# Climate Control System HMI Requirements

# General

***These requirements have been developed for the portion of a climate control system comprised of an Electronic Finish Panel(EFP), Remote Climate Control Module(RCCM) and Centerstack Display(CSD) They are presented here in context and as such, some of the specific requirements must be met by some components but maybe not others. To clarify, the EFP, RCCM and CSD are responsible for satisfying all requirements contained within this document unless otherwise specified via a specific notation in front of the requirement. Notation for these exceptions will be in the form of an "E" for EFP, "R" for RCCM and "D" for CSD***

***Reference to CSD is used as a simplification throughout this specification to represent a subsystem comprised of both a display and any applicable Sync module(s). Consequently, any CSD requirements within this specification must be satisfied by either the display and/or the Sync module(s). The specific breakdown is beyond the scope of this specification.***

***Many of the CAN messages required to support the climate system are transmitted and received across multiple network buses thru a gateway module. As a result certain message names may be appended with a suffix designating the source bus i.e. '_MS1' or '_HS3'. However, for simplicity all message names referenced throughout this specification refer to the base message name only and all modules shall treat as if these references include the suffix applicable for the bus(es) that module interfaces with.***

***Throughout this document general notes and other non-requirement material is listed in italics.***

***Whenever these requirements call for a signal state to be ignored, the last valid signal state received shall be used. If a valid signal state has never been received, please refer to applicable section for requirement.***

***Unless otherwise noted the term 'button' is used within these requirements to refer to any and all climate inputs, including inputs that may not exist as a hard buttons, such as voice commands or touchscreen objects.***

***Unless otherwise specified, all messages/signals/states/designations for Left hand side vs. Right hand side shall be interpreted literally and considered independently relative to type of vehicle - Left hand drive vs. Right hand drive. Unless otherwise specified, all messages/signals/states/designations for Driver vs. Passenger shall be interpreted literally and must be considered relative to type of vehicle - Left hand drive vs. Right hand drive. i.e. if receiving a signal denoted as driver, the receiving module is responsible for applying to proper side based on type of vehicle - Left hand drive vs. Right hand drive***

# 1 RCCM(Remote Climate Control Module) to Electronic Finish Panel (EFP) Interface

**1.1 E** The EFP shall provide status of climate control user inputs for the 'hard' controls on the instrument panel via **Messages**: Remote_Climate_Data

**1.2 E** The EFP shall also provide a means to display the climate control status for various functions as detailed throughout this specification.

**1.3** The RCCM communicates applicable system/indicator status back to the EFP via **Messages**: Clmt_Button_Stat1, Clmt_Button_Stat2, and Clmt_Button_Stat3.

# 2 RCCM(Remote Climate Control Module) to Centerstack Display (CSD) Interface

**2.1 D** For climate control systems, the CSD shall provide a means to display the climate control status(statically and/or whenever status changes) and, in the case of voice and/or touchscreen equipped vehicles, provide additional climate control inputs to the climate module. *Details for how CSD shall display climate control status upon change can be found in section 8.*.

**2.2 D** On some vehicles all of the settings and indicators for a Single Zone Manual climate control system are included as part of the EFP. In these cases, climate control status may not be included in CSD (in either a dedicated screen or status bar). Consequently, some of the following requirements can be disregarded for SZM systems as applicable.

**2.3 D** For Rear Zone climate control systems in touchscreen equipped vehicles, the CSD shall provide a means to display the climate control status and provide additional climate control inputs to the climate module.

**2.4** The CSD shall provide status of user inputs for both touchscreen and voice controls via **Message**: Clmt_Button_Stat4

**2.5** The RCCM communicates applicable system/indicator status back to the CSD via **Messages**: Clmt_Button_Stat1, Clmt_Button_Stat2, and Clmt_Button_Stat3.

**2.6** All climate menus, pop-ups, status messages etc within the CSD shall not be displayed based on a change in the indicator status signals/states. They shall only be displayed based on specific "trigger" signal/states associated with the applicable menu, pop-up, status message etc. as outlined within this specification.

*NOTE: All layouts, graphics & illustrations within this document are for reference only*

# 3 Front Controls

## 3.1 Knobs

3.1.1 **360 degree Rotary Knobs on the EFP** (i.e. continuous travel without a position pointer) shall communicate adjustments to the RCCM via transmission of the increment or decrement button signals defined within

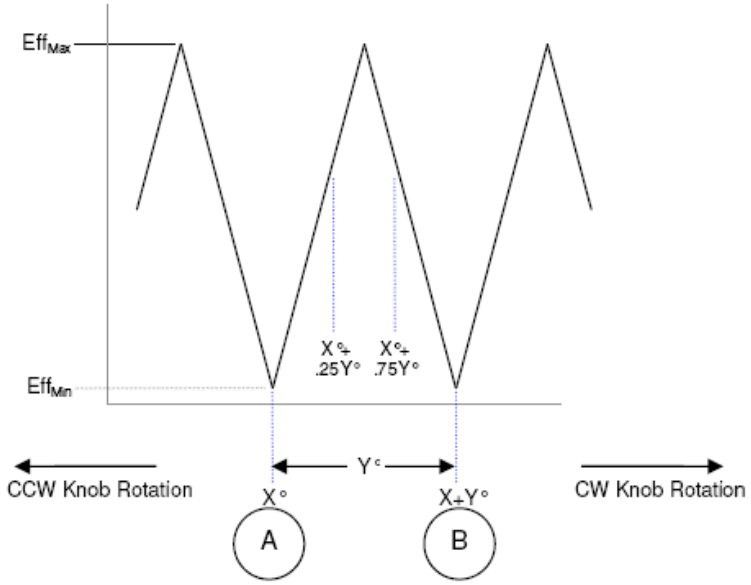
sections 3.4.1 and 3.5.3 as applicable. The EFP will transmit increment pressed status or increment not-pressed status, and decrement pressed status or not-pressed status, for each knob movement (using detent or non-detent move interval as calibrated & filtered in the EFP software per application).

