

**Research & Vehicle Technology**

**“Infotainment Systems Product Development”**

**Feature – Stand-alone Rear View Camera**

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

Version 2.7

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**Version Date: April 26, 2019**

**FORD CONFIDENTIALF**

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Version** | **Notes** | |
| **May 31, 2013** | **1.0** | **Initial Release** |  |
|  |  |  |  |
| **December 16, 2014** | **2.0** |  | |
|  | RVC-IIR-REQ-014199/B-RVC Server CAN Status (TcSE ROIN-146765-7) | | rpaquet2 - Added PrkBrkActv\_B\_Actl and PrkBrkStatus for Manual Transmission applications. |
|  | RVC-FUR-REQ-014088/B-Deactivate RVC (TcSE ROIN-293328) | | rpaquet2 - Added new text to clarify Forward gear and Park no prak for Manual transmission applications. |
|  | CAMERA-FUR-REQ-014093/B-Camera Image Priority (TcSE ROIN-264652-1) | | rpaquet2 - Updated requirement to work for all camera views. no change to requirement intent. |
|  |  |  |  |
| **June 25, 2015** | **2.1** |  | |
|  | RVC-FUR-REQ-014087/B-RVC Malfunction (TcSE ROIN-146656-2) | | rpaquet2 - Updated requirement per APIM team. |
|  | RVC-TMR-REQ-166649/A-T\_cameraMalfunctionDelay | | rpaquet2 - Added new timer requirement for delay. |
|  | RVC-FUR-REQ-014088/C-Deactivate RVC (TcSE ROIN-293328) | | wstephe1: Revised to align with Max Speed requirement CAMERA-REQ-014077 |
|  | CAMERA-REQ-014077/B-Feature Maximum Speed (TcSE ROIN-290556) | | wstephe1: Updated requirement for Max Speed per feature scenario types: camera activation (any feature), RVC active, and DAFVC active by configuration of front (off road) camera. Scenarios to continue application across camera features. |
|  | RVC-UC-REQ-014099/B-Rear Camera Delay Mode is On (TcSE ROIN-289798) | | wstephe1: Revised to align with Max Speed requirement CAMERA-REQ-014077 |
|  | RVC-UC-REQ-014100/B-Active Park Assist is Active (TcSE ROIN-290554) | | wstephe1: Revised to align with Max Speed requirement CAMERA-REQ-014077 |
|  |  |  |  |
| **October 2, 2015** | **2.2** |  | |
|  | STR-052775/B-Interface Requirements (TcSE ROIN-146884) | | Added RVC Split View Request and Status interfaces. |
|  | CAMERA-REQ-014077/C-Feature Maximum Speed (TcSE ROIN-290556) | | tmertiri: Updated requirement to account for off road changes. |
|  | RVCv1-FUN-REQ-196091/A-Split View | | tmertiri: Added Split View functionality. |
|  | RVC-UC-REQ-196086/A-Rear Split View Exit | | tmertiri: Added Split View use cases. |
|  | RVC-UC-REQ-196085/A-Enable Split View | | tmertiri: Added Split View use case |
|  | RVC-ACT-REQ-196084/A-Rear View Camera Split View | | tmertiri: Added Split View Activity Diagram |
|  |  |  |  |
| **October 19, 2016** | **2.3** |  | |
|  | RVC-IIR-REQ-014199/D-RVC Server CAN Status (TcSE ROIN-146765-7)+ | | tmertiri: Update old signal PJB\_BootLidStatus to new one DrStatTgate\_B\_Actl and another replacement old signal GearRvrseActv\_D\_Actl to new signal GearRvrse\_D\_Actl . |
|  | RVC-IIR-REQ-014199/E-RVC Server CAN Status (TcSE ROIN-146765-7) | | tmertiri: The feature shall be responsive to both signals PJB\_BootlidStatus and DrStatTgate\_B\_Actl.Also to both GearRvrseActv\_D\_Actl and GearRvrse\_D\_Actl. Updated GearRvrse\_D\_Actl with more parameters. |
|  | RVC-FUR-REQ-014088/D-Deactivate RVC (TcSE ROIN-293328)+ | | tmertiri: updated Reverse can signal name |
|  | RVC-FUR-REQ-014090/B-Display RVC Video (TcSE ROIN-194462-2)+ | | tmertiri: replaces old signal name to new one. GearRvrse\_D\_Actl. |
|  |  |  |  |
| **January 19, 2018** | **2.4** |  | |
|  | RVC-REQ-292387/A-GearPos\_D\_Trg | | tmertiri: Added new signal name |
|  | RVC-REQ-292388/A-Veh\_V\_ActlEng | | tmertiri: Added new signal name |
|  | RVC-FUR-REQ-014090/D-Display RVC Video (TcSE ROIN-194462-2) | | tmertiri: updated with new signal names |
|  |  |  |  |
| **February 1, 2018** | **2.5** |  | |
|  | RVC-FUR-REQ-014090/E-Display RVC Video (TcSE ROIN-194462-2) | | tmertiri: Update wording |
|  |  |  |  |
| **July 23, 2018** | **2.6** |  | |
|  | RVC-FUR-REQ-014090/F-Display RVC Video (TcSE ROIN-194462-2) | | tmertiri: Remove DE values details. |
|  |  |  |  |
| **April 26, 2019** | **2.7** |  | |
|  | RVC-FUR-REQ-014090/G-Display RVC Video (TcSE ROIN-194462-2) | | tmertiri: update the GeaRvrse\_D\_Actl New Strategy |

