



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature – Trailer Backup Assist Image Client

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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FORD CONFIDENTIAL



Ford Motor Company

Subsystem Part Specific Specification

Engineering Specification

Revision History

Date	Version	Notes
May 31 st , 2013	1.0	Initial Release



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1.1 Overview

Trailer Backup Assist (TBA) is a system that allows the driver to continuously command a radius of curvature for the trailer as it is reversed. The system automatically steers the vehicle to achieve the commanded curvature while the driver controls the vehicle speed via the throttle and the brakes.

TBA automatically steers as driver reverses the vehicle

- The Driver controls trailer trajectory (angle) by using the trailer steering knob.
- The TBA algorithm determines the vehicle steering angle to achieve the desired trailer trajectory
- The Driver is in control of throttle and brake, while TBA does the steering

1.2 General Requirements

FAS-TBAv1-GREQ-280328-1-Trailer Backup Assist HMI Instruction () -

The TrailerBackupAssistImageClient HMI displays are dependent on the encoding of the TrailerBackupAssist_St signal.

1.3 Architectural Design

1.3.1 FAS-TBAv1-GCLD-280786-1-Trailer Backup Assist Image Client

Responsibility:

The Trailer Backup Assist Image Client is an interface of the Trailer Backup Assist (TBA) feature. The Trailer Backup Assist Image Client is responsible for displaying camera images and providing some user interface for communication with both the Trailer Backup Assist Activation Client and Trailer Backup Assist Server as part of the trailer setup process.

The Trailer Backup Assist Image Client is also responsible for displaying trailer maneuver instructions to the user during use of the TBA feature.

Both Activation and Setup of TBA require hand-shaking with the Trailer Backup Assist Activation Client in order to synchronize proper HMI display to the user between the two clients.

Review the implementation guide/static view/block diagram to locate the Trailer Backup Assist Image Client object.

1.3.2 TrailerBackupAssistImageClient Interface

1.3.2.1 FAS-TBAv1-GIF-280747-4-TrailerBackupAssistImageClient_Rx

1.3.2.1.1 TrailerSetup_Rq

Message Type: Request

This signal is used as a hand-shaking between the TrailerBackupAssistActivationClient and the TrailerBackupAssistImageClient. The signal is used to trigger changes in HMI displayed to the user.

Name	Literals	Value	Description
Type	-	-	-
	Inactive	0x0	
	BeginSetup	0x1	
	EndSetup	0x2	
	NotUsed	0x3	

1.3.2.1.2 TrailerBackupAssist_St



Message Type: Status

This signal is used to inform the Trailer Backup Assist system HMI what the current trailer backup maneuver instruction is. Each encoding of this signal will map to a specific maneuver instruction that will produce a specific HMI response to the driver. See the latest version of the TBA_HmiStatus_Coding Excel document maintained by the active steering feature group for the specific details of each "message" (Message1 – Message 31 listed below).

Name	Literals	Value	Description
Type	-	-	-
	NoMessage	0x00	
	Message1	0x01	
	Message2	0x02	
	Message3	0x03	
	Message4	0x04	
	Message5	0x05	
	Message6	0x06	
	Message7	0x07	
	Message8	0x08	
	Message9	0x09	
	Message10	0x0A	
	Message11	0x0B	
	Message12	0x0C	
	Message13	0x0D	
	Message14	0x0E	
	Message15	0x0F	
	Message16	0x10	
	Message17	0x11	
	Message18	0x12	
	Message19	0x13	
	Message20	0x14	
	Message21	0x15	
	Message22	0x16	
	Message23	0x17	
	Message24	0x18	
	Message25	0x19	
	Message26	0x1A	
	Message27	0x1B	
	Message28	0x1C	
	Message29	0x1D	
	Message30	0x1E	
	Message31	0x1F	

1.3.2.1.3 AcquireTarget_St

Message Type: Status

This signal is used to inform the TrailerBackupAssistImageClient the current state of the trailer target acquiring process. The signal is used to let the TrailerBackupAssistClient know that the TrailerBackupAssistServer has acquired the trailer target or not as well as whether or not the server is currently in the process of acquiring the trailer target.

Name	Literals	Value	Description
Type	-	-	-
	Null	0x0	
	TargetAcquired	0x1	
	TargetNotAcquired	0x2	
	Processing	0x3	
	RvcForTbaActivated	0x4	
	NotUsed	0x5	



	NotUsed	0x6	
	Faulty	0x7	

1.3.2.1.4 CameraRemote_St

Message Type: Status

This signal is used to inform the TrailerBackupAssistImageClient the current state of the remote wireless camera connection.

Name	Literals	Value	Description
Type	-	-	-
	NotSupported	0x0	Remote Wireless Camera Not Connected
	Supported	0x1	Remote Wireless Camera Connected

1.3.2.1.5 Feature_St

Message Type: Status

Represents the current status of a feature (feature selected, feature setting, etc.).

Included Parameters:

FeatureID

Configuration

PersIndex

Name	Literals	Value	Description
FeatureID	-	-	Active feature number
		0x0000 – 0xFFFF	
Configuration	-	-	Active configuration value
		0x0000 – 0xFFFF	
PersIndex	-	-	Indicates which personality profile is active
	PERS_1	0x0	
	PERS_2	0x1	
	PERS_3	0x2	
	PERS_4	0x3	
	VEHICLE	0x4	
	Not Used	0x5	
	Not Used	0x6	
	Not Used	0x7	

FAS-TBAv1-GREQ-293528-1-Sending of Request and Response for TBA Feature (Interface) -

Requirement, [IFS-MMCAN-GREQ-66252-1-Sending of Request and Response](#), is not valid for the Trailer Backup Assist (TBA) feature. Request signals used for TBA shall behave similar to status signals such that the current state of the signal is always a valid condition (they will not revert to "inactive" automatically).

1.3.2.2 FAS-TBAv1-GIF-280748-1-TrailerBackupAssistImageClient_Tx

1.3.2.2.1 TrailerSetup_St

Message Type: Status

This signal is used to complete the hand-shaking between the TrailerBackupAssistActivationClient and the TrailerBackupAssistImageClient. The signal tells the TrailerBackupAssistActivationClient what state the TrailerBackupAssistImageClient is currently in so that the HMI screens can correlate between the two clients.



Name	Literals	Value	Description
Type	-	-	-
	Null	0x0	
	BeginSetup	0x1	
	EndSetup	0x2	
	EnterParameters	0x3	
	NotUsed	0x4	
	NotUsed	0x5	
	NotUsed	0x6	
	Faulty	0x7	

1.3.2.2.2 AcquireTarget_Rq

Message Type: Request

This signal is used to send confirmation of trailer target placement to the TrailerBackupAssistServer so that the trailer target acquiring process can begin.

Name	Literals	Value	Description
Type	-	-	Confirms trailer target placement by the driver.
	Inactive	0x0	
	StartAcquisition	0x1	
	AcquisitionSuccessful	0x2	
	RetryAcquisition	0x3	
	CancelAcquisition	0x4	
	ActivateRvcForTba	0x5	
	NotUsed	0x6	
	NotUsed	0x7	

1.3.2.2.3 CancelTrailerBackupAssist_Rq

Message Type: Request

This signal is used to deactivate the Trailer Backup Assist feature. The signal is sent from the TrailerBackupAssistImageClient to the TrailerBackupAssistServer as a result of a user action.

Name	Literals	Value	Description
Type	-	-	-
	Null	0x0	
	Cancel	0x1	

1.4 Functional Definition

1.4.1 FAS-TBAv1-GFUN-293596-1-Set Up

1.4.1.1 Requirements

FAS-TBAv1-GREQ-278222-1-Setup Process Interruption Memory () -

If the trailer setup process is interrupted before the process is complete, the TrailerBackupAssistActivationClient shall remember the last known point of the setup process and revert to this point upon reinitiation of the process.

