



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature – Frunk Softswitch
Interface Client v2

Infotainment Subsystem Part Specific
Specification (SPSS)

Version 1.0

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FORD CONFIDENTIAL



Revision History

Date	Ver	Notes	
July 15, 2020	1.0	Initial Release	



Table of Contents

REVISION HISTORY	2
1 OVERVIEW	4
1.1 Terminology and Abbreviations	4
2 ARCHITECTURAL DESIGN.....	5
2.1 FKSSv2-CLD-REQ-372050/A-Frunk Softswitch Interface Client.....	5
2.2 FKSS-CLD-REQ-323814/B-Frunk Softswitch Server1	5
2.3 FKSSv2-CLD-REQ-372051/A-Frunk Softswitch Server2	5
2.4 Physical Mapping of Classes	5
2.5 FKSSInterfaceClient Interface.....	5
2.5.1 FKSSv2-IIR-REQ-372052/A-FKSSInterfaceClient_Tx.....	5
2.5.2 FKSSv2-IIR-REQ-372053/A-FKSSInterfaceClient_Rx	6
3 GENERAL REQUIREMENTS	8
3.1 FKSS-REQ-372054/A-Powermode Conditions.....	8
3.2 FKSS-REQ-372055/A-Feature Configuration	8
3.3 FKSS-REQ-372067/A-Speed Restriction Configuration	8
4 FUNCTIONAL DEFINITION	9
4.1 FKSS-FUN-REQ-372056/A-Power Frunk Softswitch	9
4.1.1 Use Cases	9
4.1.2 Requirements	10
4.1.3 White Box View	12
5 APPENDIX: REFERENCE DOCUMENTS.....	14



1 Overview

The Frunk Softswitch feature allows a customer to:

- request an open/close/pause if the Frunk is Automatic/Powered
- view the ajar status of the Frunk

This second variant (v2) of the Frunk Softswitch SPSS is applicable to those programs whose release module does not support feature precondition evaluation and the accompanying restriction signal for use by the HMI (ex. P702 BEV). For this variant, the display module is required to evaluate all preconditions internally to enable/disable this feature's HMI.

1.1 Terminology and Abbreviations

Abbreviation	Description
CAN	Controller Area Network
DID	Data Identifier
FHCM	Front Hatch Control Module
BCM	Body Control Module

Term	Description
Frunk	Front trunk



2 Architectural Design

2.1 FKSSv2-CLD-REQ-372050/A-Frunk Softswitch Interface Client

The Frunk Softswitch Interface Client (FKSSInterfaceClient) is responsible for the tasks listed below:

- Providing a user interface for the Frunk Softswitch feature
- Transmitting user input to FKSSServer1
- Managing feature restricted status
- Displaying active feature state on user interface

Please review the implementation guide/block diagram to locate the FKSSInterfaceClient class.

2.2 FKSS-CLD-REQ-323814/B-Frunk Softswitch Server1

The Frunk Softswitch Server1 (FKSSServer1) is responsible for the tasks listed below:

- Receiving user request from FKSSInterfaceClient
- Transmitting request to FKSSServer2

Please review the implementation guide/block diagram to locate the FKSSServer1 class.

2.3 FKSSv2-CLD-REQ-372051/A-Frunk Softswitch Server2

The Frunk Softswitch Server2 (FKSSServer2) is responsible for the tasks listed below:

- Receiving release request from FKSSServer1
- Releasing the Frunk

Please review the implementation guide/block diagram to locate the FKSSServer2 class.

2.4 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Frunk Softswitch feature can be mapped into physical modules. This mapping is an example only and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
FKSSInterfaceClient	SYNC
FKSSServer1	BCM
FKSSServer2	FHCM

2.5 FKSSInterfaceClient Interface

2.5.1 FKSSv2-IIR-REQ-372052/A-FKSSInterfaceClient_Tx

2.5.1.1 MD-REQ-328279/A-FrunkReleaseCounter_Rq

Message Type: Request

This signal is used to request a release of the Frunk. This signal increments by 1 everytime it is sent to request a release.

Name	Literals	Value	Description
Type	-	-	Unit: SED Resolution: 1 Offset: 0
	Initial Value	0x0	Reserved for transmitter reset
	Code Value	0x1 To 0x6	
	Not Used	0x7	

**2.5.2 FKSSv2-IIR-REQ-372053/A-FKSSInterfaceClient_Rx****2.5.2.1 MD-REQ-027149/A-IgnitionStatus_St (TcSE ROIN-225464-1)**

Message Type: Status

Signal used to indicate ignition state.

