Requirements Specification
FRS AUS4 Camera

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1 General

1.1 Version history

Version	Author	Content	Date
1.0	Adeliina Aho Tarkka	First version	2012-04-11
2.0	Christer Aspman	**General** Added version handling on requirements **Updated requirements** / **New version** UFR 523_Camera view_11 / 2 UFR 523_Camera view_14 / 2 UFR 523_Camera view_18 / 2 **Deleted requirements** UFR 523_Camera view_20 UFR 523_Camera view_21 UFR 523_Camera view_22 **New requirements** UFR 523_Camera view_23 to UFR 523_Camera view_58	2013-09-23
(3.0) 0	Christer Aspman	**General** Added parameters and CAN signals. Broken down requirements from UFR. Merged with AER document. Changed to FRS specification template Changed requirement ID prefix from UFR 523_Camera view_ to FRS523_ e g UFR 523_Camera view_58 is now identified as FRS523_58 New version (0) due to new document template. **Updated requirements** / **New version** (/) (/) (/) **Deleted requirements** 78 **New requirements** FRS523_59 to FRS523_112	2013-02-01
1	Christer Aspman	**General** Updated references Updated abbreviations (/) **Updated requirements** / **New version** FRS523_14 / 3 FRS523_16 / 2 FRS523_109 / 2 FRS523_74 / 2 FRS523_87 / 2 FRS523_16 / 2 **Deleted requirements**	2013-12-19

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2	Christer Aspman	**General** Updated according to internal reviews and comments. Updated according to new CAN specification. Requesting display and camera function moved to Utility Management FRS. **Updated requirements** / **New version** FRS523_30 2 FRS523_43 2 FRS523_90 2 FRS523_91 2 FRS523_115 2 FRS523_116 2 FRS523_121 2 FRS523_122 2 FRS523_127 2 FRS523_128 2 **Deleted requirements** FRS523_13 FRS523_117 FRS523_118 FRS523_119	2014-06-16

		FRS523_120 FRS523_123 FRS523_124	
3	Christer Aspman	**General** Removed Hazard analysis. Added FRS523_129.	2014-06-27
4	Christer Aspman	Added timer for reverse camera. Major cleaning. Removed a lot of requirements due to double information. Updated CAN-table. Updated parameter names. **New requirements** FRS523_130 FRS523_131 **Updated requirements** FRS523_12 FRS523_14 FRS523_25 FRS523_39 FRS523_ FRS523_63 FRS523_64 FRS523_68 FRS523_69 FRS523_82 FRS523_83 FRS523_90 FRS523_91 FRS523_99 FRS523_106 FRS523_127 FRS523_128 **Deleted requirements** FRS523_11 FRS523_15 FRS523_17 FRS523_19 FRS523_28 FRS523_29 FRS523_30 FRS523_31 FRS523_32 FRS523_33 FRS523_34 FRS523_35 FRS523_37	2014-09-03

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5	Daniel Velcic	General Updated according to internal reviews and comments. Updated requirements FRS523_16 FRS523_25 FRS523_53 FRS523_62 FRS523_127 FRS523_128	2015-04-13
6	Daniel Velcic	General Updated according to discussions in final OPL Updated requirements FRS523_42 FRS523_69	2015-09-07
7	Daniel Velcic	General Updated after fault detection in testing. Updated requirements FRS523_125 FRS523_126 FRS523_127 FRS523_128	2015-11-27
8	Daniel Velcic	General Update after discussions of the Requirements Updated requirements FRS523_18	2015-12-17