3.1.2 **Absolute position Rotary Knobs on the EFP (**i.e. fixed position knobs with position pointers) shall provide an absolute position in degrees of clockwise rotation from the full counter clockwise knob mechanical stop position (using detent or non-detent move interval as calibrated & filtered in the EFP software per application).

3.1.3 The RCCM will make the full clockwise position and the blower setting ranges calibratable.

3.1.4 The EFP shall limit the signal states to valid values, defined as follows:

Rotary Knob Rotation Multiplex Message Format




3.1.5 **Rotary knob function:**
A climate control knob is at rest at position "A" which corresponds to X° of rotation from the full CCW position. The CAN message shall contain the angular information for X. This information shall continue to be transmitted, as the knob is rotated from position "A" to "B" until the angular rotation exceeds 75% of the angular rotation between detent positions A and B. Once the angular position exceeds the X°+ .75Y° +/- .05Y° (or 1°, whichever is greater) point the MS-CAN data shall transmit the angular information which corresponds to position B. The only valid angular data shall be that which corresponds to position A or B. The module transmitting this angular position shall not transmit CAN data for intermediate positions. Hysteresis is maintained in a similar fashion for rotation in the opposite direction (i.e. CCW). If the knob is resting at position B the transmitting module shall transmit the total angular sum of X°+Y°. This information shall be transmitted until the angular position of the knob exceeds X° +.25 Y° +/- .05Y° (or 1°, whichever is greater).

The data to be transmitted(if applicable) shall be limited to following values:

*Manual Blower, 7 positions:*
*0° (blower speed 1), 20° (blower speed 2), 40° (blower speed 3), 60° (blower speed 4), 80° (blower speed 5), 100° (blower speed 6), 120° (blower speed 7)*

Manual Temperature, 31 positions:
0°, 9°, 18°, 27°, 36°, 45°, 54°, 63°, 72°, 81°, 90°, 99°, 108°, 117°, 126°, 135°, 144°, 153°, 162°, 171°, 180°, 189°, 198°, 207°, 216°, 225°, 234°, 243°, 252°, 261°, 270°

## 3.2 Touchscreen – Climate Control Access

3.2.1 **D** The CSD shall support the access of both the front and rear climate interfaces within a touchscreen via shortcut buttons on the EFP in addition to (or in place of) any climate menu buttons in the touchscreen itself.

3.2.2 **E-** In the case of the Rear Menu shortcut button, the EFP shall include an indicator that illuminates whenever the 2nd and/or 3rd row rear zone power is on.

3.2.3 The signals used to provide status to the CSD from the EFP for the climate shortcut buttons are as follows:

EFP Press status: **Message:** **RemoteClimate_Data**
**Signal:** E_Frt_Btn_Status_1st
E_Frt_Btn_Status_2nd

*3.2.3.1* **State** FrontMnu_Pressed
*Defined as data range 0x20*
The EFP shall transmit this signal state whenever the user selects the 'Menu' or "More' shortcut button to access the Front climate interface. Upon receipt of this state within either of these signals the CSD shall open and display (or close) the front climate interface.

*3.2.3.2* **State** MdeMnu_Pressed
*Defined as data range 0x24*
The EFP shall transmit this signal state whenever the user selects the 'Air Distribution' shortcut button to access the air distribution interface. Upon receipt of this state within either of these signals the CSD shall open and display (or close) the air distribution interface.

*3.2.3.3* **State** RearMnu_Pressed
*Defined as data range 0x21*
The EFP shall transmit this signal state whenever the user selects the 'Rear' shortcut button to access the Rear climate interface. Upon receipt of this state within either of these signals the CSD shall open and display (or close) the rear climate interface.

3.2.4 The signals used to provide status to the EFP from the RCCM for the Rear Menu shortcut button indication are as follows:

EFP Indicator status: (for Rear Menu shortcut button only):

**Message:** Clmt_Button_Stat3
**Signal:** Rr_Power_Btn_Stt

**Message:** Clmt_Button_Stat7
**Signal:** Rr_Third_Power_Btn_Stt

<u>Rr_Power_Btn_Stt</u>

3.2.4.1 **State** Enabled_Inactive
*Defined as data range (0x0)*
The EFP shall consider the state of Signal: Rr_Third_Power_Btn_Stt and if this signal state is also Enabled_Inactive or Disabled, the EFP shall set included indicator to off(Inactive).