Name	Literals	Value	Description
Type	-	-	Indicates ignition state
	Unknown	0x0	
	Off	0x1	
	Accessory	0x2	
	Run	0x4	
	Start	0x8	
	Invalid	0xF	

2.5.2.2 MD-REQ-201601/A-Delay_Accy

Message Type: Status

This signal is used indicate whether Delayed Accessory is active or not.

Name	Literals	Value	Description
Type	-	-	Status of delayed accessory
	Off	0x00	
	On	0x01	

2.5.2.3 MD-REQ-014025/A-VehicleSpeed_St (TcSE ROIN-223023-1)

Message Type: Status

Status used to indicate vehicle speed.

Name	Literals	Value	Description
Type	-	-	Indicates vehicle speed. Unit: kph Resolution:0.01 Offset:0
	kph	0x0 to 0xFFFF	

2.5.2.4 MD-REQ-014023/A-GearLvrPos_D_Actl (TcSE ROIN-266648-1)

Message Type: Status

Vehicle status signal for the Gear Lever Position on an automatic transmission vehicle.

Name	Literals	Value	Description
Type	-	-	-
	Park	0x0	



	Reverse	0x1	
	Neutral	0x2	
	Drive	0x3	
	Sport_DriveSport	0x4	
	Low	0x5	
	First	0x6	
	Second	0x7	
	Third	0x8	
	Fourth	0x9	
	Fifth	0xA	
	Sixth	0xB	
	Undefined_Treat_as_Fault	0xC	
	Undefined_Treat_as_Fault1	0xD	
	Unknown_Position	0xE	
	Fault	0xF	

2.5.2.5 MD-REQ-297763/A-HoodStatus

Message Type: Status

This method is indicating the vehicle hood status.

Name	Literals	Value	Description
HoodStatus	-	-	
	Closed	0x0	
	Ajar	0x1	



3 General Requirements

3.1 FKSS-REQ-372054/A-Powermode Conditions

The FKSSInterfaceClient shall only allow the functionality of this feature when:

- IgnitionStatus_St = Run, Start, or Acc and the touch screen display is On, OR
- IgnitionStatus_St = Off and Delay_Accy = On and the touch screen display is On

3.2 FKSS-REQ-372055/A-Feature Configuration

The FKSSInterfaceClient shall have configurable parameters to determine whether the vehicle supports the Frunk Softswitch feature and which specific variant.

- All of the functionality and signals defined in this SPSS shall be supported if the parameters indicate that:
 - The Frunk Softswitch feature is Enabled, AND
 - The Frunk Restricted Determination is Internal
 - None of the functionality defined in this SPSS shall be supported if the parameters indicate that:
 - The Frunk Softswitch feature is Enabled, AND
 - The Frunk Restricted Determination is External
 - (see original Frunk Softswitch SPSS in this case)
- OR
- The Frunk Softswitch feature is Disabled

3.3 FKSS-REQ-372067/A-Speed Restriction Configuration

The FKSSInterfaceClient shall have a configurable parameter to set the vehicle speed threshold by which the Frunk Softswitch menu shall be made available/unavailable. The default shall be 3kph.



4 Functional Definition

4.1 FKSS-FUN-REQ-372056/A-Power Frunk Softswitch

4.1.1 Use Cases

4.1.1.1 *FKSS-UC-REQ-372069/A-User selects Open Power Frunk Softswitch on FKSSInterfaceClient (switch enabled)*

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met FKSSInterfaceClient is ON Frunk Softswitch Button is Enabled Power Frunk is Closed
Scenario Description	The user selects the Frunk softswitch on the FKSSInterfaceClient
Post-conditions	The FKSSServer2 begins to open the Power Frunk FKSSInterfaceClient displays the Frunk as Opened
List of Exception Use Cases	
Interfaces	FKSSInterfaceClient CAN, G-HMI

4.1.1.2 *FKSS-UC-REQ-372070/A-User selects Close Power Frunk Softswitch on FKSSInterfaceClient (switch enabled)*

