Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Emergency Assistance

APIM_DuerOS Subsystem Part Specific Specification (SPSS)

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FORD CONFIDENTIAL

Revision History

Date	Ver	Notes	
Month XX, 2019	1.0	Initial Release	

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1 Introduction

1.1 Purpose

This document specifies the requirements for SYNC+ Emergency Assistance Feature for China market.

1.2 Feature Name

The feature name shall be 'Emergency Assistance'.

1.3 Feature Background

SYNC+ Emergency Assistance feature provides direct access to localized call centers in the case of a qualified vehicle accident. The Emergency Assistance feature utilizes the driver's Bluetooth enabled device to place an emergency call to a call center. Before the emergency call is initiated and connected, SYNC+ delivers a message to the vehicle occupants in their pre-set preferred language that an emergency call is being placed and allows the user to cancel the call if they please. Once the emergency call is connected, SYNC+ provides an introductory audio message and may include GNSS location information to the call center operator.

1.4 References

The following table lists the references which influence the design requirements discussed in this document.

	Reference Title	Type	Location
1	Previous Emergency Assistance specs		
2	A22c – Tones, Prompts, and Chimes	MS Excel	
3	HMI Specification		
4	CAN message list		
5	Rest of World Call Taker Feature Training	URL	www.emergencyassistance.ford.com
	Note: Reference material above will be provided if requested		

TABLE: List of References.

1.5 Terminology, Abbreviations, & Definitions

The following table lists terminologies that are used in this document along with a brief description.

Term	Description
B&A	Body and Assembly
BCM	Body Control Module
CAN	Controller Area Network (General Network)
DSP	Digital Signal Processing Module
EA	Emergency Assistance - Official Feature Marketing Name
ECU	Electronic Control Unit
EOL	End of Line
GPS	Global Position System
GNSS	Global Navigation Satellite System
HFP	Hands Free Profile - Bluetooth profile used for making and receiving calls
HMI	Human Machine Interface
HS-CAN	High Speed Controller Area Network
I-CAN	Infotainment Controller Area Network

Term	Description
PSAP	Public Safety Answering Point
RCM	Restraints Control Module
ROW	Rest of The World
TTS	Text To Speech
VEDS	Vehicle Emergency Data Set {Crash Data}
VIN	Vehicle Identification Number
WERS	World-Wide Engineering Release System
Off-Hook	The active state when a phone call is connected to the far-end. For this specification this definition applies to the state when the Phone Core confirms an active and connected phone call.
Voice Prompt	A pre-recorded audio message that can be played to the occupant or operator

TABLE: List of Terminology, Abbreviations & Definitions.

1.6 Schedule and Dependencies

The Supplier shall provide a detailed project plan that includes timing milestones which details every phase of the project. All project dependencies shall be included and specified in this project plan.

2 Feature Overview

2.1 Goals

1) Provide capability for the user to enable/disable the feature via Emergency Assistance menu.
2) Provide assistance in contacting emergency services for vehicle occupants involved in a qualified crash event (airbag deployment and/or fuel pump shut off as determined by the RCM).
3) Provide notification of an accident event and GPS location data (if available) to emergency services via concatenated pre-recorded prompts in Chinese.
4) Provide an appropriate in-vehicle user experience utilizing display and voice prompts.
5) Provide hands-free voice communication between the vehicle occupants and public safety services.
6) Perform phone connection and reconnection strategy as defined.
7) Provide VEDS support for China market.
8) Provide a post-crash priority Emergency Screen Display with relevant display and prompt information to the vehicle occupant – i.e. vehicle restart instruction, Emergency Contacts if previously set.
9) Provide Emergency Assistance feature awareness with ON/OFF messaging and permanent display icon upon phone connection.
10) When MyKey Emergency Assistance override is enabled, prevent the user from disabling feature in addition to providing a notification that the feature cannot be disabled.

2.2 Additional Features

1) Detect off-hook phone condition before beginning PSAP prompts.
2) Support dual-track audio messages for PSAP and the vehicle occupants.

2.3 General Assumptions

1) Access to the Emergency Assistance application and menus will be configurable via ECU DataIdentifiers(DID).
2) PSAP language is Chinese Mandarin.
3) Vehicle Audio messages should be in accordance with the user language preference pre-selected by the user. All in-vehicle prompts will be sculpted and available for use in direct correlation with the installed language packs for each vehicle.
4) Pre-recorded voice prompts requirements: All in-vehicle audio and PSAP messages related to the feature– should err on the side of clarity and completeness. They shall have proper speaking cadence [variable], adequate volume [variable] as to be heard clearly within the vehicle cabin after a crash event without user intervention. The PSAP message should also be of an appropriate volume [variable]. Appropriate volume levels subject to final approval by Ford. Language prompts shall be tuned to match the broadest dialect for regional understanding. All voice messages related to the feature should be intelligible and spoken completely without delay when requested. There should be no pausing or stuttering in a prompt delivery.
5) Display notification shall be as clear as possible and display items shall be visible on the screen for an appropriate length of time and subject to final approval by Ford.
6) Emergency Assistance application: takes priority over all competing SYNC+ features (phone calls, popups, etc.) during an Emergency Assistance event. Emergency calling is a high-priority data thread over all applications. All incoming calls, alerts, and notifications shall be suppressed until after Emergency Assistance has completed all emergency call attempts. Any priorities which seem to interfere should be reviewed with Ford.
7) Initiating the emergency phone call shall be made independent of availability of multimedia, HMI, or CAN availability after receiving the RstrnImpactEvntStatus CAN signal with a Threshold_2_Exceeded (0x5 value) (Qualified Crash Event) from the RCM post-crash.
8) The hands-free phone call volume shall be adequate as to be heard clearly in the vehicle cabin during the emergency call. The user volume setting should be overridden if the user volume is below the adequate volume level and set to an adequate level. The in cabin volume level shall be configurable subject to approval by Ford (prompts & connected call).
9) GNSS information includes latitude & longitude and shall be available to the PSAP Operator in the prompt message.
10) During an Emergency Assistance event, the in-vehicle Bluetooth OFF setting shall be overwritten and a Bluetooth connection sequence shall be initiated in an attempt to connect a phone that has been previously paired to SYNC+.
11) Upon Ignition ON and after a paired phone is connected, the Emergency Assistance OFF status is displayed on the HMI screen using a status message along with a permanent icon.
12) With MyKey, the administrator has the option of preventing the MyKey user from disabling Emergency Assistance (i.e., The Emergency Assistance Feature is defaulted to ON when MyKey is active).
13) Support the delivery of VEDS.

14) Please refer to the latest SYNC+ EA HMI Flow for reference on how the HMI shall be displayed.
15) Please refer to the latest A22c spec for the voice prompts used for Emergency Assistance feature.
16) Please refer to the latest Translation Table for all text used for Emergency Assistance feature.

3 Architectural Design

Emergency Assistance Block Diagram

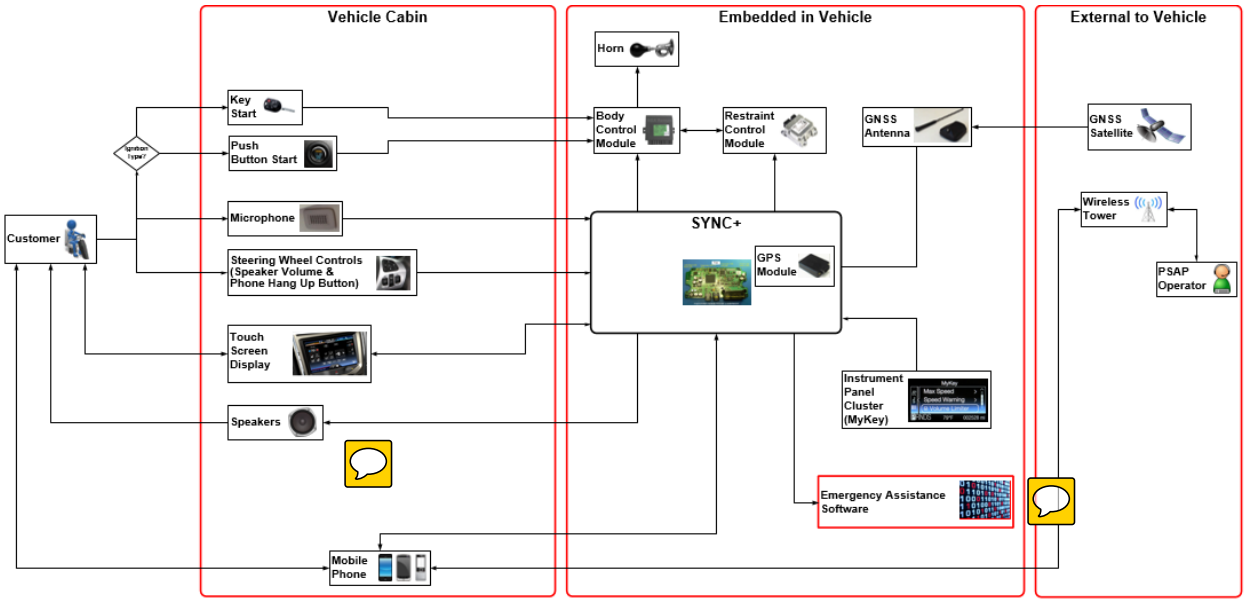


Figure: Emergency Assistance Block Diagram

3.1 Interface Requirements

3.1.1 EASSIST-FUR-REQ-354335/A-Restraint Impact Event Status CAN Signal:

The following CAN signal shall be continuously monitored by SYNC+ to know when a qualified crash event has occurred as determined by the Restraint Control Module (RCM). A qualified crash event is when the RCM detects an event with airbag deployment/s or fuel pump shutoff.

Attributes	Signal	Values
Transmit Node: RCM via GWM **Cycle time:** 100ms Event Periodic	**RstrnImpactEvntStatus** **Length:** 3 bits	0x0: Normal
		0x1: Not_Used_1
		0x2: Not_Used_2
		0x3: Threshold_1_Exceeded
		0x4: Not_Used_3
		0x5: Threshold_2_Exceeded
		0x6: Not_Used_4
		0x7: Invalid
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: RstrnImpactEvntStatus Signal

3.1.2 EASSIST-FUR-REQ-354336/A-Qualified Crash Event CAN Values from RCM

SYNC+ shall start the Emergency Assistance crash event behavior upon reception of one or more transmissions of the **RstrnImpactEvntStatus** signal with a value of 0x5 (Threshold_2_Exceeded). RstrnImpactEvntStatus equal to 0x5 (Threshold_2_Exceeded) is transmitted by the RCM upon detection of airbag deployment/s or fuel pump shutoff.

3.1.3 EASSIST-FUR-REQ-354337/A-Unwanted Call Prevention

The Emergency Assistance crash event behavior shall not start a subsequent time until SYNC+ has received a transition of **RstrnImpactEvntStatus** from a value of 0x5 (Threshold_2_Exceeded) to a value of 0x0(Normal). Below is a diagram of this behavior:

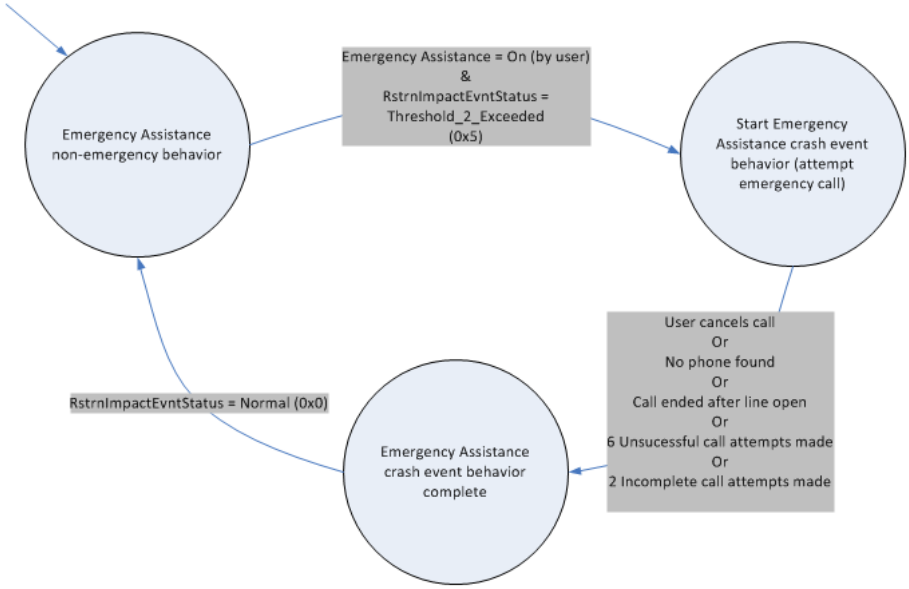


FIGURE: Unwanted Call Prevention

3.1.4 EASSIST-FUR-REQ-354338/A-CAN Reception from RCM

SYNC+ shall expect to receive the **RstrnImpactEvntStatus** signal periodically (typically every 100ms or every 1000ms) while the vehicle ignition status is at RUN or START (RCM is only powered during RUN/START). Please refer to appropriate vehicle CAN database.

3.1.5 EASSIST-FUR-REQ-354339/A-Invalid CAN Values from RCM

SYNC+ shall classify the Emergency Assistance feature as **Not Operational** for the following states of the **RstrnImpactEvntStatus** signal:

1) **RstrnImpactEvntStatus** consecutively has the following values for 5 seconds:
   a. 0x1 (Not_Used_1) **or**
   b. 0x2 (Not_Used_2) **or**
   c. 0x4 (Not_Used_3) **or**
   d. 0x6 (Not_Used_4) **or**
   e. 0x7 (Invalid)
2) **RstrnImpactEvntStatus** has not been received for 5 consecutive seconds while the ignition status is at RUN or START.

3.1.6 EASSIST-FUR-REQ-354340/A-RstrnImpactEvntStatus Monitoring

RstrnImpactEvntStatus shall be continuously monitored at all times SYNC+ is powered and awake.

3.1.7 EASSIST-FUR-REQ-354343/A-Ignition Status CAN signal

The following CAN signal shall be continuously monitored to know when the vehicles ignition status is at Run or Start as determined by the BCM.

Attributes	Signal	Values
Transmit Node: BCM via GWM	**Ignition_Status** **Length:** 4 bits	0x0: Unknown
		0x1: Off
		0x2: Accessory
		0x4: Run
		0x8: Start
		0xF: Invalid
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: Ignition_Status Signal

3.1.8 EASSIST-FUR-REQ-354344/A-Door Status CAN signals

The following CAN signal shall be continuously monitored to know when the vehicles driver door is ajar.

Attributes	Signal	Values
Transmit Node: BCM via GWM	**DrStatDrv_B_Actl** **Length:** 1 bits	0x0: Closed
		0x1: Ajar
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: DrStatDrv_B_Actl Signal

3.1.9 EASSIST-FUR-REQ-354345/A-Key Type CAN Signals

The following CAN signal shall be continuously monitored to determine what type of key is being used.