**Table of Contents**

[Revision History 2](#_Toc7185394)

[1 Architectural Design 5](#_Toc7185395)

[1.1 RVC-CLD-REQ-014201/A-RVC Client (TcSE ROIN-146885-1) 5](#_Toc7185396)

[1.2 Interface Requirements 5](#_Toc7185397)

[1.2.1 RVC-IIR-REQ-014197/B-RVC Client CAN Request (TcSE ROIN-146762-6) 5](#_Toc7185398)

[1.2.2 RVC-IIR-REQ-014198/A-RVC HMI Logic Operations (TcSE ROIN-146763-5) 5](#_Toc7185399)

[1.2.3 RVC-IIR-REQ-014199/E-RVC Server CAN Status (TcSE ROIN-146765-7) 6](#_Toc7185400)

[1.2.4 RVC-REQ-292387/A-GearPos\_D\_Trg 7](#_Toc7185401)

[1.2.5 RVC-REQ-292388/A-Veh\_V\_ActlEng 8](#_Toc7185402)

[1.2.6 RVC-IR-REQ-014200/A-Guideline Signals Always On (TcSE ROIN-289021) 8](#_Toc7185403)

[2 General Requirements 9](#_Toc7185404)

[2.1 RVC-FUR-REQ-014087/B-RVC Malfunction (TcSE ROIN-146656-2) 9](#_Toc7185405)

[2.2 RVC-TMR-REQ-166649/A-T\_cameraMalfunctionDelay 9](#_Toc7185406)

[2.3 RVC-FUR-REQ-014088/E-Deactivate RVC (TcSE ROIN-293328) 9](#_Toc7185407)

[2.4 CAMERA-REQ-014077/C-Feature Maximum Speed (TcSE ROIN-290556) 9](#_Toc7185408)

[2.5 RVC-FUR-REQ-014089/A-Decklid/Liftgate Ajar (TcSE ROIN-146658-2) 10](#_Toc7185409)

[2.6 RVC-FUR-REQ-014090/G-Display RVC Video (TcSE ROIN-194462-2) 10](#_Toc7185410)

[2.7 RVC-TMR-REQ-014091/A-T\_minImageDisp (TcSE ROIN-264661-1) 11](#_Toc7185411)

[2.8 RVC-TMR-REQ-014092/A-T\_maxImageDisp (TcSE ROIN-264662-1) 11](#_Toc7185412)

[2.9 CAMERA-FUR-REQ-014093/B-Camera Image Priority (TcSE ROIN-264652-1) 11](#_Toc7185413)

[3 Functional Definition 12](#_Toc7185414)

[3.1 RVC-FUN-REQ-014189/A-Camera System Initialization (TcSE ROIN-146874-1) 12](#_Toc7185415)

[3.1.1 Sequence Diagrams 12](#_Toc7185416)

[3.2 RVC-FUN-REQ-014185/A-RVC Active (TcSE ROIN-293214) 13](#_Toc7185417)

[3.2.1 Use Cases 13](#_Toc7185418)

[3.2.2 Sequence Diagrams 14](#_Toc7185419)

[3.3 RVC-FUN-REQ-014186/A-RVC Zoom (TcSE ROIN-293217) 15](#_Toc7185420)

[3.3.1 Use Cases 15](#_Toc7185421)