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met FKSSInterfaceClient is ON Frunk Softswitch Button is Enabled Power Frunk is Open
Scenario Description	The user selects the Frunk softswitch on the FKSSInterfaceClient
Post-conditions	The FKSSServer2 begins to close the Power Frunk FKSSInterfaceClient displays the Frunk as Opened until it fully closes. When closed, the FKSSInterfaceClient displays the Frunk as Closed.
List of Exception Use Cases	
Interfaces	FKSSInterfaceClient CAN, G-HMI

4.1.1.3 *FKSS-UC-REQ-372071/A-User selects Power Frunk Softswitch on FKSSInterfaceClient while Frunk in motion (switch enabled)*

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met FKSSInterfaceClient is ON Frunk Softswitch Button is Enabled Power Frunk is in motion (opening/closing)



Scenario Description	The user selects the Frunk softswitch on the FKSSInterfaceClient
Post-conditions	The FKSSServer2 stops/pauses Power Frunk operation/motion FKSSInterfaceClient displays the Frunk as Opened
List of Exception Use Cases	
Interfaces	FKSSInterfaceClient CAN, G-HMI

4.1.1.4 FKSS-UC-REQ-372072/A-User selects Power Frunk Softswitch on FKSSInterfaceClient (switch disabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met FKSSInterfaceClient is ON Frunk Softswitch Button is Disabled
Scenario Description	The user selects the Frunk softswitch on the FKSSInterfaceClient
Post-conditions	The FKSSInterfaceClient indicates that the operation cannot be performed at this time
List of Exception Use Cases	
Interfaces	FKSSInterfaceClient CAN, G-HMI

4.1.2 Requirements

4.1.2.1 FKSS-REQ-372057/A-Frunk Release - Interface Client Request

When the Frunk Release is selected by the user via HMI, the FKSSInterfaceClient shall increment the event counter FrunkReleaseCounter_Rq by a value of 1.

When FrunkReleaseCounter_Rq reaches a count value of 6, the next increment shall reset the counter to a value of 1. The count value of 0 is reserved, and shall not be used in the increment operation of this counter.

4.1.2.2 Event Counter Requirements

4.1.2.2.1 FKSS-REQ-372058/A-Initial Value

When the FKSSInterfaceClient resets, it shall initialize and publish FrunkReleaseCounter_Rq = 0.

Immediately following a reset, the FKSSInterfaceClient shall monitor for events that will cause FrunkReleaseCounter_Rq to increment.

The FKSSInterfaceClient shall continue to publish 0 until an event causes FrunkReleaseCounter_Rq to increment.

4.1.2.2.2 FKSS-REQ-372059/A-Valid Events

For a count event to be deemed valid, the FKSSInterfaceClient must first detect a "non-button press" before an actual "press." Only then shall the FKSSInterfaceClient increment FrunkReleaseCounter_Rq.

When powering back On from a reset, the FKSSInterfaceClient shall not increment FrunkReleaseCounter_Rq if the first value it reads for the corresponding button is a "pressed" value. This is to avoid any possible "stuck button" error conditions.



Ex. If the interface is a manual switch that is pressed/not pressed, the module shall ensure that the switch is first not pressed, and then when it sees a pressed event, it shall increment the counter.

4.1.2.2.3 FKSS-REQ-372060/A-Voltage Range

The FKSSInterfaceClient shall not increment FrunkReleaseCounter_Rq when voltage is out of range, even if an incrementing event occurs (refer to Ford Next Generation Infotainment Engineering Spec VerX_SYNC4 for voltage requirements).

4.1.2.2.4 FKSS-REQ-372061/A-Bus Wakeup

The FKSSInterfaceClient shall wake CAN whenever FrunkReleaseCounter_Rq has changed.

4.1.2.2.5 FKSS-REQ-372062/A-Bus Sleep Voting

The FKSSInterfaceClient is allowed to vote for CAN Sleep 5 seconds after the last FrunkReleaseCounter_Rq change, independent of the FNOS wakeup strategy.

4.1.2.2.6 FKSS-REQ-372063/A-Value Retention

The FKSSInterfaceClient shall retain the last transmitted value of FrunkReleaseCounter_Rq through sleep/wake cycle.

4.1.2.3 FKSS-REQ-372064/A-Frunk Release - User Input

The FKSSInterfaceClient shall provide a user interface (button/graphic) to allow selection of the Frunk Softswitch release button.

