





1 HUD HMI Handling - CGEA1.3

1.1 Functional Description

The purpose of this document is to provide the information regarding HMI arbitration/priority handling, and timeouts in the HUD.

1.2 Operation: Performance and Functional

1.2.1 Precedence

1.2.1.1 HMI-REQ-302190/A- Order of precedence

Following is the order of precedence for the information displayed in the same display area in HUD:

- FCW, ACC Brake Capacity
- Settings (Vertical, Horizontal, Rotation, Brightness)
- CTA
- ADAS (ACC,iACC, CC, Distance Alert, LKA, LDW, TJA, ASLD, TSR)
- Notification (Phone)*
- Navigation Repeater
- Control Mirror (Drive Mode, Gear, Volume, Radio, Media QuickAction button, etc)
- Tachometer
- Info Display (Status bar)

1.2.1.2 HMI-REQ-302191/A-Background

The overlaying graphics will apply the precedence when other information is shown in background. (For e.g. Navigation will not be shown when Settings menu is active, but the other information that are non-overlapping will be shown)

1.2.1.3 Notes:

1.2.1.3.1 HMI-REQ-302187/A-ACC text warning is in the same graphic location

If ACC text warning is in the same graphic location as ACC Stop & Go text fields, LKS/TJA Lanes, ACC Lead Car, ACC Gaps, then only ACC Text Warnings will be shown.

1.2.1.3.2 HMI-REQ-302188/A-TJA Warning

If showing TJA Warning – Vehicle Slowing Down, graphics for LKS/TJA Lanes, ACC Lead Car, ACC Gaps shall not be shown.

1.2.1.3.3 HMI-REQ-343157/A-TJA Cancelled

TJA Cancelled text has lower priority than the ACC warnings.

1.2.1.3.4 HMI-REQ-302189/A-Phone notification



Phone notification should cause the Distance & Street name not to be displayed. The Near_NAV sign will continue to be displayed. When BT_PHONE_TIMEOUT expires, the Distance & Street name will be displayed again.

1.2.2 Control Mirrors

1.2.2.1 HMI-REQ-302192/A-Time Out

-Control Mirrors shall timeout on CM_Timer. Retriggering shall restart this timer.

1.2.2.2 HMI-REQ-302199/A-Priority

-The Control Mirrors do not have any priority. Every new trigger for the control mirror will override the existing one displayed.

1.2.2.3 HMI-REQ-302200/A- Minimum display time

-A control mirrors shall be displayed for a minimum display time of MIN_CM_DISP_TIME, before triggering another control mirror.

1.2.2.4 HMI-REQ-302201/A-No Gap

-There shall be no gap between 2 control mirrors, if a new one is triggered within the timeout of the previous.

1.2.2.5 HMI-REQ-302202/A-Control mirror data display

-If a data is displayed in the Control mirror, the value shall be updated in display, if data changes within timeout. (Need to ensure each value is displayed for MIN_CM_DISP_TIME)

1.2.2.6 HMI-REQ-302203/A-More than one control mirror

-If more than one control mirror occurs within MIN_CM_DISP_TIME, consider only the latest occurrence and ignore all the intermediate triggers.

1.2.2.7 HMI-REQ-302204/A-Gear Selection

-The Gear Selection and Select Shift Indication have no timeout, except when Gear show "D" or SSI show "—".

1.2.3 Display Off Handling

1.2.3.1 HMI-REQ-302205/A-HUD shall switch on/off

-The HUD shall switch on/off the image depending on the value of HUD_On_Off. Only image is switched off during this time, but core logic in HUD shall be running in the background to show critical features such as FCW warning immediately. During Image off, HUD illumination shall be set to zero, to make sure no image is visible in windshield.

1.2.3.2 HMI-REQ-302206/A-FCW Image position

-The FCW Image position shall be automatically centered (default position) unless memory is recalled or image adjusted in the current ignition cycle (This is applicable only if display is off)



1.2.4 Navigation

1.2.4.1 HMI-REQ-302207/A-Arrived at waypoint

The arrived at waypoint and arrived at destination display shall timeout after NAV_DEST_TIMEOUT

1.2.4.2 HMI-REQ-302208/A-Loading

"Loading.." shall be displayed during Startup animation only when RouteActive_St is Active prior to the start of Startup animation. If Route transitions to Active during the course of Startup animation, then "Loading.." shall not be shown even after Startup animation is completed. Also, if Route transitions to Inactive during the course of Startup animation, then "Loading.." shall continue to be shown until the completion of Startup animation.