[3.3.2 Sequence Diagrams 16](#_Toc7185422)

[3.4 RVC-FUN-REQ-014187/A-RVC Delay Mode (TcSE ROIN-293220) 18](#_Toc7185423)

[3.4.1 Use Cases 18](#_Toc7185424)

[3.5 RVC-FUN-REQ-014188/A-RVC Visual Park Aid Alert Mode (TcSE ROIN-293222) 18](#_Toc7185425)

[3.5.1 Use Cases 18](#_Toc7185426)

[3.5.2 Sequence Diagrams 19](#_Toc7185427)

[3.6 RVCv1-FUN-REQ-196091/A-Split View 19](#_Toc7185428)

[3.6.1 Use Cases 19](#_Toc7185429)

[3.6.2 White Box Views 21](#_Toc7185430)

[4 Appendix: Reference Documents 23](#_Toc7185431)

# Architectural Design

## RVC-CLD-REQ-014201/A-RVC Client (TcSE ROIN-146885-1)

Responsibility: The RVC Client is the interface of the Rear View Camera function. It acts with other system parts that control the Rear View Camera or need data from it.

## Interface Requirements

### RVC-IIR-REQ-014197/B-RVC Client CAN Request (TcSE ROIN-146762-6)

| **Method** | **Notes** | **Parameters** |
| --- | --- | --- |
| **«CAN» CamraOvrlDyn\_D\_Rq.Rq()** | Request message from the HMI to the RVC to enable or disable the Dynamic Guidelines. | int *Dynamic Guideline*s  0x0: OFF  0x1: ON |
| **«CAN» CamraOvrlStat\_D\_Rq.Rq()** | Request from the HMI to the RVC to enable or disable Static Guidelines. | int *Static Guideline*s  0x0: OFF  0x1: ON |
| **«CAN» CamraZoomMan\_D\_Rq.Rq()** | Request from the HMI to RVC to set the current manual zoom level. | int *RVC Zoom* Level  0x0: Off  0x1: Zoom level I  0x2: Zoom level II  0x3: Zoom level III  0x4: Zoom level IV (Not Used)  0x5: Zoom level V (Not used)  0x6: Invalid  0x7: Unknown |
| **«CAN» DistanceBarSetting.Rq()** | Request from the HMI to the RVC to enable or disable the visual park aid alert feature. | int *Distance Bars*  0x0: OFF  0x1: ON |
| **«CAN» CamraOvrlTow\_D\_Rq.Rq()** | Request from the HMI to the RVC to enable or disable the Centerline Guideline. | int *Center Guideline*  0x0: Off  0x1: On |
| **«CAN» CamraViewSplit\_B\_Rq()**  Logical name is SplitView\_Rq() | Message Type: Request  Used to activate or deactivate the rear view split mode camera. | 0x00 : Off  0x01 : On |

### RVC-IIR-REQ-014198/A-RVC HMI Logic Operations (TcSE ROIN-146763-5)

| **Method** | **Notes** | **Parameters** |
| --- | --- | --- |
| **Active Guidelines Status()** |  | int *Status*  0x0: Activated  0x1: Deactivated |
| **CenterLine()** |  | int *Status*  0x0: Inactive  0x1: Active |
| **Fixed Guidelines Status()** |  | int *Status*  0x0: Activated  0x1: Deactivated |
| **HMI Display Status()** |  | int *RVC Display*  0x0: RVC OFF  0x1: RVC ON |
| **RVC Guidelines()** |  | int *Request*  0x0: Dynamic ON  0x1: Dynamic OFF  0x3: Fixed ON  0x4: OFF |
| **Visual Park Aid Alert()** |  | int *Status*  0x0: OFF  0x1: ON |
| **Zoom()** |  | int *Type*  0x0: OFF  0x1: Auto Active  0x2: Man Level 1  0x3: Man Level 2  0x4: Man Level 3  0x5: Man Level 4  0x6: Man Level 5 |