Attributes	Signal	Values
Transmit Node: BCM via GWM	**IgnKeyType_D_Actl** **Length:** 4 bits	0x0: Key_Read_In_Progress
		0x1: Key_In_Ign_Standard_Key
		0x2: Key_In_Ign_My_Key
		0x3: Key_Not_Prgrm_Read_Failure
		0xE: Unknown
		0xF: Invalid
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: IgnKeyType_D_Actl Signal

3.1.10 EASSIST-FUR-REQ-354346/A-MyKey CAN Signals

The following CAN signal shall be continuously monitored to determine if Mykey override is enabled.

Attributes	Signal	Values
Transmit Node: IPC	**MyKey_e911Override_St** **Length:** 2 bits	0x0: No_Data_Exists
		0x1: Off
		0x2: On
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: MyKey_e911Override_St Signal

3.1.11 EASSIST-FUR-REQ-354347/A-Global Real Time Signal

The following CDP shall be monitored to determine the Global Real Time at detection of a vehicle crash.

Attributes	CDP	Values
Message: 0x40A **CDID:** C000 **CDID Data Size:** 6 bytes **CDP MSB:** 39 **CDP LSB:** 8	**Global Real Time** **Size:** 32 bits	0.1 - 4.3E+08 Seconds
Important Note:	Please refer to the latest High Speed CAN message list.	

TABLE: Global Real Time Signal

4 General Requirements

The following sections discuss, in detail, the design requirements which specify the functionality of the Emergency Assistance feature. **The Example HMI Screens, Pop-Ups, Voice Prompts, and Text provided should only be treated as example aids and not as the actual final implementation.** Refer to the appropriate specifications identified in each requirement for the final implementation of HMI Screen Design, Display Text, and Voice Prompts.

4.1 HMI Summary

For reference, the HMI Summary only lists the transient messages, voice prompts and text in English. Please refer to HMI voice and text specifications that will include additional languages.

4.1.1 Emergency Assistance Transient Messages

Below is a table of all the Transient Messages associated with the Emergency Assistance feature. The duration of these Transient Messages shall be treated as variables and shall be modified if needed to improve the quality and delivery of the feature prior to the vehicle launch.

Transient Message	Definition	Duration
{Feature Name} is set to OFF.	Shown when the phone is connected and the Feature has been set to OFF. Purpose is to remind the user that the Feature is set to OFF.	3s
{Feature Name} requires a connected phone.	Shows when no phone is available to SYNC+ and the Feature has been set to ON. Purpose is to remind the user that the Feature needs a connected phone to function.	3s
Attempting to connect to an available phone.	Shown during an Emergency Call event and when no previously paired phone is connected. Purpose is to let the user know that an attempt is being made to connect to a previously paired phone.	*Persistent
Calling Emergency Services.	Shown during an Emergency Call event and after the cancellation timer expires. Purpose is to let the user know that an Emergency Call is being placed.	*Persistent
Call Connected to Emergency Operator.	Shown during an Emergency Call event and when the user was already in an active call with Emergency Services before the crash. Purpose is to let the user know that the current call is with an Emergency Operator.	*Persistent
Attempting to Redial Emergency Number.	Shown during an Emergency Call event and when the call is disconnected before PSAP prompts played entirely. Purpose is to let the user know that another attempt is being made to call Emergency Services.	*Persistent
Call connected. Please wait for Operator.	Shown during an Emergency Call event. Purpose is to let the user know that the call has been answered by an Emergency Operator.	*Persistent
Line Open. You are connected with an Emergency Operator.	Shown during an Emergency Call event and when PSAP prompts have been entirely played. Purpose is to let the user know that a 2-way communication is established with the PSAP Operator.	*Persistent
Call ended. {Feature Name} call attempts complete.	Shown at the conclusion of the Emergency Call event. Purpose is to let the user know that the Emergency Call has ended.	Until Crash Notification screen is exited.

TABLE: Transient Messages

***Persistent: The Transient Messages shall be displayed until it is replaced by another transient message.**

4.1.2 Emergency Assistance In-vehicle Voice Prompts

Below is a table of all the in-vehicle voice prompts used by the Emergency Assistance feature. These voice prompts shall be played to the vehicle occupant via the vehicle audio system.

Identification Number	Voice Prompt

101016_CHR	Emergency Assistance attempted to connect to a paired Bluetooth enabled phone, but no phone was found. Therefore Emergency Assistance cannot place an emergency call.
101024_CHR	Emergency Assistance was unable to place an emergency call.
101030_CHR	Emergency Assistance is set to off, therefore an emergency call cannot be placed.
101031	Emergency call cancelled.
101039_CHR	Emergency Assistance will attempt to make an emergency call. To cancel the call, please choose cancel from the screen, or press the phone button.
101041	Call transferred to privacy. Please use your handset.
101050_CHR	An emergency call is being placed. Emergency Assistance will speak first to the emergency operator before opening the line. Please wait.
101055	Call ended. Emergency Assistance call attempts complete.
101056	Sending important information to emergency operator. Please wait.
101114	Line open.

TABLE: Emergency Assistance In-vehicle Voice Prompts

4.1.3 Emergency Assistance PSAP Voice Prompts

See Appendix B Vehicle Emergency Data Set for a full list of all the PSAP voice prompts used by the Emergency Assistance feature. These voice prompts shall be played to emergency operator (PSAP) via the outgoing voice channel on the connected phone. See the below list of Number prompt ID referenced in Appendix B. The numbers are used for location latitude and longitude and for maximum speed change.

Identification Number	Voice Prompt
101060	Point
101061	Minus
101064	Zero
101065	One
101066	Two
101067	Three
101068	Four
101069	Five
101070	Six
101071	Seven
101072	Eight
101073	Nine

TABLE: PSAP Voice Prompts for Numbers

5 Functional Definition

5.1 Non-Emergency Behavior Requirements

5.1.1 Emergency Assistance Default Settings

5.1.1.1 EASSIST-FUR-REQ-354348/A-Feature On/Off Default User Setting

The default user setting for Emergency Assistance shall be set to OFF.

5.1.1.2 EASSIST-FUR-REQ-354349/A-Master Reset Default Settings

If a master reset is performed by the user, the Emergency Assistance user setting shall be set to OFF.

5.1.2 Emergency Assistance Menu

5.1.2.1 EASSIST-FUR-REQ-354350/A-Emergency Assistance Settings Display

Upon entering SYNC+ settings menu, the user shall be presented with the Emergency Assistance Setting selection if the feature is configured on. In addition, the user should be able to navigate to the Emergency Assistance Menu after entering SYNC+ settings menu. Please refer to the HMI spec for details.

5.1.2.2 EASSIST-REQ-354351/A-Emergency Assistance On and Off

In the Emergency Assistance menu, the user shall be able to set the Emergency Assistance feature on or off by toggling the Emergency Assistance feature button. Please refer to the HMI spec for details.

Below is an example of the HMI screen:

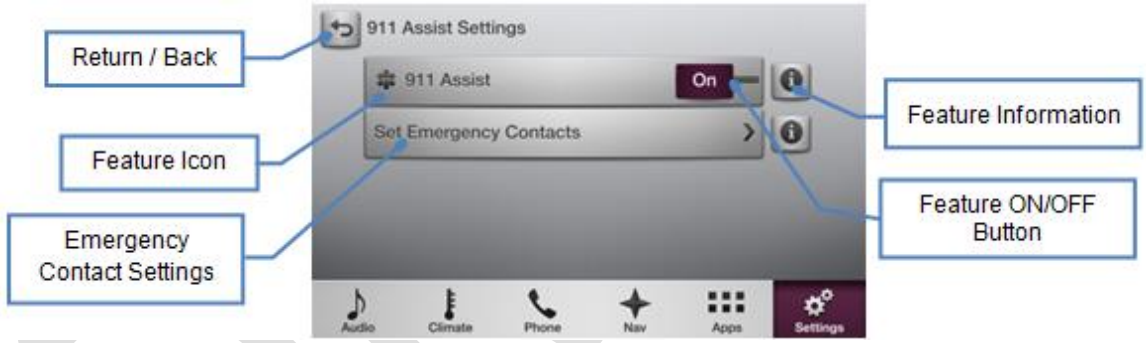


Figure: Emergency Assistance Menu

5.1.2.3 EASSIST-REQ-354352/A-Emergency Assistance Information Icon

The Emergency Assistance feature shall have an information icon to display information pertaining to the feature. When the icon is pressed, the information shall be displayed via an HMI Pop-Up. Please refer to the HMI spec for details.

Below is an example of the HMI content:

Emergency Assistance

If set to On, Emergency Assistance will automatically attempt to call emergency services using your connected phone when a qualified crash is detected. To setup emergency contacts, make sure that the mobile phone contacts are downloaded.

5.1.2.4 EASSIST-FUR-REQ-354353/A-Emergency Assistance User Setting Persistence

The Emergency Assistance user setting shall be stored in non-volatile memory to retain its state upon the user changing the setting.

5.1.2.5 EASSIST-REQ-354354/A-No Phone Connected Menu Behavior

If there is no phone connected to SYNC+ upon the user turning the Emergency Assistance feature on, the user shall be notified with a pop-up indicating that a connected phone is required for the Emergency Assistance feature to function. When the pop-up is dismissed, the Emergency Assistance feature shall be turned ON. Please refer to HMI spec for details.

Below is an example of the HMI content:

"Emergency Assistance requires a connected phone in order to operate."

5.1.2.6 EASSIST-REQ-354355/A-Not Operational Settings Behavior

If it is determined that Emergency Assistance is not operational upon the user attempting to select the Emergency Assistance Setting selection from SYNC+ main settings screen, the user shall be notified with the Not Operational pop-up. And the user shall not be able to access the Emergency Assistance menu. Please refer to HMI spec for details.

Below is an example of HMI content:

Warning!
Emergency Assistance is not operational. Please visit your dealer for service.

5.1.2.7 EASSIST-FUR-REQ-354356/A-Not Operational Menu Behavior

If it is determined that the Emergency Assistance is not operational upon the user attempting to set the Emergency Assistance on or off, the user shall be notified with the Not Operational pop-up. Please refer to HMI spec for details.

Below is an example of the HMI content:

Warning!
Emergency Assistance is not operational. Please visit your dealer for service.

5.1.3 Emergency Contacts

5.1.3.1 EASSIST-REQ-354357/A-Emergency Contacts Not Available

If a phone is connected and the contacts are not downloaded to SYNC+, the Emergency Contacts button shall not be displayed. Please refer to HMI spec for details.

5.1.3.2 EASSIST-FUR-REQ-354358/A-Emergency Contacts Available

User shall be able to configure two Emergency Contacts from the phonebook if contacts of the connected phone are downloaded to SYNC+. Once configured, the Emergency Contacts shall be associated with the specific phone and only show up when that phone is connected. The Emergency Contacts configuration shall be supported on multiple phones. Please refer to HMI spec for details.

Below is an HMI example:

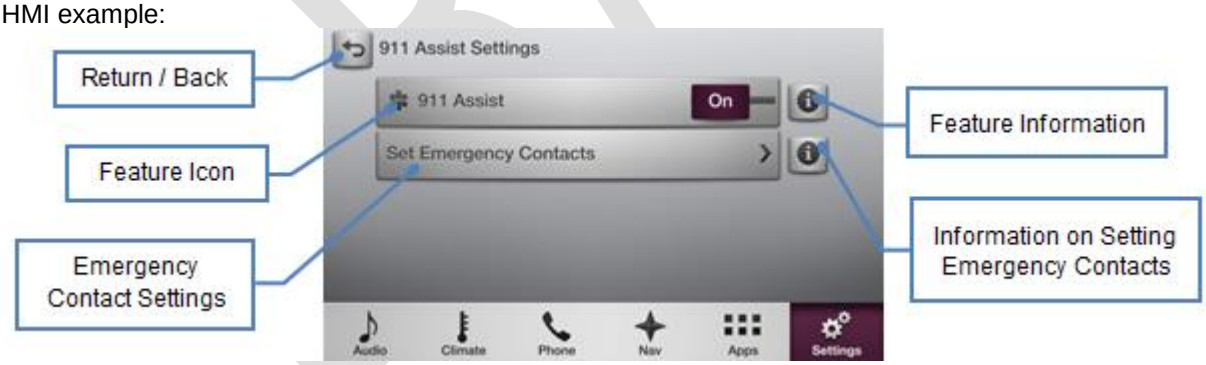


Figure: Set Emergency Contacts Option

5.1.3.3 EASSIST-FUR-REQ-354359/A-Emergency Contacts Information Icon

The Emergency Assistance feature shall have an information icon to display information pertaining to setting Emergency Contacts. When the icon is pressed, the information shall be displayed via an HMI Pop-Up. The Emergency Contacts Information Pop-Up shall expire via a "Close" software button. Please refer to HMI spec for details.

Below is an example of the HMI Pop-Up:

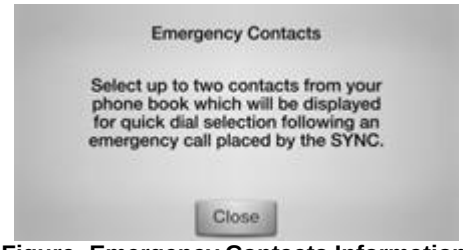


Figure: Emergency Contacts Information

5.1.3.4 EASSIST-REQ-354360/A-Emergency Contacts Settings

Upon the user selecting the 'Set Emergency Contacts' button, SYNC+ shall allow user to select a contact from the phonebook. Please refer to HMI spec for details.

Below is an example of the HMI screen:

Figure: Emergency Contacts Settings Screen

5.1.3.5 EASSIST-REQ-354361/A-Emergency Contacts Configuration

Once an Emergency Contact has been stored, the system shall allow the user to change or delete the contact. Please refer to HMI spec for details.

Below is an example of the HMI screen:

Figure: Emergency Contacts Settings Screen

5.1.3.6 EASSIST-REQ-354362/A-Emergency Contacts Deletion

Upon selecting the 'Delete' button, the user shall be prompted to confirm the intent to delete a stored Emergency Contact via an HMI Pop-Up. The confirmation to delete a stored emergency contact Pop-Up shall expire via "Yes / No" software buttons. Please refer to HMI spec for details.

Below is an example of the HMI Pop-Up:

Figure: Confirmation to Delete Emergency Contact

5.1.3.7 EASSIST-REQ-354363/A-Emergency Contacts Validity

If a previously paired phone is deleted from SYNC+, all previously setup Emergency Contacts associated with that device shall also be deleted and the user must setup new Emergency Contacts if the same device is connected with SYNC+ once more.

5.1.4 MyKey Emergency Assistance Override

5.1.4.1 EASSIST-FUR-REQ-354364/A-Emergency Assistance MyKey Override

If a MyKey is present (IgnKeyType_D_Actl == Key_In_Ign_My_Key) and the MyKey EA override is set to on (MyKey_e911Override_St == On), SYNC+ shall override the Emergency Assistance user setting to on. The user shall not be allowed to disable the feature while the MyKey override is on.

5.1.4.2 EASSIST-FUR-REQ-354365/A-MyKey Override Indication

Upon entering the Emergency Assistance menu, if Emergency Assistance is overridden to on by MyKey, the user shall be indicated that the feature is on. Please refer to HMI spec for details.