		FRS523_52 FRS523_56 2.1 Parameters	
9	Daniel Velcic	General Update after discussions of the Requirements New requirements FRS523_132	2016-01-12
10	Daniel Velcic	General Update after discussions of the Requirements New requirements FRS523_133 Updated requirements FRS523_130 FRS523_132	2016-01-28
11	Daniel Velcic	General Corrections of the Requirements after Review Deleted requirements FRS523_132 for later SOP Updated requirements FRS523_125-128 Parameters (Speed Range to 255) ReverseCameraActiveTimer to 255 SteeringWheelPosition added Values FRS523_50 FRS523_52 FRS523_16	2016-02-26
12	Daniel Velcic	General Corrections of the Requirements after Review Updated requirements 2.2 Sensors and actuators 3.2 Can Communication requirements (Media) 3.2.1 Can Communication requirements (General Camera) 3.3.2 General requirements (Front Camera) 3.3.3 Can Communication requirements (Front Camera) 3.4.2 General requirements (Reverse Camera) 3.4.3 Can Communication requirements (Reverse Camera) FRS523_12 FRS523_23 FRS523_57 FRS523_62 FRS523_66 FRS523_69 FRS523_133 New requirements FRS523_134 FRS523_135 FRS523_136	2016-04-25
13	Daniel Velcic	Updated requirements FRS523_52 FRS523_23	2016-04-25

14	Jakob Gourie	Deleted requirements FRS523_63, FRS523_66 and FRS523_67 (since they are duplicates of FRS523_23), FRS523_101, FRS523_102 and FRS523_103 (since they are duplicates of FRS523_104) and FRS523_133 (is written as information instead). Updated requirements FRS523_14, FRS523_16, FRS523_23, FRS523_53, FRS523_54, FRS523_56, FRS523_62, FRS523_64, FRS523_104, FRS523_106, FRS523_111, FRS523_115, FRS523_116, FRS523_121, FRS523_122, FRS523_125, FRS523_126, FRS523_127, FRS523_128 and FRS523_131. New requirements FRS523_137, FRS523_138 and FRS523_139.	2016-10-06
15	Jakob Gourie	General Updated requirements to implement CR46 (Worklight and DirectionIndicatorsLeft/RightIntended). Note: Pay also attention to FRS523_14 and FRS523_106 that were changed in version 14. Deleted requirements FRS523_137, FRS523_138 and FRS523_139. Updated requirements FRS523_12, FRS523_104, FRS523_125, FRS523_126, FRS523_127 and FRS523_128. New requirements FRS523_133	2017-03-28

1.2 Purpose

The purpose with this document is to list the functionality for the new infotainment system SRS 2126748, which will be possible to implement in both trucks and coaches. This document describes the camera functionality requirements.

1.3 Background

When driving a heavy vehicle it can sometime be difficult for the driver to have a good overview around the vehicle. In these situations a camera can be a great help and show areas that the driver otherwise would not have seen.

With a camera solution connected to the vehicle the driver can receive additional information to what can be seen via the mirrors. The camera solution will enable the driver to see areas around the vehicle that are difficult to see from the driver's seat, and can therefore detect and avoid hazardous situations. The cameras can also be used for monitoring body-builder functionality and loads.

1.4 General description of the function

A camera view shall be shown in the display of the infotainment system. The video image shall be provided via an available video input. The video source can be a directly connected camera or a camera ECU. It shall not be

necessary to specify the purpose of the video input, i.e. it can be a reverse view camera, a front camera, etc. EOL parameters will define the purpose of each video input on each unique vehicle.

The driver shall be able to activate the camera view via the infotainment system, but it shall also be possible to activate the camera view via a pin. When the camera view is active other functionality in the system, e.g. sound, shall not be affected.

Please note, the camera functionality shall not replace the rear view mirrors, but shall be possible to replace the front mirrors and side view mirrors.