### RVC-IIR-REQ-014199/E-RVC Server CAN Status (TcSE ROIN-146765-7)

| **FMethod** | **Notes** | **Parameters** |
| --- | --- | --- |
| **«CAN» CamPDCGuidStat.St()** | Status from RVC to HMI to show state of the visual park aid alert feature. | int *Distance Bar Status*  0x0: Invalid  0x1: Active  0x2: Inactive  0x3: Not Used |
| **«CAN» CamraOvrlDyn\_D\_Actl.St()** | Status from RVC to HMI to show state of dynamic guidelines. | int *Dynamic Guideline Status*  0x0: Invalid  0x1: Active  0x2: Inactive  0x3: Not Used |
| **«CAN» CamraOvrlStat\_D\_Actl.St()** | Status from RVC to HMI to show state of the static guidelines. | int *Static Guideline Status*  0x0: Invalid  0x1: Active  0x2: Inactive  0x3: Not Used |
| **«CAN» CamraZoomMan\_D\_Actl.St()** | Status from RVC to HMI to show the current manual zoom level. | int *RVC Zoom Status*  0x0: Off  0x1: Zoom level I  0x2: Zoom level II  0x3: Zoom level III  0x4: Zoom level IV (Not Used)  0x5: Zoom level V (Not Used)  0x6: Invalid  0x7: Unknown |
| **«CAN»PJB\_BootLidStatus** | Status from gateway to HMI to tell when the decklid/liftgate is ajar. | int *Trunk Status*  0x0: TrunkClosed  0x1: TrunkAjar |
| **«CAN»DrStatTgate\_B\_Actl** | Status from gateway to HMI to tell when the decklid/liftgate is ajar. | int *Trunk Status*  0x0: Closed  0x1: Ajar |
| **«CAN» CamraOvrlTow\_D\_Actl.St()** | Status from RVC to HMI to show the state of the centerline guideline | int *Center Guideline Status*  0x0: Invalid  0x1: Active  0x2: Inactive  0x3: Unused |
| **«CAN» GearLvrPos\_D\_Actl** | Status of the Gear Lever Position on an automatic transmission vehicle.  RVC uses to determine when Reverse Gear is engaged on automatic transmission vehicles. | 0x0: Park  0x1: Reverse  0x2: Neutral  0x3: Drive  0x4: Sport\_DriveSport  0x5: Low  0x6: first  0x7: second  0x8: third  0x9: fourth  0xA: fifth  0xB: sixth  0xC: Undefined\_Treat\_as\_Fault  0xD: Undefined\_Treat\_as\_Fault1  0xE: Unknown\_Position  0xF: Fault |
| **«CAN» GearRvrseActv\_D\_Actl** | The purpose of this signal is to notify that Reverse Gear is engaged on a manual transmission vehicle | 0x0: Inactive  0x1: Active  0x2: Unknown  0x3: Fault |
| **«CAN» GearRvrse\_D\_Actl** | The purpose of this signal is to notify that Reverse Gear is engaged on a manual transmission vehicle | $0: Inactive\_not\_confirmed $1: Inactive\_confirmed $2: Active\_not\_confirmed $3: Active\_confirmed $4: NotUsed\_1 $5: NotUsed\_2 $6: NotUsed\_3 $7: Fault |
| **«CAN» PrkBrkStatus** | Signal used to indicate the Parking Brake status in Manual Transmission Vehicle with Electronic Park Brake. | 0x0: NotUsed  0x1: Rear\_Caliper\_Closed  0x2: Rear\_Caliper\_Transition  0x3: RWU\_By\_EPB\_Active  0x4: Rear\_Caliper\_Open  0x5: EPB\_Limphome\_Active  0x6: ECD\_by\_Brake\_ECU\_Active  0x7: GeneralFault\_MaintenceMod |
| **«CAN» PrkBrkActv\_B\_Actl** | Signal used to indicate the Parking Brake status in Manual Transmission Vehicle with Mechanical Park Brake. | 0x0: Inactive  0x1: Active |
| **«CAN» CamraViewSplit\_D\_Actl()**  Logical name is RVCSplitView\_St() | Message Type: Status  Indicates the stats from Rear View Camera when a Split View mode request has been sent previously.  Invalid: Rear Normal View  Active: Rear Split View  Inactive: Rear Normal View  Not Used: Rear Normal View | 0x00: Invalid  0x01: Active  0x02: Inactive  0x03: Not Used |

### RVC-REQ-292387/A-GearPos\_D\_Trg

GearPos\_D\_Trg

This signal is used to indicate Gear direction. Used with other gear signals to determine whether or not RVC is to be turned On or Off.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Literals | Value | Description |
| Type | - | - | - |
|  | Neutral | 0x0 |  |
|  | First | 0x1 |  |
|  | Second | 0x2 |  |
|  | Third | 0x3 |  |
|  | Fourth | 0x4 |  |
|  | Fifth | 0x5 |  |
|  | Sixth | 0x6 |  |
|  | Seventh | 0x7 |  |
|  | Eighth | 0x8 |  |
|  | Ninth | 0x9 |  |
|  | Tenth | 0xA |  |
|  | Undefined\_3 | 0xB |  |
|  | Undefined\_4 | 0xC |  |
|  | Undefined\_5 | 0xD |  |
|  | Reverse | 0xE |  |
|  | Unknown | 0xF |  |

### RVC-REQ-292388/A-Veh\_V\_ActlEng

Veh\_V\_ActlEng

This signal is used to indicate vehicle speed. Refer to database for proper signal values.