Below is an example of the HMI:

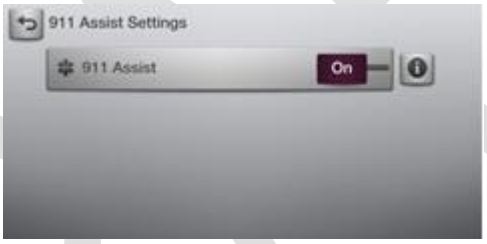


FIGURE: MyKey Override Indication

5.1.4.3 EASSIST-FUR-REQ-354366/A-MyKey Override Prompt

Upon entering the Emergency Assistance menu, if the user attempts to turn the feature off when the Emergency Assistance MyKey override is on, the user shall be notified that the feature is overridden to on and the setting cannot be changed.

Below is an example of the HMI content:

"Emergency Assistance is set to On. MyKey may prevent you from changing this setting."

5.1.4.4 EASSIST-FUR-REQ-354367/A-MyKey Override Off

If there is not a MyKey present (IgnKeyType_D_Actl != Key_In_Ign_My_Key) or if MyKey EA override is set to off (MyKey_e911Override_St != On) or the MyKey status is unknown, the Emergency Assistance user setting shall remain unchanged from the last known state of when MyKey Override was last off.

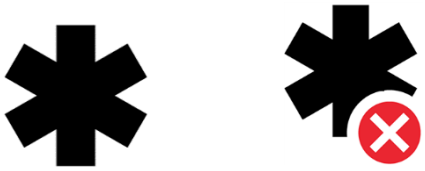
5.1.5 Emergency Assistance Icon

5.1.5.1 EASSIST-FUR-REQ-354368/A-Emergency Assistance Phone Status Icon

The Emergency Assistance feature shall have a dedicated status icon. Please refer to the HMI spec for details on how the icon should be displayed.

5.1.5.2 EASSIST-FUR-REQ-354369/A-Emergency Assistance Phone Status Icon States

The Emergency Assistance status icon shall have an on, an off, an alert and a not shown state. Below are examples of the on, off, and alert icon states:



On Off

FIGURE: Emergency Assistance Icon

5.1.5.3 EASSIST-FUR-REQ-354370/A-On Status Icon

The Emergency Assistance on status icon shall be displayed if **all** of the following three conditions are true:

1. The Emergency Assistance user setting is on
2. A phone is connected to SYNC+
3. The Emergency Assistance feature is operational

5.1.5.4 EASSIST-FUR-REQ-354371/A-Off Status Icon

The Emergency Assistance off status icon shall be displayed if **both** of the following conditions are true:

1. The Emergency Assistance user setting is off
2. Emergency Assistance is operational

5.1.5.5 EASSIST-FUR-REQ-354372/A-No Status Icon

The Emergency Assistance status icon shall not be displayed if **any** of the following conditions are true:

1. SYNC+ is attempting to connect to a phone and the Emergency Assistance feature is On
2. Emergency Assistance has been configured Off at EOL
3. The Emergency Assistance user setting is On and no phone is connected to radio
4. Emergency Assistance is not operational

5.1.6 Phone Pairing

5.1.6.1 EASSIST-FUR-REQ-354373/A-Emergency Assistance Phone Pairing Prompt

Upon the completion of pairing a phone to SYNC+, if the Emergency Assistance user setting is Off, the user shall be prompted with a pop-up allowing the user to turn Emergency Assistance On or leave it Off. Please note that the Emergency Assistance selection can be paired with other selectable options (Auto-Download Contacts, Set as Primary Phone, etc.).

Below is an example of the HMI Pop-up:

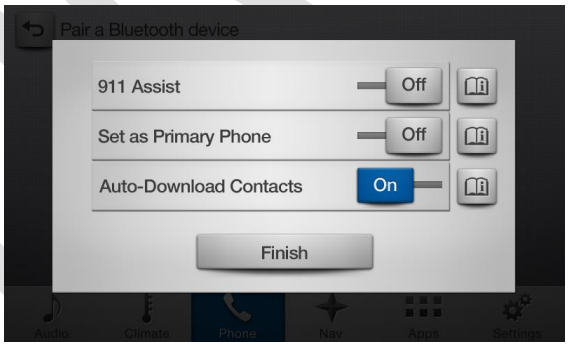


FIGURE: Phone Paring Prompt

5.1.6.2 EASSIST-REQ-354374/A-Phone Pairing Feature Description Icon

When the information icon pertaining to the Feature ON/OFF setting is pressed, the user shall be presented with an HMI Pop-Up displaying text that briefly describes the function of the Emergency Assistance Feature. The Pop-Up shall expire via a “Close” software button.

Below is an example of the HMI Pop-Up:

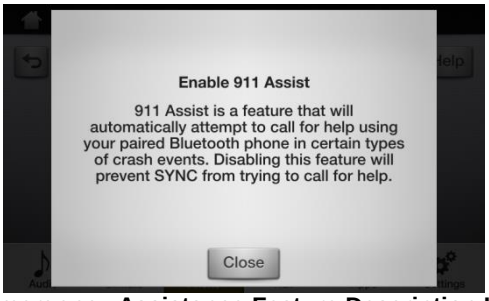


Figure: Emergency Assistance Feature Description Information

5.1.6.3 EASSIST-REQ-354375/A-Feature Not Operational Phone Pairing

Upon the completion of pairing a phone to SYNC+, if Emergency Assistance is not operational, the user shall be notified with the Not Operational pop-up after the user selects 'Finish' on the phone pairing dialog. In addition, if the user elects to set the feature to on during the phone pairing process, the feature should be turned on despite the fact that the feature is not operational at this moment.

Below is an example of the HMI Pop-Up:

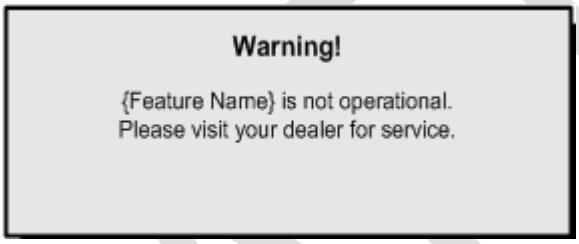


Figure: Emergency Assistance Not Operational Phone Pairing

5.1.6.4 EASSIST-FUR-REQ-354376/A-Emergency Assistance Off Phone Pairing

Upon the completion of pairing a phone to SYNC+, if Emergency Assistance is operational, and the feature has remained off, the user shall be notified with a Transient Message indicating the Emergency Assistance feature is off.

Below is an example of the Transient Message:

"Emergency Assistance is set to OFF."

5.1.7 Phone Connections

5.1.7.1 EASSIST-FUR-REQ-354381/A-Emergency Assistance On, No Phone Connected

Upon detecting that no phone is available to SYNC+, if the Emergency Assistance feature is set to on and operational, the user shall be notified with a transient message indicating that Emergency Assistance requires a connected phone to function. The user shall be notified once per ignition cycle.

Below is an example of the transient message:

"Emergency Assistance requires a connected phone."

5.1.7.2 EASSIST-REQ-354382/A-Emergency Assistance Off, Phone Connected

Upon connecting to a phone, if the Emergency Assistance feature is off, the user shall be notified with a transient message indicating the Emergency Assistance feature is off. Please refer to HMI spec for details.

Below is an example of the transient message:

"Emergency Assistance is set to OFF."

5.1.8 Emergency Assistance Not Operational

5.1.8.1 EASSIST-FUR-REQ-354383/A-Not Operational Detection

SYNC+ shall continuously check to see if Emergency Assistance is operational when the ignition status is only at Run or Start.

5.1.8.2 EASSIST-FUR-REQ-354384/A-Not Operational Check

SYNC+ shall check to see if Emergency Assistance is operational regardless of whether or not the user has turned the feature on.

5.1.8.3 EASSIST-FUR-REQ-354385/A-Not Operational With Feature Off

SYNC+ shall not check to see if Emergency Assistance is operational if the feature has been configured to off at end of line (EOL).

5.1.8.4 EASSIST-FUR-REQ-354386/A-Not Operational Pop-up

Upon detection of Emergency Assistance being not operational, the user shall be notified with a pop-up. This pop-up shall not be re-shown if the Not Operational fault is re-qualified a subsequent time during the same ignition cycle. Please refer to HMI spec for details.

Below is an example of the HMI Pop-Up:

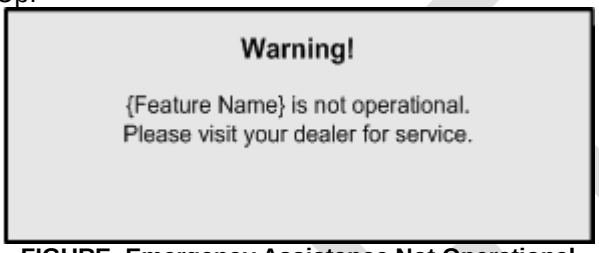


FIGURE: Emergency Assistance Not Operational

5.2 Emergency Event Behavior Requirements

5.2.1 Feature Set To Off

5.2.1.1 EASSIST-FUR-REQ-354387/A-Qualified Crash Event with Feature Off

Upon detection of a qualified crash event, if the Emergency Assistance user setting is off and MyKey override is off, the Emergency Event Behavior shall not start and no Emergency Call shall be made.

5.2.1.2 EASSIST-FUR-REQ-354388/A-Qualified Crash Event with Feature Off Pop-up

Upon detection of a qualified crash event, if the Emergency Assistance user setting is off, the user shall be notified with a pop-up indicating that Emergency Assistance is set to off. Please refer to HMI spec for details.

Below is an example of the HMI Pop-Up:

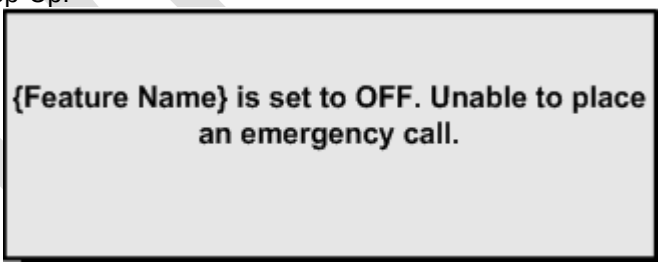


FIGURE: Feature Off

5.2.1.3 EASSIST-REQ-354389/A-Qualified Crash Event with Feature Off Voice Prompt

Upon detection of a qualified crash event, if the Emergency Assistance user setting is off and there is not an active phone call, the user shall be notified with a voice prompt (101030) indicating that Emergency Assistance is set to off.

Below is an example of the voice prompt:

"Emergency Assistance is set to off, therefore an emergency call cannot be placed."

5.2.1.4 EASSIST-REQ-354390/A-Emergency Contacts with Feature Off

If the Emergency Contacts have been previously stored, SYNC+ shall present the vehicle occupants with a button that provides the option to view and dial an Emergency Contact. Please refer to HMI spec for details.

5.2.2 Emergency Assistance Event Initialization

5.2.2.1 EASSIST-FUR-REQ-354391/A-Qualified Crash Event Persistence

Upon detection of a qualified crash event, if the Emergency Assistance user setting is set to on, SYNC+ shall store a flag ('Event_in_progress') in non-volatile memory indicating the detection of a qualified crash event.

5.2.2.2 EASSIST-FUR-REQ-354392/A-Persistence Storage Time

The action of storing the 'Event_in_progress' flag shall be completed within 1ms of qualified crash event detection.

5.2.2.3 EASSIST-FUR-REQ-354393/A-Power On RstrnImpactEvntStatus Monitoring

When SYNC+ becomes powered from an unpowered state, SYNC+ shall start monitoring RstrnImpactEvntStatus within 120 milliseconds of being powered. If RstrnImpactEvntStatus is received and has a value of 0x5 (Threshold_2_Exceeded), this shall be stored in volatile memory until SYNC+ is capable of storing the 'Event_in_progress' flag.

5.2.2.4 EASSIST-FUR-REQ-354394/A-Persistence Flag Corruption

Steps shall be taken to prevent the Emergency Assistance persistence variables in non-volatile memory from corrupting in the event of power loss.

5.2.2.5 EASSIST-FUR-REQ-354395/A-Emergency Assistance Feature Priority

Upon detection of a qualified crash event, SYNC+ shall give all system priorities to the Emergency Assistance feature. All other features shall be temporarily disabled. All pop-ups not related to the Emergency Assistance feature shall be suppressed during the emergency event behavior.

5.2.2.6 EASSIST-FUR-REQ-354396/A-Default Volume Setting

The in-vehicle prompt volume shall be reset to the default prompt volume before each Emergency Assistance voice prompt is played if the current volume is below the default prompt volume.

5.2.2.7 EASSIST-FUR-REQ-354397/A-Emergency Call Source and Priority Type

When an Emergency Assistance call is in progress, SYNC+ shall send the ResourceUpdate.St() signal as defined in the Audio Management SPSS. The status shall be updated as such:

ResourceUpdate.St(*RequesterSystem = FrontRequester,*
RequestedAudioSource = Bluetooth Phone,
RequesterPriority = Emergency Service,
ResourceRequestStatus = Granted ***)***

Note 1: Priority Service = Emergency Service

5.2.2.8 VOL-SR-REQ-354398/A-Emergency Call Volume Level

eCall Phone Volume:
The emergency phone call volume borders are defined as follows:
min. eCall Phone Volume = Volume-Step 18
max. eCall Phone Volume = Maximum Audio Phone Volume Step

If the last active phone volume was below the min eCall Phone volume then the eCall Phone volume shall be the min eCall Phone Volume.

If the last active phone volume was above the min eCall Phone Volume then the eCall volume shall equal the last phone volume above the min eCall Phone Volume.

Note for eCall this supersedes any other phone volume border requirements.

eCall Prompt Volume:
If an emergency call is in progress and SYNC_Alert Mixable Prompts become active (ex SYNC_Alert : Alert_Chan = Initialized_for_prompts) then the eCall prompt volume borders are defined as follows:

min. eCall Prompt Volume = Volume-Step 12
max. eCall Prompt Volume = Maximum Audio Prompt Volume Step

Note: every time a new mixable prompt becomes active during an eCall phone call (ie Alert_Chan → Initialized_for_prompts → Inactive → Initialized_for_prompts) the prompt volume shall never re-enter playing the new prompt below the min eCall Prompt Volume:

If the last active prompt volume was below the min eCall prompt volume then the eCall prompt volume shall be the min eCall prompt Volume.

If the last active prompt volume was above the min eCall Prompt Volume then the eCall prompt volume shall equal the last prompt volume above the min eCall Prompt Volume.

Note: for eCall this supersedes any other Prompt volume border requirements.

Note2: eCall for this requirement is equivalent to Emergency Assistance called out in the EA SPSS.

5.2.2.9 EASSIST-FUR-REQ-354399/A-Volume Adjustment

The volume shall be adjustable throughout the Emergency Assistance emergency event behavior; no volume indication shall be displayed on the screen.

5.2.2.10 EASSIST-FUR-REQ-354400/A-In-vehicle Prompt Language

The in-vehicle prompt language shall match the language set for SYNC+. In-vehicle prompt language should not change during the emergency event.

