

**Research & Vehicle Technology**

**“Infotainment Systems Product Development”**

**Feature – Reverse Brake Assist**

**Infotainment Subsystem Part Specific Specification (SPSS)**

Version 1.1

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**FORD CONFIDENTIALF**

**Revision History**

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| **Date** | **Version** | **Notes** | |
| **October 6, 2016** | **1.0** | **Initial Release** |  |
|  |  |  |  |
| **February 20, 2017** | **1.1** | **Updated Release** |  |
|  | RBA-FUR-REQ-237323/B-RBA Logical Signal Mapping | | TM: Updating signals capitalization and renaming RbaSys\_D\_Stat to RbaMnu\_D\_Rq |
|  | MD-REQ-237337/B-RBAAlrtSt | | TM: Updating Signal literals |
|  | MD-REQ-237338/B-RBASt | | Update literals |
|  | MD-REQ-238207/B-RBASysRq | | TM: rename signal |
|  | MD-REQ-237339/B-RBARq | | TM: Signal literals updated |
|  | MD-REQ-237339/B-RBARq | | TM: Signal literals updated |
|  | MD-REQ-237337/B-RBAAlrtSt | | TM: Updating Signal literals |
|  | MD-REQ-237338/B-RBASt | | Update literals |
|  | MD-REQ-238207/B-RBASysRq | | TM: rename signal |
|  | RBA-406892/B-General Requirements | | TM: Deleting mykey references. |
|  | RBA-REQ-238208/B-Feature Availibility | | Update signal name |

**Table of Contents**

[Revision History 2](#_Toc475349254)

[1 Architectural Design 4](#_Toc475349255)

[1.1 Overview 4](#_Toc475349256)

[1.2 RBA-CLD-REQ-237138/A-Reverse Brake Assistant Client 4](#_Toc475349257)

[1.3 RBA-CLD-REQ-237139/A-Reverse Brake Assistant Server 4](#_Toc475349258)

[1.4 RBA-FUR-REQ-237323/B-RBA Logical Signal Mapping 4](#_Toc475349259)

[1.5 RBA-IIR-REQ-237325/A-RBAServer\_Tx 4](#_Toc475349260)

[1.5.1 MD-REQ-237337/B-RBAAlrtSt 4](#_Toc475349261)

[1.5.2 MD-REQ-237338/B-RBASt 5](#_Toc475349262)

[1.5.3 MD-REQ-238207/B-RBASysRq 5](#_Toc475349263)

[1.6 RBA-IIR-REQ-237326/A-RBAServer\_Rx 5](#_Toc475349264)

[1.6.1 MD-REQ-237339/B-RBARq 5](#_Toc475349265)

[1.7 RBA-IIR-REQ-237327/A-RBAClient\_Tx 6](#_Toc475349266)

[1.7.1 MD-REQ-237339/B-RBARq 6](#_Toc475349267)

[1.8 RBA-IIR-REQ-237328/A-RBAClient\_Rx 6](#_Toc475349268)

[1.8.1 MD-REQ-237337/B-RBAAlrtSt 6](#_Toc475349269)

[1.8.2 MD-REQ-237338/B-RBASt 6](#_Toc475349270)

[1.8.3 MD-REQ-238207/B-RBASysRq 7](#_Toc475349271)

[2 General Requirements 8](#_Toc475349272)

[2.1 RBA-REQ-237140/A-State Recall 8](#_Toc475349273)

[2.2 RBA-REQ-237355/A-RBA activation 8](#_Toc475349274)

[2.3 RBA-REQ-238208/B-Feature Availibility 8](#_Toc475349275)

[3 Functional Definition 9](#_Toc475349276)

[3.1 Use Cases 9](#_Toc475349277)

[3.1.1 RBA-UC-REQ-237343/A-RBA Customer Disable 9](#_Toc475349278)

[3.1.2 RBA-UC-REQ-237344/A-RBA Customer Enable 9](#_Toc475349279)

[3.1.3 RBA-UC-REQ-237345/A-RBA Key Cycle- RBA ON 9](#_Toc475349280)

[3.1.4 RBA-UC-REQ-237346/A-RBA Key Cycle- RBA Off 10](#_Toc475349281)

[3.1.5 RBA-UC-REQ-237347/A-RBA Unavailable 10](#_Toc475349282)

[3.1.6 RBA-UC-REQ-237348/A-RBA Brake Alert Activation - Rear Park Aid Detection 10](#_Toc475349283)

[3.1.7 RBA-UC-REQ-237349/A-RBA Brake Alert Activation - Cross Traffic Alert Detection 10](#_Toc475349284)

[3.1.8 RBA-UC-REQ-237350/A-RBA Brake Alert No Activation 11](#_Toc475349285)

[3.2 White Box Views 12](#_Toc475349286)

[3.2.1 Activity Diagram 12](#_Toc475349287)

[3.2.2 Sequence Diagram 13](#_Toc475349288)

[4 Appendix: Reference Documents 15](#_Toc475349289)

# Architectural Design

## Overview

Reverse Brake Assist (RBA) is a driver assistance feature that provides audible and visual notifications of potential collisions in a zone behind the vehicle, and then responds with automatic braking if a collision is imminent and the driver has not yet intervened. The feature operates while an equipped vehicle is travelling in the reverse direction at low speeds. The feature integrates detections from rear sensing systems including the camera system, ultrasonic park aid sensors, and cross traffic radars to determine the threat of objects in the vehicle path of travel.