1.5 Abbreviations

AUS	Audio System
CAN	Controller Area Network
HMI	Human Machine Interface

1.6 References

1. 2126748 SRS Audio system
2. 2282481 CAN COMMUNICATION SPECIFICATION - Audio System AUS4
3. ISO/DIS 16505 Road Vehicles - Ergonomic and performance aspects of Camera Monitoring Systems - Requirements and test procedures .
4. 2003/97/EG DIRECTIVE 2003/97/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 10 November 2003
5. Diagnostics specification, 2307207 (Standard)
6. FRS 2289909 Utility Management
7. 2128872 HW Requirement specification

2 Inputs/Outputs

2.1 Parameters

Type	Name	Range	Unit
EOL	FrontCameraUpperSpeedLimit	0 – 255	km/h
EOL	FrontCameraUpperSpeedHysteresis	0 – 255	km/h
EOL	Camera1ReverseGeneralForwardDeactivationSpeed	0 – 255	km/h
EOL	Camera2ReverseGeneralForwardDeactivationSpeed	0 – 255	km/h
EOL	Camera1ReverseGeneralForwardHysteresis	0 – 255	km/h
EOL	Camera2ReverseGeneralForwardHysteresis	0 – 255	km/h
EOL	Camera1StartupTime	0 = off 1-5100	ms
EOL	Camera2StartupTime	0 = off 1-5100	ms
EOL	ReverseCameraActiveTimer	0 = NoTimer 1 - 255	s
EOL	Camera1	Off GeneralCamera ReverseCamera FrontCamera	
EOL	Camera2	Off	

Type	Name	Range	Unit
		GeneralCamera ReverseCamera FrontCamera	
EOL	ReverseGuidelinesCamera1	Off Image 1 To Image 10	
EOL	ReverseGuidelinesCamera2	Off Image1 To Image10	
EOL	GeneralCameraActivationWorklightCamera1	Off On	
EOL	GeneralCameraActivationWorklightCamera2	Off On	
EOL	GeneralCameraActivationDirectionIndicatorsCamera1	Off On	
EOL	GeneralCameraActivationDirectionIndicatorsCamera2	Off On	

*Camera1StartupTime and Camera2StartupTime in steps of 20ms

CAN signals

Direction	Message	Signal
Received	CruiseControlVehSpeed	WheelBasedVehicleSpeed
		ParkingBrakeSwitch
Received	CUVInformation	DirectionIndicatorRightIntended
		DirectionIndicatorLeftIntended
		WorklightToggleSwitch
Received	ETC5	ReverseSwitch
Sent	MediaStreamSourceAvailable	VideoLineIn1Available
		VideoLineIn2Available
		VideoLineIn3Available
		VideoLineIn4Available
Sent	MediaStreamSourceConnected	VideoLineIn1Connected
		VideoLineIn2Connected
		VideoLineIn3Connected
		VideoLineIn4Connected

2.2 Sensors and actuators

Type	Number	Name	Range	Unit	Description/Comment
Analogue in		Camera1 Activate	0-24	V	See Ref. 7 HW spec.
Analogue in		Camera2 Activate	0-24	V	See Ref. 7 HW spec.
Analogue out		Camera 1 wake-up	0-12	V	See Ref. 7 HW spec.
Analogue out		Camera 2 wake-up	0-12	V	See Ref. 7 HW spec.
Analogue in		Camera 1		CVBS (PAL and NTSC)	
Analogue in		Camera 2		CVBS (PAL and NTSC)	

3 Function requirements

2 Camera inputs shall be available. OSD (On Screen Display) shall be possible, e.g. to show help lines, distance marks or menu items on the camera image. The camera image shall never freeze since the system may be safety critical. The hardware shall therefore be designed to minimize freezes and delays, for example the video image shall not be affected by the system software. The system shall support both the PAL and NTSC video format. The system needs to automatically detect the format used and make necessary adjustments to be able to show the camera image without any user interaction.