5.2.2.11 EASSIST-FUR-REQ-354401/A-Settle Timer After Qualified Crash Event

Upon detection of a qualified crash event, Emergency Assistance shall wait for the specified period as defined by '*Settle_timer_delay'*, until the Emergency Assistance '*Cancellation_timer'* begins and prompts are shown.

5.2.2.12 EASSIST-REQ-354402/A-Do Not Disturb Override

If the Emergency Assistance Feature is set to ON and the "Do Not Disturb" feature has been set to ON before a qualified crash event is detected, SYNC+ shall override the setting to OFF for the remainder of the current ignition cycle.

Below is an example of the HMI screen:

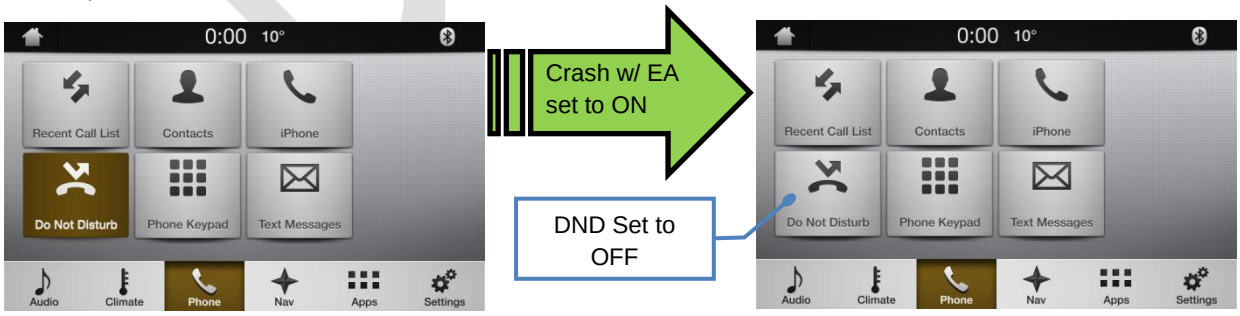


Figure: Do Not Disturb Override during a Crash Event

5.2.2.13 EASSIST-FUR-REQ-354403/A-Bluetooth Setting

Upon detection of a qualified crash event, if SYNC+ Bluetooth setting is off, the Bluetooth setting shall be set to on.

5.2.2.14 EASSIST-FUR-REQ-354404/A-Multimedia Status

Upon detection of a qualified crash event, SYNC+ shall set all multimedia audio sources to off.

5.2.2.15 EASSIST-REQ-354405/A-Crash Notification Screen

After '*Settle_timer_delay*' has expired, the crash notification screen shall be displayed regardless of user input with the following items. Please refer to HMI spec for details.

1) Feature Name.
2) Feature specific Icon.
3) Global Feature Icon (Red).
4) Vehicle Restart Instructions Button.
5) Emergency Contacts Button (After Call Ends).
6) Transient Messages in the Top Status Bar.

5.2.2.16 EASSIST-REQ-354406/A-Crash Notification Screen Vehicle Restart Instructions

The Emergency Assistance feature shall have two different Vehicle Restart Instruction HMI Pop-Ups. One Pop-Up is displayed to the vehicle occupants during a qualified crash event in a vehicle equipped with the Passive Entry Passive Start (PEPS) System. The Other Pop-Up is displayed to the vehicle occupants during a qualified crash event in a vehicle with Key Start. The Vehicle Restart Instructions Information Pop-Up shall expire via a "Close" software button.

Below is an example of the HMI Pop-Up for a vehicle equipped with PEPS.

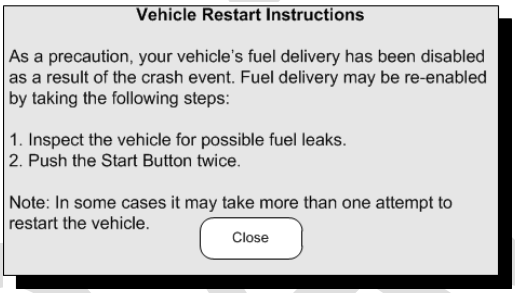


Figure: Vehicle Restart Instructions with PEPS

Below is an example of the HMI Pop-Up for a vehicle equipped with Key Start.

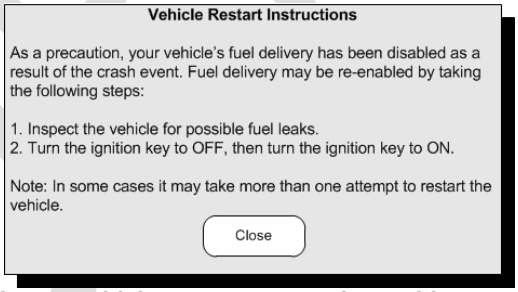


Figure: Vehicle Restart Instructions with Key Start

5.2.2.17 EASSIST-FUR-REQ-354409/A-Active Non-emergency Call

After '*Settle_timer_delay*' has expired, if there were existing non-emergency phone calls (or undetermined emergency calls) in progress, the phone call shall be disconnected and the Emergency Assistance emergency event behavior shall start.

5.2.2.18 EASSIST-FUR-REQ-354410/A-Rear View Camera

If the rear view camera is active when a crash event is detected, the rear view should be closed and the Emergency Assistance crash screen shall be displayed until the call attempts are complete.

5.2.3 GNSS Validity & Storage

5.2.3.1 EASSIST-FUR-REQ-354411/A-GNSS Coordinates Storage

After 'Settle_timer_delay' has elapsed, if there is GNSS signal, the current GNSS coordinates shall be stored in non-volatile memory and used as the coordinates provided to the PSAP operator during the Emergency Call.

5.2.3.2 EASSIST-FUR-REQ-354412/A-Dead Reckoning Coordinates

After 'Settle_timer_delay' has elapsed, if there is no GNSS signal and the dead reckoning coordinates are valid, the dead reckoning coordinates shall be stored in non-volatile memory and used as the coordinates provided to the PSAP operator during the Emergency Call.

5.2.3.3 EASSIST-FUR-REQ-354413/A-Invalid GNSS Coordinates

After 'Settle_timer_delay' has elapsed, if there is no GNSS signal and the dead reckoning coordinates are invalid, GNSS coordinates shall not be provided to the PSAP operator during the Emergency Call.

5.2.3.4 EASSIST-FUR-REQ-354414/A-Dead Reckoning

When SYNC+ is powered and awake, it shall continuously sample and store the latest GNSS coordinate value in non-volatile memory. If GNSS signal is lost, SYNC+ shall employ dead-reckoning techniques to approximate the vehicles location. Inputs such as the vehicle speed, compass, gyro, and vehicle sensors shall be used for dead-reckoning. Dead Reckoning strategy shall be reviewed and approved by Ford.

5.2.3.5 EASSIST-FUR-REQ-354415/A-Dead Reckoning Validity

SYNC+ shall consider coordinates from dead-reckoning valid only if the following conditions are true:

1. Ignition_status has not transitioned from OFF to RUN since GNSS signal was lost.
2. The total distance traveled by the vehicle since GNSS signal was lost is under 'GNSS(D)'.
3. The estimated 2D error has a radius of less than 'GNSS_Validity_Distance' meters.

5.2.3.6 EASSIST-FUR-REQ-354416/A-Dead Reckoning Validity Power Loss

If SYNC+ loses power after a crash event has been detected, the coordinates from dead-reckoning shall remain valid when power is restored.

5.2.4 HMI Lockout

5.2.4.1 EASSIST-FUR-REQ-354418/A-Button Press Lockout

Once a crash event is detected, SYNC+ shall reject and lockout all in-vehicle button presses except for the button presses which correspond to canceling the Emergency Call and the volume adjustment.

5.2.5 Phone Connection

5.2.5.1 EASSIST-FUR-REQ-354420/A-No Phone Connected

After '*Settle_timer_delay*' has expired, if no phone is currently connected, SYNC+ shall attempt to connect to a previously paired phone.

5.2.5.2 EASSIST-FUR-REQ-354421/A-Phone Connection Strategy

While attempting to connect to a previously paired phone during the Emergency Assistance emergency event behavior, SYNC+ shall attempt to connect to previously paired phones in the following order:

1. The primary(favorite/master) phone
2. The last-connected phone
3. Each of the previously paired devices beginning with the most recently connected.

5.2.5.3 EASSIST-FUR-REQ-354423/A-Phone Connection Time Limit

The time required to connect to a previously paired phone shall be reviewed with Ford and subject to approval.

5.2.5.4 EASSIST-FUR-REQ-354424/A-Phone Connection Attempts

Once an attempt has been made to connect to a specific previously paired device, SYNC+ shall not make additional attempts to connect to that device again if the phone connection process is triggered again. SYNC+ shall record which devices it has attempted to connect to during the Emergency Assistance emergency event behavior.

5.2.5.5 EASSIST-FUR-REQ-354425/A-Phone Connection Prompt

While attempting to connect to a phone during the Emergency Assistance emergency event behavior, the user shall be notified with a transient message indicating that the phone connection process is in progress. The Attempting to Connect to an Available Phone transient message shall be persistent.

Below is an example of the transient message:

"Attempting to connect to an available phone"

5.2.5.6 EASSIST-FUR-REQ-354427/A-No Phone Found

If SYNC+ has attempted to connect to all previously paired phones during the Emergency Assistance emergency event behavior, and no phone was found, the Emergency Assistance emergency behavior shall end.

5.2.5.7 EASSIST-FUR-REQ-354428/A-No Phone Found Prompts

If SYNC+ has attempted to connect to all previously paired phones during the Emergency Assistance emergency event behavior, and no phone was found, the user shall be notified with a voice prompt (101016) and a pop-up indicating that no phone was found and no emergency call will be made. The No Phone Found Pop-Up shall expire via a "Close" software button.

Below is an example of the HMI Pop-Up:

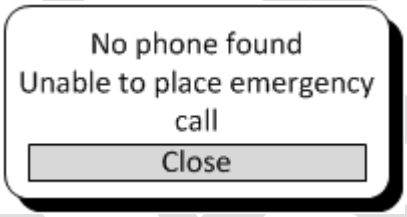


FIGURE: No phone found

Below is an example of the voice prompt:

"Emergency Assistance attempted to connect to a paired Bluetooth enabled phone, but no phone was found. Therefore, Emergency Assistance cannot place an emergency call."

5.2.6 User Cancelation

5.2.6.1 EASSIST-FUR-REQ-354429/A-Cancellation Prompts

After '*Settle_timer_delay*' has elapsed and a phone is connected, the user shall be prompted with a voice prompt (101039) and pop-up indicating that an Emergency Call is being made and allow the user to cancel the call. The pop-up shall be displayed for the time specified by '*Cancellation_timer*'.

Below is an example of the HMI Pop-Up:

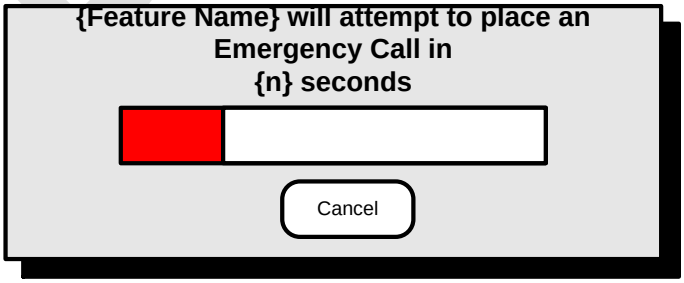


FIGURE: Cancellation Prompt

Below is an example of the voice prompt:

"Emergency Assistance will attempt to make an emergency call. To cancel the call, please choose cancel from the screen, or press the phone button."

5.2.6.2 EASSIST-FUR-REQ-354430/A-Assigned Cancellation Buttons

After '*Settle_timer_delay*' has elapsed and a phone is connected, the user shall be able to cancel the emergency call the following ways:

1. Selecting 'Cancel' on the screen.
2. Pressing the 'Hang-Up' button on the steering wheel (if present)
3. Pressing the 'Hang-Up' button on SYNC+ (if present)
4. Pressing the 'Phone' button on SYNC+

5.2.6.3 EASSIST-FUR-REQ-354431/A-Cancellation Timer

After '*Settle_timer_delay*' has elapsed and a phone is connected, if the user does not press one of the assigned cancellation buttons within the time specified by '*Cancellation_timer*', then Emergency Assistance shall proceed with the Emergency Call.

5.2.6.4 EASSIST-FUR-REQ-354432/A-Cancellation User Confirmation

If the user presses one of the assigned cancellation buttons before the '*Cancellation_timer*' has expired, the user shall be prompted with a pop-up allowing to the user to confirm the cancellation or proceed with the emergency call. The default selection shall be the 'Yes' selection.

Below is an example of the HMI Pop-Up:

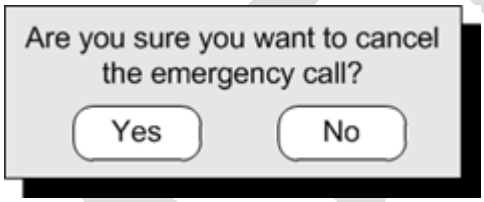


FIGURE: Cancellation Confirmation

5.2.6.5 EASSIST-FUR-REQ-354433/A-Cancellation User Confirmation Timer

If the user does not confirm the cancellation on the user confirmation pop-up within the time specified by '*Cancel_Confirmation_timer*', or the user selects the 'No' option on the confirmation pop-up, then Emergency Assistance shall proceed with the Emergency Call.

5.2.6.6 EASSIST-FUR-REQ-354434/A-Call Cancelled Prompt

If the user confirms the cancellation within the time specified by '*Cancel_Confirmation_timer*', the user shall be notified with a pop-up and voice prompt (101031) indicating that the emergency call has been cancelled.

Below is an example of the HMI Pop-Up:

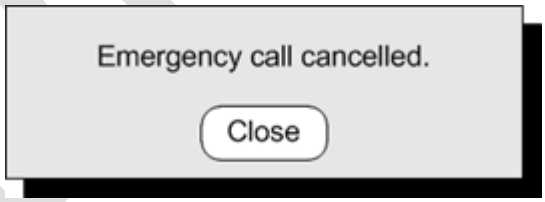


FIGURE: Call Cancelled

Below is an example of the voice prompt:

"Emergency Call Cancelled."

5.2.6.7 EASSIST-REQ-354435/A-Call Cancelled Emergency Contacts

At the end of the Emergency Call Event, if the Emergency Call is cancelled and Emergency Contacts have been previously stored, SYNC+ shall display the Emergency Contacts button on the HMI Screen.

5.2.7 Emergency Call

5.2.7.1 EASSIST-FUR-REQ-354439/A-Emergency Call Attempt

After the '*Cancellation_timer*' has expired and a phone is connected to SYNC+, an Emergency Call shall be placed using the connected phone.

5.2.7.2 EASSIST-FUR-REQ-354440/A-Emergency Number Selection

The emergency number to be dialed shall be 400-8215-110.

5.2.7.3 EASSIST-FUR-REQ-354441/A-Connecting Prompts

While Emergency Assistance is attempting to place an emergency call, the user shall be notified with a voice prompt (101050) and transient message indicating that an emergency call is being placed. The transient message shall be displayed until off-hook is detected. The Calling Emergency Services Transient Message expiration timer shall be persistent.