FAS-TBAv1-GREQ-280326-3-Trailer Target Acquisition Retry () -

When trailer hitch angle target acquisition fails, the TrailerBackupAssistImageClient shall present the user the option to retry acquisition or cancel acquisition. Each trailer hitch angle target acquisition failure shall result in an additional retry or cancellation. After three retry attempts, the TrailerBackupAssistImageClient shall present the user a target placement



coaching screen per HMI documentation, prior to continuing with the setup. Setup cannot be completed until trailer hitch angle target acquisition is successful.

FAS-TBAv1-GREQ-280329-2-Trailer Parameter Data () -

The TrailerBackupAssistActivationClient shall store values for the following measurements:

- A: Bumper-to-Ball
- B: *Bumper-to-Tape
- C: Bumper-to-Axle
- D: *Tape-to-Ground
- E: *Tape-Offset
- F: Calibration Offset (determined by the system, not measured by user)

All of these values shall be stored for each saved trailer with a maximum of 10 trailers. Each trailer will have an ID associated with it that will be assigned by the TrailerBackupAssistActivationClient upon initiation of new trailer setup.

The above data for the currently active trailer shall be published to the CAN bus via the ActiveTrailerParameter_St signal.

Notes:

- Parameter E above (*Tape-Offset) consists of two parts, a numerical value and a sign (positive/negative). See interface requirements for further definition.
- Parameter F above (Calibration Offset) consists of two parts, a numerical value and a sign (positive/negative) and is provided by the TrailerBackupAssistServer after a trailer is activated the first time. See *Trailer Calibration* requirement for further information regarding this parameter.

* "Tape" is interchangeable with "Target" and "Sticker" when referencing all material related to the Trailer Backup Assist feature.

FAS-TBAv1-GREQ-293527-1-End Setup (System) -

The TrailerBackupAssistImageClient shall start a 1 second timer upon sending TrailerSetup_St = EndSetup (to signify the end of the setup function).

Upon expiration of the 1 second timer, the TrailerBackupAssistImageClient shall set the following signals as specified below:

TrailerSetup_St = 0x0:Null
CancelTrailerBackupAssist_Rq = 0x0:Null
AcquireTarget_Rq = 0x0:Inactive

1.4.1.2 Use Cases

1.4.1.2.1 FAS-TBA-GUC-290416-Enter Trailer Backup Assist Setup

Linked Elements

- [290419] FAS-TBA-GUC-290419-Place Hitch Angle Targets
- [290417] FAS-TBA-GUC-290417-Vehicle Not In Park
- [290418] FAS-TBA-GUC-290418-Driver Cancels Trailer Backup Assist Setup

Actors	Vehicle Occupant
Pre-conditions	The infotainment system is powered on. The ignition status is Run/Start. The gear position status is Park.
Scenario Description	The driver initiates the Trailer Backup Assist (TBA) setup process.
Post-conditions	The TrailerBackupAssistImageClient displays trailer setup information to the driver upon reception of a vehicle network interface signal from the TrailerBackupAssistActivationClient.
List of Exception Use Cases	E1 – Vehicle Not In Park E2 – Driver Cancels Trailer Backup Assist Setup
Interfaces	G-HMI Instrument Cluster Interface



Vehicle System Interface

1.4.1.2.2 FAS-TBA-GUC-290417-Vehicle Not In Park**Linked Elements**

[290416] FAS-TBA-GUC-290416-Enter Trailer Backup Assist Setup

Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The driver attempts to enter Trailer Backup Assist (TBA) setup with the vehicle <u>not</u> in 'Park'.
Post-conditions	The driver is notified that the vehicle must be in 'Park' prior to initiating the setup process.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.1.2.3 FAS-TBA-GUC-290418-Driver Cancels Trailer Backup Assist Setup**Linked Elements**

[290416] FAS-TBA-GUC-290416-Enter Trailer Backup Assist Setup

[290419] FAS-TBA-GUC-290419-Place Hitch Angle Targets

[290421] FAS-TBA-GUC-290421-Display Trailer Parameter Related Instructions

[290422] FAS-TBA-GUC-290422-Trailer Parameter Entry Confirmed via Vehicle Network

Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The driver cancels Trailer Backup Assist (TBA) setup.
Post-conditions	The vehicle display returns to the state previous to entering TBA setup.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.1.2.4 FAS-TBA-GUC-290419-Place Hitch Angle Targets**Linked Elements**

[290421] FAS-TBA-GUC-290421-Display Trailer Parameter Related Instructions

[290416] FAS-TBA-GUC-290416-Enter Trailer Backup Assist Setup

[290418] FAS-TBA-GUC-290418-Driver Cancels Trailer Backup Assist Setup

[290420] FAS-TBA-GUC-290420- Hitch Angel Targets Not Acquired

Actors	Vehicle Occupant
Pre-conditions	The TrailerBackupAssistImageClient is displaying trailer setup information to the driver.
Scenario Description	The driver is instructed to place the Hitch Angle Target on the Trailer Backup Assist (TBA) trailer. The driver successfully places the Hitch Angle Target on the trailer and the target is successfully acquired by system.
Post-conditions	The TrailerBackupAssistImageClient is notified via vehicle network interface signal that the trailer Hitch Angle Target has been acquired successfully.
List of Exception	E1 – Hitch Angel Targets Not Acquired



Use Cases	E2 – Driver Cancels Trailer Backup Assist Setup
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.1.2.5 FAS-TBA-GUC-290420- Hitch Angel Targets Not Acquired

Linked Elements

[290419] FAS-TBA-GUC-290419-Place Hitch Angle Targets

Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The driver applies a Hitch Angle Target to the trailer and confirms target placement via HMI interface. However, the system is not able to acquire the target.
Post-conditions	The driver is notified that the Hitch Angle Target was not acquired.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.1.2.6 FAS-TBA-GUC-290421-Display Trailer Parameter Related Instructions

Linked Elements

[290422] FAS-TBA-GUC-290422-Trailer Parameter Entry Confirmed via Vehicle Network

[290418] FAS-TBA-GUC-290418-Driver Cancels Trailer Backup Assist Setup

[290419] FAS-TBA-GUC-290419-Place Hitch Angle Targets

Actors	Vehicle Occupant
Pre-conditions	The TrailerBackupAssistImageClient is notified via vehicle network interface signal that the trailer Hitch Angle Target has been acquired successfully.
Scenario Description	The HMI displays instructions to the user related to taking measurements and entering parameters in the Trailer Backup Assist (TBA) System. The TrailerBackupAssistActivationClient is notified via vehicle interface signal that the driver is ready to enter the trailer parameters.
Post-conditions	The trailer parameter instructions are displayed to the user in the TrailerBackupAssistImageClient HMI. The TrailerBackupAssistActivationClient is ready to accept trailer parameters. The TrailerBackupAssistImageClient is awaiting confirmation via vehicle network interface that trailer parameters have been entered into the system.
List of Exception Use Cases	E1 – Driver Cancels Trailer Backup Assist Setup
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.1.2.7 FAS-TBA-GUC-290422-Trailer Parameter Entry Confirmed via Vehicle Network

Linked Elements

[290418] FAS-TBA-GUC-290418-Driver Cancels Trailer Backup Assist Setup

[290421] FAS-TBA-GUC-290421-Display Trailer Parameter Related Instructions

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[66252-1] IFS-MMCAN-GREQ-66252-1-Sending of Request and Response
[278190-2] FAS-TBAv1-GUC-278190-2-Enter Setup
[278196-1] FAS-TBAv1-GUC-278196-1-Place Hitch Angle Targets
[278202-2] FAS-TBAv1-GUC-278202-2-Enter Trailer Parameters
[280753-3] FAS-TBAv1-GAD-280753-3-Trailer Backup Assist Setup

Scenarios

Normal Usage

The driver initiates and completes the setup of a trailer to be used with the Trailer Backup Assist feature.

Constraints

Pre-condition

The vehicle's ignition switch is in the RUN/START position.