3.2.4.2 **State:** Active *(used as an Enabled_Active equivalent state)*
*Defined as data range (0x1)*

The EFP shall set included indicator to on(Active).

3.2.4.3 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The EFP shall consider the state of Signal: Rr_Third_Power_Btn_Stt and if this signal state is also Disabled or Enabled_Inactive, the EFP shall set included indicator to off(Inactive).

3.2.4.4 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The EFP shall set included indicator to on(Active).

Rr_Third_Power_Btn_Stt

3.2.4.5 **State** Enabled_Inactive
*Defined as data range (0x0)*
The EFP shall consider the state of Signal: Rr_Btn_Stt and if this signal state is also Enabled_Inactive or Disabled, the EFP shall set included indicator to off(Inactive).

3.2.4.6 **State:** Active *(used as an Enabled_Active equivalent state)*
*Defined as data range (0x1)*
The EFP shall set included indicator to on(Active).

3.2.4.7 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The EFP shall consider the state of Signal: Rr_Btn_Stt and if this signal state is also Disabled or Enabled_Inactive, the EFP shall set included indicator to off(Inactive).

3.2.4.8 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The EFP shall set included indicator to on(Active).

3.2.5 CSD shall use only the above signals and states within RemoteClimate_Data. All other signals within this message and all other states within these signals shall be ignored.

3.2.6 The CSD may also utilize the above signals to allow users the ability to toggle the front and/or rear climate interfaces both on and off via selection of the shortcut buttons. In order to do this the CSD shall only open the climate interface, if currently off (OR close it, if currently on) when **State** = xxxMnu_Pressed (0x20 or 0x21) is preceded by **State** ≠ xxxMnu_Pressed (0x20 or 0x21) within the same signal.

*Any requirements for the appearance of the climate interfaces accessed via a shortcut button on the climate module including size, location, transitions, duration etc. are outside the scope of these requirements and are not included within this specification. They shall be developed per separate GUI design standards and/or other specifications from HMI activity.*

## 3.3 Touchscreen – Air Quality status

3.3.1 The CSD shall support the display of both exterior and cabin air quality status via dedicated screen(s) and/or overlay(s). The requirements for when the air quality status shall actually be displayed are outside the scope of this specification, but the determination of the actual cabin Air Quality shall be made by the RCCM.

# Cabin Air Quality (PM2.5 or PM10)

## Current Quality

3.3.2 The signals used to provide status of the current air quality inside the cabin from the RCCM to the CSD are as follows:

Current status: **Message:** **ParticulateMatterData2**
**Signal:** PmCabn_Conc_Actl

PmCabn_Conc_Actl

*3.3.2.1* **State** 0-500
*Defined as data range 0x000-0x1F4*
The CSD shall display the value received (numerically and/or graphically) as the current cabin air quality.

*3.3.2.2* **State** 501-509
*Defined as data range 0x1F5-0x1FD*
These signal states are included as a design protect only. Consequently, the RCCM shall never transmit these states. If the CSD receives these states it shall respond as if it has received 'No_Data_Exists' state.

*3.3.2.3* **State** No_Data_Exists
*Defined as data range 0x1FE*
The CSD shall consider the state of signal PmSnsCabn_D_Stat and satisfy the requirements for the current state of that signal.

*3.3.2.4* **State** Faulty
*Defined as data range 0x1FF*
This signal state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If the CSD receives this state it shall respond as if it has received 'No_Data_Exists' state.

## Historical Quality

3.3.3 The signals used to provide status of the historical air quality inside the cabin from the RCCM to the CSD are as follows:

Historical Data: **Message:** **ParticulateMatterData1**
**Signals:** PmCabn02Mnte_Conc_Actl
PmCabn04Mnte_Conc_Actl
PmCabn06Mnte_Conc_Actl
PmCabn08Mnte_Conc_Actl
PmCabn10Mnte_Conc_Actl

**Message:** **ParticulateMatterData2**
**Signals:** PmCabn12Mnte_Conc_Actl
PmCabn14Mnte_Conc_Actl
PmCabn16Mnte_Conc_Actl
PmCabn18Mnte_Conc_Actl
PmCabn20Mnte_Conc_Actl

PmCabnxxMnte_Conc_Actl

*3.3.3.1* **State** 0-509
*Defined as data range 0x000-0x1FD*
The CSD shall display the value received (numerically and/or graphically) as the cabin air quality associated with the applicable time (previous 2-20 minutes as defined per the signal name).

*3.3.3.2* **State** No_Data_Exists
*Defined as data range 0x1FE*
The CSD shall blank out any data that would normally be displayed in the area where the associated Cabin data would normally be displayed or graphed.

*3.3.3.3* **State** Faulty
*Defined as data range 0x1FF*
This signal state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If the CSD receives this state it shall respond as if it has received 'No_Data_Exists' state.

## Sensor Diagnostics

3.3.4 The RCCM shall also support the transmission of a signal based on diagnosis of current cabin sensor status. The CSD shall then use this information to determine if additional information shall be displayed in addition to, or in place of the current air quality data. The signal used to provide the cabin sensor status is as follows:

**Message:** **ParticulateMatterData2**
**Signal:** PmSnsCabn_D_Stat

PmSns~~r~~Cabn_D_Stat

*3.3.4.1* **State** Initializing
*Defined as data range 0x0*
The CSD shall display the text "Initializing" (and/or approved alternative) in the area(s) where the current cabin data would normally be displayed.