Below is an example of the transient message:

"Calling Emergency Services."

Below is an example of the voice prompt:

"An Emergency call is being placed. Emergency Assistance will speak first to the emergency operator before opening the line. Please wait."

5.2.8 Off-Hook Detection

5.2.8.1 EASSIST-FUR-REQ-354445/A-Phone Off-Hook Detection

SYNC+ shall monitor the connected phone to determine when off-hook (PSAP answers call) is detected by the phone.

5.2.8.2 EASSIST-FUR-REQ-354446/A-Off-Hook Timer

The time defined by 'Off-hook_timer' shall determine when the PSAP prompts shall be played. Below are two examples of how to determine when to play PSAP prompts:

1. Off-hook detected before 'Off-hook_timer' expires: Play PSAP prompts after 'Off-hook_timer' expires.

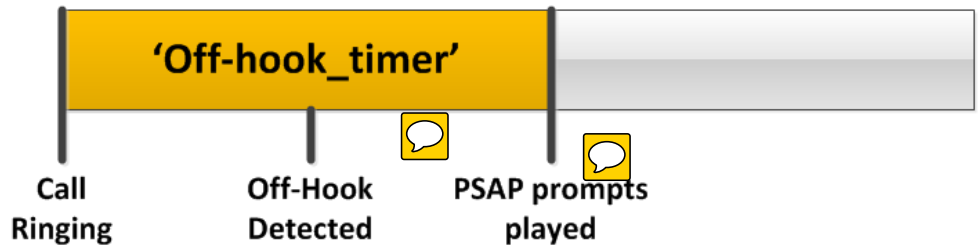


FIGURE: Off-hook Before Timer 1

2. Off-hook detected after 'Off-hook_timer' expires: Play PSAP prompts when off-hook is detected.

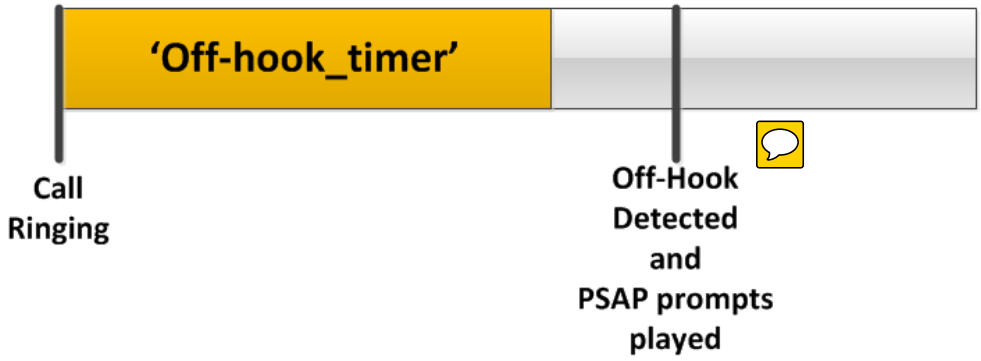


FIGURE: Off-hook After Timer 2

5.2.8.3 EASSIST-REQ-354448/A-Off-Hook Detected Transient Message

After off-hook is detected, the user shall be notified with a transient message indicating that the call is connected. The Call Connected Transient Message expiration timer shall be persistent.

Below is an example of the transient message:

"Call Connected. Please wait for Operator."

5.2.9 PSAP Prompts

5.2.9.1 EASSIST-FUR-REQ-354450/A-Muting Call Audio

After off-hook has been detected, the incoming audio from the PSAP side shall be muted in the vehicle and the outgoing audio from the in-vehicle microphone shall be muted to the PSAP. Both audio channels shall be un-muted after the PSAP prompts have finished playing and the line is opened.

5.2.9.2 EASSIST-FUR-REQ-354452/A-Dual Audio

SYNC+ shall have the ability to play in-vehicle prompts and PSAP prompts simultaneously.

5.2.9.3 EASSIST-FUR-REQ-354454/A-PSAP Language

The PSAP language shall be Chinese.

5.2.9.4 EASSIST-FUR-REQ-354460/A-PSAP Prompt Spacing

The spacing between PSAP voice prompts shall be defined by *'Spacing_between_PSAP_prompts'*.

5.2.9.5 EASSIST-FUR-REQ-354463/A-GNSS Coordinate Spacing

The spacing between each spoken GNSS digit in the PSAP prompt shall be defined by '*Spacing_between_GNSS_digits*'.

5.2.9.6 EASSIST-FUR-REQ-354465/A-GNSS Coordinate Precision

The precision of the GNSS coordinates displayed and spoken shall be rounded beyond four (4) digits to the right of the decimal place >= 5 up and < 5 down.

5.2.9.7 EASSIST-FUR-REQ-354467/A-GNSS Coordinate Format

The Latitude shall always be spoken and displayed prior to Longitude. A minus sign shall be spoken or displayed if the coordinate is negative.

5.2.9.8 EASSIST-FUR-REQ-354468/A-In-vehicle Prompts

While PSAP prompts are being played to the emergency operator, the user shall be notified with voice prompt 101056 indicating that Emergency Assistance is in communication with the PSAP operator. When the PSAP prompts finish, prompt 101056 shall be cut short if necessary.

Below is an example of the voice prompt:

"Sending important information to emergency operator, please wait."

5.2.9.9 EASSIST-FUR-REQ-354470/A-In-vehicle Prompt Repetition

While PSAP prompts are being played to the emergency operator, the in-vehicle voice prompt (101056) shall be repeated until the line is opened between PSAP and the vehicle occupant. The spacing between each repetition shall be defined by '*Dual_audio_in-vehicle_prompt_spacing*'.

5.2.9.10 EASSIST-FUR-REQ-354472/A-Line Open

The line shall be opened between the PSAP and the vehicle occupant upon completion of the PSAP prompts. The incoming and outgoing communication shall be un-muted and the hands-free communication shall be established.

5.2.9.11 EASSIST-FUR-REQ-354474/A-Hands Free Communication

Upon opening the line between the PSAP and the vehicle occupant, the two parties shall be able to communicate using the in-vehicle microphone and the vehicle's audio system.

5.2.10 Unsuccessful Call Attempts

5.2.10.1 EASSIST-FUR-REQ-354477/A-Unsuccessful Call

A call shall be considered unsuccessful under any of the following conditions:

1. Call is ended before Off-Hook is detected.
2. Phone indicates that call has failed and was never placed.

5.2.10.2 EASSIST-FUR-REQ-354479/A-Unsuccessful Call Retry Attempts

If an emergency call is considered unsuccessful, a retry emergency call shall be attempted by SYNC+. The spacing between each retry attempt shall be defined by variable '*Spacing_between_Retry_Attempts*'. There shall be up to 5 retry attempts per phone upon detection of each unsuccessful call. If the fifth retry attempt is unsuccessful, SYNC+ shall attempt to connect to a previously paired phone as define in the Phone Connection section.

5.2.11 Incomplete Call Attempts

5.2.11.1 EASSIST-FUR-REQ-354480/A-Incomplete Call

A call shall be considered incomplete if the call is ended after off-hook but before all PSAP prompts have finished and communication has been opened between the user and the PSAP operator.

5.2.11.2 EASSIST-FUR-REQ-354481/A-Incomplete Call Retry Attempts

If an emergency call is considered incomplete, a retry emergency call shall be attempted by SYNC+. The spacing between each retry attempt shall be defined by variable '*Spacing_between_Retry_Attempts*'. There shall be 1 retry attempt upon detection of an incomplete call. If the retry attempt is incomplete, the Emergency Assistance process shall end.

5.2.11.3 EASSIST-FUR-REQ-354482/A-Incomplete Call Retry Transient Message

During an incomplete call retry attempt, the user shall be notified with a transient message indicating that a retry attempt is being made. The Attempting to Redial Emergency Number Transient Message expiration timer shall be persistent.

Below is an example of the transient message:

"Attempting to Redial Emergency Number."

5.2.11.3.1 EASSIST-FUR-REQ-354483/A-Line Open Prompts

The line shall be opened after the completion of the 'Line Open' (101114) prompt which shall be played to the in-vehicle occupant and PSAP operator simultaneously in the language corresponding to the setting for the in-vehicle prompts and PSAP prompts language settings respectively. In addition, the user shall be indicated with the transient message that the line has opened. The Line Open Transient Message expiration timer shall be persistent.

Below is an example of the transient message:

"Line Open. You are connected with an Emergency Operator."

Below is an example of the voice prompt:

"Line Open."

5.2.11.4 EASSIST-FUR-REQ-354484/A-Separation of Incomplete and Unsuccessful Calls

SYNC+ shall differentiate between an unsuccessful retry attempt and an incomplete retry attempt. There shall be a separate counter for each retry attempt type.

5.2.12 Privacy Behavior

5.2.12.1 EASSIST-FUR-REQ-354485/A-Entering Privacy Mode From Phone

Privacy mode on the phone shall be entered at any point in the emergency call if SYNC+ has detected that the phone has entered into privacy.

5.2.12.2 EASSIST-FUR-REQ-354486/A-Entering Privacy Mode After PSAP Prompts

Privacy mode on the phone shall be entered after the PSAP prompts have finished playing and one of the following has occurred:

1. Phone is connected via Bluetooth and ignition status is off and driver door is ajar
2. An in-vehicle microphone or audio system failure is detected by SYNC+

5.2.12.3 EASSIST-FUR-REQ-354487/A-Privacy Mode Behavior

Upon entering privacy mode, SYNC+ shall insure that the emergency call is not ended and shall transfer in-vehicle hands free communication to the handset. The Transient Message pertaining to the Emergency Assistance feature displayed on the Top Status Bar shall be terminated.

5.2.12.4 EASSIST-FUR-REQ-354488/A-Privacy Mode Entered Before PSAP Prompts Finish

While a SYNC+ initiated emergency call is taking place, if privacy mode is entered before the PSAP prompts have finished playing, SYNC+ shall not disconnect the emergency call. After SYNC+ has detected that the privacy call has ended, SYNC+ shall treat the call attempt as an incomplete call and one retry call shall be made if one has not already been attempted.

SYNC+ shall consider the following as privacy call ended:

1. SYNC+ detected via Bluetooth that one side has ended the privacy call
2. SYNC+ detected the Bluetooth connection with the connected phone has been lost during the active emergency call

5.2.12.5 EASSIST-FUR-REQ-354489/A-Privacy Mode Entered After Line Open

While a SYNC+ initiated emergency call is taking place, if privacy mode is entered after the line is opened between PSAP and the vehicle occupant, the call shall be considered successful and no retry attempt shall be made.

5.2.12.6 EASSIST-FUR-REQ-354490/A-Privacy Mode Prompts

While a SYNC+ initiated emergency call is taking place, if privacy mode is entered, the user shall be notified with a voice prompt (101041) and pop-up indicating that the call is in privacy mode. The pop-up shall be dismissed via a software “Close” button.

Below is an example of the HMI Pop-Up:

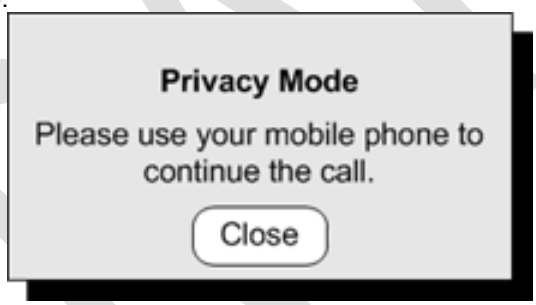


FIGURE: Privacy

Below is an example of the voice prompt:

“Call transferred to Privacy. Please use your handset.”

5.2.12.7 EASSIST-FUR-REQ-354491/A-Exiting Privacy Mode

Privacy mode shall be exited in the following conditions:

1. SYNC+ has detected via Bluetooth that the phone has left privacy
2. The active phone call has ended

5.2.12.8 EASSIST-FUR-REQ-354492/A-Exiting Privacy Mode Prompts

If at any time SYNC+ initiated emergency call is taken out of privacy and the call is still connected, the user shall be notified with a transient message indicating that the call is connected. The Call Connected to Emergency Operator Transient Message expiration timer shall be persistent.

Below is an example of the transient message:

“Call Connected to Emergency Operator”

5.2.13 Power Moding

5.2.13.1 EASSIST-FUR-REQ-354493/A-Power Moding

During the Emergency Event Behavior, SYNC+ shall remain powered and fully functional until the Emergency Event Behavior has completed. Door status and ignition status shall not affect the power state of SYNC+ during the Emergency Event Behavior.

5.2.13.2 EASSIST-FUR-REQ-354494/A-Out of Range Voltage

During the Emergency Assistance emergency event behavior, if SYNC+ voltage moves out of the expected range, SYNC+ shall prioritize keeping the system awake in order to complete the emergency event behavior.

5.2.13.3 EASSIST-FUR-REQ-354495/A-Voltage Out of Range Emergency Call

If there is an ongoing Emergency Call, if the vehicle voltage moves to a level where SYNC+ can no longer play audio over the speakers, SYNC+ shall place the emergency call in privacy as defined in the privacy behavior section.

5.2.14 Call Attempts Complete

5.2.14.1 EASSIST-FUR-REQ-354496/A-Successful Call Attempts

If a SYNC+ initiated emergency call has ended and the line had been opened between PSAP and the in-vehicle occupants, SYNC+ shall consider the call successful and shall end the Emergency Assistance emergency event behavior.

5.2.14.2 EASSIST-FUR-REQ-354497/A-Call Complete Prompts

If SYNC+ has completed one successful emergency call, the user shall be notified with a voice prompt (101055) and transient message indicating that the Emergency Assistance call attempts are complete. The Call Attempts Complete transient message shall be displayed until crash notification screen is exited.

Below is an example of the transient message:

"Call ended. Emergency Assistance call attempts complete"

Below is an example of the voice prompt:

"Call ended. Emergency Assistance call attempts complete"

5.2.15 Call Attempts Incomplete

5.2.15.1 EASSIST-FUR-REQ-354498/A-Incomplete Call Attempts

If Emergency Assistance has made two call attempts where off-hook was detected but the line was not opened, SYNC+ shall consider the call attempts incomplete and shall end the Emergency Assistance emergency event behavior.

5.2.15.2 EASSIST-FUR-REQ-354499/A-Incomplete Prompts

If Emergency Assistance has made two call attempts where off-hook was detected but the line was not opened, the user shall be notified with a voice prompt (101055) and transient message indicating that the Emergency Assistance call attempts are complete. The Call Attempts Complete transient message shall be displayed until crash notification screen is exited.

Below is an example of the transient message:

"Call ended. Emergency Assistance call attempts complete."

Below is an example of the voice prompt:

"Call ended. Emergency Assistance call attempts complete."

5.2.16 Call Attempts Unsuccessful

5.2.16.1 EASSIST-FUR-REQ-354500/A-Unsuccessful Call Attempts

If Emergency Assistance has made six call attempts where off-hook was not detected for every available previously paired device, SYNC+ shall consider the call attempts unsuccessful and shall end the Emergency Assistance emergency event behavior.

