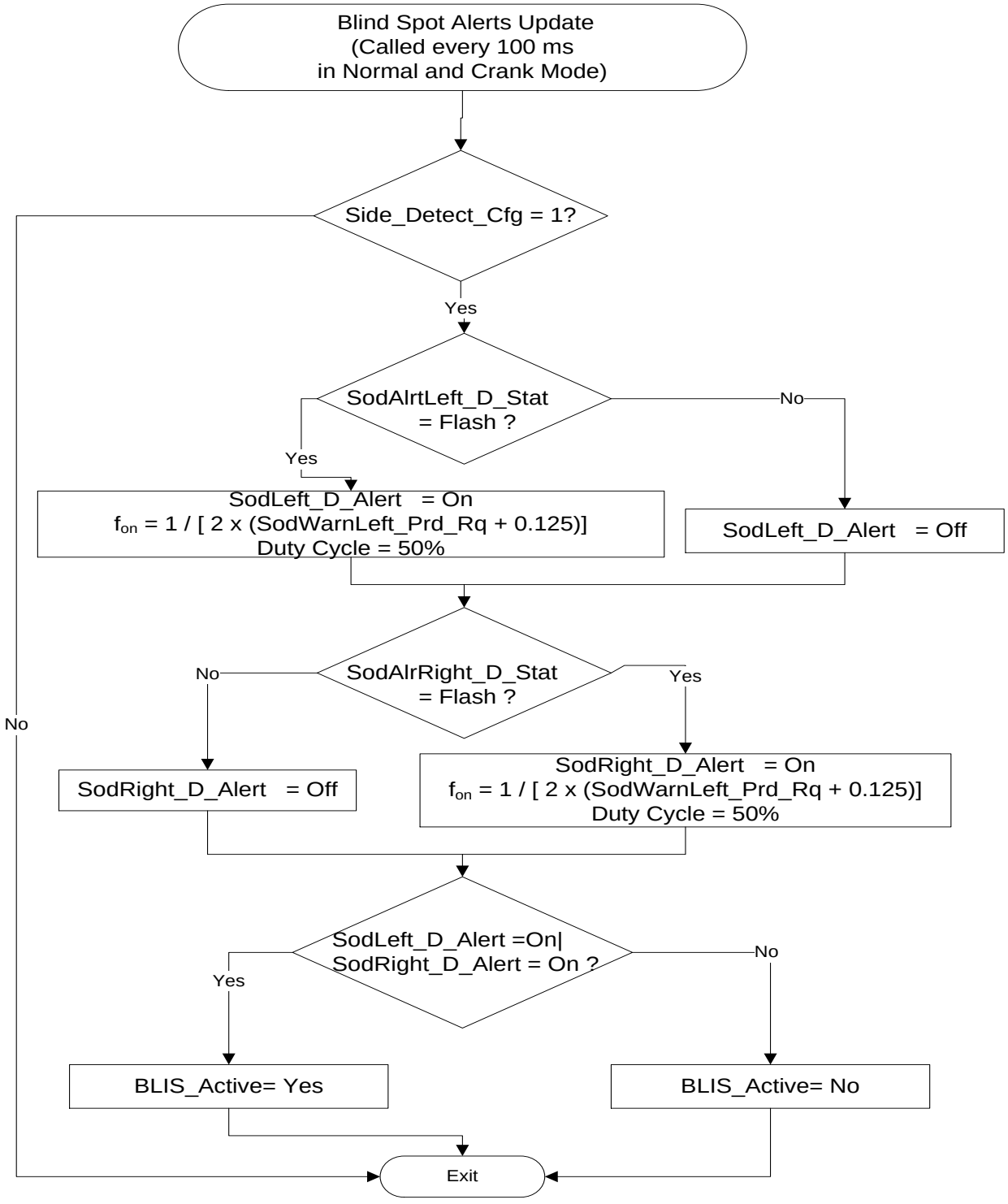
Within a 100 msec of receiving a message that results in a change of state the HUD will update the display to the proper status.

1.3.5 Operation: Performance and Functional

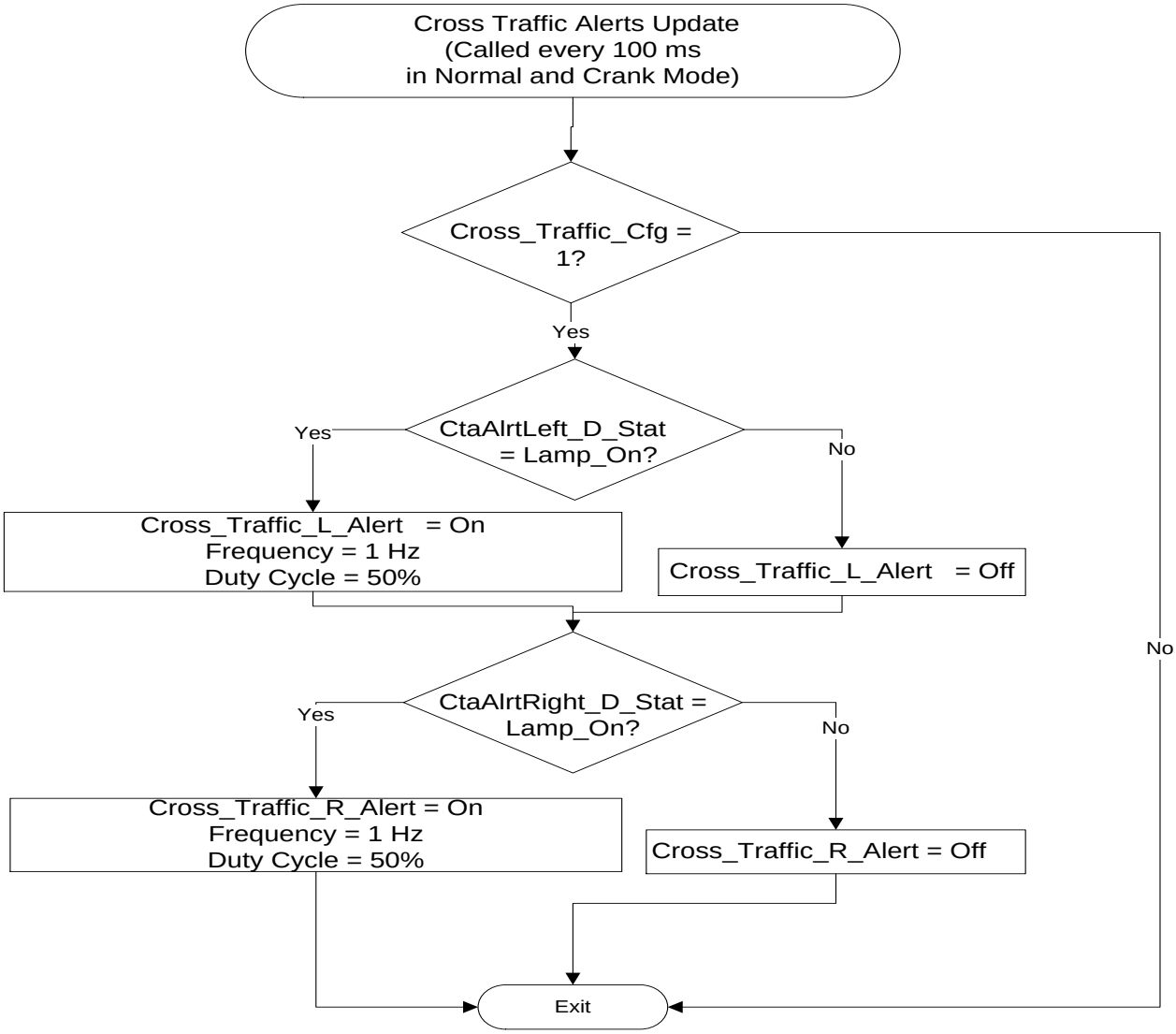
1.3.5.1 F-REQ-302059/A-Subsystem Algorithm Flowcharts / State Diagrams



1.3.5.1.1 F-REQ-302057/A-Subsystem Flowchart for Blind Spot Alerts



1.3.5.1.2 F-REQ-302058/A-Subsystem Flowchart for Cross Traffic Alert



1.3.5.2 Operation Description (supports algorithm flowchart /state diagram)

1.3.5.2.1 BLIS Operation

1.3.5.2.1.1 F-REQ-302051/A-Blind Sport Alert

- The Blind Spot Alert in the HUD shall be active only when the status signal from SODx is of “Flash” state.

1.3.5.2.1.2 F-REQ-302052/A- BLIS display

- BLIS display in the HUD shall follow the status of “Side_Detect_BLIS_Cfg”, it shall remain “solid on” when Side_Detect_BLIS_Cfg = “On”, otherwise shall flash at the rate and duty cycle specified.

1.3.5.2.1.3 F-REQ-302053/A- Exterior mirror

- The “On” state of the signal from SODx shall be ignored, while Blind Spot Alert in the Exterior mirror may still displays a solid “On”.

1.3.5.2.2 F-REQ-302054/A-CTA Operation

- CTA Alert shall flash when Cross_Traffic_x_Alert = on.

1.3.5.3 FS-REQ-302056/A;1-Function Safety Classification (EMC)

Class B

1.3.5.4 NVM-REQ-302060/A-Memory Storage

Parameter Name	Description	Value at Battery Connect	Value at Module Wake-up or Value at Transition to Normal Mode
Operational_Mode	4 state indicator for HUD operational mode	Limited	Limited, Normal or Crank
Side_Detect_Cfg	Configures HUD to allow Blind spot Alert	Do Not Init	Do Not Init
Side_Detect_BLIS_Cfg	Configures HUD to allow BLIS display either “On” or “Flash”	Do Not Init	Do Not Init
SodAlrtRight_D_Stat	Input signal to the HUD	OFF (0x0)	OFF (0x0)
SodAlrtRight_D_Stat	Input signal to the HUD	OFF (0x0)	OFF (0x0)
SodLeft_D_Alert	Used to control the state of the Indicator Off (0x0), On(0x1)	OFF (0x0)	OFF (0x0)
SodRight_D_Alert	Used to control the state of the Indicator Off (0x0), On(0x1)	OFF (0x0)	OFF (0x0)
SodWarnLeft_Prd_Rq	Used to control the flash rate of the Indicator	Do Not Init	Do Not Init
BLIS_Active	Indicates BLIS status Yes (0x1), No (0x0)	No (0x0)	No (0x0)
CtaAlrtRight_D_Stat	Input signal to the HUD	OFF (0x0)	OFF (0x0)
CtaAlrtRight_D_Stat	Input signal to the HUD	OFF (0x0)	OFF (0x0)
Cross_Traffic_L_Alert	Used to control the state of the Indicator Off (0x0), On(0x1)	OFF (0x0)	OFF (0x0)
Cross_Traffic_R_Alert	Used to control the state of the Indicator Off (0x0), On(0x1)	OFF (0x0)	OFF (0x0)

1.3.5.5 Reconfigurable Telltale

Not Applicable

1.3.5.6 Prove Out

Not applicable

1.3.5.7 Message Center Msg

Refer to “Global_Msg_Lst.xls” file – Message IDs W441, W442.

1.4 Error Handling

1.4.1 Missing Message Strategy

None

1.4.2 Invalid Message Strategy

None

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

None

1.6 Reference Specification

FS-DS7T-14C689-AC

1.7 Revision History

SPSS Module Revision History

Revision Level	Name	Change Description	Date
1.0	M. Ye	Initial Release	5/15/2014
1.1	M. Ye	Added configuration for BLIS display “On” or “Flash”	4/15/2015
1.2	P.Denduku	Initial VSEM RM Release	03/19/2018