*3.3.4.2* **State** Unsupported
*Defined as data range 0x1*
This signal state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If the CSD receives this state it shall respond as if it has received 'Blank_Field' state.

*3.3.4.3* **State** Clean_Sensor
*Defined as data range 0x2*
The CSD shall display the text "Sensor Dirty" (and/or approved alternative) in the area(s) where the current cabin data would normally be displayed.

*3.3.4.4* **State** Replace_Sensor
*Defined as data range 0x3*
The CSD shall display the text "Replace the sensor" (and/or approved alternative) in the area(s) where the current cabin data would normally be displayed.

*3.3.4.5* **State** Blank_Field
*Defined as data range 0x4*
The CSD shall blank out any data that would normally be displayed in the area(s) where the current cabin data would normally be displayed or graphed.

*3.3.4.6* **State** No_Issue
*Defined as data range 0x5*
NOTE: This is the default signal state that will be transmitted whenever none of the other requirements is met for other signal states.
The CSD shall display the numerical value 0-500 within signal PmCabn_Conc_Actl if available. Otherwise, the CSD shall blank out any data that would normally be displayed in the area(s) where the current cabin data would normally be displayed or graphed.

*3.3.4.7* **State** Intermittent_Inhibit
*Defined as data range 0x6*
The CSD shall display the text "environmental limit reached" (and/or approved alternative) in the area(s) where the current cabin data would normally be displayed or graphed.

*3.3.4.8* **State** Not_Used_1
*Defined as data range 0x7*

This signal state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If the CSD receives this state it shall respond as if it has received 'No_Issue' state.

*Requirements for specific display appearance, labeling, layout, size, duration etc. for the above data are not included within this specification are outside the scope of these requirement. These requirements shall be determined as part of the GUI design standards and/or other HMI/Sync system requirements. However, it is recommended for CSD to include a 5-10s delay before reading and displaying historical quality data it receives in PmCabnxxMnte_Conc_Actl and/or to continuously read this data to eliminate possibility of timing offsets and display issues.*

## 3.4 "Buttons"

3.4.1 Unless otherwise specified touchscreen button status and any applicable indications shall be determined based solely on the CAN signals designated for indicator status within these requirements.

3.4.2 Unless otherwise noted the details outlined within sections 3.8.6.1 – 3.8.6.4 shall apply for all signals that have identical encoding to the encoding outlined within these sections.

3.4.3 **Signals:** Frt_Btn_Status_2nd and Rr_Btn_Status_2nd within **Message**: Clmt_Button_Stat4 are included to support recognition of simultaneous, physical button presses for up to two functions at a time.

3.4.4 **Signals:** E_Frt_Btn_Status_2nd and E_Rr_Btn_Status_2nd within **Message**: Remote_Climate_Data are included to support recognition of simultaneous, physical button presses for up to two functions at a time.

3.4.5 The EFP shall design hardware and implement software so that selection of the Defrost and/or Max Defrost(if applicable) functions are always transmitted within either Frt_Btn_Status_1st or Frt_Btn_Status_2nd signals regardless of how many other buttons are pushed at the same time.

3.4.6 The EFP and/or CSD shall have the ability to determine if any of the climate control inputs are "stuck". A climate input shall be considered "stuck" any time it is reported as having been in a pressed state continuously for ≥ 120s.

3.4.7 If any climate control input is determined to be "stuck", it shall be ignored(i.e. Pressed state for that function shall no longer be transmitted) for the duration of time it is "stuck" Other inputs shall be conditionally accepted per the following:

3.4.7.1 If all inputs used to direct air to the windshield become "stuck" (i.e. both Windscreen and Max Defrost(if applicable) buttons/inputs on an EFP mated w/ non-touch screen OR Defrost and Max Defrost buttons/inputs on an EFP mated w/ 8" touch screen), the EFP shall continuously transmit:

- Max_Defrost_Pressed state to the RCCM for the duration of time that ALL of these inputs are "stuck". IF EQUIPPED WITH MAX DEFROST FUNCTION
- Defrost_Pressed state to the RCCM for the duration of time that ALL of these inputs are "stuck". IF NOT EQUIPPED WITH MAX DEFROST FUNCTION

3.4.7.2 If all inputs on the climate module that are used to direct air to the windshield become "stuck", the system shall still allow a press of the power button to turn the system off. However, if all of these inputs are "stuck" when the power is turned on (regardless of how the power is turned on), the system shall return to Windscreen mode.

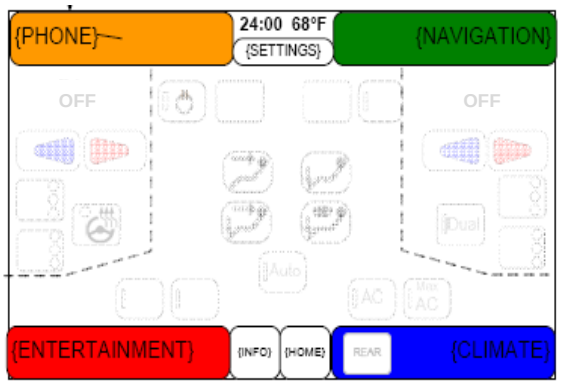
3.4.7.3 The status and associated limitations defined above for a "stuck" button/input shall be cleared when that button/input is no longer considered "stuck".