5.2.16.2 EASSIST-FUR-REQ-354501/A-Unsuccessful Call Prompts

If Emergency Assistance has made six unsuccessful call attempts per available previously paired device, the user shall be notified with a voice prompt (101024) and pop-up indicating that the call attempts were unsuccessful. SYNC+ shall terminate any transient message pertaining to the Emergency Assistance feature being displayed on the top status bar.

Below is an example of the HMI Pop-Up:

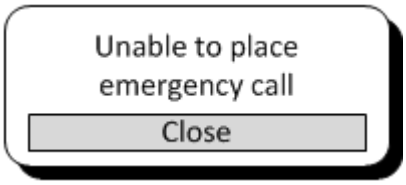


FIGURE: Call Unsuccessful

Below is an example of the voice prompt:

"Emergency Assistance was unable to place an emergency call"

5.2.17 Phone Disconnected

5.2.17.1 EASSIST-FUR-REQ-354502/A-Phone Disconnected Before Off-Hook

If the connected phone becomes disconnected to SYNC+ while Emergency Assistance is attempting an Emergency Call before off-hook is detected, SYNC+ shall consider the call attempt unsuccessful and shall attempt to reconnect to a previously paired phone as defined in the Phone Connection section. The user shall not be prompted with the cancelation HMI to cancel the call once the previously paired phone is connected.

5.2.17.2 EASSIST-FUR-REQ-354503/A-Phone Disconnected During PSAP Prompts

If the connected phone becomes disconnected to SYNC+ while Emergency Assistance is playing PSAP prompts and there was not a previous incomplete call, SYNC+ shall consider the call attempt incomplete and shall attempt to reconnect to a previously paired phone as defined in the Phone Connection section.

5.2.17.3 EASSIST-FUR-REQ-354504/A-Phone Disconnected During Retry

If the connected phone becomes disconnected to SYNC+ while Emergency Assistance is playing PSAP prompts and there has been a previous incomplete call, SYNC+ shall consider the call attempt incomplete and shall end the Emergency Assistance emergency event behavior.

5.2.17.4 EASSIST-FUR-REQ-354505/A-Phone Reconnection after Phone Disconnection

If a phone is connected to SYNC+ after a connection was lost, upon connection to the phone, SYNC+ shall not disconnect any ongoing phone call and shall remain in privacy mode until the active call is ended.

5.2.17.5 EASSIST-FUR-REQ-354506/A-Phone Disconnected While Line Open

If the connected phone becomes disconnected to SYNC+ while the line is open between PSAP and the vehicle occupant, SYNC+ shall consider the call attempt successful.

5.2.17.6 EASSIST-FUR-REQ-354507/A-Phone Disconnected Prompts

If the connected phone becomes disconnected to SYNC+ while the line is open between PSAP and the vehicle occupant or while PSAP prompts are playing and there has already been one incomplete call, the user shall be notified with transient message and voice prompt (101055) indicating that the call attempts are complete. The Call Attempts Complete transient message shall be displayed until crash notification screen is exited.

Below is an example of the transient message:

"Call ended. Emergency Assistance call attempts complete"

Below is an example of the voice prompt:

"Call ended. Emergency Assistance call attempts complete"

5.2.18 Return to Normal Operation

5.2.18.1 EASSIST-FUR-REQ-354508/A-Normal Operation

Upon completion of the Emergency Assistance emergency event behavior, SYNC+ shall return to normal operation.

5.2.18.2 EASSIST-FUR-REQ-354509/A-Default Screen

Upon completion of the Emergency Assistance emergency event behavior, the user shall be presented with the crash notification screen until the user navigates away from the crash notification screen. No audio shall be played in the crash notification screen.

5.2.18.3 EASSIST-REQ-354510/A-Emergency Contacts

If Emergency Contacts have been previously stored, SYNC+ shall present the vehicle occupants with a button that provides the option to view and dial an emergency contact. Otherwise, SYNC+ shall not display the Emergency Contacts button.

5.2.18.4 EASSIST-REQ-354511/A-Emergency Contacts HMI

If Emergency Contacts have been previously stored, upon the user selecting the Emergency Contacts Button, SYNC+ shall present an HMI Pop-Up that lists the stored contacts. The pop-up shall be dismissed via a “Close” software button.

The following is an HMI Pop-Up example.

Figure: Emergency Contacts Pop-Up

5.2.18.5 EASSIST-FUR-REQ-354512/A-Emergency Contacts Selection

Upon the user selecting an emergency contact, SYNC+ shall place the call to that contact using the default phone screen. Upon completion of the call, the crash notification screen shall be shown.

5.2.19 Emergency State Persistence and Tracking

5.2.19.1 EASSIST-FUR-REQ-354513/A-Emergency State Power Loss Persistence

The state of the Emergency Assistance call process shall be stored in non-volatile memory at all state changes. The purpose of this requirement is to add traceability of the feature when vehicle power is intermittent. The table below contains and defines the Persistence Variables that Emergency Assistance shall store in memory.

Persistence Variables	Values	States	Description
Event_in_progress 1 byte Default Value: 0x0	0x0	No	No event detected or call attempts complete.
	0x1	Yes	Qualified crash event detected(first reception of RstrnImpactEvntStatus = Threshold_2_Exceeded), call attempts in progress.
Event_State 1 byte Default Value: 0x0	0x0	No_event	No event has ever been detected by the system.
	0x1	Event_detected	Event detected, cancellation prompts incomplete.
	0x2	Connecting	Call not cancelled, attempting to connect to a phone.

	0x3	Calling	Call not cancelled, call being placed.
	0x4	PSAP_prompts	Off-hook detected, playing PSAP prompts.
	0x5	Feature_off	Event detected, feature set to off by user.
	0x6	Call_cancelled	Event detected, call cancelled by user.
	0x7	No_phone	Event detected, no phone found.
	0x8	Unsuccessful	Event detected, call attempts complete, off-hook not detected on last call attempt.
	0x9	Incomplete	Event detected, call attempts complete, off-hook detected and line did not open on last call attempt.
	0xA	Successful	Event detected, call attempts complete, line opened between PSAP and vehicle occupant.
Unsuccessful_Call_Count 1 byte Default Value: 0x0	0x0 – 0x6	0 – 6	Number of calls placed where off-hook was not detected. If call is being placed, counter shall be increased by one, upon off-hook detection counter shall be decreased by one.
Incomplete_Call_Count 1 byte Default Value: 0x0	0x0 – 0x2	0 – 2	Number of calls placed where line was not opened. If call is being placed, counter shall be increased by one, upon line open, counter shall be decreased by one.
Phones_Attempted 1 byte Default Value: 0x0	0x0 – 0xC	0 – 12	The number of phones SYNC+ has attempted to connect to.
Last_RstrnImpactEvntStatus 1 byte Default Value: 0x0	0x0 – 0x7	0x0 – 0x7	The last value sent by the RCM for RstrnImpactEvntStatus.
Global_Real_Time_at_Crash 4 bytes Default Value: 0.0	0x0 – 0xFFFF FFFF	0.0 – 4.3E+08	The Global Real Time value at detection of a crash event.

TABLE: Persistence Variables

5.2.19.2 *EASSIST-FUR-REQ-354514/A-Emergency State Flow Diagram*

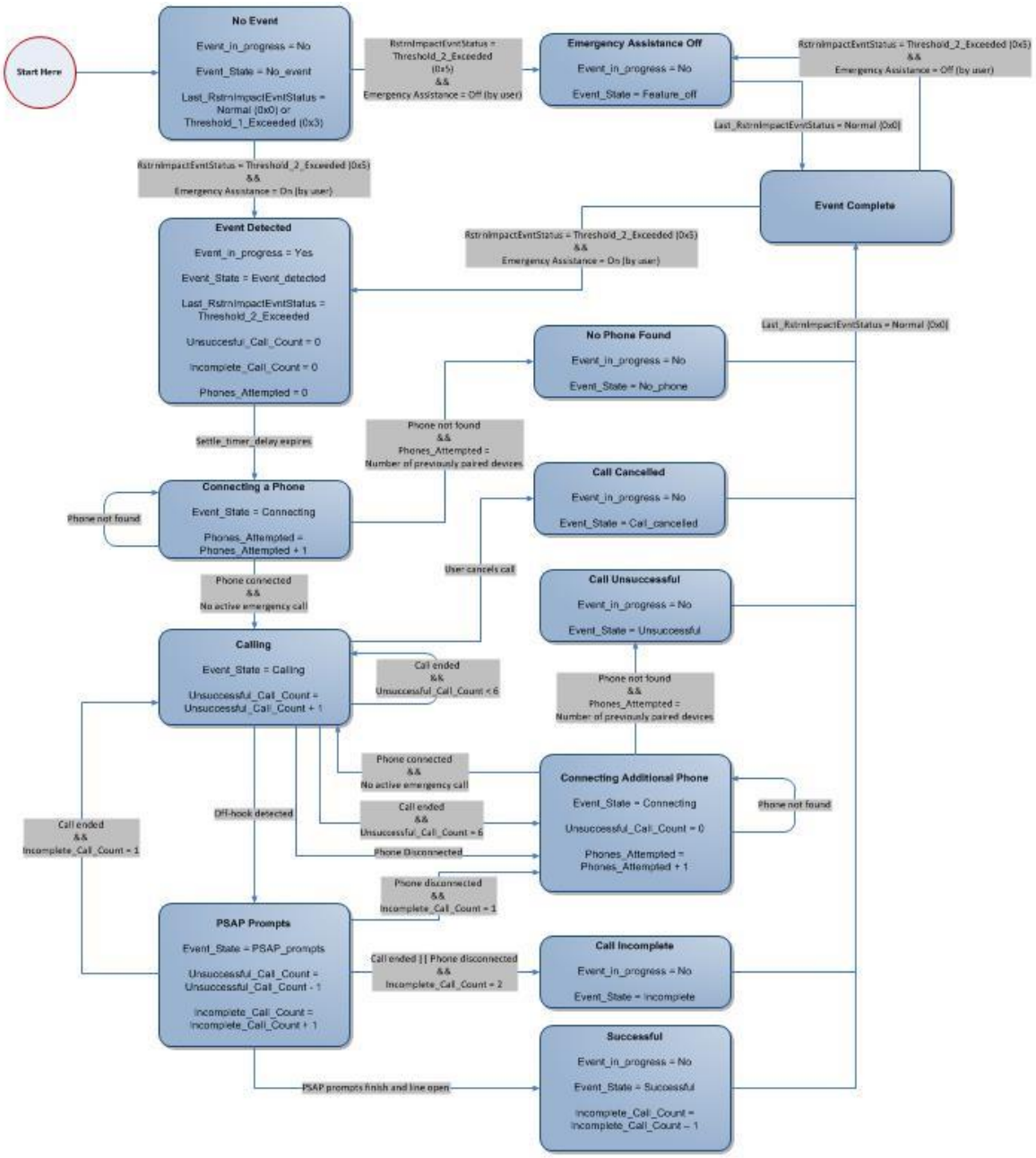


FIGURE: Emergency State Flow Diagram

5.2.19.3 *EASSIST-FUR-REQ-354515/A-Power Loss*

If SYNC+ loses power, when power is restored, if the 'Event_in_progress' is equal to 'Yes', SYNC+ shall enter the 'Event Detected' state and the emergency event behavior shall start from the beginning with the '*Settle_timer_delay*'.

5.2.19.4 *EASSIST-FUR-REQ-354516/A-Emergency State Storage*

All Emergency Assistance persistence values stored in non-volatile memory shall also be reflected in a dedicated engineering DID, Emergency Assistance data recording. All state changes shall be reflected in the Emergency Assistance data recording DID.

5.2.19.5 EASSIST-FUR-REQ-354517/A-Multiple Event Storage Buffer

The DataIdentifier that stores the Persistance variables shall store up to 3 separate Emergency Assistance events. If there are more than 3 Emergency Assistance events, the oldest Emergency Assistance event shall be overwritten with the most recent Emergency Assistance event. An event shall start and the 'Event Detected' state and end at the 'Event Complete' state.

5.3 End of Line Configurations

5.3.1 Feature Availability

5.3.1.1 EASSIST-FUR-REQ-354519/A-End of Line Configuration

There shall be a byte dedicated to Emergency Assistance feature availability within the SYNC+'s configuration Data Identifiers. Below are all the values for this byte:

- **0x0 Default:** Feature is default to ON.
- **0x1 OFF:** Emergency Assistance feature is off. Feature shall be unavailable in the menus.

5.4 Configurable Variables

5.4.1 EASSIST-FUR-REQ-354525/A-Configurable Variables Requirement

For testing purposes, the following values shall be treated as variables and modified if needed to improve the quality and delivery of the feature prior to the vehicle launch. Below is a table of the configurable values.

Variable Name	Definition	Value	Min	Max	Resolution
Cancellation_timer	Indicates how long the system must count down prior to making an emergency call	15s	0	30s	1s
Cancel_Confirmation_timer	Indicates how long the user will have to confirm that they do want to cancel the emergency call.	7s	0	30s	1s
Settle_timer_delay	Indicates how long after an event is detected to wait prior to beginning the Emergency Assistance HMI. Used to allow event stabilization during events like roll-overs	3s	0	10s	1s
Spacing_between_PSAP_prompts	Indicates the delay between each concatenated PSAP message spoken to the operator	0s	0	1000ms	1ms
Off-hook_timer	The specified time after a phone call is initiated by SYNC+	5s	0	20s	1s
Spacing_between_GNSS_digits	Indicates the delay between each concatenated GPS digit spoken to the operator	150ms	0	1000ms	1ms
Dual_audio_in-vehicle_prompt_spacing	Spoken to the user while the PSAP prompts are playing to the operator, the delay between the in-vehicle prompt is specified here.	5s	0	20s	1s
GNSS(D)	This is the maximum distance traveled before GNSS coordinates are considered INVALID	TBD after discussion with supplier	0	10,000m	1m
Spacing_between_Retry_Attempts	Indicates the delay between each retry attempt	1s	0	10s	1s
Geofencing_GNSS_Validity_Distance	This is the maximum 2D error before considering the GNSS coordinates as INVALID for the Geofencing PSAP language selection	150m	0	1000m	1m
GNSS_Validity_Distance	This is the maximum 2D error before considering the GNSS coordinates as INVALID for the location provided to the PSAP	25m	0	1000m	1m

TABLE: Configurable Variables

5.5 Diagnostic Trouble Codes

5.5.1 RCM DTCs

5.5.1.1 EASSIST-FUR-REQ-354526/A-Missing RCM DTC

SYNC+ shall set a DTC when it is detected that the RstrnImpactEvntStatus signal has not been received for 5 consecutive seconds while the ignition status is at RUN or START.

5.5.1.2 EASSIST-FUR-REQ-354527/A-Invalid Data from RCM DTC

SYNC+ shall set a DTC when it is detected that the RstrnImpactEvntStatus consecutively has the following values for 5 seconds or more:

1) 0x1 (Not_Used_1) **or**
2) 0x2 (Not_Used_2) **or**
3) 0x4 (Not_Used_3) **or**
4) 0x6 (Not_Used_4) **or**
5) 0x7 (Invalid)

5.6 Software Testing & Design Validation

5.6.1 Testing Expectations

5.6.1.1 EASSIST-FUR-REQ-354528/A-Supplier Testing

During the coding and stabilization of the Emergency Assistance feature, it is expected that the application will be thoroughly tested throughout all phases of the software development process prior to and post feature complete / code delivery. It is expected that each requirement provided in the Emergency Assistance specification will be tested and noted as MEET or DOES NOT MEET requirement in the validation test report.