Pre-condition

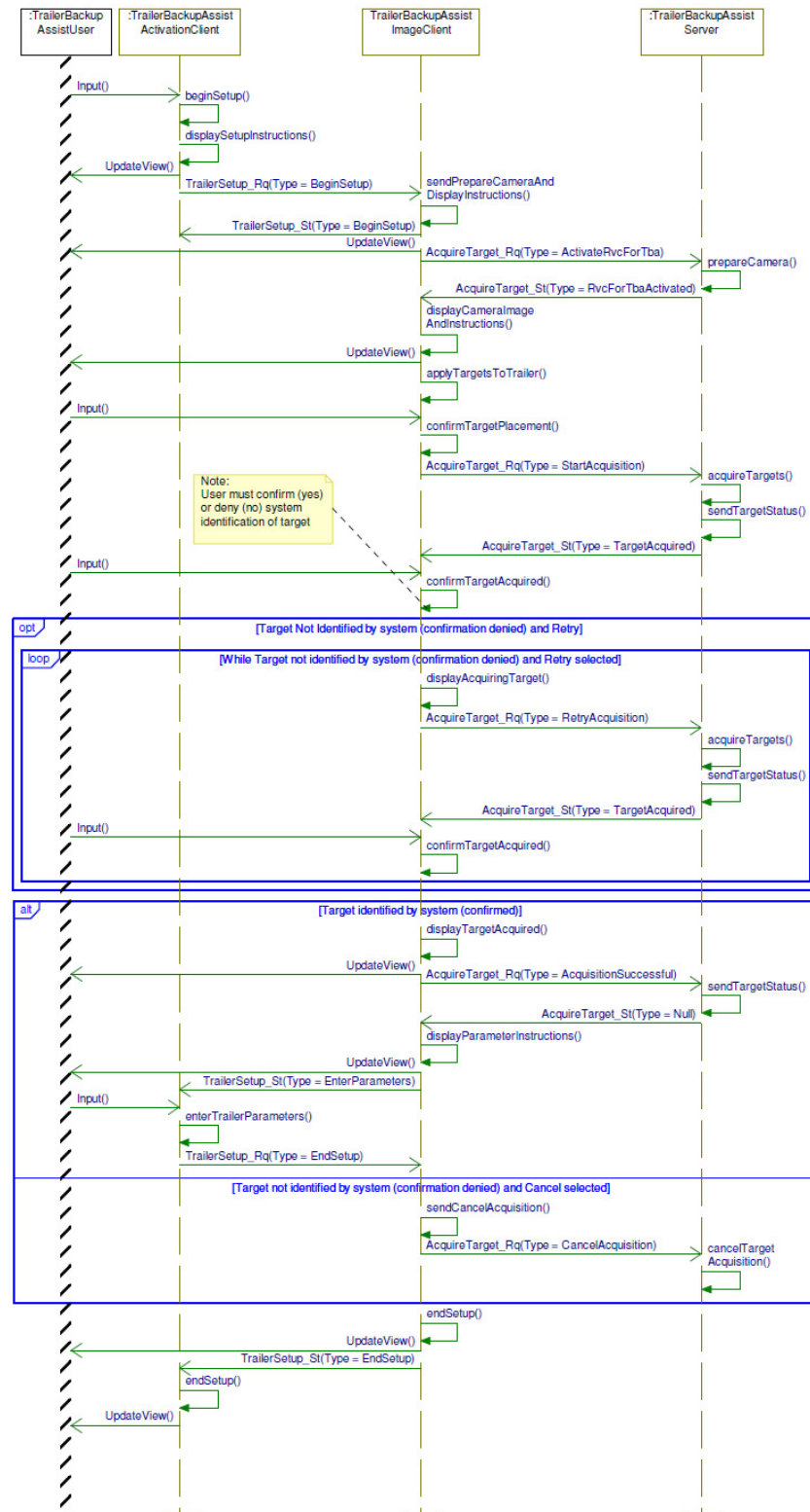
The vehicle's transmission is in 'Park'.

Post-condition

Trailer setup has been completed successfully.



Sequence Diagram





1.4.2 FAS-TBAv1-GFUN-293602-1-Activation and Usage

1.4.2.1 Requirements

FAS-TBAv1-GREQ-280983-3-Trailer Calibration () -

A trailer must be calibrated the first time it is used with the Trailer Backup Assist (TBA) System. The TrailerBackupAssistActivationClient will store a calibration offset value provided by the TrailerBackupAssistServer. This calibration offset value will be published to the CAN bus via the ActiveTrailerParameter_St signal (see [TBAv1-GREQ-280329-1-Trailer Parameter Data](#) and [ActiveTrailerParameter_St](#) for further information).

The first time a trailer is activated for TBA, the TrailerBackupAssistActivationClient will publish 'Null' for the value of the "calibration offset direction". The activation process will dictate a calibration take place. Once calibration is complete the TrailerBackupAssistServer will send a calibration offset direction value other than 'Null' to the TrailerBackupAssistActivationClient along with the Trailer ID. The TrailerBackupAssistActivationClient will then store this calibration offset value with the other trailer parameter data for the identified trailer.

Each subsequent time TBA is activated for the calibrated trailer the TrailerBackupAssistActivationClient will publish this stored calibration offset value to the CAN bus.

FAS-TBAv1-GREQ-297155-1-Active Usage Cancellation (System) -

The TrailerBackupAssistImageClient shall start a 1 second timer upon sending CancelTrailerBackupAssist_Rq = 0x1:Cancel.

Upon expiration of the 1 second timer, the TrailerBackupAssistImageClient shall set: CancelTrailerBackupAssist_Rq = 0x0:Null.

1.4.2.2 Use Cases

1.4.2.2.1 FAS-TBA-GUC-290423-Activate Trailer Backup Assist

Linked Elements

[290424] FAS-TBA-GUC-290424-System Exit without User Confirm

[290425] FAS-TBA-GUC-290425-System Exit with User Confirm

Actors	Vehicle Occupant
Pre-conditions	The trailer setup process has been successfully completed. The trailer calibration process has been completed (a TBA trailer exists).
Scenario Description	The Trailer Backup Assist (TBA) system determines conditions for feature activation are true. The TBA feature becomes available for the driver to use in maneuvering a trailer.
Post-conditions	The driver is instructed to remove hands from the steering wheel, place the vehicle in reverse and use the Trailer Backup Assist knob to steer the trailer in reverse. The Trailer Backup Assist system is active and waiting for the vehicle to reverse.
List of Exception Use Cases	E1 – System Exit without User Confirm E2 – System Exit with User Confirm
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.2.2.2 FAS-TBA-GUC-290424-System Exit without User Confirm

Linked Elements

[290423] FAS-TBA-GUC-290423-Activate Trailer Backup Assist

Actors	Vehicle Occupant
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Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The system determines one or more conditions are true that require the system to deactivate. The system deactivates as indicated by the vehicle network interface and the HMI screens return to the state previous to activating TBA.
Post-conditions	The TBA system is deactivated without HMI confirmation.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.2.2.3 FAS-TBA-GUC-290425-System Exit with User Confirm

Linked Elements

[290423] FAS-TBA-GUC-290423-Activate Trailer Backup Assist

Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The system determines one or more conditions are true that require the system to deactivate. The system notifies the user via vehicle network interface that deactivation is occurring. The user confirms the deactivation and takes control of the vehicle steering-wheel.
Post-conditions	The TBA system is deactivated. The driver is notified that deactivation is occurring.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.2.2.4 FAS-TBA-GUC-290426-Activate Trailer Backup Assist with Calibration

Linked Elements

Actors	Vehicle Occupant
Pre-conditions	The trailer calibration process has not been completed.
Scenario Description	The Trailer Backup Assist (TBA) system determines conditions for feature activation are true. The TBA system determines if calibration is required via vehicle network interface signal indication. When calibration is necessary, the HMI provides instruction to the user for calibrating the system prior to activation for use in maneuvering an active trailer.
Post-conditions	The driver is instructed to remove hands from the steering wheel, place the vehicle in reverse and use the Trailer Backup Assist knob to steer the trailer in reverse. The Trailer Backup Assist system is active and waiting for the vehicle to reverse.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