### RVC-IR-REQ-014200/A-Guideline Signals Always On (TcSE ROIN-289021)

The following signals shall permanently be set to "ON":

\*CamraOvrlDyn\_D\_Rq

\*CamraOvrlStat\_D\_Rq

\*Reference: [RVC-GIF-146762-6-RVC Client CAN Request](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=16.0.8008711&LID=19.0.78579906)

# General Requirements

## RVC-FUR-REQ-014087/B-RVC Malfunction (TcSE ROIN-146656-2)

When the RVC Client (RearViewCameraClient) does not detect video present in the signal from the camera it shall set a DTC and the RVC Client shall display camera overlays for T\_cameraMalfunctionDelay before displaying an error message allowing the user to acknowledge the video error and revert to the previous screen. At any time the video signal is detected RVC client should check for Gear position and show the camera.

## RVC-TMR-REQ-166649/A-T\_cameraMalfunctionDelay

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_cameraMalfunctionDelay | Time DAFVC or RVC Client should wait before displaying an error message to the user according to RVC-REQ-014087-RVC Malfunction or DAFVC-REQ-166649 DAFVC Malfunction. | sec | 0-30 | 1 | 10 |

## RVC-FUR-REQ-014088/E-Deactivate RVC (TcSE ROIN-293328)

The RVC Client (RearViewCameraClient) shall stop displaying RVC video when one of the following conditions is met:

1. Vehicle is shifted out of reverse (Camera Delay = OFF)

2. Vehicle is shifted out of reverse (GearLvrPos\_D\_Actl does not equal Reverse in automatic Transmission vehicle or GearRvrse\_D\_Actl or GearRvrseActv\_D\_Actl does not equal active in Manual Transmission vehicle) and vehicle speed > limit per CAMERA-REQ-014077-Feature Maximum Speed (Camera Delay = ON)

3. CGEA 1.2:

Power Mode does not equal IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status does not equal Run

4. Vehicle is shifted into Park

1. Automatic Transmission vehicle GearLvrPos\_D\_Actl == 0x0
2. Manual Transmission Vehicle with Mechanical Park Brake

GearRvrse\_D\_Actl == Inactive or GearRvrseActv\_D\_Actl == Inactive AND PrkBrkActv\_B\_Actl == Active

1. Manual Transmission Vehicle with Electronic Park Brake

GearRvrse\_D\_Actl == Inactive or GearRvrseActv\_D\_Actl == Inactive AND PrkBrkStatus == Active

## CAMERA-REQ-014077/C-Feature Maximum Speed (TcSE ROIN-290556)

The feature maximum speed when displaying a camera image in forward gear shall be as described for each operational scenario below:

1. **Any camera feature activation attempted by User**
   1. *Rear Camera*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Not Available*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and does NOT meet conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and meets conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 20 kph*

1. **Rear Camera Active**

*Feature maximum speed = 10 kph*

1. **Front Camera Active**
   1. Off Road Front Camera configured: *Not Available*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and does NOT meet conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and meets conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 24 kph*

## RVC-FUR-REQ-014089/A-Decklid/Liftgate Ajar (TcSE ROIN-146658-2)

When the RVC Client (RearViewCameraClient) detects the decklid or liftgate is ajar, the RVC Client shall display a warning message that explains why no guidelines are available in the camera image.

## RVC-FUR-REQ-014090/G-Display RVC Video (TcSE ROIN-194462-2)

There are two ways for Reverse Detection. What way to use is decided on configuration values.