5.6.1.2 EASSIST-FUR-REQ-354529/A-Software Bugs

All software bugs found during the testing and development phases of the project should be captured and proper actions to resolve each issue should be taken to ensure that the quality of the feature is not compromised. Any issue closed or un-resolved should be reviewed with Ford to determine if follow-up or containment actions should be administered.

5.6.1.3 EASSIST-FUR-REQ-354530/A-SYNC+ Integration

The Emergency Assistance application shall be tested in a fashion that all native SYNC+ / infotainment events and features (e.g USB, AM/FM, BT Audio, etc.) will be exercised and validated against all aspects of the Emergency Assistance feature.

5.6.2 Test Tools

5.6.2.1 EASSIST-FUR-REQ-354531/A-Change Emergency Number

For testing, the Emergency Assistance emergency number shall be configurable via engineering DID ‘e911 telephone number’. The DID phone number shall be stored and used for all future calls during testing. ASCII value “0000” shall be used to reset the DID phone number after the testing is complete. After the DID value is reset, the market configured phone number shall be used for all the EA event phone calls. A master reset/factory reset shall not affect the configured emergency number. Please refer to the engineering DIDs specification for more details on the ‘e911 telephone number’ DID.

5.6.2.2 EASSIST-FUR-REQ-354532/A-Developer Log

SYNC+’s developer log shall include the following information about Emergency Assistance:

- Whether the feature is configured on or off at EOL
- Configured country code
- Whether the feature is turned on or off by the user
- All state changes of the Event_in_progress variable
- All state changes of the Event_state variable

- All state changes of the Unsuccessful_call_count variable
- All state changes of the Incomplete_call_count variable
- All state changes of the Last_RstrnImpactEvntStatus variable
- All Bluetooth communication between the connected phone and SYNC+

5.6.2.3 EASSIST-FUR-REQ-354533/A-GNSS Position Simulation

There shall be a capability in SYNC+ to override the coordinates provided to the PSAP operator and displayed in-vehicle during an Emergency Assistance Call using the 'Global Positioning System (GPS) Latitude' and 'Global Positioning System (GPS) Longitude' DataIdentifiers. Please refer to the DataIdentifier specifications for implementation details.

6 Appendix A: China GNSS Shift Algorithm

6.1 China Law

Local China Market prohibits directly communicating GNSS coordinates as defined in China Government Law notice No.7 of the navigation electronic map management with the relevant provisions from Bureau of Surveying and Mapping issued on 2007.

The following are articles 9 & 10 of Notice No. 7 both in the Chinese and English versions:

九、除依法取得导航电子地图测绘资质的外，其他单位和个人在使用导航电子地图过程中，不得携带其他带有空间定位系统（如 GPS 等）信号接收、定位功能的仪器开展显示、记录、存储、标注空间坐标、高程、地物属性信息，以及检测、校核、更改导航电子地图相关内容等测绘活动。

Unless legally obtained licenses for surveying and mapping of navigation electronic maps, other organizations and individuals, when using navigation electronic map, shall not carry equipment that have space positioning system (GPS) receiver, positioning features for displaying, recording, storing and annotating space coordinates, elevation, land and property information, as well as for detecting, verifying and changing survey and mapping of navigation electronic.

十、由导航电子地图、导航软件、导航设备构成的导航产品，不得设置以文本或数据库等任何形式显示、记录、存储涉密基础地理信息数据（坐标、高程等）的功能选项。

Navigation products consisting of navigation e-maps, software and equipment should not allow any features that display, record or store such confidential information about geographic locations (i.e. coordinate, elevation, etc.) in the form of text or database.

6.2 GNSS Shift Implementation

6.2.1 FUR-REQ-355179/A-Cooperation with Chinese Government

The supplier of SYNC+ shall work with the Chinese government to get the GNSS Shift Algorithm. The supplier will be provided with an executable by the Chinese government.

6.2.2 FUR-REQ-355180/A-GNSS Shift Algorithm

SYNC+ shall use the algorithm provided by the Chinese government to shift the GNSS coordinates spoken to the PSAP operator via voice prompts.

6.2.3 FUR-REQ-355181/A-GNSS Shift Algorithm Input

The input to the GNSS Shift algorithm shall consist of the following 4 input parameters: Raw GPS latitude, Raw GPS longitude, Real Time and Height.

6.2.4 FUR-REQ-355182/A-GNSS Shift Algorithm Output Failure

If no GNSS coordinates are provided by the GNSS Shift Algorithm, or erroneous data is provided, SYNC+ shall run the algorithm again. If a second failure occurs, SYNC+ shall consider the coordinates invalid and not provide coordinates to the PSAP operator.

7 Appendix B: Vehicle Emergency Data Set

7.1 EASSIST-REQ-354569/A-Vehicle Emergency Data Set Overview

Vehicle Emergency Data Set (VEDS) is a set of data elements transmitted from the vehicle to the emergency services after a crash event detected by the vehicle crash sensing system. The goal of VEDS is to provide the emergency services with information that will help assess the crash event severity and possible number of occupants in order to determine the hospital trauma level required, closest hospital, the number of emergency vehicles required at the scene, occupant information etc…
The VEDS data sources can come from various in-vehicle sensors and/or occupant information. Note that there are ongoing industry wide efforts associated with VEDS standardization and the development of urgency algorithms with groups such as AACN, APCO and NENA.
Today's planned implementation of VEDS is primarily based on data transmitted by the Restraints Control Module (RCM) to SYNC+ via the High Speed CAN network. During an Emergency call event trigger (911 Assistance or Emergency Assistance), SYNC+ will receive data from the RCM, process that data, and then transmit the information to the PSAP via voice prompts.

7.2 EASSIST-REQ-354570/A-VEDS Data Elements Description

The following table lists the VEDS Data Descriptions and their corresponding CAN Signal State and Hex value.

Data Element Description	HS-CAN Signal Tx by RCM	Signal State	Hex Value
Crash Event Type	VedsEvntType_D_Ltchd	No event	0x0
		Frontal	0x1
		Side	0x2
		Rear	0x3
		Rollover	0x4
		Unused	0x5
		Not Supported	0x6
		Fault	0x7
Rollover Event (Yes,No)	VedsEvntRoll_D_Ltchd	No event	0x0
		No	0x1
		Yes	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Multi Event (Yes,No)	VedsMultiEvnt_D_Ltchd	No event	0x0
		No	0x1
		Yes	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Maximum Delta Velocity	VedsMaxDeltaV_D_Ltchd	kph	0x01-FD
		No event	0x0
		Not Supported	0xFE
		Fault	0xFF
Driver Airbag Deployment Status	VedsDrvBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Airbag Deployment Status	VedsPasBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3

Data Element Description	HS-CAN Signal Tx by RCM	Signal State	Hex Value
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Side Airbag Deployment Status	VedsDrvSideBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Side Airbag Deployment Status	VedsPasSideBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Curtain Airbag Deployment Status	VedsDrvCrtnBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Curtain Airbag Deployment Status	VedsPasCrtnBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Belt Tensioner Deployment Status, 1st row	VedsDrvBelt_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Belt tensioner Deployment Status, 1st row	VedsPasBelt_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Knee Airbag Deployment Status	VedsDrvKneeBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Knee Airbag Deployment Status	VedsPasKneeBag_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7

Data Element Description	HS-CAN Signal Tx by RCM	Signal State	Hex Value
Passenger Child Detected (yes/no)	VedsRw1PasChld_D_Ltchd	No event	0x0
		Child detected	0x1
		Child not detected	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Buckle Status, 1st Row	VedsRw1DrvBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Buckle Status, 1st Row	VedsRw1PasBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Buckle Status, 2nd Row	VedsRw2dBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Middle Buckle Status, 2nd Row	VedsRw2mBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Buckle Status, 2nd Row	VedsRw2pBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Buckle Status, 3rd Row	VedsRw3dBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Middle Buckle Status, 3rd Row	VedsRw3mBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Buckle Status, 3rd Row	VedsRw3pBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3

Data Element Description	HS-CAN Signal Tx by RCM	Signal State	Hex Value
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Driver Rear Inflatable Belt Deployment Status, 2nd Row	VedsRw2dRib_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Passenger Rear Inflatable Belt Deployment Status, 2nd Row	VedsRw2pRib_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Middle Belt Tensioner Deployment Status, 1st Row	VedsRw1mBelt_D_Ltchd	No event	0x0
		Deployed	0x1
		Not deployed	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7
Middle Buckle Status, 1st Row	VedsRw1mBckl_D_Ltchd	No event	0x0
		Belted	0x1
		Not belted	0x2
		Unused_1	0x3
		Unused_2	0x4
		Unused_3	0x5
		Not Supported	0x6
		Fault	0x7

VEDS Data Elements Description.

7.3 EASSIST-REQ-354571/A-SYNC+ & RCM Interaction Requirements

1. The RCM shall periodically transmit VEDS data to SYNC+ via the HS-CAN vehicle communication network. Refer to CAN message list specifications and the "VEDS Data Elements Description" table.
2. SYNC+ shall periodically receive VEDS data from the RCM via the HS-CAN vehicle communication network.
3. The RCM shall periodically transmit VEDS supported signals populated with no event status under normal conditions (no crash event detected by RCM).
4. Upon an Emergency Assistance event trigger (qualified crash event), the RCM shall periodically transmit VEDS supported signals populated with appropriate crash status.
5. SYNC+ shall continuously monitor, detect and store VEDS data change(s) in its non-volatile memory.
6. SYNC+ shall process the VEDS data stored in non-volatile memory once the Emergency Assistance cancellation timer expires.

7.4 EASSIST-REQ-354572/A-SYNC+ VEDS PSAP Prompt Determination

SYNC+ shall not process and provide VEDS data to the PSAP if the VEDS data from the RCM is:

a. Missing or invalid on HS-CAN during Run/Start ignition modes.
b. Any of the RCM VEDS signals == unused, unused_1, unused_2, unused_3, or fault. Refer to the table below for signal breakdown and values associated with abort VEDS.

RCM VEDS Signal	Signal State	Hex Value	Voice Prompts to be played (blank means no prompt)	Additional VEDS & Prompts Criteria / Conditions
VedsEvntType_D_Ltchd	No event	0x0		
	Frontal	0x1	Play ' Frontal '	
	Side	0x2	Play 'Side '	

	Rear	0x3	Play 'Rear '	
	Rollover	0x4	Play 'Rollover impact'	
	Unused	0x5		Abort VEDS
	Not Supported	0x6		
	Fault	0x7		Abort VEDS
VedsEvntRoll_D_Ltchd	No event	0x0		
	No	0x1		
	Yes	0x2	Play 'With rollover'	Do not play prompt if VedsEvntType_D_Ltchd == 0x4 (because of redundancy)
	Unused_1	0x3		Abort VEDS
	Unused_2	0x4		Abort VEDS
	Unused_3	0x5		Abort VEDS
	Not Supported	0x6		
	Fault	0x7		Abort VEDS
VedsMultiEvnt_D_Ltchd	No event	0x0		
	No	0x1		
	Yes	0x2	Play 'Multiple impacts detected'	
	Unused_1	0x3		Abort VEDS
	Unused_2	0x4		Abort VEDS
	Unused_3	0x5		Abort VEDS
	Not Supported	0x6		
	Fault	0x7		Abort VEDS
VedsMaxDeltaV_D_Ltchd	kph	0x01-FD	Play 'The maximum speed change was xx ' If the maximum speed value is equal or greater than 100mph(for US) or equal or greater than 100kph(for ROW), play the prompt 101120 'greater than' Note for the number, refer to the pre-recorded prompts [0,100].	If VedsMaxDeltaV_D_Ltchd == 0xx where x ranges from [0x01, 0xFD] values For US play in mph prompt 101121 After converting from kph to mph, make sure to round the value to the nearest integer. For ROW (Rest of World), play in kph prompt 101122
	No event	0x0		
	Not Supported	0xFE		
	Fault	0xFF		Abort VEDS
VedsDrvBag_D_Ltchd VedsPasBag_D_Ltchd VedsDrvSideBag_D_Ltchd VedsPasSideBag_D_Ltchd VedsDrvCrtnBag_D_Ltchd VedsPasCrtnBag_D_Ltchd	No event	0x0		
	Deployed	0x1	Play 'Airbags deployed'	If VedsDrvBag_D_Ltchd I VedsPasBag_D_Ltchd I VedsDrvSideBag_D_Ltchd I VedsPasSideBag_D_Ltchd I VedsDrvCrtnBag_D_Ltchd I VedsPasCrtnBag_D_Ltchd == 0x1
	Not deployed	0x2		
	Unused_1	0x3		Abort VEDS
	Unused_2	0x4		Abort VEDS
	Unused_3	0x5		Abort VEDS
	Not Supported	0x6		
	Fault	0x7		Abort VEDS
VedsRw1DrvBckl_D_Ltchd VedsRw1PasBckl_D_Ltchd VedsRw2dBckl_D_Ltchd VedsRw2mBckl_D_Ltchd VedsRw2pBckl_D_Ltchd VedsRw3dBckl_D_Ltchd VedsRw3mBckl_D_Ltchd VedsRw3pBckl_D_Ltchd VedsRw1mBckl_D_Ltchd	No event	0x0		No prompt
	Belted	0x1	Play 'detected (Number) seat belt(s) fastened' where the number value is determined by the maximum of number signals equal to belted status. Do not play the prompt Iff the number of belted is 0. Note for the number, refer to the pre-recorded prompts.	If VedsRw1DrvBckl_D_Ltchd VedsRw1PasBckl_D_Ltchd I VedsRw2dBckl_D_Ltchd I VedsRw2mBckl_D_Ltchd I VedsRw2pBckl_D_Ltchd I VedsRw3dBckl_D_Ltchd I VedsRw3mBckl_D_Ltchd I VedsRw3pBckl_D_Ltchd I VedsRw1mBckl_D_Ltchd Number == 0x1 where Number = count of signals ==0x1
	Not belted	0x2		No prompt
	Unused_1	0x3		Abort VEDS
	Unused_2	0x4		Abort VEDS
	Unused_3	0x5		Abort VEDS
	Not Supported	0x6		No prompt
	Fault	0x7		Abort VEDS

SYNC+ VEDS PSAP Prompts

7.5 Rest of World VEDS Implementation

The following requirements apply for VEDS in vehicles destined for the markets other that in United States.

7.5.1 EASSIST-REQ-354576/A-Without VEDS or if VEDS is aborted

The following table lists the prompt that shall be played if VEDS is not available or is aborted.