**1.4.2.2.5 FAS-TBA-GUC-290427-Follow Trailer Backup Assist Instructions****Linked Elements**

[290428] FAS-TBA-GUC-290428-User Cancellation via Image Client

[290429] FAS-TBA-GUC-290429-User Cancellation via Activation Client

Actors	Vehicle Occupant
Pre-conditions	Trailer Backup Assist system has been activated.
Scenario Description	The Trailer Backup Assist (TBA) feature is active and the driver is maneuvering a trailer and following instructions provided by the TBA system. Maneuvering instructions are defined in the latest version of the TBA_HmiStatus_Coding document.
Post-conditions	The trailer is maneuvered to the driver's desired location. The user confirms maneuvers complete to exit.
List of Exception Use Cases	E1 – User Cancellation via Image Client E2 – User Cancellation via Activation Client
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.2.2.6 FAS-TBA-GUC-290428-User Cancellation via Image Client**Linked Elements**

[290427] FAS-TBA-GUC-290427-Follow Trailer Backup Assist Instructions

Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The driver selects 'cancel' from the camera image screen. The driver is notified of the cancellation. The system deactivates, the driver confirms cancellation via the instrument cluster interface (or timeout occurs), and the vehicle display screens revert to the state previous to TBA activation.
Post-conditions	The TBA system is deactivated. The driver is notified of the cancellation.
List of Exception Use Cases	NA
Interfaces	G-HMI Instrument Cluster Interface Vehicle System Interface

1.4.2.2.7 FAS-TBA-GUC-290429-User Cancellation via Activation Client**Linked Elements**

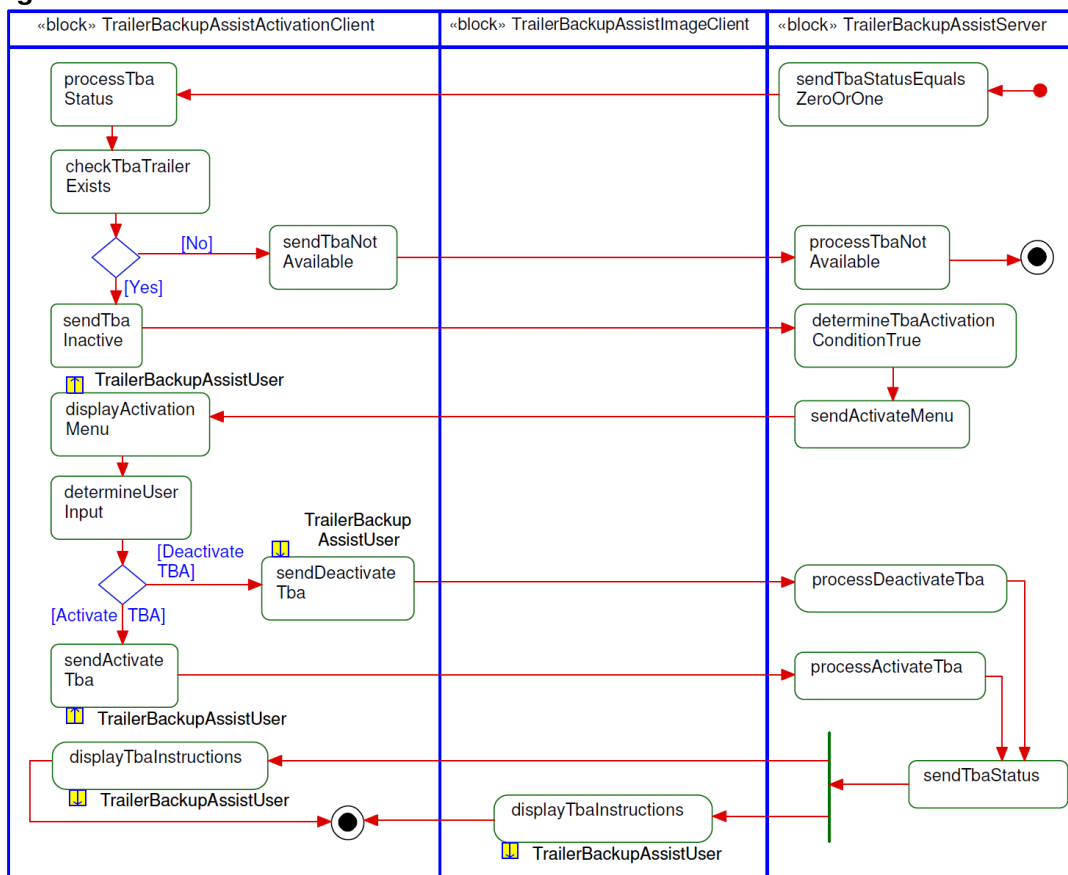
[290427] FAS-TBA-GUC-290427-Follow Trailer Backup Assist Instructions

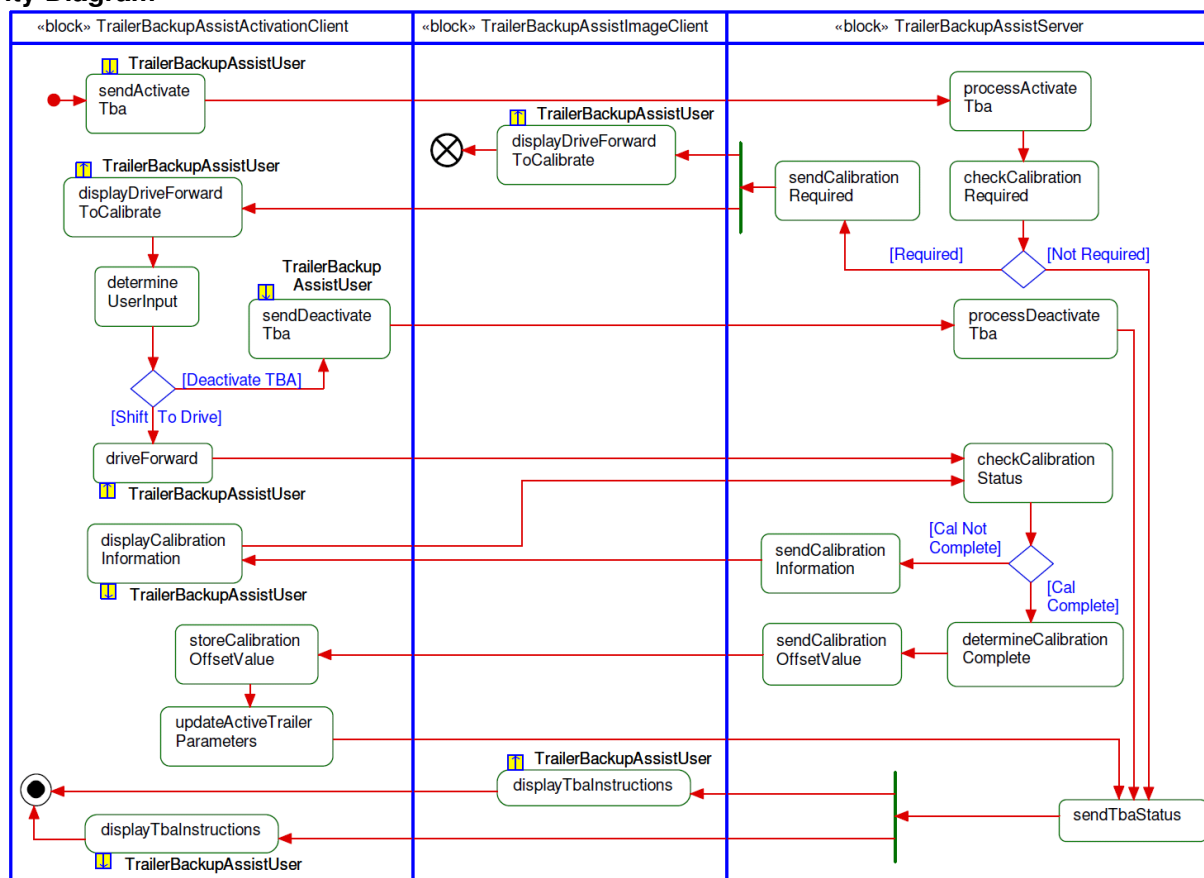
Actors	Vehicle Occupant
Pre-conditions	Same as Normal Usage Use Case
Scenario Description	The driver selects 'cancel' from the instrument cluster interface. The system deactivates and the vehicle display screens revert to the state previous to TBA activation.
Post-conditions	The TBA system is deactivated.
List of Exception Use Cases	NA
Interfaces	G-HMI