Reverse Detection NEW:

Reverse\_Gear is determined as mentioned in below table. Once GearLvrPos\_D\_Actl is reverse, System need to loop through signal GearPos\_D\_Trg to determine reverse gear until either GearLvrPos\_D\_Actl is not reverse OR Camera turn ON.

|  |  |  |
| --- | --- | --- |
| GearLvrPos\_D\_Actl = 0x1 (Reverse) (automatic transmission) | GearPos\_D\_Trg | Gear position and Camera Status |
| Reverse | 0xE (Reverse) | Gear is Reverse, Turn Camera On |

Upon detecting the conditions for RVC to be ON, the RVC Client (RearViewCameraClient) shall start a timer (T\_minImageDisp) and shall not display the RVC image until the expiration of this timer.  Upon expiration of the timer, the RVC Client shall start another timer (T\_maxImageDisp). The RVC Client must display the RVC image prior to the expiration of T\_maxImageDisp.

Once the conditions for displaying RVC are no longer applicable the RVC client shall:

1.            Cancel the timer

2.            Not display the RVC image

Reverse Detection LEGACY:

Reverse Detection is determined as mentioned in below table.

|  |  |
| --- | --- |
| GearLvrPos\_D\_Actl = 0x1 (Reverse) (automatic transmission) or  GearRvrseActv\_D\_Actl = 0x1 (Active )(manual transmission vehicle and Legacy Message Set) or GearRvrse\_D\_Actl = 0x3 or 0x2 ( Active Confirmed or Active\_not\_confirmed) (manual transmission vehicle and New Message Set) | Gear position and Camera Status |
| Reverse | Gear is Reverse, Turn Camera On |

Upon detecting the conditions for RVC to be ON, the RVC Client (RearViewCameraClient) shall start a timer (T\_minImageDisp) and shall not display the RVC image until the expiration of this timer.  Upon expiration of the timer, the RVC Client shall start another timer (T\_maxImageDisp). The RVC Client must display the RVC image prior to the expiration of T\_maxImageDisp.

Once the conditions for displaying RVC are no longer applicable the RVC client shall:

1.            Cancel the timer

2.            Not display the RVC image

## RVC-TMR-REQ-014091/A-T\_minImageDisp (TcSE ROIN-264661-1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_minImageDisp | Minimum time RVC Client should wait before displaying the RVC video image to the user according to RVC-GREQ-194462-2-Display RVC Video. | msec | 225-275 | 5 | 250 |

## RVC-TMR-REQ-014092/A-T\_maxImageDisp (TcSE ROIN-264662-1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_maxImageDisp | Maximum time RVC Client should wait before displaying the RVC video image to the user according to RVC-GREQ-194462-2-Display RVC Video. | msec | 450-550 | 5 | 500 |

## CAMERA-FUR-REQ-014093/B-Camera Image Priority (TcSE ROIN-264652-1)

Once the camera image has been displayed to user, the image shall be maintained as long as the conditions required to be in the particular camera view are present and shall have highest priority:

• No pop-up screens shall interrupt the video image.

• Media functions (source change, volume control, etc.) shall be available, but shall not interrupt the image view to the user.

# Functional Definition

## RVC-FUN-REQ-014189/A-Camera System Initialization (TcSE ROIN-146874-1)

### Sequence Diagrams

#### RVC-SD-REQ-014156/A-Camera System Initialization (TcSE ROIN-202661-4)

Scenario

Normal Usage

The Rear View Camera (RVC) receives power due to Ignition being in Run or Engine On. The RVC updates camera system status signals with the last known values.

Constraints

Pre-condition

CGEA 1.2:

Power Mode != IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ingition\_Status != Run

Post-condition

CGEA 1.2:

Power Mode = IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status = Run

Post-condition

Rear View Camera system is initialized with last known values of all status messages.

Sequence Diagram



## RVC-FUN-REQ-014185/A-RVC Active (TcSE ROIN-293214)

### Use Cases

#### RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates the Rear View Camera (RVC) by placing the vehicle in Reverse Gear. |
| **Post-conditions** | The vehicle display shows the RVC image. |
| **List of Exception Use Cases** | E1 – [Rear View Camera Malfunction](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849059&LID=19.0.79292089)  E2 – [Decklid/Liftgate is Ajar while Rear View Camera is ON](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849134&LID=19.0.79292091) |
| **Interfaces** | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-014096/A-Rear View Camera Malfunction (TcSE ROIN-289795)

**Linked Elements**

RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The HMI interface indicates that the Rear View Camera (RVC) image cannot be shown because of a malfunction. |
| **Post-conditions** | The vehicle display is NOT showing RVC image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-014097/A-Decklid/Liftgate is Ajar while Rear View Camera is ON (TcSE ROIN-289796)