3.4.8 The RCCM shall be responsible for using the xxx_Pressed or None_Pressed states transmitted by the CSD and/or EFP to determine if 'press & hold" strategy (per Climate Module functional specification) shall be used.

3.4.9 The RCCM shall be responsible for using the xxx_Pressed or None_Pressed states transmitted by the CSD and/or EFP to determine proper response for Multiple Input strategies (per Climate Module functional specification).

3.4.10 The RCCM shall not set a stuck button DTC for any button press input received via a network message. The module sending the button press status message to RCCM shall set a stuck button DTC as applicable.

3.4.11 **D**-When Vehicle State = 'Ignition Off – Not Started', all climate functions within the touchscreen shall be 'grayed' out and not selectable – See illustration below




3.4.12 **D**-When Vehicle State = 'Ignition Off – Not Started', all climate displays within the status bar and any applicable 'Home' Screen shall be blank. Appropriate feedback such as "Climate Off" may be provided in these displays.

## 3.5 Temperature Display (Manual Climate Systems)

3.5.1 The CSD shall use the following signal states to determine what temperature setting shall be displayed. The indication/display for the specific temperature setting shall be in the form of a graphic showing the relative position along a range of possible settings from Full Cool to Full Heat. The RCCM shall transmit the applicable state for these signals per the applicable state logic section(s) of the RCCM Functional Specification.

| | | |
|---|---|---|
| Press status | **Message:** | None |
| | **Signal:** | None |
| Indicator Status | **Message:** | BCP_Status_Message |
| | **Signal:** | Manual_Temp_Setting |

3.5.1.1 **State:** Off (0x00)
The CSD shall indicate via graphical expression that climate control power is off and eliminate any indication/display for a specific temperature setting. The RCCM shall transmit this state whenever the climate control power is off.

3.5.1.2 **State:** Full_Cool (0x01)
The CSD shall display temperature setting associated with the coolest position on the temperature range which shall be at lowest, extreme end of the range. At this end of the range the graphics must be colored blue.

3.5.1.3 **State:** Setting_2 (0x02)
The CSD shall display temperature setting associated with 2nd coolest position on the temperature range.

3.5.1.4 **State:** Setting_3 (0x03)
The CSD shall display temperature setting associated with 3rd coolest position on the temperature range.

3.5.1.5 **State:** Setting_4 (0x04)
The CSD shall display temperature setting associated with 4th coolest position on the temperature range.

3.5.1.6 **State:** Setting_5 (0x05)
The CSD shall display temperature setting associated with 5th coolest position on the temperature range

3.5.1.7 **State:** Setting_6 (0x06)
The CSD shall display temperature setting associated with 6th coolest position on the temperature range.

3.5.1.8 **State:** Setting_7 (0x07)
The CSD shall display temperature setting associated with 7th coolest position on the temperature range.

3.5.1.9 **State:** Setting_8 (0x08)
The CSD shall display temperature setting associated with 8th coolest position on the temperature range.

3.5.1.10 **State:** Setting_9 (0x09)
The CSD shall display temperature setting associated with 9th coolest position on the temperature range.

3.5.1.11 **State:** Setting_10 (0x0A)
The CSD shall display temperature setting associated with 10th coolest position on the temperature range.

3.5.1.12 **State:** Setting_11 (0x0B)
The CSD shall display temperature setting associated with 11th coolest position on the temperature range.

3.5.1.13 **State:** Setting_12 (0x0C)
The CSD shall display temperature setting associated with 12th coolest position on the temperature range.

3.5.1.14 **State:** Setting_13 (0x0D)
The CSD shall display temperature setting associated with 13th coolest position on the temperature range.

3.5.1.15 **State:** Setting_14 (0x0E)
The CSD shall display temperature setting associated with 14th coolest position on the temperature range.

3.5.1.16 **State:** Setting_15 (0x0F)
The CSD shall display temperature setting associated with 15th coolest position on the temperature range.

3.5.1.17 **State:** Setting_16 (0x10)
The CSD shall display temperature setting associated with the 16th coolest (midpoint) position on the temperature range.

3.5.1.18 **State:** Setting_17 (0x11)
The CSD shall display temperature setting associated with 17th coolest (15th hottest) position on the temperature range.

3.5.1.19 **State:** Setting_18 (0x12)
The CSD shall display temperature setting associated with 18th coolest (14th hottest) position on the temperature range.

3.5.1.20 **State:** Setting_19 (0x13)
The CSD shall display temperature setting associated with 19th coolest (13th hottest) position on the temperature range.

3.5.1.21 **State:** Setting_20 (0x14)

The CSD shall display temperature setting associated with 20th coolest (12th hottest) position on the temperature range.

3.5.1.22 **State:** Setting_21 (0x15)
The CSD shall display temperature setting associated with 21st coolest (11th hottest) position on the temperature range

3.5.1.23 **State:** Setting_22 (0x16)
The CSD shall display temperature setting associated with 22nd coolest (10th hottest) position on the temperature range.