## RBA-CLD-REQ-237138/A-Reverse Brake Assistant Client

Responsibility: Reverse Brake Assistant (RBA) Client among its other duties that it may have is also responsible for displaying the RBA feature state, enables the users to change the state of the RBA feature (such as On and Off).

## RBA-CLD-REQ-237139/A-Reverse Brake Assistant Server

Responsibility: Reverse Brake Assist Server is responsible for the main feature functionality. Basically it will reply to user requests to turn the feature On or Off or will notify the Client if the feature is unavailable due to any restrictions or errors.

## RBA-FUR-REQ-237323/B-RBA Logical Signal Mapping

The CAN signals mentioned throughout this document shall refer to the CAN signal’s logical name. The logical names shall be mapped to their actual CAN signal names. Please use the table below to perform the mapping. The InfoCAN database file is the master file for the actual CAN signal names. Note: There may be cases where the actual CAN signal name is used in this documentation.

|  |  |
| --- | --- |
| **Logical Name** | **CAN Signal Name** |
| RBAAlrtSt | RbaAlrt\_D\_Dsply |
| RBASt | Rba\_D\_Stat |
| RBASysRq | RbaMnu\_D\_Rq |
| RBARq | Rba\_D\_Rq |

Table: Logical name/CAN signal mapping

## RBA-IIR-REQ-237325/A-RBAServer\_Tx

### MD-REQ-237337/B-RBAAlrtSt

RBAAlrtSt is used by the Server to tell the Client to display warning notifications to the user.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBAAlrtSt |  |  |  |
|  | OFF | 0x0 | Do not display warning graphics. |
|  | GRAPHIC | 0x1 | Client displays warning graphics. |
|  | TEXT | 0x2 | Cluster displays warning text. |
|  | BOTH | 0x3 | Client displays warning graphics and cluster displays warning text. |

### MD-REQ-237338/B-RBASt

RBASt is used by the Server to send to the Client RBA State condition

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBASt |  |  |  |
|  | OFF | 0x0 | RBA feature is off **(Client displays OFF)** |
|  | ON | 0x1 | RBA feature is on **(Client displays ON)** |
|  | DISABLED | 0x2 | RBA feature is disabled **(Client does not display RBA menu)** |
|  | Unused | 0x3 | This value is not being used currently |

### MD-REQ-238207/B-RBASysRq

RBASysRq is sent by the Server to the Client. The client uses it to determine on whether the feature is Active (0x2), or Not Active (0x1), etc.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBASysRq |  |  |  |
|  | NONE | 0x0 | Indicates that no ON/OFF menu should be available to the user. This would only be the case when the RBA feature has been disabled by Method II configuration. |
|  | INACTIVE | 0x1 | Indicates that the ON/OFF menu should be visible but not active to the user. Menu should be greyed out. |
|  | ACTIVE | 0x2 | Indicates that the ON/OFF menu should be visible and active to the user. |
|  | Unused | 0x3 | Not used currently. |

## RBA-IIR-REQ-237326/A-RBAServer\_Rx

### MD-REQ-237339/B-RBARq

RBARq is used by the Client to send to requests to the Server to turn the feature On , Off etc.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBARq |  |  |  |
|  | NULL | 0x0 | No new request to change feature state. |
|  | OFF | 0x1 | Request to turn Off RBA |
|  | ON | 0x2 | Request to turn On RBA |
|  | Unused | 0x3 | Not used currently. |

## RBA-IIR-REQ-237327/A-RBAClient\_Tx

### MD-REQ-237339/B-RBARq

RBARq is used by the Client to send to requests to the Server to turn the feature On , Off etc.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBARq |  |  |  |
|  | NULL | 0x0 | No new request to change feature state. |
|  | OFF | 0x1 | Request to turn Off RBA |
|  | ON | 0x2 | Request to turn On RBA |
|  | Unused | 0x3 | Not used currently. |

## RBA-IIR-REQ-237328/A-RBAClient\_Rx

### MD-REQ-237337/B-RBAAlrtSt

RBAAlrtSt is used by the Server to tell the Client to display warning notifications to the user.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBAAlrtSt |  |  |  |
|  | OFF | 0x0 | Do not display warning graphics. |
|  | GRAPHIC | 0x1 | Client displays warning graphics. |
|  | TEXT | 0x2 | Cluster displays warning text. |
|  | BOTH | 0x3 | Client displays warning graphics and cluster displays warning text. |