**Linked Elements**

RVC-UC-REQ-128278/A-Activate Rear View Camera

RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The HMI interface indicates that the Decklid/Liftgate is Ajar. |
| **Post-conditions** | The vehicle display shows the Rear View Camera image.  The video feed from the Rear View Camera contains an image without guideline overlays. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver deactivates the Rear View Camera (RVC) by shifting the vehicle out of Reverse Gear. |
| **Post-conditions** | The vehicle display is NOT showing RVC image. |
| **List of Exception Use Cases** | E1 – [Rear Camera Delay Mode is On](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849284&LID=19.0.79292101)  E2 – [Active Park Assist is Active](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.79223622&LID=19.0.79292103)  E3 – [Trailer Backup Assist is Active](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.79213757&LID=19.0.79292104) (N/A for stand-alone RVC) |
| **Interfaces** | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-014099/B-Rear Camera Delay Mode is On (TcSE ROIN-289798)

**Linked Elements**

RVC-UC-REQ-128280/A-Deactivate Rear View Camera

RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The driver shifts out of Reverse Gear and into any gear other than Park. The RVC image remains displayed to the driver until the vehicle reaches limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **Post-conditions** | The vehicle display stops showing Rear View Camera image when vehicle speed reaches limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-014100/B-Active Park Assist is Active (TcSE ROIN-290554)

**Linked Elements**

RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

RVC-UC-REQ-128280/A-Deactivate Rear View Camera

DAFVCv1-UC-REQ-128313/A-Deactivate Driver Assist Front View Camera

DAFVCv1-UC-REQ-014049/B-Deactivate Driver Assist Front View Camera (TcSE ROIN-290146)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The driver shifts out of Reverse Gear and into any other gear while Active Park Assist (APA) is active. The camera image feed remains displayed to the driver as long as APA is active and vehicle speed does not exceed limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **Post-conditions** | The vehicle display stops showing Rear View Camera image when APA is no longer active or vehicle speed exceeds limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### Sequence Diagrams

#### RVC-SD-REQ-014160/A-Activate RVC (TcSE ROIN-146686-4)

Scenario

Normal Usage

The user activates the RVC by placing the vehicle in R (reverse) Gear

Constraints

Pre-condition

CGEA 1.2:

Power Mode = IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status = Run

Post-condition

HMI Display shows RVC image

Sequence Diagram



## RVC-FUN-REQ-014186/A-RVC Zoom (TcSE ROIN-293217)

### Use Cases

#### RVC-UC-REQ-014107/A-Select Manual Zoom Level X (TcSE ROIN-289799)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start.  The vehicle display is showing the Rear View Camera image. |
| **Scenario Description** | The driver activates Manual Zoom Mode Level X via the HMI interface. |
| **Post-conditions** | The vehicle display continues to show the Rear View Camera image.  The vehicle display indicates that a zoom level is selected.  The video feed from the Rear View Camera contains a zoomed-in image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |
| **Notes** | *There are three defined zoom levels and "Level X" is used to generically designate that one of the three is selected as described in this use case.*  *Refer to HMI documentation (requirements and/or screen-flow) for which level(s) of zoom will be utilized.* |

#### RVC-UC-REQ-014108/A-Deactivate Manual Zoom (TcSE ROIN-289802)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start.  The vehicle display is showing the Rear View Camera image with Zoom Level X selected. |
| **Scenario Description** | The user deactivates Manual Zoom Mode via HMI interface. |
| **Post-conditions** | The vehicle display continues to show the Rear View Camera image.  The vehicle display indicates that no zoom level is selected.  The video feed from the Rear View Camera contains a normal (no zoom applied) image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |
| **Notes** | *There are three defined zoom levels and "Level X" is used to generically designate that one of the three is selected as described in this use case.*  *Refer to HMI documentation (requirements and/or screen-flow) for which level(s) of zoom will be utilized.* |

### Sequence Diagrams

#### RVC-SD-REQ-014176/A-Activate Manual Zoom Level X (TcSE ROIN-146721-5)

Scenario

Normal Usage

The user activates Manual Zoom Level 1, 2, or 3 via HMI

Constraints

Pre-condition

CGEA 1.2:

Power Mode = IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status = Run

Pre-condition

Vehicle is in R (reverse)