4.1.2.4 FKSS-REQ-372065/A-Frunk Release - User Input Enable/Disable

The FKSSInterfaceClient shall enable/disable (show/hide, grey-out, etc.) the Frunk Softswitch user interface (button/graphic) based on the following:

IgnitionStatus_St	Delay_Accy	VehicleSpeed_St	GearLvrPos_D_Actl	Frunk Softswitch User Interface
OFF	ON	Less than threshold in REQ-372067	D/C	Enabled
RUN, START or ACC	D/C	Less than threshold in REQ-372067	D/C	Enabled
RUN, START or ACC	D/C	Greater than threshold in REQ-372067	D/C	Disabled
RUN, START or ACC	D/C	D/C	Park	Enabled
RUN, START or ACC	D/C	D/C	!= Park	Disabled
!= OFF, RUN, START or ACC	D/C	D/C	D/C	Disabled

*D/C – Don't Care

4.1.2.5 FKSS-REQ-372066/A-Frunk Ajar Status

The FKSSInterfaceClient shall display a graphic indicating the ajar (open/close) status of the Frunk. The graphic shall be shown as such:

- When HoodStatus = "(0x0) Closed" the Frunk shall be shown as Closed

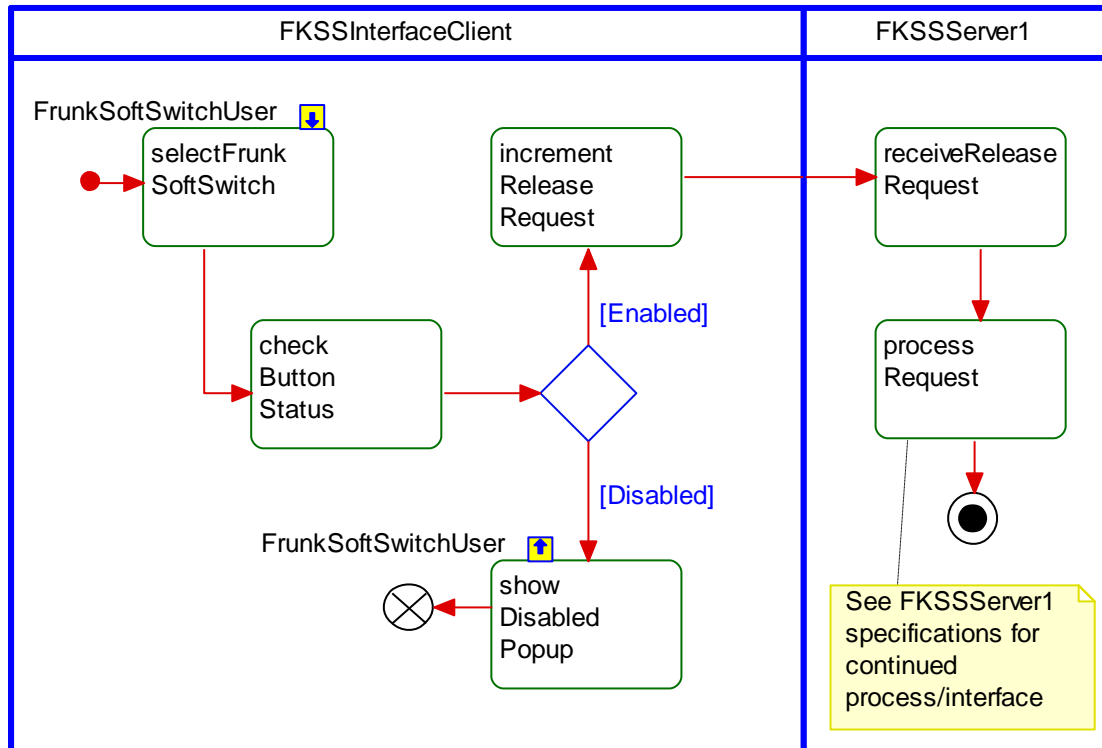


- When HoodStatus = "(0x1) Ajar" the Frunk shall be shown as Opened
 - If HoodStatus is not available on the bus or cannot be read, the Frunk shall be shown as Closed

4.1.3 White Box View

4.1.3.1 Activity Diagrams

4.1.3.1.1 FKSS-ACT-REQ-372074/A-User Selects Power Frunk Softswitch On FKSSInterfaceClient Activity Diagram



4.1.3.2 Sequence Diagrams

4.1.3.2.1 FKSS-SD-REQ-372076/A-User Selects Power Frunk Softswitch On FKSSInterfaceClient

Constraints

Pre-Condition

Powermode Conditions are met
FKSSInterfaceClient is ON
Frunk Softswitch is Enabled
Power Frunk is Closed

Scenarios

Normal Usage

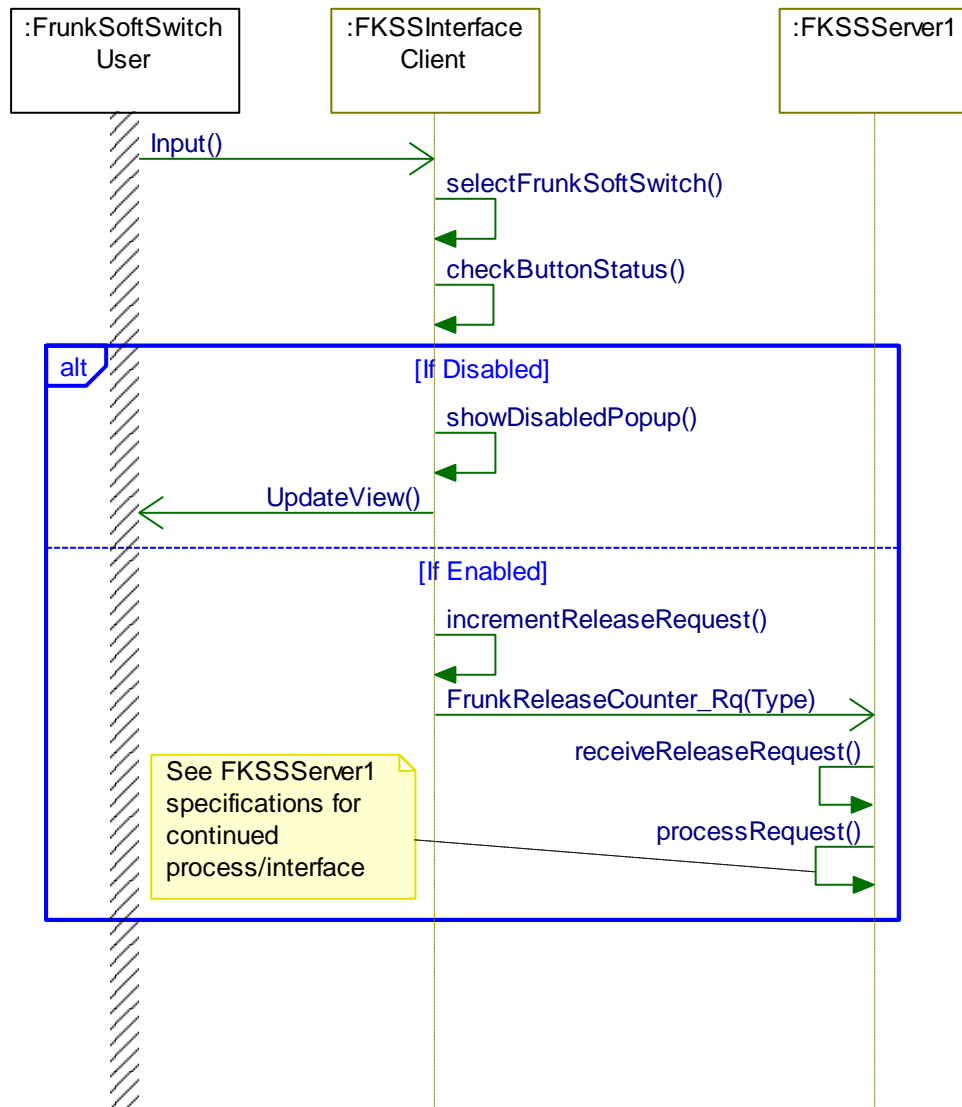
The user selects the Frunk softswitch on the FKSSInterfaceClient

Post-Condition

The FKSSServer2 begins to open the Power Frunk



Sequence Diagram





5 Appendix: Reference Documents

Reference #	Document Title
1	Infotainment Diagnostics Specification APIM Gen 4
2	Ford Next Generation Infotainment Engineering Spec_VerX_SYNC4
3	
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