3.5.1.24 **State:** Setting_23 (0x17)
The CSD shall display temperature setting associated with 23rd coolest (9th hottest) position on the temperature range.

3.5.1.25 **State:** Setting_24 (0x18)
The CSD shall display temperature setting associated with 24th coolest (8th hottest) position on the temperature range.

3.5.1.26 **State:** Setting_25 (0x19)
The CSD shall display temperature setting associated with 25th coolest (7th hottest) position on the temperature range.

3.5.1.27 **State:** Setting_26 (0x1A)
The CSD shall display temperature setting associated with 26th coolest (6th hottest) position on the temperature range

3.5.1.28 **State:** Setting_27 (0x1B)
The CSD shall display temperature setting associated with 27th coolest (5th hottest) position on the temperature range.

3.5.1.29 **State:** Setting_28 (0x1C)
The CSD shall display temperature setting associated with 28th coolest (4th hottest) position on the temperature range.

3.5.1.30 **State:** Setting_29 (0x1D)
The CSD shall display temperature setting associated with 29th coolest (3rd hottest) position on the temperature range

3.5.1.31 **State:** Setting_30 (0x1E)
The CSD shall display temperature setting associated with 30th coolest (2nd hottest) position on the temperature range.

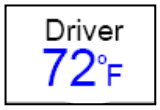
3.5.1.32 **State:** Full_Heat (0x1F)
The CSD shall display temperature setting associated with the hottest positon on the temperature range which shall be at highest, extreme end of the range. At this end of the range the graphics must be colored red.

3.5.2 Indication/display for temperature setting shall also be made available on the 'Home' screen(as applicable) and the climate status bar

## 3.6 Driver and Passenger Setpoint Displays (Automatic Climate Systems)

3.6.1 The CSD and/or other displays shall use the following signal states to determine what value shall be displayed for the left hand side occupant's setpoint. *NOTE: This will typically be the driver but may be passenger in certain regions. In the case of an autonomous vehicle with a single setpoint the following LHS signal states*

*shall be used.* The RCCM shall transmit the applicable state for these signals per the applicable state logic section(s) of the RCCM Functional Specification.




| | | |
|---|---|---|
| Press status | **Message:** | None |
| | **Signal:** | None |
| Indicator Status | **Message:** | Clmt_Button_Stat2 |
| | **Signals:** | LHS_Temp_Display_Digit1<br>LHS_Temp_Display_Digit2<br>LHS_Temp_Display_Digit3<br>EATC_LHS_Units |

LHS_Temp_Display_Digit1-2

3.6.1.1 **State:** "ASCII" encoding
*Data range 0x0 -0xFF*
The CSD shall simply display the corresponding ASCII character. The CSD shall be capable of displaying all alphanumeric characters. Any non-alphanumeric character transmitted within these signals shall also be displayed if possible. If a non-alphanumeric character cannot be displayed due to constraints on display font etc., the CSD shall replace the character with a blank.

LHS_Temp_Display_Digit3

3.6.1.2 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display a third digit for left hand side setpoint.

3.6.1.3 **State:** _0
*Defined as data range (0x1)*
The CSD shall display .0 (decimal point followed by zero) as the third digit for left hand side setpoint.

3.6.1.4 **State:** _5
*Defined as data range (0x2)*
The CSD shall display .5 (decimal point followed by five) as the third digit for left hand side setpoint.

3.6.1.5 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the ECP. In the event this signal state is received by the CSD, it shall not display a third digit for left hand side setpoint.

EATC LHS_Units

3.6.1.6 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display anything following the applicable setpoint value.

3.6.1.7 **State:** Celsius
*Defined as data range (0x1)*
The CSD shall display shall display °C after the applicable setpoint value.

3.6.1.8 **State:** Fahrenheit
*Defined as data range (0x2)*
The CSD shall display shall display °F after the applicable setpoint value.

3.6.1.9 **State:** Unused
*Defined as data range (0x3)*

This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall not display anything following the applicable setpoint value.

3.6.2 The CSD shall use the following signals to determine what value shall be displayed for the right hand side occupant's setpoint.


| | | |
|---|---|---|
| Press status | **Message:** | None |
| | **Signal:** | None |
| Indicator Status | **Message:** | Clmt_Button_Stat2 |
| | **Signals:** | RHS_Temp_Display_Digit1<br>RHS_Temp_Display_Digit2<br>RHS_Temp_Display_Digit3<br>EATC_RHS_Unit |

RHS_Temp_Display_Digit1-2

3.6.2.1 **State:** "ASCII" encoding
*Data range 0x0 -0xFF*
The CSD shall simply display the corresponding ASCII character. The CSD shall be capable of displaying all alphanumeric characters. Any non-alphanumeric character transmitted within these signals shall also be displayed if possible. If a non-alphanumeric character cannot be displayed due to constraints on display font etc., the CSD shall replace the character with a blank.

RHS_Temp_Display_Digit3

3.6.2.2 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display a third digit for right hand side setpoint.