Instrument Cluster Interface
Vehicle System Interface

1.4.2.3 White Box View

1.4.2.3.1 Activity Diagrams

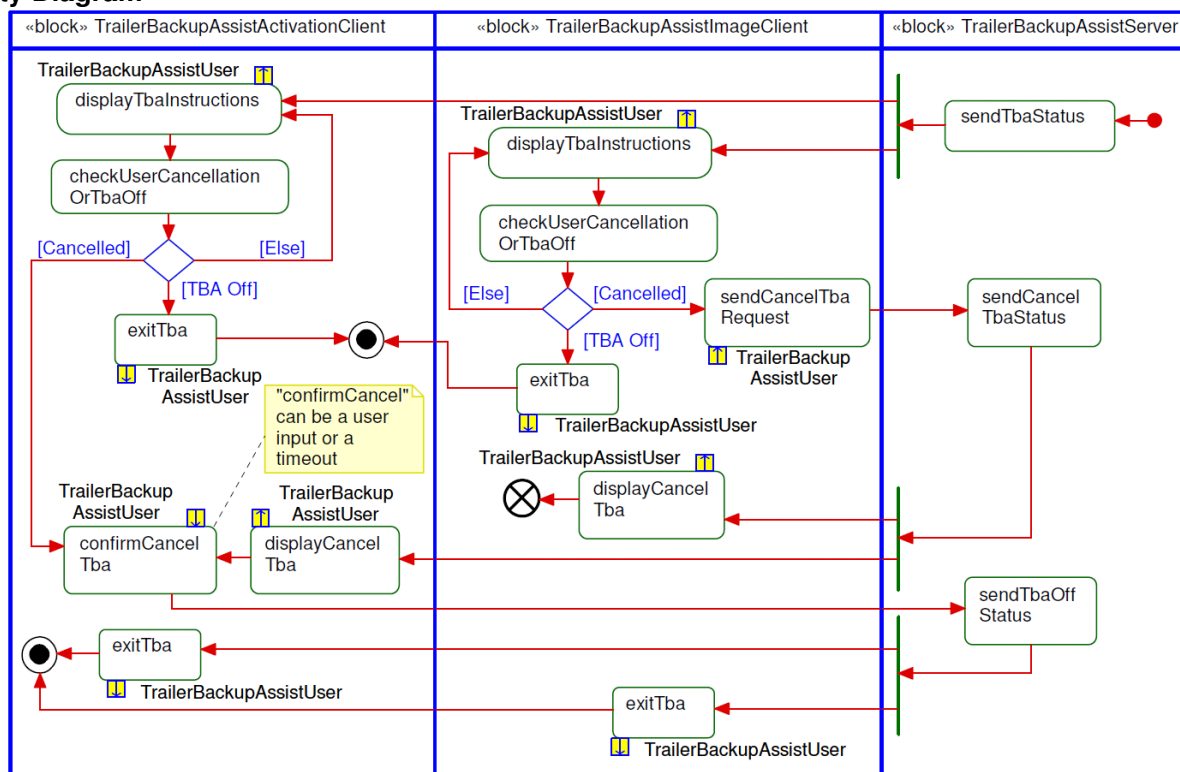
FAS-TBAv1-GAD-280751-3-Trailer Backup Assist ActivationLinked Elements**Activity Diagram****FAS-TBAv1-GAD-287306-1-Trailer Backup Assist Activation with Calibration**Linked Elements



Linked Elements



Activity Diagram



1.4.2.3.2 Sequence Diagrams

FAS-TBAv1-GSD-280776-3-Activate TBA

Linked Elements

[278223-2] FAS-TBAv1-GUC-278223-2-Activate Trailer Backup Assist
[280751-3] FAS-TBAv1-GAD-280751-3-Trailer Backup Assist Activation

Scenarios

Normal Usage

The Trailer Backup Assist (TBA) system determines conditions for feature activation are true. The TBA feature becomes available for the driver to use in maneuvering a trailer.

Constraints

Pre-condition

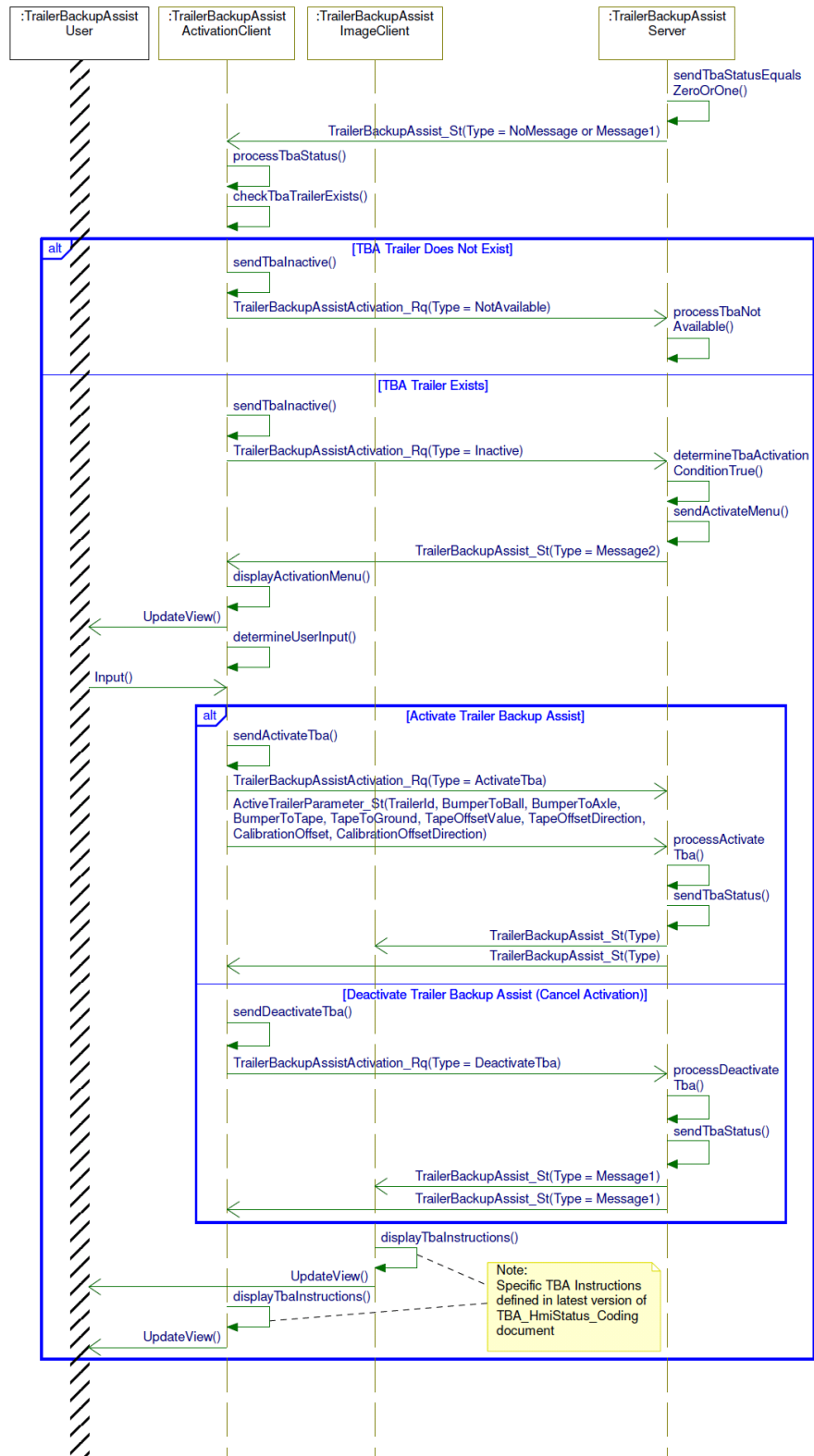
The system determines that a TBA trailer exists (The trailer setup process has been successfully completed).