Pre-condition

Semi Automatic Parallel Parking is Not enabled

Pre-condition

HMI Display is showing RVC Image

Post-condition

HMI display shows a zoom Level 1, 2, or 3 Rear Video Camera image

Sequence Diagram



#### RVC-SD-REQ-014177/A-Deactivate Manual Zoom (TcSE ROIN-146728-4)

Scenario

Normal Usage

The user deactivates Manual Zoom Mode via HMI

Constraints

Pre-condition

CGEA 1.2:

Power Mode = IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status = Run

Pre-condition

Vehicle is in R (reverse)

Pre-condition

Semi Automatic Parallel Parking is Not enabled

Pre-condition

HMI Display is showing RVC Image

Pre-condition

Manual Zoom Level 1, 2, or 3 is active

Post-condition

HMI display shows a non-zoomed Rear Video Camera image

Sequence Diagram



## RVC-FUN-REQ-014187/A-RVC Delay Mode (TcSE ROIN-293220)

### Use Cases

#### RVC-UC-REQ-014112/A-Activate/Deactivate Rear Camera Delay (TcSE ROIN-289803)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates/deactivates the Rear View Camera (RVC) Delay Mode via the HMI interface. |
| **Post-conditions** | The RVC Delay Mode is activated/deactivated. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

## RVC-FUN-REQ-014188/A-RVC Visual Park Aid Alert Mode (TcSE ROIN-293222)

### Use Cases

#### RVC-UC-REQ-014121/A-Activate/Deactivate Enhanced Park Aids (TcSE ROIN-289804)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates/deactivates the Enhanced Park Aids via the HMI interface. |
| **Post-conditions** | The Enhance Park Aids are activated/deactivated.  The HMI indicates the setting change determined by vehicle system interface signal. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### Sequence Diagrams

#### RVC-SD-REQ-014184/A-Activate/Deactivate Visual Park Aid Alert (TcSE ROIN-146735-3)

Scenario

Normal Usage

The user selects Visual Park Aid Alert "ON/OFF" from the Rear Camera Settings via HMI.

Constraints

Pre-condition

CGEA 1.2:

Power Mode = IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status = Run

Pre-condition

Vehicle is equipped with a Park Aid Module

Pre-condition

Visual Park Aid Alert Mode is inactive/active

Post-condition

Visual Park Aid Alert mode is active/inactive

Sequence Diagram



## RVCv1-FUN-REQ-196091/A-Split View

### Use Cases

#### RVC-UC-REQ-196086/A-Rear Split View Exit

|  |  |
| --- | --- |
| **Actors** | Rear Split View Exit |
| **Pre-conditions** | Vehicle Occupant |
| **Scenario Description** | * Vehicle in Run/Start * Rear Camera is showing * Rear Split View is showing on camera (rear split view stat = on) * Display and Camera are configured for Rear Split View (display also configured for without front camera, TBA, CHMSL camera, or Aux camera) |
| **Post-conditions** | * Customer presses Rear Normal View button   OR   * Rear Camera is sending Rear Normal View (Rear split view stat = off) |
| **List of Exception Use Cases** | Sync highlights Rear Normal View, populates the zoom button, and sends rear split request signal as on. Camera switches to rear normal view (if not already at rear normal view). |
| **Interfaces** | E1 – Vehicle is not RUN/START  E2 – valid camera video signal not present  E3 – Loss of communication with RVC |
|  | G-HMI  Vehicle System Interface |

#### RVC-UC-REQ-196085/A-Enable Split View

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | * Vehicle in Run/Start * RVC is display * RVC is not showing Split View * Display and Camera are configured for Rear Split View (display also configured for without front camera, TBA, CHMSL camera, or Aux camera) |
| **Scenario Description** | Customer presses the view button to go to Rear Split View |
| **Post-conditions** | Sync highlights Rear Split View button, stops showing the zoom button, and sends Rear Split View request signal as Rear Split View On. Camera then shows Rear Split View |
| **List of Exception Use Cases** | E1 – Vehicle is not ON  E2 – valid camera video signal not present  E3 – Loss of communication with RVC |
| **Interfaces** | G-HMI  Vehicle System Interface |

### White Box Views

#### Activity Diagrams

##### RVC-ACT-REQ-196084/A-Rear View Camera Split View



#### Sequence Diagrams

##### RVC-SD-REQ-196087/A-Activate and Exit Split View

**Linked Elements**

RVC-UC-REQ-014272/A-Activate RVC (TcSE ROIN-146094-1)



# Appendix: Reference Documents

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