3.6.2.3 **State:** _0
*Defined as data range (0x1)*
The CSD shall display .0 (decimal point followed by zero) as the third digit for right hand side setpoint.

3.6.2.4 **State:** _5
*Defined as data range (0x2)*
The CSD shall display .5 (decimal point followed by five) as the third digit for right hand side setpoint.

3.6.2.5 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall not display a third digit for right hand side setpoint.

EATC RHS_Units

3.6.2.6 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display anything following the applicable setpoint value.

3.6.2.7 **State:** Celsius
*Defined as data range (0x1)*
The CSD shall display shall display °C after the applicable setpoint value.

3.6.2.8 **State:** Fahrenheit
*Defined as data range (0x2)*
The CSD shall display shall display °F after the applicable setpoint value.

3.6.2.9 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall not display anything following the applicable setpoint value.

3.6.3 Both driver and passenger set points shall be displayed per above signal states whenever the automatic climate controls are on, regardless of whether the system is operating in single or dual zone states.

3.6.4 **D/E-**Indication/display for what driver and passenger setpoints have been selected shall also be made available on the 'Home' screen(as applicable) and the climate status bar

## 3.7 Temperature selection (Conventional up/down buttons)

3.7.1 The CSD, EFP and/or any other module that supports climate interface shall use the following signals to communicate that a temperature setting(Manual system) or temperature setpoint(Auto system) adjustment has been requested via press of a temperature up or down button.

## Left Hand Side Setpoint

3.7.2 **For Manual systems**, temperature adjustments shall always be communicated via the following Left Hand Side signal states.

3.7.3 **For Single Zone Auto systems (incl Autonomous vehicles with single setpoint)**, temperature adjustments shall always be communicated via the following Left Hand Side signal states.

3.7.4 **For Dual Zone Auto systems**, the following Left Hand Side signal states will typically be transmitted for driver's temperature adjustment, but may be transmitted for passenger's adjustment in certain regions.

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| ECG status | **Message:** | ECG_Climate_Set |
| | **Signals:** | Frt_Btn_Status_1st_2 |
| | **State:** | LHS_Temp_Inc_Pressed |
| EFP Press status | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | LHS_Temp_Dec_Pressed |
| ECG status | **Message:** | ECG_Climate_Set |
| | **Signals:** | Frt_Btn_Status_1st_2 |
| | **State:** | LHS_Temp_Dec_Pressed |
| EFP Press status | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | LHS_Temp_Dec_Pressed |

| | | |
|---|---|---|
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

## Right Hand Side Setpoint

3.7.5 **For Manual systems**, the following Right Hand Side signal states shall never be transmitted.

3.7.6 **For Single Zone Auto systems(incl Autonomous vehicles with single setpoint)**, the following Right Hand Side signal states shall never be transmitted.

3.7.7 **For Dual Zone Auto systems**, the following Right Hand Side signal states will typically be transmitted for passenger's temperature adjustment, but may be transmitted for driver's adjustment in certain regions.

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | RHS_Temp_Inc_Pressed |
| ECG status | **Message:** | ECG_Climate_Set |
| | **Signals:** | Frt_Btn_Status_1st_2 |
| | **State:** | RHS_Temp_Inc_Pressed |
| EFP Press status | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | RHS_Temp_Inc_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1$^{st}$ |
| | | Frt_Btn_Status_2nd |
| | **State:** | RHS_Temp_Dec_Pressed |
| ECG status | **Message:** | ECG_Climate_Set |
| | **Signals:** | Frt_Btn_Status_1st_2 |
| | **State:** | RHS_Temp_Dec_Pressed |
| EFP Press status | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | RHS_Temp_Dec_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

Both LHS and RHS setpoint selections via up/down buttons shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button.

## 3.8 Temperature selection (Direct/Slider interface)

3.8.1 The CSD and/or any other module that supports climate interface shall use the following signals to communicate that a temperature setting(Manual system) or temperature setpoint(Auto system) adjustment has been requested via any of the following methods:

- Selection of specific setting or setpoint by press of a button/location within a range of temperatures
- Movement of a temperature "slider" across a range of temperatures
- Voice command for a valid temperature setting (ref voice command section below)
- Selection of a particular user profile and/or user selection from within a phone app etc.

3.8.2 **For Manual systems**, all temperature adjustments shall be communicated via Drv_Set_Temp signal only. State of Psngr_Set_Temp signal shall always be set = No_Request. In the event RCCM receives Psngr_Set_Temp signal state ≠ No_Request, it shall treat as if it has received No_Request.

3.8.3 **For Single Zone Auto systems(incl Autonomous vehicles with single setpoint),** all temperature adjustments shall be communicated via Drv_Set_Temp signal only. State of Psngr_Set_Temp signal shall always be set = No_Request. In the event RCCM receives Psngr_Set_Temp signal state ≠ No_Request, it shall treat as if it has received No_Request.

3.8.4 **For Dual Zone Auto systems**, the temperature adjustments shall be communicated via the applicable signal per user request.

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Drv_Set_Temp |
| | | Psngr_Set_Temp |
| ECG status | **Message:** | ECG_Climate_Set |
| | **Signals:** | Drv_Set_Tmp2 |

3.8.5 **D**-When CSD provides a "slider" type interface for temperature selection the user may change the temperature very quickly and pass thru many temperatures in a short period of time. Consequently, the CSD shall limit transmission of Drv_Set_Temp and Psngr_Set_Temp signals to no quicker than once every 20 msec +/-10%.