"Loading.." shall continue to be shown after Startup animation completion at key ON until one of the following conditions become TRUE:

NAV_LOADING_TIMEOUT timer expires

SYNC transmits information to show the NAV sign, which also includes Off Route, Calc. Route and No Route.














Route becomes Inactive

Note: REQ-302208 is applicable only for the programs whose wallpaper defines "Loading.." and is part of the startup animation

1.2.4.3 HMI-REQ-302209/A- Navigation Speed Limit

Market Code	Country Code	Speed Limit Sign
USA	US	
GUAM	GUM	
PUERTO RICO	PRI	
CANADA	CAN	
MEXICO	MX	
PANAMA	PAN	



DOMINICAN REPUBLIC	DOM			
ARUBA	ABW			
JORDAN	JOR			
SAUDI ARABIA	SAU			
OMAN	OMN			
YEMEN	YEM			
LEBANON	LBN			
BAHRAIN	BHR			
KUWAIT	KWT			
QATAR	QAT			
UNITED ARAB EMIRATES	ARE			
SOUTH KOREA	KOR			
CHINA	CHN			

*Other regions to be considered in the future



1.2.5 SLIF/TSR

1.2.5.1 HMI-REQ-302210/A-SLIF/TSR is disabled

If SLIF/TSR is disabled, then ISA-Intelligent Speed Assistance and IACC- Intelligent Adaptive Cruise Control shall not be shown

1.2.5.2 HMI-REQ-302211/A-SLIF/TSR has a faulty condition

If SLIF/TSR has a faulty condition, ISA- Intelligent Speed Assistance and IACC- Intelligent Adaptive Cruise Control shall be shown with a “connector between iACC and TSR- refer to the HMI wallpaper

1.2.6 HMI-REQ-302218/A-Bluetooth Phone

Incoming call icon display shall timeout after BT_PHONE_TIMEOUT

1.2.7 Image Density Setting

1.2.7.1 HMI-REQ-302212/A- HUD Image Density is set to Low

- If the HUD Image Density is set to Low (Feat Num: 0xC03 = 0x0 in Memory recall STSS), following data will be removed from the Status bar:
 - o DTE/Fuel Icon
 - o Time
 - o Outside Air Temperature
 - o Compass (if available for the program)

1.2.7.2 HMI-REQ-302213/A-HUD Image Density is set to High

- If the HUD Image Density is set to High (Feat Num: 0xC03 = 0x1 in Memory recall STSS) the above data will be reverted back to status bar.

1.2.8 HMI-REQ-302217/A-Traffic Sign Recognition (TSR)

If TSR is enabled, then PHEV state of charge and DTE shall not be shown on the right

*This only applies to U611

1.2.9 HMI-REQ-343156/A-Lane Centering Assist (Traffic Jam Assist)

The LCA Icon will appear to the left of the digital speed whenever any ACC Text Warning is being shown or the Stop & Go text is being displayed in the center. Otherwise, the LCA Icon shall appear in the center.

1.2.10 ADAS Display Settings

1.2.10.1 HMI-REQ-302214/A-HUD ADAS = 0

HUD_ADAS = 0

Do not display graphics related to the following:
:NCC- Normal Cruise Control



:ACC/iACC- Adaptive Cruise Control/Intelligent Adaptive Cruise Control
:LCA- Lane Centering Assist
:LKS – Lane Keeping System
:ASLD/ISA- Adjustable Speed Limiter Device/ Intelligent Speed Assistance

1.2.10.2 HMI-REQ-302215/A-HUD_ADAS = 1(CC+LKS)

HUD_ADAS = 1
(CC+LKS)

Display Graphics for the following features:
:NCC- Normal Cruise Control
:ACC/iACC- Adaptive Cruise Control/Intelligent Adaptive Cruise Control
:LCA- Lane Centering Assist
:LKS – Lane Keeping System
:ASLD/ISA- Adjustable Speed Limiter Device/ Intelligent Speed Assistance

1.2.10.3 HMI-REQ-302216/A-HUD_ADAS = 2(CC Only)

HUD_ADAS = 2
(CC Only)

Display Graphics for the following features:
:NCC- Normal Cruise Control
:ACC/iACC- Adaptive Cruise Control/Intelligent Adaptive Cruise Control
:LCA- Lane Centering Assist
:ASLD/ISA- Adjustable Speed Limiter Device/ Intelligent Speed Assistance

1.2.11 FS-REQ-302184/A- Function Safety Classification (EMC)

B

1.2.12 NVM-REQ-302185/A- Memory Storage

Parameter Name	Description	Value at Battery Connect	Value at Module Wake-up
Operational_Mode	4 state indicator for HUD operational mode	Limited	Limited, Normal or Crank

1.2.13 NVM-REQ-302219/A-Timer Definitions

		Timers shall be programmable within the following range : *			
Timer Name	Duration	Description	Min	Max	Resolution
CM_Timer	4 s	Minimum duration that a New Control mirror must be displayed.	0 s	10 s	1 s
MIN_CM_DISP_TIME	0 s	Duration that first control mirror is displayed when a second control mirror gets active at the same time. (No minimum display time for D544 HUD to match cluster control mirrors)	0 s	5 s	1 s
NAV_DEST_TIMEOUT	3 s	Duration which Navigation arrived at destination or waypoint is displayed	1 s	10 s	1 s
NAV_LOADING_TIMEOUT	25 s	Duration "Loading.." shall continue to be shown after Startup animation completion at key ON	0 s	255 s	1 s
BT_PHONE_TIMEOUT	4 s	Duration which Incoming Call is displayed	1 s	10 s	1 s
PHEV_DTE_TIMEOUT	4s	Duration which PHEV DTE is displayed when PHEV DTE IS missing/invalid or value of '0'	1s	10s	1s



Timers shall be programmable within the following range : *

Timer Name	Duration	Description	Min	Max	Resolution
* Note: Timers must be programmable to at least the Max value listed. Higher Max values and finer resolutions are acceptable. These values are expected to be programmable through a supplier DID during development, but not expected to be field programmable					

1.3 Error Handling

1.3.1 Missing Message Strategy

1.3.1.1 Missing signal reference

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

1.3.1.2 States & History

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

1.4 Diagnostics

1.4.1 Self Test

None

1.4.2 Engineering Test Mode

Reference section "Dealer / Engineering Test Mode (ETM)"

1.4.3 Part II Performance

Supported Diagnostic Trouble Codes (DTCs)

None

1.5 Revision History

SPSS Module Revision History

Revision Level	Name	Change Description	Date
1.0	A. Mathai	Initial Release	7/29/2014
1.1	A. Mathai	Added Phone notification inhibition and clarified control mirrors	8/28/14
1.2	A. Mathai	Removed Phone notification suppression and added FCW centering during display off	10/28/14
1.3	A. Mathai	Changed MIN_CM_DISP_TIME value to 0s. Added CTA in precedence table. Moved the Image adjustment and Control mirror priority up to just below FCW warning.	2/13/14



1.4	A. Mathai	Removed timeout for Gear shift control mirrors except when showing "D" or "—"	4/16/15
1.5	A. Mathai	Moved the Control mirror priority below Navigation	5/29/15
1.6	A. Mathai	Included timeout for Navigation destination display	6/25/15
1.7	A. Mathai	Clarified to turn illumination to zero during Image off.	1/28/16
1.8	A. Mathai	Included Navigation "Loading Data" requirement and Low density clarification	5/20/16
1.9	A.Salameh	Added Bluetooth Phone timeout for incoming call	6/9/2017
1.10	A. Salameh	Updated Section 1.2.1 Table 1.0 - added PHEV DTE timeout Added section 1.2.7 ADAS display settings Added section 1.2.4.4 & 1.2.4.5	10/6/2017
1.11	A.Salameh	Added notes to section 1.2.1, updated table 1.2.4.3, modified section 1.2.4.5 and added section 1.2.7	11/03/2017
1.12	A. Salameh	Updated section title 1.2.7. Updated 1.2.4.4 and 1.2.4.5	11/14/2017
1.13	A. Salameh	Updated note in section 1.2.1	02/05/2017
1.14	P.Denduku	Initial VSEM RM Release	03/19/2018
1.15	ilopezla	Added REQ-34156 -"Lane Centering Assist (Traffic Jam Assist)"	2/3/2019
1.16	ilopezla	Removed REQ- 302186 "Acc Text Warnings" which indicated that ACC text warnings shall take precedence over TJA Cancelled warning.	2/3/2019
1.17	ilopezla	Added REQ-343157 "TJA Cancelled text has lower priority than the ACC warnings"	2/3/2019