Post-condition

The Trailer Backup Assist feature is activated.



Sequence Diagram



**FAS-TBAv1-GSD-280962-3-Activate TBA with Calibration****Linked Elements**

[66252-1] IFS-MMCAN-GREQ-66252-1-Sending of Request and Response
[278223-2] FAS-TBAv1-GUC-278223-2-Activate Trailer Backup Assist
[280983-3] FAS-TBAv1-GREQ-280983-3-Trailer Calibration
[287306-1] FAS-TBAv1-GAD-287306-1-Trailer Backup Assist Activation with Calibration

Scenarios**Normal Usage**

The Trailer Backup Assist (TBA) system determines conditions for feature activation are true. The TBA system determines if calibration is required and if necessary, provides instruction to the user for calibrating the system prior to activation for use in maneuvering an active trailer.

Constraints**Pre-condition**

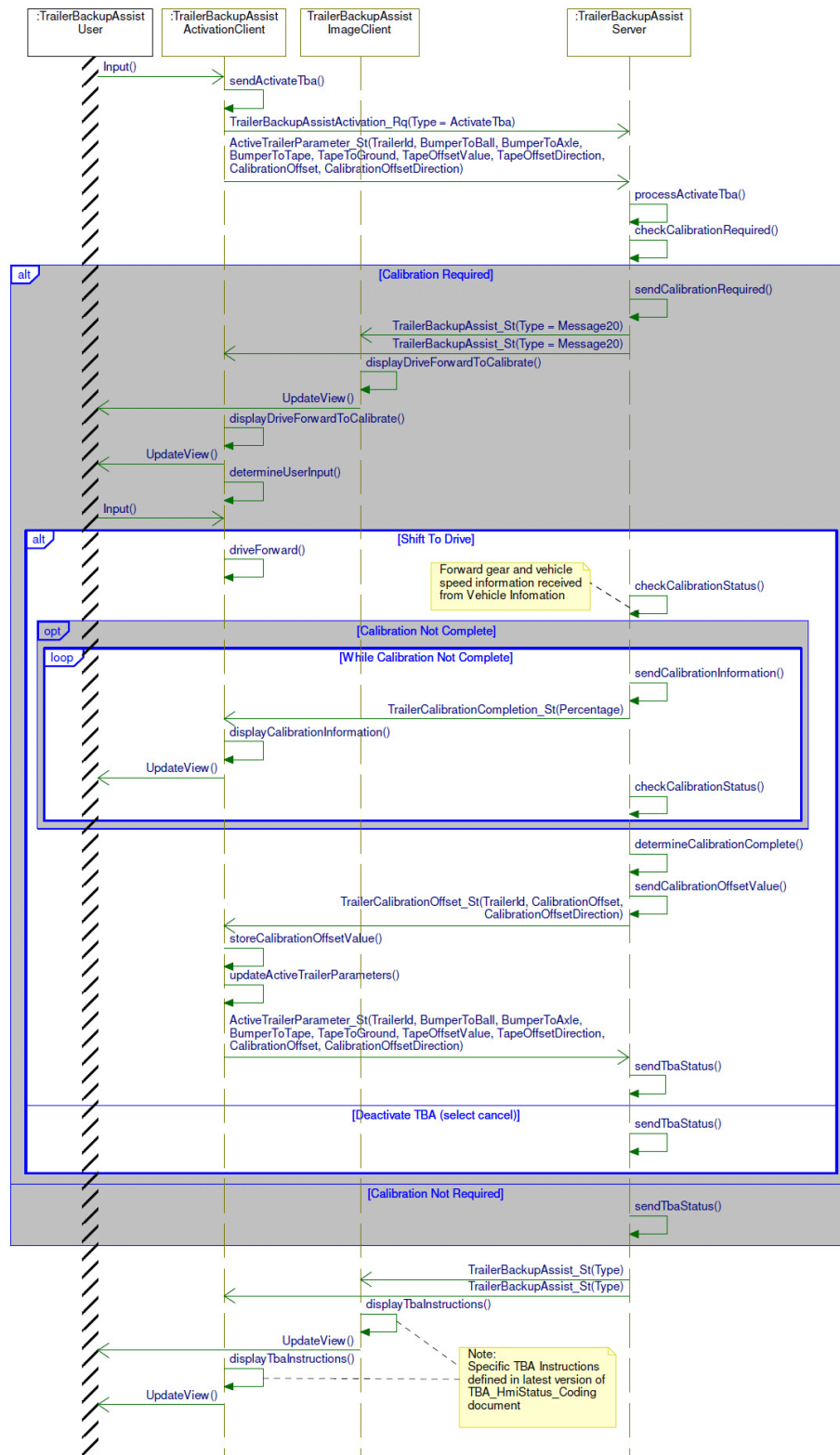
The system determines that a TBA trailer exists (The trailer setup process has been successfully completed).

Post-condition

The Trailer Backup Assist feature is activated and calibrated.



Sequence Diagram



FAS-TBAv1-GSD-287310-1-Follow TBA Instructions with Activation Client Cancellation Exception

Linked Elements

FILE:TRAILER BACKUP ASSIST IMAGE CLIENT
APIM SPSS VER1_0 MAY 31 2013FORD MOTOR COMPANY CONFIDENTIAL
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[287308-1] FAS-TBAv1-GAD-287308-1-Follow Trailer Backup Assist Instructions

[287350-1] FAS-TBAv1-GUC-287350-1-Follow Trailer Backup Assist Instructions

Scenarios

Normal Usage

The Trailer Backup Assist (TBA) feature is active and the driver is maneuvering a trailer and following instructions provided by the TBA system.

E1-Trailer Backup Assist feature is cancelled by user from Activation Client

The Trailer Backup Assist (TBA) feature is active and the driver is maneuvering a trailer and following instructions provided by the TBA system. The user chooses to cancel use of the TBA system via HMI provided by the TrailerBackupAssistActivationClient.

Constraints

Pre-condition

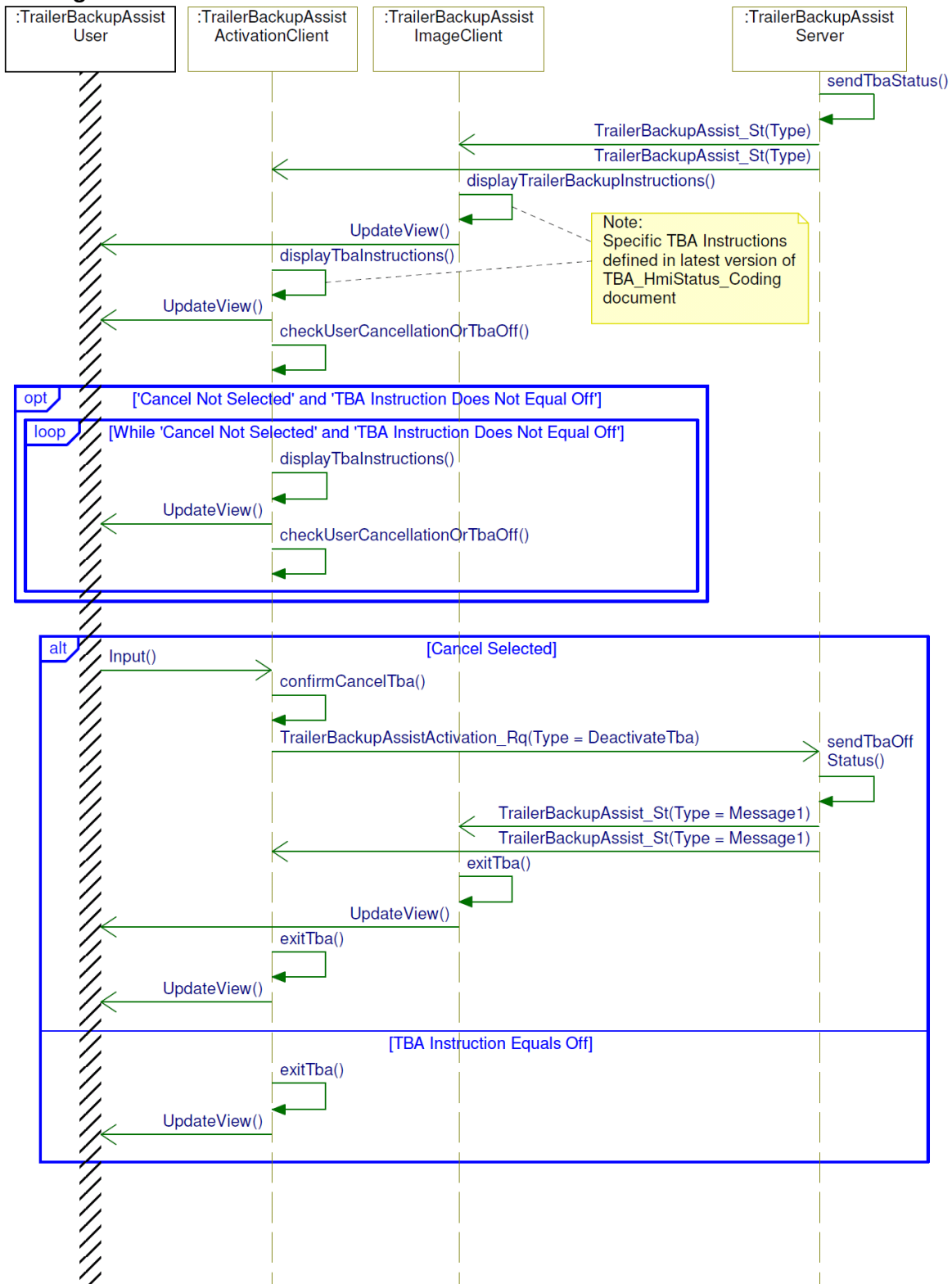
The Trailer Backup Assist feature is active.

Post-condition

The Trailer Backup Assist feature is active and in use by the driver.



Sequence Diagram



FAS-TBAv1-GSD-287318-1-Follow TBA Instructions with Image Client Cancellation Exception

Linked Elements

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[287308-1] FAS-TBAv1-GAD-287308-1-Follow Trailer Backup Assist Instructions

[287350-1] FAS-TBAv1-GUC-287350-1-Follow Trailer Backup Assist Instructions

Scenarios

Normal Usage

The Trailer Backup Assist (TBA) feature is active and the driver is maneuvering a trailer and following instructions provided by the TBA system.

E1-Trailer Backup Assist feature is cancelled by user from Image Client

The Trailer Backup Assist (TBA) feature is active and the driver is maneuvering a trailer and following instructions provided by the TBA system. The user chooses to cancel use of the TBA system via HMI provided by the TrailerBackupAssistImageClient.

Constraints

Pre-condition

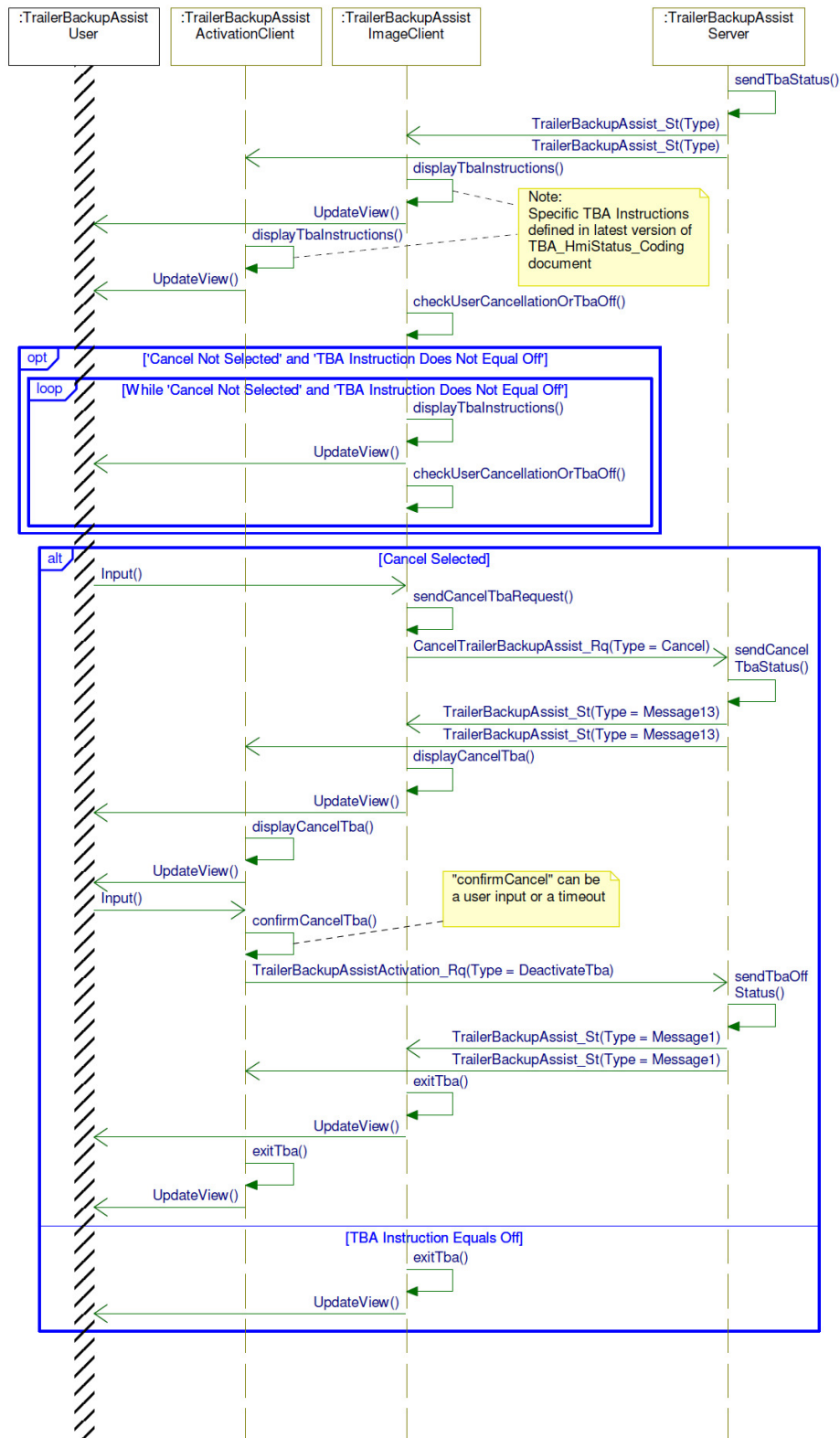
The Trailer Backup Assist feature is active.

Post-condition

The Trailer Backup Assist feature is active and in use by the driver.



Sequence Diagram





1.4.3 FAS-TBAv1-GFUN-293608-1-Remote Wireless Camera Usage

1.4.3.1 Requirements

FAS-TBAv1-GREQ-281500-1-Remote Wireless Camera Connection () -

The TrailerBackupAssistServer shall determine if the Remote Wireless Camera (RWC) is connected to the vehicle system and update the connection status on the CAN bus accordingly.

FAS-TBAv1-GREQ-281557-2-Camera Image Status Update () -

When the Remote Wireless Camera (RWC) is connected to the system, the TrailerBackupAssistServer determines which image (Vehicle Camera or Remote Wireless Camera) is being output to the TrailerBackupAssistImageClient. The TrailerBackupAssistServer shall transmit the Feature_St signal on the CAN bus with appropriate feature ID and configuration information to notify which image is currently being output.