Without GPS		
Sequence #	**Prompt ID**	**Prompt**
1	101025 OR 101025a	Attention: A Ford vehicle has been in an accident. Stand by for communication with vehicle occupants. Attention: A Lincoln vehicle has been in an accident. Stand by for communication with vehicle occupants.
2	101025 OR 101025a	Attention: A Ford vehicle has been in an accident. Stand by for communication with vehicle occupants. Attention: A Lincoln vehicle has been in an accident. Stand by for communication with vehicle occupants.
3	101114	Line Open.
With GPS		
Sequence #	**Prompt ID**	**Prompt**
1	101146 OR 101146a	Attention, a Ford vehicle has been involved in an accident at the following coordinates: latitude [GPS_Lat] Attention! A Lincoln vehicle has been involved in an accident at the following coordinates latitude [GPS_Lat]
2	101044	and longitude [GPS_Long].
3	101042	Repeating location.
4	101147	latitude [GPS_Lat]
5	101044	and longitude [GPS_Long].
6	101114	Line Open.

Table: Prompts if VEDS is N/A or Aborted.

7.5.2 EASSIST-REQ-354577/A-With VEDS

The following table lists the prompts that shall be played if VEDS is enabled.

Without GPS		
Sequence #	**Prompt ID**	**Prompt**
1	101025 OR 101025a	Attention: A Ford vehicle has been in an accident. Stand by for communication with vehicle occupants. Attention: A Lincoln vehicle has been in an accident. Stand by for communication with vehicle occupants.
2	101141 101142 101143 101144 OR No prompt	Frontal Impact detected Side Impact detected Rear Impact detected Rollover Impact detected
3	101126 OR No prompt	With rollover
4	101134 OR No prompt	Multiple impacts detected
5	101135a and <Number prompt ID> 101122 OR No prompt	The maximum speed change was <Number> Kilometers per hour
6	101129 OR No prompt	Airbags deployed
7	101131 and 101132b	Detected <number> seatbelts fastened.

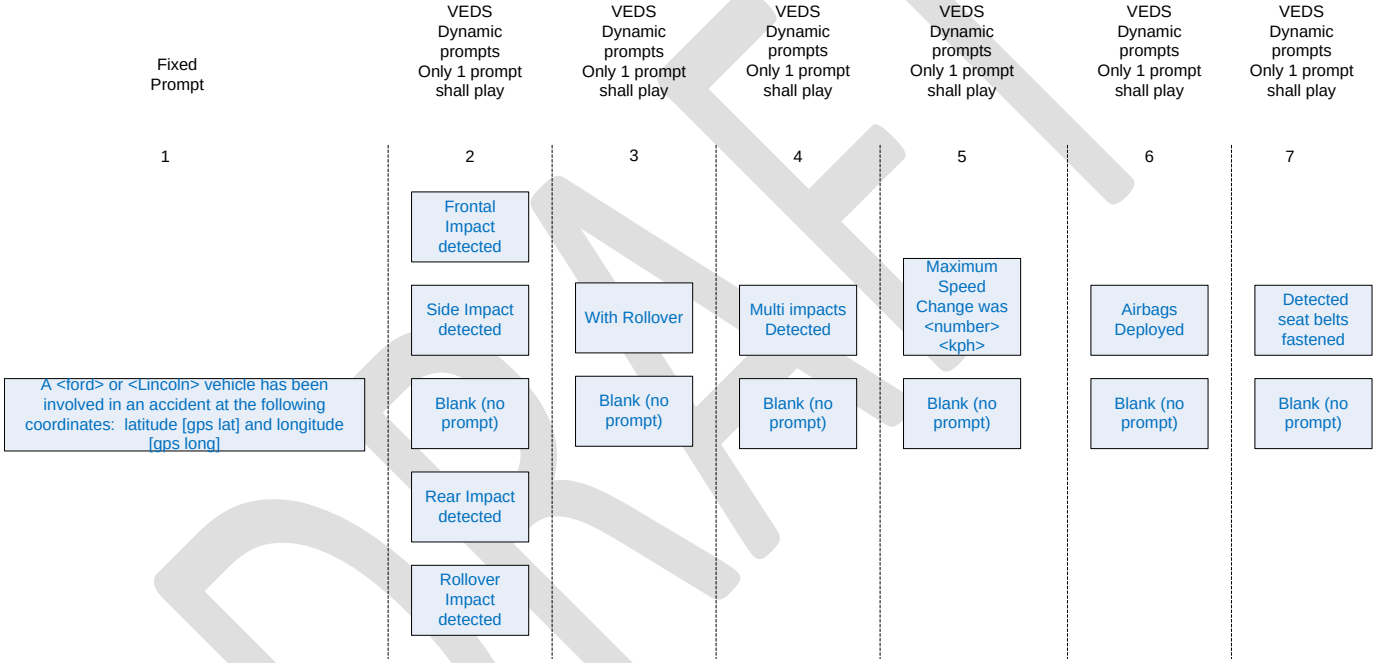
	OR 101131 and 101132a OR No prompt	Or Detected <number> seatbelt fastened.
8	101145	Repeating information.
9	101025	Attention: A Ford vehicle has been in an accident. Stand by for communication with vehicle occupants.
10	101141 101142 101143 101144 OR No prompt	Frontal Impact detected Side Impact detected Rear Impact detected Rollover Impact detected
11	101126 OR No prompt	With rollover
12	101134 OR No prompt	Multiple impacts detected
13	101135a and <Number prompt ID> 101122 OR No prompt	The maximum speed change was <Number> Kilometers per hour
14	101129 OR No prompt	Airbags deployed
15	101131 and 101132b or 101131 and 101132a OR No prompt	Detected <number> seatbelts fastened. Or Detected <number> seatbelt fastened.
16	101114	Line open
With GPS		
Sequence #	**Prompt ID**	**Prompt**
1	101146 OR 101146a	Attention, a Ford vehicle has been involved in an accident at the following coordinates: latitude [GPS_Lat] Attention! A Lincoln vehicle has been involved in an accident at the following coordinates latitude [GPS_Lat]
2	101044	and longitude [GPS_Long].
3	101141 101142 101143 101144 OR No prompt	Frontal Impact detected Side Impact detected Rear Impact detected Rollover Impact detected
4	101126 OR No prompt	With rollover
5	101134 OR No prompt	Multiple impacts detected
6	101135a and <Number prompt ID> 101122 OR No prompt	The maximum speed change was <Number> <Kilometers per hour
7	101129 OR No prompt	Airbags deployed

8	101131 and 101132b OR 101131 and 101132a OR No prompt	Detected <number> seatbelts fastened.Or Detected <number> seatbelt fastened.
9	101042	Repeating location.
10	101147	latitude [GPS_Lat]
11	101044	and longitude [GPS_Long].
12	101114	Line open

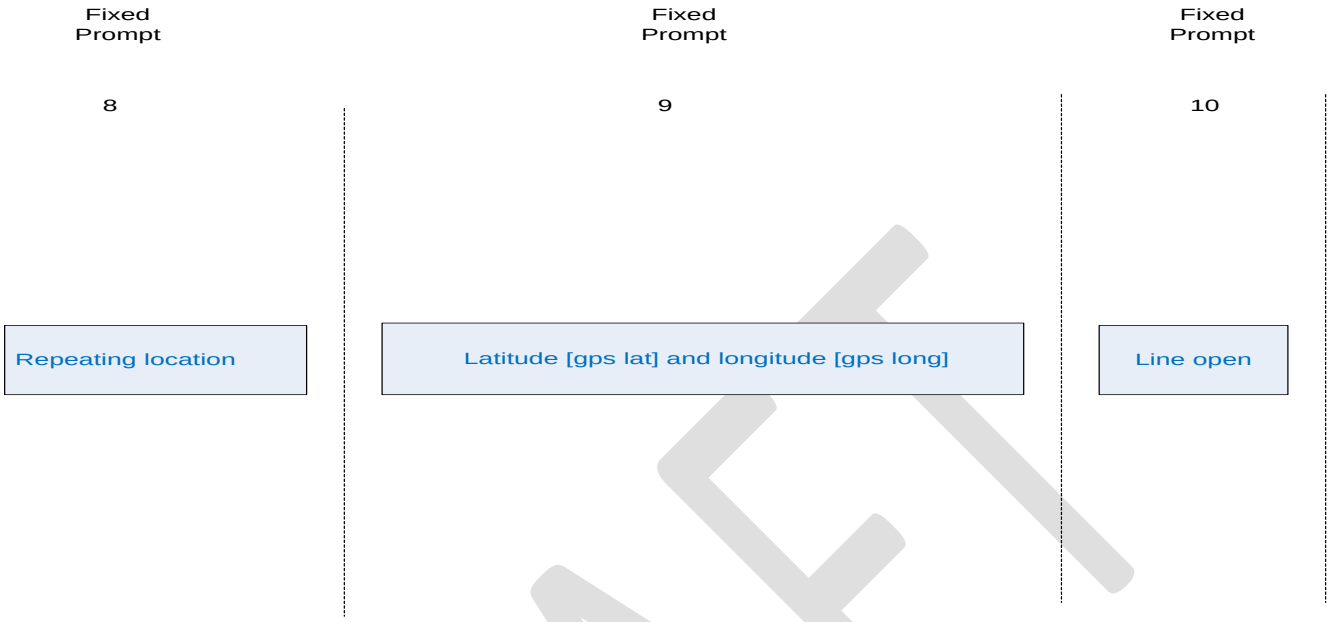
Table: Prompts if VEDS is Enabled.

The following diagrams show a visual representation of the VEDS Prompt sequence.

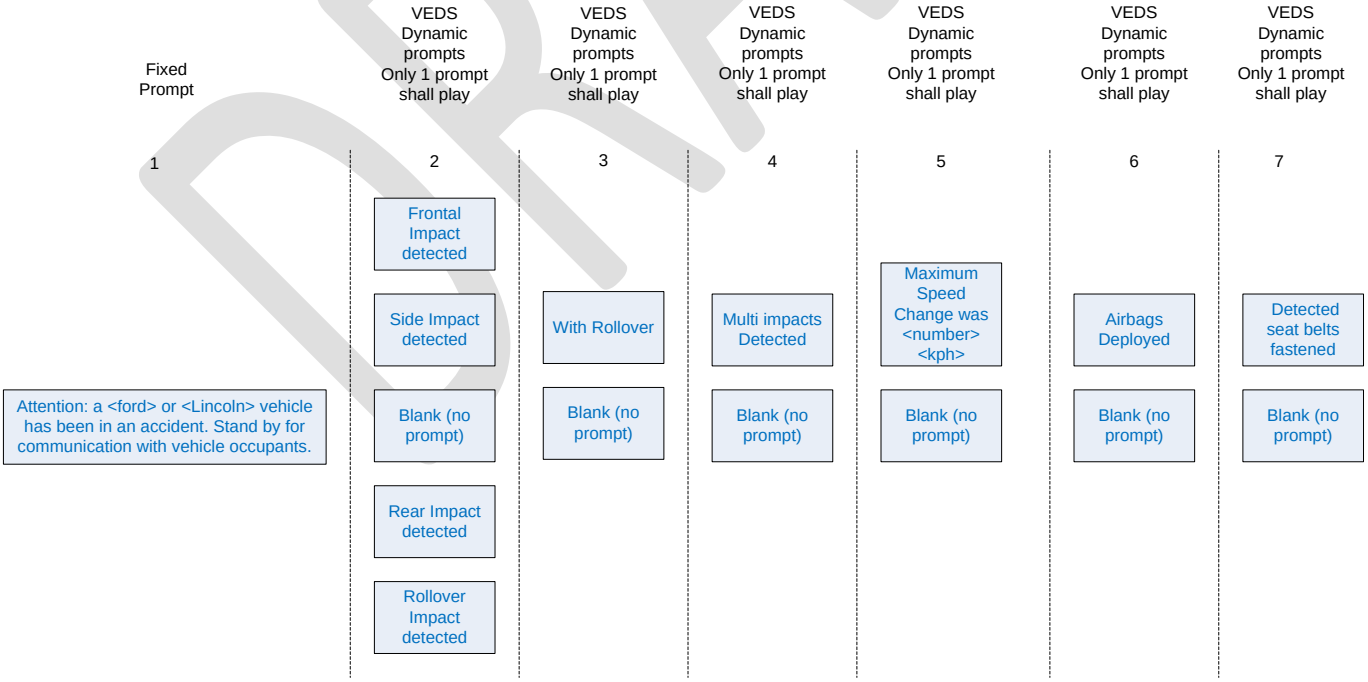
With GPS



With GPS cont



Without GPS



Without GPS cont

Fixed Prompt	Fixed Prompt	VEDS Dynamic prompts Only 1 prompt shall play	VEDS Dynamic prompts Only 1 prompt shall play	VEDS Dynamic prompts Only 1 prompt shall play	VEDS Dynamic prompts Only 1 prompt shall play	VEDS Dynamic prompts Only 1 prompt shall play	VEDS Dynamic prompts Only 1 prompt shall play
8	9	10	11	12	13	14	15
Repeating information	Attention: a <ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants.	Frontal Impact detected	With Rollover	Multi impacts Detected	Maximum Speed Change was <number> <kph>	Airbags Deployed	Detected seat belts fastened
		Side Impact detected	Blank (no prompt)	Blank (no prompt)	Blank (no prompt)	Blank (no prompt)	Blank (no prompt)
		Blank (no prompt)					
		Rear Impact detected					
		Rollover Impact detected					

The following table shows VEDS prompt examples with complete information.

A <Ford> or <Lincoln> vehicle has been in an accident at the following coordinates, Latitude {latitude}, and longitude {longitude}. **Frontal impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating location. Latitude {latitude}, and longitude {longitude}. Line open
A <Ford> or <Lincoln> vehicle has been in an accident at the following coordinates, Latitude {latitude}, and longitude {longitude}. **Side impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating location. Latitude {latitude}, and longitude {longitude}. Line open
A <Ford> or <Lincoln> vehicle has been in an accident at the following coordinates, Latitude {latitude}, and longitude {longitude}. **Rear impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating location. Latitude {latitude}, and longitude {longitude}. Line open
A <Ford> or <Lincoln> vehicle has been in an accident at the following coordinates, Latitude {latitude}, and longitude {longitude}. **Rollover impact detected. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating location. Latitude {latitude}, and longitude {longitude}. Line open

Table: VEDS Prompt Examples with complete information.

The following table shows VEDS prompt examples with complete information but without GPS information.

Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Frontal impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating information. Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Frontal impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.**
Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Side impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating information. Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Side impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.**
Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Rear impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating information. Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Rear impact detected With rollover. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.**
Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Rollover impact detected. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.** Repeating information. Attention: A <Ford> or <Lincoln> vehicle has been in an accident. Stand by for communication with vehicle occupants. **Rollover impact detected. Multiple impacts detected. The maximum speed change was 20 kph. Airbags deployed. Detected 2 seatbelts fastened.**

Table: VEDS Prompt Examples with complete information and without GPS.

7.6 EASSIST-REQ-354578/A-VEDS Validation

1. Supplier shall perform validation by simulating all possible VEDS CAN combinations.
2. Supplier shall review the VEDS CAN combinations validation results and final report with Ford for final approval.
3. Supplier shall obtain real crash barrier events recorded CAN data from Ford, run that data through the VEDS function and provide the results to Ford for review and approval.