3.1 General

Req-ID	ver	Requirement
FRS523_110	1	The camera function shall be available in performance step Standard.
FRS523_9	1	The camera image shall be shown on the display of the system. The image shall be provided via a video input. The video source can be a directly connected camera or via a camera ECU.
FRS523_12	4	It shall be possible to activate and deactivate each camera input • automatically, which means via CAN signals, e.g. reverse signal, speed signal etc. that are sent according to specific requirements. • manually, via hard key. • via hardware pin (DigIn 1 and DigIn 2) on the head unit. • via command on CAN, means that CAN signals are sent e.g. signals in “InfotainmentFunctionDisplayControl”. Since the use for each input is unknown the conditions must be configurable via EOL parameters. See Ref. 6 FRS 2289909 Utility Management for details regarding camera commanded via CAN.
FRS523_14	5	If no camera is connected and an attempt to activate a camera is initiated, the system shall ignore this command. If the attempt is via the camera HMI (hard keys and touch screen) a notification shall be presented to the user, saying that the application is not supported.
FRS523_16	4	When the camera view is deactivated, the system shall transit to the latest used view other than the camera view, or the view for the active source, in case the source where changed during the camera was active. If the system was turned on by activation of a camera, the system shall shift to a lower state when the camera view is deactivated. See Ref. 1 SRS for power-states.
FRS523_18	3	The camera image shall not be frozen or delayed. The camera functionality is safety critical and the implementation of the camera function and the whole system needs to be designed to avoid frozen or delayed camera images. Due to this the supplier shall provide to Scania relevant parts of the system design and test protocols to proof that the camera functionality is not causing any freezes or delays.
FRS523_23	3	The infotainment system shall be equipped with two 12V output pins, one for each camera. The pins shall be active when the corresponding camera view is displayed.
FRS523_25	3	The infotainment system shall show input from a connected camera with maximum 100 ms delay. I e what appears outside the vehicle shall be visible not later than after

		100 ms in the display. The requirement affects both the Camera delay and the Camera at Cold Start up.
FRS523_53	3	The start-up time on the system, from state = off until a camera-image is showed on the display shall be no more than 3s. If other state than off state, requirement FRS523_54 (500ms) applies. See Ref. 1 SRS for ECU states.
FRS523_54	2	When the infotainment-system is running and has higher state than off and a camera-view is • commanded on CAN, or • automatically activated due to a CAN-signal • activated by camera pins • activated by hard keys there shall be no more than 500 ms latency in the Infotainment system until the image is showing on the display. Please note that this requirement assumes a camera image is already available, any camera-delay is not covered. See Ref. 6 FRS 2289909 Utility Management for details regarding camera commanded via CAN.
FRS523_26	1	The Camera interface shall support most camera systems on the aftermarket. See Ref.1 SRS for more information.
FRS523_99	3	The purpose for each video input is decided by parameters. Camera 1 functionality shall be defined by parameter **Camera1**. Camera 2 functionality shall be defined by parameter **Camera2**. If parameter **Camera1[2]** = • Off The camera shall be deactivated. • GeneralCamera The camera shall work as general camera. • ReverseCamera The camera shall work as reverse camera. • FrontCamera The camera shall work as front camera.
FRS523_39	3	Audio playback and information sent on CAN, regarding other functions in the infotainment system, shall not be affected by the camera function. E g Radio information and navigation information shall still be available, accessible in the instrument cluster and possible to control by steering wheel buttons.
FRS523_62	4	It shall be possible to activate the camera view and show a camera image on the infotainment systems display by activating the activation hardware pins (DigIn 1 and DigIn 2) for each camera. I e: When DigIn 1 is active, Camera1 view shall be displayed. When DigIn 2 is active Camera2 view shall be displayed. When an activation pin is not active, the corresponding camera view shall not be displayed anymore if not for other triggers than the activation pins.
FRS523_111	2	The activation of cameras via the activation-pins DigIn 1 and DigIn 2 shall override the speed-limitations on displaying camera described in FRS523_106.

FRS523_64	3	If the infotainment system is configured with two camera inputs (via parameters **Camera1** and **Camera2**) the hard key shall be configured to toggle between: 1. camera input 1 2. camera input 2 See also prioritization of cameras FRS523_104. Toggle possibility is dependent of camera configuration.
FRS523_68	2	Each camera input shall be able to detect if a valid camera image is sent on the camera input. The camera input shall provide a stable image before the camera view is activated. If no stable image is available but conditions to activate the camera view is fulfilled the function shall continue to search for a stable image from the camera and activate the camera view as soon as an image is available.
FRS523_69	3	**If no camera is physically connected to an input which is configured to other than off (in parameters Camera1 and Camera2) a blue screen shall be displayed with the message "No camera connected".**
FRS523_100	1	If a time is specified in parameter **Camera1StartupTime** and/or **Camera2StartupTime**, a black image shall be displayed during the specified time, before the corresponding camera image is shown.
FRS523_112	1	If several conditions are fulfilled that activates a camera, the camera shall remain activated until all conditions that deactivates the camera are fulfilled. E g an automatic activation due to speed in parallel with a separate CAN-request shall keep the camera active until a CAN-request for deactivation is received.
FRS523_135	1	If the infotainment system is configured with at least one camera input (via parameters **Camera1** and **Camera2**) the Camera settings view shall be available (from Setup menu or Camera Screen). In the Camera settings a preview screen is shown with the name of the Screen attached to it. The default name for Camera input 1 is Camera 1 and Camera 2 for Camera input 2. This can be renamed to an arbitrary text name. The Camera name will appear in the top bar of the Camera Screen.
FRS523_136	1	When pressing the touch screen the top bar and bottom bar will be active for 6 seconds and then change to inactive (disappear). The name of the Camera will be shown in the top bar.

FRS523_104	3	If conditions for both camera inputs are fulfilled simultaneously the prioritization shall follow the table below. Configuration according to parameters **Camera1** and **Camera2**. Conditions in this case can be hard pins, CAN-requests, other CAN-signals (speed-signals, brake-signals, gear) and requests via HMI.

Camera1	Camera2	Prioritized input
Off	Off	n/a
Off	GeneralCam	2
Off	Reverse	2
Off	Front	2
GeneralCam	Off	1
GeneralCam	GeneralCam	Initially 1 but possible to toggle with HMI
GeneralCam	Reverse	1
GeneralCam	Front	2
Reverse	Off	1
Reverse	GeneralCam	2
Reverse	Reverse	Initially 1 but possible to toggle with HMI
Reverse	Front	2
Front	Off	1
Front	GeneralCam	1
Front	Reverse	1
Front	Front	1

FRS523_133	2	Expected HMI Implementation shall be as described below: Overridable is equivalent with a possibility to escape the Screen with either CAN signal, Hard Pin and Camera Hard key. Non-Overridable means no possibility to escape the Screen with either CAN signal, Hard Pin or Camera Hard key. See Ref. 15 in DeviationList_NotIncludedPoints.

Expected HMI Implementation

Camera Type		HMI Behavior Based on Camera Activation Source					
Camera Type 1	Camera Type 2	CAN Signal		Hard Pin (Digin1/Digin2)		Camera HK (Face Plate)	
		Camera 1	Camera 2	Camera 1	Camera 2	Camera 1	Camera 2
Off	Off	N/A	N/A	N/A	N/A	N/A	N/A
Off	GeneralCam	N/A	Non-Overridable	N/A	Non-Overridable	N/A	Overridable
Off	Reverse	N/A	Overridable	N/A	Non-Overridable	N/A	Overridable
Off	Front	N/A	Non-Overridable	N/A	Non-Overridable	N/A	Overridable
GeneralCam	Off	Non-Overridable	N/A	Non-Overridable	N/A	Overridable	N/A
GeneralCam	GeneralCam	Non-Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
GeneralCam	Reverse	Non-Overridable	Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
GeneralCam	Front	Non-Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Reverse	Off	Overridable	N/A	Non-Overridable	N/A	Overridable	N/A
Reverse	GeneralCam	Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Reverse	Reverse	Overridable	Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Reverse	Front	Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Front	Off	Non-Overridable	N/A	Non-Overridable	N/A	Overridable	N/A
Front	GeneralCam	Non-Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Front	Reverse	Non-Overridable	Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable
Front	Front	Non-Overridable	Non-Overridable	Non-Overridable	Non-Overridable	Overridable	Overridable

3.2 CAN Communication requirements (Media)

Req-ID	ver	Requirement
FRS523_115	3	**MediaStreamSourceAvailable.VideoLineIn1Available** shall be set as follows: • **SourceNotAvailable.** If camera1 is configured as OFF. • **General camera.** If camera1 is configured as a general camera. • **RearViewCameraAvailable.** If camera1 is configured as reverse camera. • **FrontViewCameraAvailable**. If camera1 is configured as front camera.
FRS523_116	3	**MediaStreamSourceAvailable.VideoLineIn2Available** shall be set as follows: • **SourceNotAvailable.** If camera2 is configured as OFF. • **General camera.** If camera2 is configured as a general camera. • **RearViewCameraAvailable.** If camera2 is configured as reverse camera. • **FrontViewCameraAvailable**. If input 2 is configured as front camera.
FRS523_121	3	**MediaStreamSourceConnected.VideoLineIn1Connected** shall be set as follows: • **Not connected.** If no camera is connected on camera1 input. • **Connected.** If a camera is connected on camera1 input. • **Error.** If an error is detected on the connection for camera 1 input. • **Not available.** If none of the above applies.
FRS523_122	3	**MediaStreamSourceConnected.VideoLineIn2Connected** shall be set as follows: • **Not connected.** If no camera is connected on camera2 input. • **Connected.** If a camera is connected on camera2 input. • **Error.** If an error is detected on the connection for camera 2 input. • **Not available.** If none of the above applies.
FRS523_131	2	**MediaStreamSourceConnected.VideoLineIn3Connected** **MediaStreamSourceConnected.VideoLineIn4Connected** **MediaStreamSourceAvailable.VideoLineIn3Available** **MediaStreamSourceAvailable.VideoLineIn4Available** Shall all be set to **0.**

3.2.1 CAN Communication requirements (General Camera)

FRS523_125	4	If parameter **Camera1** = GeneralCamera **and** If parameter **GeneralCameraActivationWorklightCamera1** = on the camera 1 view shall be activated when signal **CUVInformation.WorklightOutputStatus** = On. The camera shall be active as long as the condition above is true, or until the vehicle has reached speed as mentioned in condition FRS523_106. Note: The general camera view shall be possible to deactivate with HMI (hard keys and touch screen). If camera 1 view was deactivated via HMI (hard keys and touch screen) it shall not be activated automatically again until **CUVInformation.WorklightOutputStatus** ≠ On was received.
FRS523_126	3	If parameter **Camera2** = GeneralCamera **and** If parameter **GeneralCameraActivationWorklightCamera2** = on the camera 2 view shall be activated when signal **CUVInformation. WorklightOutputStatus** = On. The camera shall be active as long as the condition above is true or until the vehicle has reached speed as mentioned in condition FRS523_106. Note: The general camera view shall be possible to deactivate with HMI (hard keys and touch screen). If camera 2 view was deactivated via HMI (hard keys and touch screen) it shall not be activated automatically again until **CUVInformation.WorklightOutputStatus** ≠ On was received.

FRS523_127	6	If parameter **Camera1** = GeneralCamera **and** If parameter **GeneralCameraActivationDirectionIndicatorsCamera1** is set to on the camera 1 view shall be activated when **CUVInformation.DirectionIndicatorLeftIntended** ≠ On **and** **CUVInformation.DirectionIndicatorRightIntended** = On The Camera view shall be activated when **CUVInformation.DirectionIndicatorRightIntended** = "On", and stay active as long as the signal combination above is true. The Camera view shall be deactivated when **CUVInformation.DirectionIndicatorRightIntended** ≠ On during three consecutive CAN cycles. Note: The general camera view shall be possible to deactivate with HMI (hard keys and touch screen). If camera 1 view was deactivated via HMI (hard keys and touch screen) it shall not be activated automatically until three consecutive CAN cycles has been received with **CUVInformation.DirectionIndicatorRightIntended** ≠ On
FRS523_128	6	If parameter **Camera2** = GeneralCamera **and** If parameter **GeneralCameraActivationDirectionIndicatorsCamera2** is set to on the camera 2 view shall be activated when **CUVInformation.DirectionIndicatorRightIntended** ≠ On **and** **CUVInformation.DirectionIndicatorLeftIntended** = On The Camera view shall be activated when **CUVInformation.DirectionIndicatorLeftIntended** = "On", and stay active as long as the signal combination above is true. The Camera view shall be deactivated when **CUVInformation.DirectionIndicatorLeftIntended** ≠ On during three consecutive CAN cycles. Note: The general camera view shall be possible to deactivate with HMI (hard keys and touch screen). If camera 2 view was deactivated via HMI (hard keys and touch screen) it shall not be activated automatically until three consecutive CAN cycles has been received with **CUVInformation.DirectionIndicatorLeftIntended** ≠ On

FRS523_106	3	If a camera is configured as GeneralCamera, according to parameter **Camera1** or **Camera2**, the camera view shall be automatically deactivated after a certain speed forward. If • **ETC5. ReverseSwitch** = **Off** and • **CruiseControlVehSpeed.WheelBasedVehicleSpeed** > (**Camera[1, 2]ReverseGeneralForwardDeactivationSpeed** + **Camera[1, 2]ReverseGeneralForwardHysteresis)** The camera view shall be deactivated. It shall not be possible to activate the camera view again while **CruiseControlVehSpeed.WheelBasedVehicleSpeed** > (**Camera[1, 2]ReverseGeneralForwardDeactivationSpeed.** See also requirement FRS523_16 for deactivation.

3.3 Front camera

3.3.1 Background

Legislation requires the driver to have clear sight around the front corner of the passenger side of the truck. Usually this requirement is met by mounting a mirror above the windscreen on the passenger side but other solutions are allowed. An alternative solution is to use a camera, mounted above the windscreen, instead of the mirror and use a display in the instrument panel to show the camera image. This solution is regulated in directive 2003/97/EG. According to the directive the display used to show the front camera image must be dedicated to show the front camera image when the vehicle is moving with a speed below 30 km/h. Over this speed the front camera image may be turned off and the display may be used to show other information, for example navigation or radio information.

3.3.2 General Requirements (Front Camera)

Req-ID	ver	Requirement
FRS523_41	1	The system shall comply with directive 2003/97/EG.
FRS523_57	2	The system shall comply with relevant parts of ISO standard ISO/DIS 16505. The relevant parts is **display reflections, display visability** and **start-up time**. Relevant use-cases could e g be • **Direct light in the display** • **Cold Start** • **Visibility in the display**
FRS523_55	1	The system shall comply with new directives that affect camera-systems for commercial vehicles. The supplier shall discuss with Scania about possible new requirements that need to be considered.
FRS523_42	1	The front camera view shall work without any other camera systems connected to the system. Any of the two composite video inputs shall be possible to configure as a front camera via EOL. The second camera need not be connected.
FRS523_56	3	When conditions (FRS523_82 and FRS523_83) for an active front camera view are fulfilled it shall not be possible to replace the camera view, not by the HMI (hard keys and touch screen) or via CAN or hardware pins (DigIn 1 or DigIn 2). The System should not enter standby when pressing the left rotary knob as long as conditions for front camera view are fulfilled.

3.3.3 CAN communication requirements (Front Camera)

Req-ID	ver	Requirement
FRS523_83	2	The front camera activation speed is defined by parameter **FrontCameraUpperSpeedLimit** If front camera view is deactivated and • **ETC5.ReverseSwitch** = Off and • **CruiseControlVehSpeed.ParkingBrakeSwitch** = **ParkingBrakeNotSet** and • **CruiseControlVehSpeed.WheelBasedVehicleSpeed** =< **FrontCameraUpperSpeedLimit** any camera configured as front camera shall be activated.
FRS523_82	2	If the vehicle speed is above a certain speed the infotainment system shall switch to the view displayed before the front camera view was activated. The deactivation speed is decided by parameter: **FrontCameraUpperSpeedLimit** and a hysteresis parameter **FrontCameraUpperSpeedHysteresis**. If front camera view is activated and **CruiseControlVehSpeed.WheelBasedVehicleSpeed** > **FrontCameraUpperSpeedLimit** + **FrontCameraUpperSpeedHysteresis** any camera configured as front camera shall be deactivated.

3.4 Reverse camera

3.4.1 Background

With a camera input configured as a reverse camera (at EOL coding and aftermarket) it is possible to see help lines on the display when reversing. The help lines are used to aid the driver to the correct place when parking and to draw the help lines correctly on the display they need to be adapted to the vehicles specification, on trucks this is especially important since each truck is configured and built for a special purpose. For the camera system the help lines are stored as static images in the infotainment system.

3.4.2 General requirements (Reverse Camera)

Req-ID	ver	Requirement
FRS523_50	1	If the reverse camera is connected as camera 1 the reverse guidelines shall be selected by parameter **ReverseGuidelinesCamera1**. If the reverse camera is connected as camera 2 the reverse guidelines shall be selected by parameter **ReverseGuidelinesCamera2**. One option in the parameters selection is to have the reverse guidelines completely off.
FRS523_52	3	If the help lines function is enabled by parameterization, this will be shown when Reverse Camera view is activated. If parameter **ReverseGuidlinesCamera1** or **ReverseGuidlinesCamera2** is Off (0) then the option shall not be selectable in the HMI. See Ref. 16 in DeviationList_NotIncludedPoints.
FRS523_129	1	**Camera view manually activated** If the reverse camera is manually activated it shall only be deactivated manually or according to requirement FRS523_91.
FRS523_88	1	**Reverse help lines** If the camera input in configured as a reverse camera the infotainment system shall be able to show reverse help guidelines in the display on top of the camera image.
FRS523_134	1	**Notification when Reversing** If the vehicle is reversing and configured with a rear camera the driver should be notified on the camera screen to pay attention of the surroundings.

3.4.3 CAN communication requirements (Reverse Camera)

Req-ID	ver	Requirement
FRS523_90	3	The camera view shall be automatically activated when an indication that the truck will start reversing is sent to the infotainment system via CAN. If reversed camera view is deactivated and - **ETC5.ReverseSwitch = On** reversed camera shall be activated.
FRS523_130	2	If reverse camera view has been automatically activated and - **ETC5.ReverseSwitch = Off** the reverse camera shall remain activated according to the time specified in parameter **ReverseCameraActiveTimer** or until deactivated according to requirement FRS523_91. Note that if **ReverseCameraActiveTimer** = 0 means the reverse camera will remain activated for 0 seconds. Note that this will not apply if the reverse Camera has been manually activated via HK or activated via Hard pin.
RS523_91	3	The reverse camera view shall be automatically deactivated after a certain speed forward. If **ETC5.ReverseSwitch** = **Off** and **CruiseControlVehSpeed.WheelBasedVehicleSpeed** > **Camera[1, 2]ReverseGeneralForwardDeactivationSpeed** + **Camera[1, 2]ReverseGeneralForwardHysteresis** deactivate camera view. This is valid when the reverse camera has been automatically or manually activated. See also requirement FRS523_16 for deactivation.

4 Change Notes

Change	ECO Number	Section	Change Description	Date	Sign
A	600547	Deleted requirements	Edited requirements	2016-08-29	jgon84