### MD-REQ-237338/B-RBASt

RBASt is used by the Server to send to the Client RBA State condition

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBASt |  |  |  |
|  | OFF | 0x0 | RBA feature is off **(Client displays OFF)** |
|  | ON | 0x1 | RBA feature is on **(Client displays ON)** |
|  | DISABLED | 0x2 | RBA feature is disabled **(Client does not display RBA menu)** |
|  | Unused | 0x3 | This value is not being used currently |

### MD-REQ-238207/B-RBASysRq

RBASysRq is sent by the Server to the Client. The client uses it to determine on whether the feature is Active (0x2), or Not Active (0x1), etc.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| RBASysRq |  |  |  |
|  | NONE | 0x0 | Indicates that no ON/OFF menu should be available to the user. This would only be the case when the RBA feature has been disabled by Method II configuration. |
|  | INACTIVE | 0x1 | Indicates that the ON/OFF menu should be visible but not active to the user. Menu should be greyed out. |
|  | ACTIVE | 0x2 | Indicates that the ON/OFF menu should be visible and active to the user. |
|  | Unused | 0x3 | Not used currently. |

# General Requirements

## RBA-REQ-237140/A-State Recall

RBA Server shall recall the last state of RBA feature after an ignition cycle. The server shall inform the client of this state.

## RBA-REQ-237355/A-RBA activation

Upon receiving a message indicating that the system has applied automatic braking, the Client shall display an alert indicating that a brake event has occurred for as long as the signals are being sent by the sensor.

## RBA-REQ-238208/B-Feature Availibility

RBASysRq tells the client of the feature availability. The feature shall be available only for value 0x2. For any other value the feature should be grayed out and user should not be able to select anything on client.

If RBASt comes with a value of 0x2 (Disabled) the Client should not Display anything about the feature.

For the user to be able to interface with the feature, RBASysRq should 0x2 (Active) and RBASt must not be 0x2 (RBA menu Off) or 0x3 (unused).

# Functional Definition

## Use Cases

### RBA-UC-REQ-237343/A-RBA Customer Disable

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | Customer finds RBA on/off selection in Sync.  Client displays that RBA is ON.  Customer selects on/off toggle. |
| **Post-conditions** | Client displays that RBA is OFF. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237344/A-RBA Customer Enable

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | Customer finds RBA on/off selection in Sync.  Client displays that RBA is OFF.  Customer selects on/off toggle. |
| **Post-conditions** | Client displays that RBA is ON. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237345/A-RBA Key Cycle- RBA ON

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature.  RBA is ON in the customer settings in Sync. |
| **Scenario Description** | Customer shuts vehicle OFF.  Customer turns vehicle ON at later time.  Customer finds RBA setting in Sync. |
| **Post-conditions** | Client displays that RBA is ON. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237346/A-RBA Key Cycle- RBA Off

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature.  RBA is OFF in the Client settings. |
| **Scenario Description** | Customer shuts vehicle OFF.  Customer turns vehicle ON at later time.  Customer finds RBA setting in Sync. |
| **Post-conditions** | Client is displaying that RBA is OFF. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237347/A-RBA Unavailable

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | Customer finds RBA on/off selection in Sync.  Client is displaying that RBA is ON.  Customer turns off Park Aid (or something else happens that causes RBA to be unavailable- sensor blockage, fault, CTA off, trailer connected). |
| **Post-conditions** | Client displays that RBA is unavailable (follow HMI strategy). |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237348/A-RBA Brake Alert Activation - Rear Park Aid Detection

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | The driver places vehicle in reverse and Reverse Brake Assist (RBA) is active.  The driver reverses vehicle towards an obstacle in path and receives notifications of the obstacles presence via PDC display and chimes.  The driver continues to approach obstacle until collision is imminent and the RBA feature applies automatic braking. |
| **Post-conditions** | The vehicle display shows the RBA brake alert animation. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237349/A-RBA Brake Alert Activation - Cross Traffic Alert Detection

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | The driver places vehicle in reverse and Reverse Brake Assist (RBA) is active.  The driver reverses vehicle towards cross traffic and receives notifications of the obstacles presence via Cross Traffic Alert (CTA) graphics and chimes.  The driver continues to approach cross traffic until collision is imminent and the RBA feature applies automatic braking. |
| **Post-conditions** | The vehicle display stops showing CTA Alert and shows the RBA brake alert animation. |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RBA-UC-REQ-237350/A-RBA Brake Alert No Activation

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start  Vehicle is equipped with Reverse Brake Assist feature. |
| **Scenario Description** | The driver places vehicle in reverse and Reverse Brake Assist (RBA) is active.  The driver reverses vehicle and no obstacles are detected. |
| **Post-conditions** | The vehicle display does not show any RBA animation |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI  Vehicle System Interface |

## White Box Views

### Activity Diagram

#### RBA-REQ-237353/A-Activity Diagram Activate/Deactivate



#### REQ-237725/A-State Update Activity Diagram

### Sequence Diagram

#### RBA-REQ-237354/B-Sequence Diagram



# Appendix: Reference Documents

|  |  |
| --- | --- |
| Reference # | Document Title |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |