

**Research & Vehicle Technology**

**“Infotainment Systems Product Development”**

**Feature – Multi Contoured Seats Client V2**

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

Version 1.3

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**Version Date: June 28, 2018**

**FORD CONFIDENTIALF**

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Version** | **Notes** | |
| **December 1, 2016** | **1.0** | **Initial Release** |  |
|  |  |  |  |
| **February 20, 2017** | **1.1** | **Updated Release** |  |
|  | STR-407596/B-Architectural Design | | MBORREL4: Added REQ-250012/A-Multi Contoured Seat Remote Client2 |
| MCSv2-SV-REQ-237612/B-IBD\_MultiContouredSeatSystem | | MBORREL4: Replaced draft IBD with higher level diagram |
| MCS-DOC-417814/B-Physical Mapping of Classes | | MBORREL4: Added MultiContouredSeatRemoteClient2 |
| MCS-CLD-REQ-250012/A-Multi Contoured Seat Remote Client2 | | MBORREL4: New class description for the 5way controller |
| MCS-CLD-REQ-239811/B-Multi Contoured Seat Server | | MBORREL4: Updated to include execution from RemoteClient2 |
| STR-417487/B-Functional Requirements | | MBORREL4: Added REQ-250020, REQ-250536 |
| MCS-SR-REQ-239812/B-Request to display MCS Screen via MultiContouredSeatRemoteClient | | MBORREL4: Updated title to reflect that this is only for Shortcut Key. Updated content for clarity |
| MCS-SR-REQ-250020/A-Request to display MCS Screen via MultiContouredSeatRemoteClient2 | | MBORREL4: New req. to define 5way controller button input |
| MCS-SR-REQ-239444/B-Inactivity of any user input to MultiContoured Seats | | MBORREL4: Updated to convey timer reset on user input and timer initialization on release of input. Updated to include 5way controller signals/behavior |
| MCS-TMR-REQ-239445/B-T\_MCS\_Input | | MBORREL4: Updated to include 5way controller |
| MCS-TMR-REQ-239813/B-T\_MCS\_Screen | | MBORREL4: Updated to include 5way controller |
| MCS-SR-REQ-250536/A-Selecting a Massage Pattern from the touch screen | | MBORREL4: New req. to capture selecting a massage pattern from HMI |
| MCSv2-IIR-REQ-237614/B-MultiContouredSeatsClient\_Rx | | MBORREL4: Added REQ-021447 & REQ-021456 and updated table |
| MCS-ACT-REQ-237767/B-Activate/Deactivate Multi Contour Seat Feature Screen HMI | | MBORREL4: Updated diagram to correctly reflect user input request (no functional changes, clarification only) |
| MCS-SD-REQ-237620/B-Activate/Deactivate Multi Contour Seat Feature Screen HMI | | MBORREL4: Updated diagram to correctly reflect user input request (no functional changes, clarification only) |
| STR-407602/B-Use Cases | | MBORREL4: Added REQ-250097, REQ-021354, REQ-021356 |
| MCS-UC-REQ-250097/A-Select Front Seat Massage Pattern from Seat | | MBORREL4: New usecase for 5way controller |
| MCS-UC-REQ-021354/B-Adjust Front Seat Massage Intensity from Seat (TcSE ROIN-291761) | | MBORREL4: Updated precondition to include IGN = ACC |
| MCS-UC-REQ-021356/B-Exiting Front Massage and transitioning to Adjust bladder pressure via Seat (TcSE ROIN-292491) | | MBORREL4: Updated precondition to include IGN = ACC |
| STR-407603/B-White Box View | | MBORREL4: Added REQ-250099, REQ-250100, REQ-250101, REQ-250102, REQ-250103 |
| MCS-ACT-REQ-237796/B-Select Massage Pattern from Touch Screen | | MBORREL4: Updated name to include "from Touch Screen", added a final activity point |
| MCS-ACT-REQ-250099/A-Select Massage Pattern from Seat | | MBORREL4: New act. diag. for 5way controller |
| MCS-ACT-REQ-237797/B-Set Massage Intensity from Touch Screen | | MBORREL4: Updated name to include "from Touch Screen", added note, and changed "InitiateMassageIntensity" action to "InitiateMassageIntensityRequest" action (Clarification only, no functional change) |
| MCS-ACT-REQ-250100/A-Set Massage Intensity from Seat | | MBORREL4: New act. diag. for 5way controller |
| MCS-SD-REQ-239326/B-Turn ON Massage Mode from Touch Screen | | MBORREL4: Changed "InitiateMassageIntensity()" to "InitiateMassageIntensityRequest()" (Clarification only, no functional change) |
| MCS-SD-REQ-250101/A-Turn ON Massage Mode from Seat | | MBORREL4: New seq. diag. for 5way controller |
| MCS-SD-REQ-250102/A-Select Massage Pattern from Seat | | MBORREL4: New seq. diag. for 5way controller |
| MCS-SD-REQ-237799/B-Set Massage Intensity to High from Touch Screen | | MBORREL4: Changed "InitiateMassageIntensity()" to "InitiateMassageIntensityRequest()" (Clarification only, no functional change) |
| MCS-SD-REQ-237800/B-Set Massage Intensity to Medium from Touch Screen | | MBORREL4: Changed "InitiateMassageIntensity()" to "InitiateMassageIntensityRequest()" (Clarification only, no functional change) |
| MCS-SD-REQ-237801/B-Set Massage Intensity to Low from Touch Screen | | MBORREL4: Changed "InitiateMassageIntensity()" to "InitiateMassageIntensityRequest()" (Clarification only, no functional change) |
| MCS-SD-REQ-250103/A-Set Massage Intensity from Seat | | MBORREL4: New seq. diag. for 5way controller |
| STR-407600/B-Use Cases | | MBORREL4: Added UC-REQ-021336 |
| MCS-UC-REQ-021336/B-Adjust Front Seat Bladder Pressure from Seat (TcSE ROIN-291759) | | MBORREL4: Remove IGN=Run precondition and IGN !=Run exception usecase |
| STR-407601/B-White Box View | | MBORREL4: Added REQ-250048, REQ-250049, REQ-021351 |
| MCS-ACT-REQ-250048/A-Set Lumbar - Seat Initiated | | MBORREL4: New act. diag. for 5way controller |
| MCS-SD-REQ-250049/A-Set Lumbar Bladder at Seat | | MBORREL4: New seq. diag. for 5way controller |
| STR-407604/B-Use Cases | | MBORREL4: Added REQ-021369 |
| MCS-UC-REQ-021369/B-Adjust Front Seat Bolster Bladder from Seat (TcSE ROIN-293589) | | MBORREL4: Remove IGN=Run precondition |
| STR-407605/B-White Box View | | MBORREL4: Added REQ-250054, REQ-250055, REQ-250092, REQ-021380 |
| MCS-ACT-REQ-250054/A-Set Bolster - Seat Initiated | | MBORREL4: New act. diag. for 5way controller |
| MCS-SD-REQ-250055/A-Initiate Bolster Adjust at Seat - No pressure updates | | MBORREL4: New seq. diag. for 5way controller |
| MCS-SD-REQ-250092/A-Set Bolster at Seat | | MBORREL4: New seq. diag. for 5way controller |
|  |  |  |  |
| **March 8, 2017** | **1.2** | **Updated Release** |  |
|  | MCS-SR-REQ-239787/B-Powermode Conditions | | cwu3: Deleted ACC from pre-conditions. Updated Seat Adjust and Massage Mode to have the same powermode conditions |
| MCS-TMR-REQ-239813/C-T\_MCS\_Screen | | cwu3: Changed default value from 8 to 12. Added requirement for default value not less than the time needed by Multi Contoured Seat Server to rebuild or adjust pressures. |
| MCSv2-IIR-REQ-237614/C-MultiContouredSeatsClient\_Rx | | cwu3: Added MD-REQ-199809/A- IgnitionStatus\_St |
| MCS-UC-REQ-237633/B-Open Seat Adjust Screen from Shortcut Key | | cwu3: Added Note to clarify when Ignition is not in Run. No content changed. |
| MCS-UC-REQ-237634/B-Exit Seat Adjust Screen from Shortcut Key | | cwu3: Added Note for time out timer reference |
| MCS-UC-REQ-237772/B-Select Front Seat Massage Pattern from HMI | | cwu3: Deleted ACC from Pre-conditions |
| MCS-UC-REQ-250097/B-Select Front Seat Massage Pattern from Seat | | cwu3: Deleted ACC from Pre-conditions |
| MCS-UC-REQ-021353/C-Adjust Front Seat Massage Intensity from HMI (TcSE ROIN-291760) | | cwu3: Deleted ACC from Pre-conditions |
| MCS-UC-REQ-021354/C-Adjust Front Seat Massage Intensity from Seat (TcSE ROIN-291761) | | cwu3: Deleted ACC from Pre-conditions |
| MCS-UC-REQ-021355/C-Exiting Front Massage and transitioning to Adjust bladder pressure via HMI (TcSE ROIN-292490) | | cwu3: Deleted ACC from Pre-conditions |
| MCS-UC-REQ-021356/C-Exiting Front Massage and transitioning to Adjust bladder pressure via Seat (TcSE ROIN-292491) | | cwu3: Deleted ACC from Pre-Conditions |
| MCS-UC-REQ-240862/B-Adjust Front Seat Bladder Pressure from HMI | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-UC-REQ-021336/C-Adjust Front Seat Bladder Pressure from Seat (TcSE ROIN-291759) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021337/B-Select Lumbar Middle Bladder at Touch Screen - No pressure updates (TcSE ROIN-200149-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021338/B-Select Lumbar Upper Bladder at Touch Screen - No pressure updates (TcSE ROIN-200156-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021340/B-Select Lumbar Lower Bladder at Touch Screen - No pressure updates (TcSE ROIN-200170-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021341/C-Decrease Lumbar Lower Bladder from Touch Screen (TcSE ROIN-200773-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021342/C-Decrease Lumbar Middle Bladder from Touch Screen (TcSE ROIN-200780-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021343/C-Decrease Lumbar Upper Bladder from Touch Screen (TcSE ROIN-200787-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021344/C-Increase Lumbar Lower Bladder from Touch Screen (TcSE ROIN-200794-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021345/C-Increase Lumbar Middle Bladder from Touch Screen (TcSE ROIN-200801-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021346/C-Increase Lumbar Upper Bladder from Touch Screen (TcSE ROIN-200808-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-250049/B-Set Lumbar Bladder at Seat | | cwu3: Revised to add Ignition is Run to Pre-conditions and move Pre-conditions from Scenarios to Constraints |
| MCS-UC-REQ-240863/B-Adjust Front Seat Bolster Bladder from HMI | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-UC-REQ-021369/C-Adjust Front Seat Bolster Bladder from Seat (TcSE ROIN-293589) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021375/C-Increase Bolster Upper Bladders from Touch Screen (TcSE ROIN-199118-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021371/C-Increase Bolster Lower Bladders from Touch Screen (TcSE ROIN-199090-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021372/C-Decrease Bolster Upper Bladders from Touch Screen (TcSE ROIN-199097-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021373/C-Decrease Bolster Lower Bladders from Touch Screen (TcSE ROIN-199104-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021376/B-Select Bolster Upper Bladders at Touch Screen - No pressure updates (TcSE ROIN-200177-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-021378/B-Select Bolster Lower Bladders at Touch Screen - No pressure updates (TcSE ROIN-200815-1) | | cwu3: Added Ignition is Run to Pre-conditions |
| MCS-SD-REQ-250055/B-Initiate Bolster Adjust at Seat - No pressure updates | | cwu3: Revised to add ignition Run to Pre-conditions and move Post-conditions from Scenarios to Constraints |
| MCS-SD-REQ-250092/B-Set Bolster at Seat | | cwu3:Revised to add ignition Run to Pre-conditions and move Post-conditions from Scenarios to Constraints |
| STR-407606/B-Appendix: Reference Documents | | cwu3: Added HMI specification H74a |
|  |  |  |  |
| **June 28, 2018** | **1.3** | **Updated Release** | **First release as a Common SPSS** |
|  | MCS-DOC-417814/C-Physical Mapping of Classes | | MBORREL4: Added CTR |
|  | MCSv2-IIR-REQ-237613/B-MultiContouredSeatsClient\_Tx | | cwu3: Removed REQ-021436 & REQ-021437. These methods were not needed and were never implemented |
|  | MCSv2-IIR-REQ-237614/D-MultiContouredSeatsClient\_Rx | | cwu3: Updated GSDB signal name "SeatScrnDrvOn\_B\_Stat" and "SeatScrnPsngrOn\_B\_Stat" to "SeatScrnDrvOn\_B\_Rq" and "SeatScrnPsngrOn\_B\_Rq" |
|  | MCS-SD-REQ-239326/C-Turn ON Massage Mode from Touch Screen | | MBORREL4: Updated diagram to include ActiveSeatControl status back from MCSServer (conveying implementation, clarification only) |
|  | MCS-SD-REQ-250101/B-Turn ON Massage Mode from Seat | | MBORREL4: Updated diagram to include ActiveSeatControl status back from MCSServer (conveying implementation, clarification only) |
|  | MCS-SD-REQ-237811/B-Select Massage Pattern from Touch Screen | | MBORREL4: Updated diagram to include ActiveSeatControl status back from MCSServer (conveying implementation, clarification only) |
|  | MCS-SD-REQ-250102/B-Select Massage Pattern from Seat | | MBORREL4: Updated diagram to include ActiveSeatControl status back from MCSServer (conveying implementation, clarification only) |

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# Architectural Design

## MCSv2-SV-REQ-237612/B-IBD\_MultiContouredSeatSystem

Internal Block Diagram



## Physical Mapping of Classes

The table below shows an example of how the logical classes may be mapped into physical modules. This mapping example is specific to the CGEA1.3 architecture and does not necessarily carryover to other vehicle architectures.

|  |  |
| --- | --- |
| **Logical Class** | **Physical Module (ECU)** |
| Multi Contoured Seat Remote Client | Switch Pack (Shortcut Key) |
| Multi Contoured Seat Remote Client2 | Switch Pack (5way Controller) |
| Multi Contoured Seat Remote Server | DSM / PSM |
| Multi Contoured Seat Server | MCSM |
| Multi Contoured Seat Client | APIM, CTR |

## MCS-CLD-REQ-239296/A-Multi Contoured Seat Remote Server

The Multi Contoured Seat Remote Server has one function:

1. Transmit request for activation/deactivation of HMI display for multi contour seat functionality.

## MCS-CLD-REQ-239805/A-Multi Contoured Seat Remote Client

The Multi Contoured Seat Remote Client has one function:

1. Receive input from user for activation/deactivation of HMI display for Multi Contoured Seats functionality.

## MCS-CLD-REQ-250012/A-Multi Contoured Seat Remote Client2

The Multi Contoured Seat Remote Client2 has one function:

1. Receive input from user for activation/deactivation of HMI display, and adjustment/massage functionality for the Multi Contoured Seats feature.

## MCS-CLD-REQ-239811/B-Multi Contoured Seat Server

The Multi Contoured Seat Server has three functions:

1. Execute Multi Contoured Seat Function as directed by the Multi Contoured Seat Client.
2. Execute Multi Contoured Seat Function as directed by the Multi Contoured Seat Remote Client2.
3. Transmit Multi Contour Seat status information to Multi Contoured Seat Client for HMI display.

## MCS-CLD-REQ-239443/A-Multi Contoured Seat Client

The Multi Contoured Seats Client has two functions:

1. Interface between the user and all Multi Contoured Seat functions, both inputs and outputs from the display device.

2. Control inputs to the Multi Contoured Seats Server directing the server to initiate some Multi Contoured Seats function.

### Functional Requirements

#### MCS-SR-REQ-239787/B-Powermode Conditions

The MultiContoured Seat Client shall only allow the massage and seat adjust functionality of this feature when the Ignition\_Status = Run, and the touch screen display is On (HMI\_HMIMode\_St=On).

#### MCS-SR-REQ-239563/A-Configurable Parameter for Enhanced MCS

The Multi Contoured Seat Client shall have a configurable parameter to determine whether the vehicle supports Enhanced Multi Contoured Seats. If the parameter indicates that the vehicle is to support Enhanced Multi Contoured Seats, then all functionality and signals defined in this SPSS shall be used. The Legacy Multi Contoured Seats SPSS shall not be used.

If the configurable parameter for the Legacy Multi Contoured Seats feature is also configured On, the Enhanced Multi Contoured Seats feature shall take priority and a DTC shall be set by the Multi Contoured Seat Client to signify this conflict.

#### MCS-SR-REQ-021423/A-MultiContoured Seats Change Request Latency - Driver Seat (TcSE ROIN-199636-1)

The MultiContoured Seats Client shall ignore the DriverActiveSeatControl\_St status message for T\_Response\_SeatMode after sending DriverActiveSeatControl\_Rq to the MultiContoured Seats Server to allow for Gateway Latency.

#### MCS-SR-REQ-021429/A-MultiContoured Seats Change Request Latency - Passenger Seat (TcSE ROIN-201074-1)

The MultiContoured Seats Client shall ignore the PassengerActiveSeatControl\_St status message for T\_Response\_SeatMode after sending PassengerActiveSeatControl\_Rq to the MultiContoured Seats Server to allow for Gateway Latency.

#### MCS-TMR-REQ-021424/A-Change Request Latency timing (TcSE ROIN-199637-1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| Change Request Latency timing | Minimum amount of time between sending signals (DriverActiveSeatControl\_Rq or PassengerActiveSeatControl\_Rq) then updating the HMI based on status signals (DriverActiveSeatControl\_St or PassengerActiveSeatControl\_St) by the MultiContoured Seats Client. | msec | 0-1000 | 10 | 500 |

#### MCS-SR-REQ-239812/B-Request to display MCS Screen via MultiContouredSeatRemoteClient

When the MultiContouredSeatsUser requests to make seat adjustments via the specific Driver or Passenger Shortcut Keys, the Multi Contoured Seat Client shall monitor the respective signals:

DriverSeatScreenToggle\_St

PassengerSeatScreenToggle\_St

When these signals transition from from Off to On:

* If not already displayed, the Multi Contoured Seat Client shall display the Seat Adjust Screen for the respective signal/user (Driver or Passenger) when allowed (see REQ-239444 & REQ-239445).
* If already displayed, the Multi Contoured Seat Client shall close the Seat Adjust Screen for the respective signal/user (Driver or Passenger) and return to the last displayed screen.

When the MultiContouredSeatsUser completes their input (releases the button) and the respective signal reverts to Off, there shall be no change of display by the Multi Contoured Seat Client.

#### MCS-SR-REQ-250020/A-Request to display MCS Screen via MultiContouredSeatRemoteClient2

When the MultiContouredSeatsUser requests to make seat adjustments via the specific Driver or Passenger 5way controller, the Multi Contoured Seat Client shall monitor the respective signals:

DriverInitiateSeatControlMode\_St

PassengerInitiateSeatControlMode\_St

When these signals transition from from SeatControlOff to SeatControlOn:

* If not already displayed, the Multi Contoured Seat Client shall display the Seat Adjust Screen for the respective signal/user (Driver or Passenger) when allowed (see REQ-239444 & REQ-239445).
* If already displayed, the Multi Contoured Seat Client shall continue to display the current Seat Adjust Screen (no screen change).

When the MultiContouredSeatsUser completes their input (releases the button) and the respective signal reverts to SeatControlOff, there shall be no change of display by the Multi Contoured Seat Client.

#### MCS-SR-REQ-239444/B-Inactivity of any user input to MultiContoured Seats

After the MultiContouredSeatUser has made their last input, and all seat adjustment and massage request signals have reverted to Inactive or Null, and the:

* DriverSeatScreenToggle\_St or PassengerSeatScreenToggle\_St has reverted to Off (for programs with the Shortcut Key), OR
* DriverInitiateSeatControlMode\_St or PassengerInitiateSeatControlMode\_St has reverted to SeatControlOff (for programs with the 5way controller),

the Multi Contoured Seat Client shall start the T\_MCS\_Input and T\_MCS\_Screen timers.

* While T\_MCS\_Input is active (not expired), the opposing seat’s Shortcut Key or 5way controller shall not be able to request to become the primary seat on the touch screen display.
  + This timer shall not apply to the “Driver / Passenger” touch screen buttons. These buttons shall always have request control.
* After T\_MCS\_Input expires, the opposing seat’s Shortcut Key or 5way controller shall be able to request to become the primary seat on the touch screen display.
* After T\_MCS\_Screen expires, the Seat Adjust Screen shown on the touch screen display shall close.

If the user makes another input on the HMI (via any seat or massage request signal) or a 5way controller (via DriverInitiateSeatControlMode\_St or PassengerInitiateSeatControlMode\_St) within either timer, both the T\_MCS\_Input and T\_MCS\_Screen timers shall restart on input, and initialize upon the release of the users last input, when the relevant request signal has once again reverted to Inactive or Null.

If the user closes the Seat Adjust Screen using the HMI or the originating Shortcut Key (via DriverSeatScreenToggle\_St or PassengerSeatScreenToggle\_St) within either timer, both the T\_MCS\_Input and T\_MCS\_Screen timers shall become inactive and return to their default state. These timers and their functionality shall not be used when the Seat Adjust Screen is not displayed.

#### MCS-TMR-REQ-239445/B-T\_MCS\_Input

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_MCS\_Input | Time allowed from the MultiContoured Seats Client after the users last input (either by the Shortcut Key, touch screen display, or 5way controller) before allowing the opposing seat’s Shortcut Key or 5way controller to request screen control. | sec | 0-20 | 1 | 6 |

#### MCS-TMR-REQ-239813/C-T\_MCS\_Screen

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_MCS\_Screen | Time allowed from the Multi Contoured Seat Client after the users last input (either from the Shortcut Key, touch screen display, or 5way controller) before closing the HMI screen. The default value of this timer shall not be less than the required time by Multi Contoured Seat Server to rebuild or change bladder pressure. Please refer to HMI requirement [H74a.R014] for the most recent and correct value. | sec | 0-20 | 1 | 12 |

#### MCS-SR-REQ-021430/A-Highlighted Function and pressure percentage memory (TcSE ROIN-201098-1)

The MultiContouredSeats Client shall remember Lumbar bladder fill percentages, and Bolster bladder fill percentages upon powering down of current key cycle. The Client will use these values during initialization of the next key cycle, until it receives an updated actual value from the MultiContouredSeats Server.

#### MCS-SR-REQ-021427/A-Selecting the Adjust Tab from the touch screen (TcSE ROIN-200453-1)

If the user selects the adjust tab from the touch screen, the MCS Client shall initiate an DriverActiveSeatControl\_Rq or PassengerActiveSeatControl\_Rq with parameters equal to

HighlightedFunction = MiddleLumbar

SeatModeSelect = Inactive

#### MCS-SR-REQ-239446/A-Selecting the Massage Tab from the touch screen

If the user selects the Massage tab from the touch screen, the MCS Client shall initiate an DriverActiveSeatControl\_Rq or PassengerActiveSeatControl\_Rq with parameters equal to

HighlightedFunction = CushionMassage

SeatModeSelect = Inactive

#### MCS-SR-REQ-243309/A-Adjusting the Massage Pattern levels from the touch screen

If the user selects the Massage Pattern’s Low, Med, or High buttons from the touch screen, the MCS Client shall initiate an DriverActiveSeatControl\_Rq or PassengerActiveSeatControl\_Rq with parameters equal to

HighlightedFunction = CushionMassage

SeatModeSelect = Low\_2, Med\_2, or High\_2

Note: These encodings shall only be used for the Massage Patterns offered by this feature (not for the Legacy MCS).

#### MCS-SR-REQ-250536/A-Selecting a Massage Pattern from the touch screen

If the user selects a Massage Pattern button from the touch screen, the MCS Client shall initiate an DriverMassagePattern\_Rq or PassengerMassagePattern\_Rq with the Preset parameter equal to the selected pattern.

#### MCS-SR-REQ-239814/A-Multi Contoured Seats Adjustment via TouchScreen

If the user presses any seat adjustment or massage button from the touch screen display, the Multi Contoured Seat Client shall set the applicable request signals (See REQ-237613) to their associated parameters.

Those request signals shall then transmit the associated parameters continuously as long as the button is pressed by the user. Upon release of the button, those request signals shall return to “Inactive” or “Null.”

When any seat adjustment or massage button is pressed from the touch screen display, the associated parameters shall be held for a minimum of 100ms.

The Multi Contoured Seat Client does not arbitrate if an input is a "press and hold" or a "tap". This shall be done by the Multi Contoured Seat Server.

## MultiContouredSeatClient Interface

### MCSv2-IIR-REQ-237613/B-MultiContouredSeatsClient\_Tx

The MultiContouredSeatsClient\_Tx represents all the Multi Contoured Seats feature related signals transmitted by the Multi Countoured Seat Client object. The below table represents the mapping of the logical signal names (as described in this specification) to the global GSDB signal names.

|  |  |  |
| --- | --- | --- |
| **Logical Signal Name** | **Parameter Name** | **GSDB Signal Name** |
| DriverActiveSeatControl\_Rq | HighlightedFunction | SeatFnDrv\_D\_Rq |
| SeatModeSelect | SeatFnChngDrv2\_D\_Rq |
| DriverMassagePattern\_Rq | Preset | SeatMasgDrv\_D\_Rq |
| PassengerActiveSeatControl\_Rq | HighlightedFunction | SeatFnPsgr\_D\_Rq |
| SeatModeSelect | SeatFnChngPsgr2\_D\_Rq |
| PassengerMassagePattern\_Rq | Preset | SeatMasgPsngr\_D\_Rq |

Note:  GSDB signal names are reference only.  The Global Signal Database (GSDB) is the master for all signals.  If there is a conflict bring to the module D&R’s attention.

#### MD-REQ-021435/B-DriverActiveSeatControl\_Rq (TcSE ROIN-199569-2)

Message Type: Request

This method is a signal from the Multi Contoured Seat Client to the Multi Contoured Seat Server (Driver's side). This request indicates to the server what seat control update is requested (Massage, Bolster, Lumbar)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| HighlightedFunction | - | - | Requested active function. |
|  | Inactive | 0x0 |  |
|  | LowerLumbar | 0x1 |  |
|  | MiddleLumbar | 0x2 |  |
|  | UpperLumbar | 0x3 |  |
|  | LowerBolster | 0x4 |  |
|  | UpperBolster | 0x5 |  |
|  | LumbarMassage | 0x6 |  |
|  | CushionMassage | 0x7 | This encoding shall be used for “Massage Patterns” when configured for Enhanced MCS |
| SeatModeSelect | - | - | Indicates if the current highlighted function should increase pressure, decrease pressure, or increase/decrease seat/lumbar massage intensity. |
|  | Inactive | 0x0 |  |
|  | Not\_Used | 0x1 |  |
|  | Increase | 0x2 |  |
|  | Decrease | 0x3 |  |
|  | Off | 0x4 |  |
|  | Low | 0x5 |  |
|  | High | 0x6 |  |
|  | Off\_2 | 0x7 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Low\_2 | 0x8 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Med\_2 | 0x9 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | High\_2 | 0xA | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Not\_Used | 0xB-0xE |  |
|  | Fault | 0xF |  |

#### MD-REQ-237625/A-DriverMassagePattern\_Rq

Message Type : Request

This method is a signal from the Multi Contoured Seat Client to the Multi Contoured Seat Server (Driver's side). This request indicates to the server what seat massage pattern preset the user has selected.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Preset | - | - | Requested Pattern Preset |
|  | Null | 0x0 |  |
|  | Pattern 1 | 0x1 |  |
|  | Pattern 2 | 0x2 |  |
|  | Pattern 3 | 0x3 |  |
|  | Pattern 4 | 0x4 |  |
|  | Pattern 5 | 0x5 |  |
|  | Not Used | 0x6-0xF |  |

#### MD-REQ-021437/B-PassengerActiveSeatControl\_Rq (TcSE ROIN-201060-2)

Message Type: Request

This method is a signal from the Multi Contoured Seat Client to the Multi Contoured Seat Server (Passenger's side). This request indicates to the server what seat control update is requested (Massage, Bolster, Lumbar)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| HighlightedFunction | - | - | Requested active function. |
|  | Inactive | 0x0 |  |
|  | LowerLumbar | 0x1 |  |
|  | MiddleLumbar | 0x2 |  |
|  | UpperLumbar | 0x3 |  |
|  | LowerBolster | 0x4 |  |
|  | UpperBolster | 0x5 |  |
|  | LumbarMassage | 0x6 |  |
|  | CushionMassage | 0x7 | This encoding shall be used for “Massage Patterns” when configured for Enhanced MCS |
| SeatModeSelect | - | - | Indicates if the current highlighted function should increase pressure, decrease pressure, or increase/decrease seat/lumbar massage intensity. |
|  | Inactive | 0x0 |  |
|  | Not\_Used | 0x1 |  |
|  | Increase | 0x2 |  |
|  | Decrease | 0x3 |  |
|  | Off | 0x4 |  |
|  | Low | 0x5 |  |
|  | High | 0x6 |  |
|  | Off\_2 | 0x7 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Low\_2 | 0x8 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Med\_2 | 0x9 | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | High\_2 | 0xA | This encoding shall be used to request Massage Pattern changes when configured for Enhanced MCS |
|  | Not\_Used | 0xB-0xE |  |
|  | Fault | 0xF |  |

#### MD-REQ-237626/A-PassengerMassagePattern\_Rq

Message Type : Request

This method is a signal from the Multi Contoured Seat Client to the Multi Contoured Seat Server (Passenger side). This request indicates to the server what seat massage pattern preset the user has selected.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Preset | - | - | Requested Pattern Preset |
|  | Null | 0x0 |  |
|  | Pattern 1 | 0x1 |  |
|  | Pattern 2 | 0x2 |  |
|  | Pattern 3 | 0x3 |  |
|  | Pattern 4 | 0x4 |  |
|  | Pattern 5 | 0x5 |  |
|  | Not Used | 0x6-0xF |  |

### MCSv2-IIR-REQ-237614/D-MultiContouredSeatsClient\_Rx

The MultiContouredSeatsClient\_Rx represents all the Multi Contoured Seats feature related signals received by the Multi Countoured Seat Client object. The below table represents the mapping of the logical signal names (as described in this specification) to the global GSDB signal names.

|  |  |  |
| --- | --- | --- |
| **Logical Signal Name** | **Parameter Name** | **GSDB Signal Name** |
| DriverActiveSeatControl\_St | HighlightedFunction | SeatFnDrv\_D\_Stat |
| PressureUpdates | SeatPDrv\_B\_Stat |
| DriverBolsterPressureLower\_St | ActualPressure | SeatBlLoDrv\_Pc\_Actl |
| DriverBolsterPressureUpper\_St | ActualPressure | SeatBlUpDrv\_Pc\_Actl |
| DriverLumbarPressureLower\_St | ActualPressure | SeatLmbrLoDrv\_Pc\_Actl |
| DriverLumbarPressureMiddle\_St | ActualPressure | SeatLmbrMidDrv\_Pc\_Actl |
| DriverLumbarPressureUpper\_St | ActualPressure | SeatLmbrUpDrv\_Pc\_Actl |
| DriverSeatScreenToggle\_St | Mode | SeatScrnDrvOn\_B\_Rq |
| DriverMassageIntensity\_St | MassageIntensity | SeatIntnsDrv\_D\_Stat |
| DriverMassagePattern\_St | Preset | SeatMasgDrv\_D\_Stat |
| DriverInitiateSeatControlMode\_St | Mode | SeatSwtchDrv\_B\_Stat |
| PassengerActiveSeatControl\_St | HighlightedFunction | SeatFnPsgr\_D\_Stat |
| PressureUpdates | SeatPPsgr\_B\_Stat |
| PassengerBolsterPressureLower\_St | ActualPressure | SeatBlLoPsgr\_Pc\_Actl |
| PassengerBolsterPressureUpper\_St | ActualPressure | SeatBlUpPsgr\_Pc\_Actl |
| PassengerLumbarPressureLower\_St | ActualPressure | SeatLmbrLoPsgr\_Pc\_Actl |
| PassengerLumbarPressureMiddle\_St | ActualPressure | SeatLmbrMidPsgr\_Pc\_Actl |
| PassengerLumbarPressureUpper\_St | ActualPressure | SeatLmbrUpPsgr\_Pc\_Actl |
| PassengerSeatScreenToggle\_St | Mode | SeatScrnPsngrOn\_B\_Rq |
| PassengerMassageIntensity\_St | MassageIntensity | SeatIntnsPsngr\_D\_Stat |
| PassengerMassagePattern\_St | Preset | SeatMasgPsngr\_D\_Stat |
| PassengerInitiateSeatControlMode\_St | Mode | SeatSwtchPsgr\_B\_Stat |
| IgnitionStatus\_St | Type | Ignition\_Status |

Note:  GSDB signal names are reference only.  The Global Signal Database (GSDB) is the master for all signals.  If there is a conflict bring to the module D&R’s attention.

#### MD-REQ-021443/B-DriverActiveSeatControl\_St (TcSE ROIN-199404-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client. If the seat function is being controlled at the seat HMI, this signal indicates what seat mode is to be highlighted by the display HMI. If the seat function is being controlled at the display HMI, this signal is a confirmation from the Server that the function that was requested by DriverActiveSeatControl\_Rq has been accepted, and the Server is reacting to inputs from the display client.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| HighlightedFunction | - | - | Indicates the current active function. |
|  | Null | 0x0 |  |
|  | LowerLumbar | 0x1 |  |
|  | MiddleLumbar | 0x2 |  |
|  | UpperLumbar | 0x3 |  |
|  | LowerBolster | 0x4 |  |
|  | UpperBolster | 0x5 |  |
|  | LumbarMassage | 0x6 |  |
|  | CushionMassage | 0x7 | This encoding shall be used for “Massage Patterns” when configured for Enhanced MCS |
| PressureUpdates | - | - | Indicates if the pressure of the highlighted function is currently being updated. |
|  | NotUpdating | 0x0 |  |
|  | Updating | 0x1 |  |

#### MD-REQ-021444/A-DriverBolsterPressureLower\_St (TcSE ROIN-199410-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Bolster Lower Bladder Pair Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021445/A-DriverBolsterPressureUpper\_St (TcSE ROIN-199412-1)

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Bolster Upper Bladder Pair Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021449/A-DriverLumbarPressureLower\_St (TcSE ROIN-199409-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Lower Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021450/A-DriverLumbarPressureMiddle\_St (TcSE ROIN-199422-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Middle Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021451/A-DriverLumbarPressureUpper\_St (TcSE ROIN-199416-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Upper Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-237615/A-DriverSeatScreenToggle\_St

Message Type: Status

This method is a signal from a seat feature server (Driver's side) to a seat feature client informing the Client that a request has been made by the user, via seat controls (Shortcut Key), to toggle the current on/off state of the seat feature’s control function. This signal allows the Client to update the HMI output and activate/deactivate HMI controls.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Mode | - | - | Request to activate drivers side seat adjust screen in HMI |
|  | Off | 0x0 |  |
|  | On | 0x1 |  |

#### MD-REQ-237616/B-DriverMassageIntensity\_St

Message Type: Status

This method is a signal from the Multi Contoured Seat Server (Driver’s Side) to the Multi Contoured Seat Client which reports the current value of Massage Intensity.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| MassageIntensity | - | - | Current value of Massage Intensity |
|  | Null | 0x0 |  |
|  | Off | 0x1 |  |
|  | Low | 0x2 |  |
|  | Medium | 0x3 |  |
|  | High | 0x4 |  |

#### MD-REQ-237627/B-DriverMassagePattern\_St

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client (Driver's side). This status confirms client initiated request and reports what pattern is active.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Preset | - | - | Requested Pattern Preset |
|  | Null | 0x0 |  |
|  | Pattern 1 | 0x1 |  |
|  | Pattern 2 | 0x2 |  |
|  | Pattern 3 | 0x3 |  |
|  | Pattern 4 | 0x4 |  |
|  | Pattern 5 | 0x5 |  |
|  | Not Used | 0x6-0xF |  |

#### MD-REQ-021447/A-DriverInitiateSeatControlMode\_St (TcSE ROIN-199414-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server (Driver's side) to the Multi Contoured Seat Client informing the Client that a request has been made by the user to change a Multi Contoured Seat function from the seat controls. This signal allows the Client to update the HMI output.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Mode | - | - |  |
|  | SeatControlOff | 0x0 |  |
|  | SeatControlOn | 0x1 |  |

#### MD-REQ-021452/B-PassengerActiveSeatControl\_St (TcSE ROIN-201068-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client. If the seat function is being controlled at the seat HMI, this signal indicates what seat mode is to be highlighted by the display HMI. If the seat function is being controlled at the display HMI, this signal is a confirmation from the Server that the function that was requested by PassengerActiveSeatControl\_Rq has been accepted, and the Server is reacting to inputs from the display client.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| HighlightedFunction | - | - | Indicates the current active function. |
|  | Null | 0x0 |  |
|  | LowerLumbar | 0x1 |  |
|  | MiddleLumbar | 0x2 |  |
|  | UpperLumbar | 0x3 |  |
|  | LowerBolster | 0x4 |  |
|  | UpperBolster | 0x5 |  |
|  | LumbarMassage | 0x6 |  |
|  | CushionMassage | 0x7 | This encoding shall be used for “Massage Patterns” when configured for Enhanced MCS |
| PressureUpdates | - | - | Indicates if the pressure of the highlighted function is currently being updated. |
|  | NotUpdating | 0x0 |  |
|  | Updating | 0x1 |  |

#### MD-REQ-021453/A-PassengerBolsterPressureLower\_St (TcSE ROIN-201069-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Bolster Lower Bladder Pair Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021454/A-PassengerBolsterPressureUpper\_St (TcSE ROIN-201070-1)

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Bolster Upper Bladder Pair Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021458/A-PassengerLumbarPressureLower\_St (TcSE ROIN-201071-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Lower Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021459/A-PassengerLumbarPressureMiddle\_St (TcSE ROIN-201072-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Middle Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-021460/A-PassengerLumbarPressureUpper\_St (TcSE ROIN-201073-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client indicating the status of the Lumbar Upper Bladder Pressure in percentage of full.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| ActualPressure | - | 0x00 – 0x64 | Percentage of Full |

#### MD-REQ-237617/A-PassengerSeatScreenToggle\_St

Message Type: Status

This method is a signal from the seat feature server (Passenger's side) to a seat feature client informing the Client that a request has been made by the user, via seat controls (Shortcut Key), to toggle the current on/off state of the seat feature’s control function. This signal allows the Client to update the HMI output and activate/deactivate HMI controls.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Mode | - | - | Request to activate passengers side seat adjust screen in HMI |
|  | Off | 0x0 |  |
|  | On | 0x1 |  |

#### MD-REQ-237629/B-PassengerMassageIntensity\_St

Message Type: Status

This method is a signal from the Multi Contoured Seat Server (Passenger’s Side) to the Multi Contoured Seat Client which reports the current value of Massage Intensity.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| MassageIntensity | - | - | Current value of Massage Intensity |
|  | Null | 0x0 |  |
|  | Off | 0x1 |  |
|  | Low | 0x2 |  |
|  | Medium | 0x3 |  |
|  | High | 0x4 |  |

#### MD-REQ-237628/B-PassengerMassagePattern\_St

Message Type: Status

This method is a signal from the Multi Contoured Seat Server to the Multi Contoured Seat Client (Passenger’s side). This status confirms client initiated request and reports what pattern is active.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Preset | - | - | Requested Pattern Preset |
|  | Null | 0x0 |  |
|  | Pattern 1 | 0x1 |  |
|  | Pattern 2 | 0x2 |  |
|  | Pattern 3 | 0x3 |  |
|  | Pattern 4 | 0x4 |  |
|  | Pattern 5 | 0x5 |  |
|  | Not Used | 0x6-0xF |  |

#### MD-REQ-021456/A-PassengerInitiateSeatControlMode\_St (TcSE ROIN-201061-1)

Message Type: Status

This method is a signal from the Multi Contoured Seat Server (Passenger's side) to the Multi Contoured Seat Client informing the Client that a request has been made by the user to change a Multi Contoured Seat function from the seat controls. This signal allows the Client to update the HMI output.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Mode | - | - |  |
|  | SeatControlOff | 0x0 |  |
|  | SeatControlOn | 0x1 |  |

#### MD-REQ-199809/A-IgnitionStatus\_St

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 |  |

# Functional Definition

## MCS-FUN-REQ-237635/A-Activate Multi Contour Seat Display HMI via Shortcut Key

### Use Cases

#### MCS-UC-REQ-237633/B-Open Seat Adjust Screen from Shortcut Key

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  HMI is not displaying seat control feature screen |
| **Scenario Description** | User presses seat shortcut key to bring up seat controls |
| **Post-conditions** | HMI indicates {brings up seat control feature screen} |
| **List of Exception Use Cases** | MCS-UC-REQ-237634-Exit Seat Adjust Screen from Shortcut Key |
| **Interfaces** | G-HMI & vehicle system |
| **Note** | Pressing the Shortcut key will bring up the Multi Control Seat Menu when the HMI display is On. If Ignition is not in RUN, the real control menu (button input) will be greyed-out with only the Return button available. Please refer to [H74a.R030] |

#### MCS-UC-REQ-237634/B-Exit Seat Adjust Screen from Shortcut Key

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  HMI is displaying seat control feature screen |
| **Scenario Description** | User presses seat shortcut key prior to screen timeout |
| **Post-conditions** | HMI exits seat control screen and returns to prior screen |
| **List of Exception Use Cases** | Screen Timeout duration has expired |
| **Interfaces** | G-HMI & vehicle system |
| **Note** | For “screen timeout” refer to MCS-TMR-REQ-239813-T\_MCS\_Screen |

### White Bow View

#### MCS-ACT-REQ-237767/B-Activate/Deactivate Multi Contour Seat Feature Screen HMI

Activity Diagram



#### MCS-SD-REQ-237620/B-Activate/Deactivate Multi Contour Seat Feature Screen HMI

Sequence Diagram



## MCS-FUN-REQ-237622/A-Set Massage Pattern

### Use Cases

#### MCS-UC-REQ-237772/B-Select Front Seat Massage Pattern from HMI

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run |
| **Scenario Description** | User Selects < Massage Pattern> via HMI |
| **Post-conditions** | HMI indicates (Selected Pattern & Intensity}  Selected Massage Pattern Activates |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-250097/B-Select Front Seat Massage Pattern from Seat

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run |
| **Scenario Description** | User Selects <Massage Pattern> via Seat |
| **Post-conditions** | HMI indicates (Selected Pattern & Intensity}  Selected Massage Pattern Activates |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021353/C-Adjust Front Seat Massage Intensity from HMI (TcSE ROIN-291760)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run |
| **Scenario Description** | User Selects < Massage Intensity> via HMI |
| **Post-conditions** | HMI indicates (Mode & Intensity} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021354/C-Adjust Front Seat Massage Intensity from Seat (TcSE ROIN-291761)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run |
| **Scenario Description** | User Selects <Massage Intensity> via seat |
| **Post-conditions** | HMI indicates (Mode & Intensity} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021355/C-Exiting Front Massage and transitioning to Adjust bladder pressure via HMI (TcSE ROIN-292490)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run  Massage Screen is ON |
| **Scenario Description** | User exiting Massage and transitioning to Adjust bladder pressure via HMI |
| **Post-conditions** | HMI Pop – Up indicates {Massage off and restoring seat settings} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021356/C-Exiting Front Massage and transitioning to Adjust bladder pressure via Seat (TcSE ROIN-292491)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = Run  Massage Screen is ON |
| **Scenario Description** | User exiting Massage and transitioning to Adjust bladder pressure via Seat. |
| **Post-conditions** | HMI Pop – Up indicates {Massage off and restoring seat settings} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

### White Box View

#### MCS-ACT-REQ-237796/B-Select Massage Pattern from Touch Screen

Activity Diagram



#### MCS-ACT-REQ-250099/A-Select Massage Pattern from Seat

Activity Diagram



#### MCS-ACT-REQ-237797/B-Set Massage Intensity from Touch Screen

Activity Diagram



#### MCS-ACT-REQ-250100/A-Set Massage Intensity from Seat

Activity Diagram



#### MCS-SD-REQ-239326/C-Turn ON Massage Mode from Touch Screen

Sequence Diagram



#### MCS-SD-REQ-250101/B-Turn ON Massage Mode from Seat

Sequence Diagram



#### MCS-SD-REQ-237811/B-Select Massage Pattern from Touch Screen

Sequence Diagram



#### MCS-SD-REQ-250102/B-Select Massage Pattern from Seat

Sequence Diagram



#### MCS-SD-REQ-237799/B-Set Massage Intensity to High from Touch Screen

Sequence Diagram



#### MCS-SD-REQ-237800/B-Set Massage Intensity to Medium from Touch Screen

Sequence Diagram



#### MCS-SD-REQ-237801/B-Set Massage Intensity to Low from Touch Screen

Sequence Diagram



#### MCS-SD-REQ-250103/A-Set Massage Intensity from Seat

Sequence Diagram



## MCSv2-FUN-REQ-237619/A-Set Lumbar

### Use Cases

#### MCS-UC-REQ-240862/B-Adjust Front Seat Bladder Pressure from HMI

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = RUN |
| **Scenario Description** | User Selects Upper, Middle, or Lower < Adjust Bladder Pressure > via HMI |
| **Post-conditions** | HMI indicates {mode and pressure updates} |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021336/C-Adjust Front Seat Bladder Pressure from Seat (TcSE ROIN-291759)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = RUN |
| **Scenario Description** | User Selects Upper, Middle, or Lower <Adjust Bladder Pressure> via seat module |
| **Post-conditions** | HMI indicates {mode and pressure updates} |
| **List of Exception Use Cases** |  |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

### White Box View

#### MCS-ACT-REQ-021324/A-Set Lumbar - Display Initiated (TcSE ROIN-198769-1)

Activity Diagram



#### MCS-ACT-REQ-250048/A-Set Lumbar - Seat Initiated

Activity Diagram



#### MCS-SD-REQ-021337/B-Select Lumbar Middle Bladder at Touch Screen - No pressure updates (TcSE ROIN-200149-1)

Scenarios

Normal Usage

User <selects Set Lumbar Middle Bladder> via touchscreen HMI, but does not make any changes to the actual pressure.

Constraints

Pre-condition

Display is ON

Ignition = Run

Post-condition

HMI indicates {changes to Lumbar Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-021338/B-Select Lumbar Upper Bladder at Touch Screen - No pressure updates (TcSE ROIN-200156-1)

Scenarios

Normal Usage

User <selects Set Lumbar Upper Bladder> via touchscreen HMI, but does not make any changes to the actual pressure.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {changes to Lumbar Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-021340/B-Select Lumbar Lower Bladder at Touch Screen - No pressure updates (TcSE ROIN-200170-1)

Scenarios

Normal Usage

User <selects Set Lumbar Lower Bladder> via touch screen HMI, but does not make any changes to the actual pressure.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {changes to Lumbar Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-021341/C-Decrease Lumbar Lower Bladder from Touch Screen (TcSE ROIN-200773-1)

Scenarios

Normal Usage

User <selects decrease Lumbar Lower Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021342/C-Decrease Lumbar Middle Bladder from Touch Screen (TcSE ROIN-200780-1)

Scenarios

Normal Usage

User <selects decrease Lumbar Middle Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021343/C-Decrease Lumbar Upper Bladder from Touch Screen (TcSE ROIN-200787-1)

Scenarios

Normal Usage

User <selects decrease Lumbar Upper Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021344/C-Increase Lumbar Lower Bladder from Touch Screen (TcSE ROIN-200794-1)

Scenarios

Normal Usage

User <selects increrase Lumbar Lower Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021345/C-Increase Lumbar Middle Bladder from Touch Screen (TcSE ROIN-200801-1)

Scenarios

Normal Usage

User <selects increase Lumbar Middle Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021346/C-Increase Lumbar Upper Bladder from Touch Screen (TcSE ROIN-200808-1)

Scenarios

Normal Usage

User <selects increase Lumbar Upper Bladder> via touch screen HMI.

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-250049/B-Set Lumbar Bladder at Seat

Scenarios

Normal Usage

User Selects Upper, Middle, or Lower <Adjust Bladder Pressure> via seat module.

Constraints

Pre-Condition

Display is ON

Ignition = RUN

Post-Condition

HMI indicates {mode and pressure updates}.

Sequence Diagram



#### MCS-SD-REQ-021350/A-End Lumbar Adjust Update- Initiated at Touchscreen (TcSE ROIN-200878-1)

Scenarios

Normal Usage

The user ends Lumbar Adjust Mode update.

Constraints

Pre-condition

Lumbar Adjust is currently being updated by the user via Touch screen HMI

Post-condition

Lumbar Adjust is no longer updated by the user via Touch screen HMI

Sequence Diagram



#### MCS-SD-REQ-021351/A-End Lumbar Adjust Update - Initiated at Seat (TcSE ROIN-200918-1)

Scenarios

Normal Usage

The user ends Lumbar Adjust Mode update.

Constraints

Pre-condition

Lumbar Adjust is currently being updated by the user via Seat HMI

Post-condition

Lumbar Adjust is no longer being updated by the user via Seat HMI

Sequence Diagram



## MCSv2-FUN-REQ-237624/A-Set Bolster

### Use Cases

#### MCS-UC-REQ-240863/B-Adjust Front Seat Bolster Bladder from HMI

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = RUN |
| **Scenario Description** | User Selects Upper or Lower < Adjust Bolster Pressure> via HMI |
| **Post-conditions** | HMI indicates (Mode & Intensity} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

#### MCS-UC-REQ-021369/C-Adjust Front Seat Bolster Bladder from Seat (TcSE ROIN-293589)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Display is ON  Ignition = RUN |
| **Scenario Description** | User Selects Upper or Lower < Adjust Bolster Pressure> via seat module |
| **Post-conditions** | HMI indicates (Mode & Intensity} |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI & vehicle system |
| **Links to Referenced Use Cases** | NA |

### White Box View

#### MCS-ACT-REQ-021326/A-Set Bolster - Display Initiated (TcSE ROIN-198835-1)

Activity Diagram



#### MCS-ACT-REQ-250054/A-Set Bolster - Seat Initiated

Activity Diagram



#### MCS-SD-REQ-021375/C-Increase Bolster Upper Bladders from Touch Screen (TcSE ROIN-199118-1)

Scenarios

Normal Usage

User <selects increase Bolster Upper Pair of Bladders> via touch screen HMI

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021371/C-Increase Bolster Lower Bladders from Touch Screen (TcSE ROIN-199090-1)

Scenarios

Normal Usage

User <selects increase Bolster Lower Pair of Bladders> via touch screen HMI

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021372/C-Decrease Bolster Upper Bladders from Touch Screen (TcSE ROIN-199097-1)

Scenarios

Normal Usage

User <selects decrease Bolster Upper Pair of Bladders> via touch screen HMI

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021373/C-Decrease Bolster Lower Bladders from Touch Screen (TcSE ROIN-199104-1)

Scenarios

Normal Usage

User <selects decrease Bolster Lower Pair of Bladders> via touch screen HMI

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021376/B-Select Bolster Upper Bladders at Touch Screen - No pressure updates (TcSE ROIN-200177-1)

Scenarios

Normal Usage

User <selects Set Bolster Upper Bladders> via touchscreen HMI, but does not make any changes to the actual pressure

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {changes to Bolster Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-021378/B-Select Bolster Lower Bladders at Touch Screen - No pressure updates (TcSE ROIN-200815-1)

Scenarios

Normal Usage

User <selects Set Bolster Lower Bladders> via touchscreen HMI, but does not make any changes to the actual pressure

Constraints

Pre-condition

Display is ON

Ignition = RUN

Post-condition

HMI indicates {changes to Bolster Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-250055/B-Initiate Bolster Adjust at Seat - No pressure updates

Scenarios

Normal Usage

User <selects Set Bolster Lower or Upper Bladders> via seat HMI, but does not make any changes to the actual pressure.

Constraints

Pre-Condition

Display is ON

Ignition = RUN

Post-Condition

HMI indicates {changes to Bolster Adjust Mode}

Sequence Diagram



#### MCS-SD-REQ-250092/B-Set Bolster at Seat

Scenarios

Normal Usage

User <selects Set Bolster Lower or Upper Pair of Bladders> via seat HMI.

Constraints

Pre-Condition

Display is ON

Ignition = RUN

Post-Condition

HMI indicates {change Actual Pressure Settings as Seat Bladder pressure changes}

Sequence Diagram



#### MCS-SD-REQ-021379/A-End Bolster Adjust Update - Intiated at Touchscreen (TcSE ROIN-200871-1)

Scenarios

Normal Usage

The user ends Bolster Adjust Mode update.

Constraints

Pre-condition

Bolster Adjust is currently being updated by the user via the touchscreen HMI

Post-condition

Bolster Adjust is no longer being updated by the user via the touchscreen HMI

Sequence Diagram



#### MCS-SD-REQ-021380/A-End Bolster Adjust Update - Intiated at Seat (TcSE ROIN-200911-1)

Scenarios

Normal Usage

The user ends Bolster Adjust Mode update.

Constraints

Pre-condition

Bolster Adjust is currently being updated by the user via Seat HMI

Post-condition

Bolster Adjust no longer being updated by the user via Seat HMI.

Sequence Diagram



# Appendix: Reference Documents

|  |  |
| --- | --- |
| Reference # | Document Title |
| 1 | Related HMI specification: H74a-Seat Controls Shortcut Key |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 |  |
| 10 |  |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 |  |