1.4.3.2 Use Cases

1.4.3.2.1 FAS-TBA-GUC-290430-Select Alternate Camera View

Linked Elements

Actors	Vehicle Occupant
Pre-conditions	Trailer Backup Assist system has been activated. Remote wireless camera is connected to the system as indicated by the vehicle network interface. The RWC image is not currently being displayed.
Scenario Description	The driver selects to view the Remote Wireless Camera (RWC) image via hard switch interface.
Post-conditions	The Remote Wireless Camera image is shown on the vehicle display screen.
List of Exception Use Cases	NA
Interfaces	G-HMI Hard Switch Interface Instrument Cluster Interface Vehicle System Interface

1.4.3.2.2 FAS-TBA-GUC-290431-Select Vehicle Camera View

Linked Elements

Actors	Vehicle Occupant
Pre-conditions	Trailer Backup Assist system has been activated. Remote wireless camera is connected to the system as indicated by the vehicle network interface. The RWC image is currently being displayed.
Scenario Description	The driver selects to view the vehicle Camera image via hard switch interface.
Post-conditions	The Vehicle Camera image is shown on the vehicle display screen.
List of Exception Use Cases	NA
Interfaces	G-HMI Hard Switch Interface Instrument Cluster Interface Vehicle System Interface



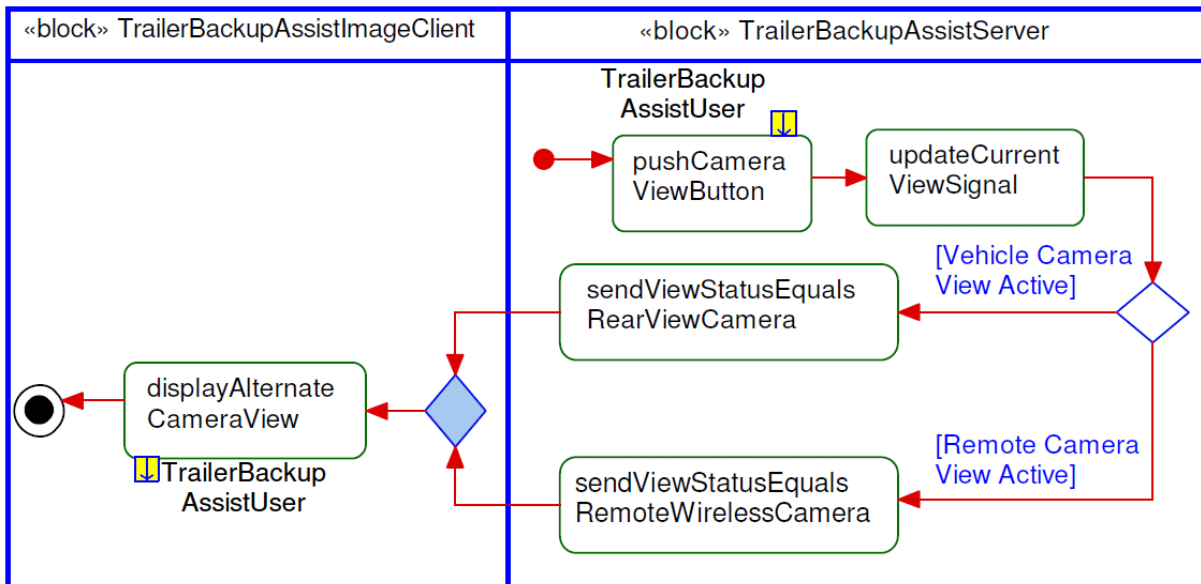
1.4.3.3 White Box View

1.4.3.3.1 Activity Diagrams

FAS-TBAv1-GAD-282592-2-Select Alternate Camera View

Linked Elements

Activity Diagram



1.4.3.3.2 Sequence Diagrams

FAS-TBAv1-GSD-282046-2-Select Alternate Camera View

Linked Elements

[66252-1] IFS-MMCAN-GREQ-66252-1-Sending of Request and Response
[281492-2] FAS-TBAv1-GUC-281492-2-Select Alternate Camera View
[282592-2] FAS-TBAv1-GAD-282592-2-Select Alternate Camera View

Scenarios

Normal Usage

During active use of the Trailer Backup Assist feature, the driver selects an alternate camera view (Vehicle Camera or Remote Camera).

Constraints

Pre-condition

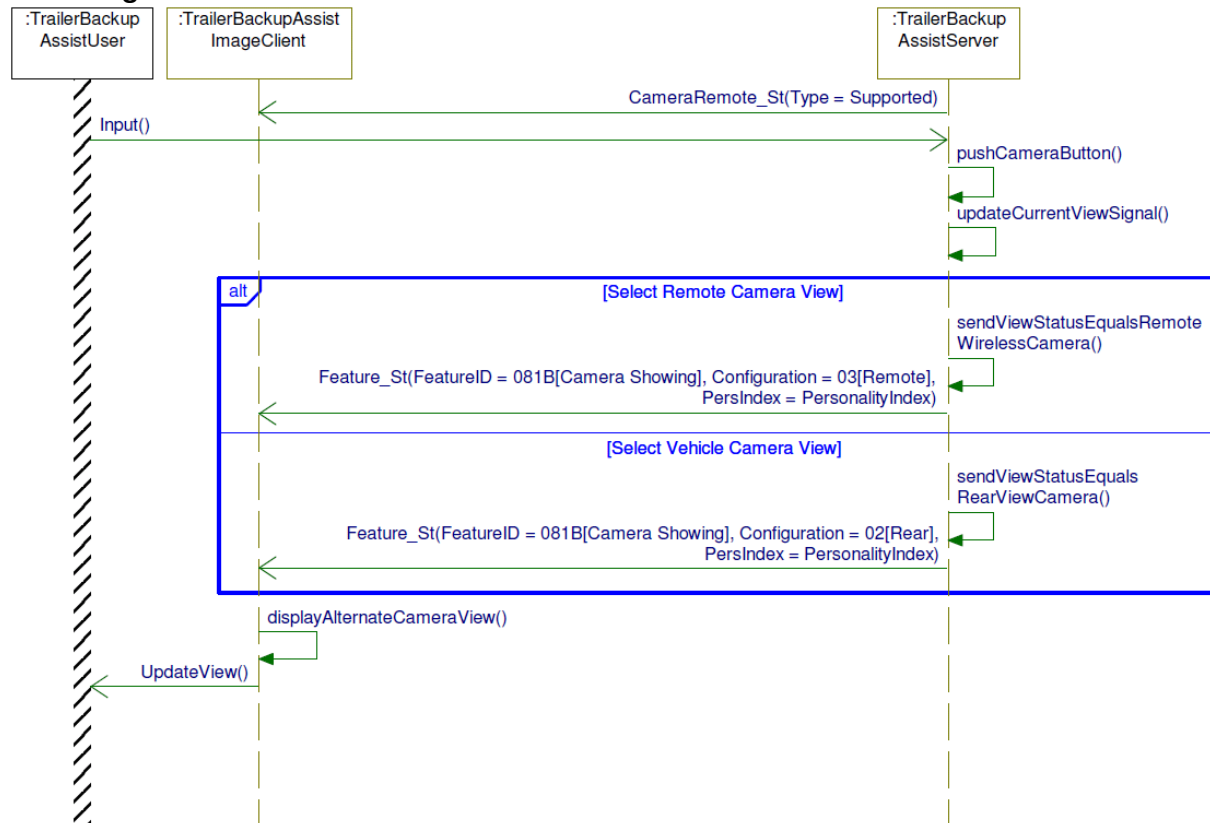
The Trailer Backup Assist feature is active.

Post-condition

Alternate camera view is displayed.



Sequence Diagram





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Subsystem Part Specific Specification

Engineering Specification

1.5 Appendix: Reference Documents

Reference #	Document Title
1	TBA_HmiStatus_Coding
2	
3	
4	
5	