3.8.6 While slider type interface is being used to adjust temperature and the signal(s) are being transmitted, the CSD shall continue to update the temperature display(s) per the applicable signal states it receives from the RCCM.

*For example, if the driver's setpoint is 16°C and the user drags slider to increase by 10°C (i.e. to 26°C) in 100 msec then only 5 Drv_Set_Temp updates would be sent out 20 msec +/- 10% apart and the setpoint display would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between setpoint request and display update over CAN for simplicity):*

*a) 20 msec after first starting to move slider from 16°C Drv_Set_Temp = 17.5°C →*
*b) 20 msec later Drv_Set_Temp = 19.5°C →*
*c) 20 msec later Drv_Set_Temp = 22.0°C →*
*d) 20 msec later Drv_Set_Temp = 24.5°C - Display changes from 16°C to 17.5°C →*
*e) 20 msec later Drv_Set_Temp = 26.0°C when the user removes finger from touchscreen - Display changes from 17.5°C to 19.5°C →*
*f) 20 msec later Display changes from 19.5°C to 22.0°C →*
*g) 20 msec later Display changes from 22.0°C to 24.5°C →*
*h) 20 msec later Display changes from 24.5°C to 26.0°C (display reflects final setpoint selection within maximum allowable time per latency requirements – 60msec in this example)*

3.8.7 The sync system shall convert and transmit all commands for a specific temperature in units of °C only, per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for the other state are satisfied.
**State:** LO (0x01)
Transmitted whenever the user issues a request for full cool(Manual system) or LO/ minimum temperature setpoint(Auto system).
**State:** 15_5 (0x02)
Transmitted whenever the user issues a request for 2nd coolest position(Manual system), 15.5 °C or 60°F

temperature setpoint(Auto system).
**State:** 16_0 (0x03)
Transmitted whenever the user issues a request for 3rd coolest position(Manual system), 16.0 °C or 61°F temperature setpoint(Auto system).
**State:** 16_5 (0x04)
Transmitted whenever the user issues a request for 4th coolest position(Manual system), 16.5 °C or 62°F temperature setpoint(Auto system).
**State:** 17_0 (0x05)
Transmitted whenever the user issues a request for 5th coolest position(Manual system), 17.0 °C or 63°F temperature setpoint(Auto system).
**State:** 17_5 (0x06)
Transmitted whenever the user issues a request for 6th coolest position(Manual system), 17.5 °C temperature setpoint(Auto system).
**State:** 18_0 (0x07)
Transmitted whenever the user issues a request for 7th coolest position(Manual system), 18.0 °C or 64°F temperature setpoint(Auto system).
**State:** 18_5 (0x08)
Transmitted whenever the user issues a request for 8th coolest position(Manual system), 18.5 °C or 65°F temperature setpoint(Auto system).
**State:** 19_0 (0x09)
Transmitted whenever the user issues a request for 9th coolest position(Manual system), 19.0 °C or 66°F temperature setpoint(Auto system).
**State:** 19_5 (0x0A)
Transmitted whenever the user issues a request for 10th coolest position(Manual system), 19.5 °C or 67°F temperature setpoint(Auto system).
**State:** 20_0 (0x0B)
Transmitted whenever the user issues a request for 11th coolest position(Manual system), 20.0 °C or 68°F temperature setpoint(Auto system).
**State:** 20_5 (0x0C)
Transmitted whenever the user issues a request for 12th coolest position(Manual system), 20.5 °C or 69°F temperature setpoint(Auto system).
**State:** 21_0 (0x0D)
Transmitted whenever the user issues a request for 13th coolest position(Manual system), 21.0 °C or 70°F temperature setpoint(Auto system).
**State:** 21_5 (0x0E)
Transmitted whenever the user issues a request for 14th coolest position(Manual system), 21.5 °C or 71°F temperature setpoint(Auto system).
**State:** 22_0 (0x0F)
Transmitted whenever the user issues a request for 15th coolest position(Manual system), 22.0 °C or 72°F temperature setpoint(Auto system).
**State:** 22_5 (0x10)
Transmitted whenever the user issues a request for 16th coolest position(Manual system), 22.5 °C temperature setpoint(Auto system).
**State:** 23_0 (0x11)
Transmitted whenever the user issues a request for 17th coolest position(Manual system), 23.0 °C or 73°F temperature setpoint(Auto system).
**State:** 23_5 (0x12)
Transmitted whenever the user issues a request for 18th coolest position(Manual system), 23.5 °C or 74°F temperature setpoint(Auto system).
**State:** 24_0 (0x13)
Transmitted whenever the user issues a request for 19th coolest position(Manual system), 24.0 °C or 75°F temperature setpoint(Auto system).
**State:** 24_5 (0x14)
Transmitted whenever the user issues a request for 20th coolest position(Manual system), 24.5 °C or 76°F temperature setpoint(Auto system).
**State:** 25_0 (0x15)

Transmitted whenever the user issues a request for 21st coolest position(Manual system), 25.0 °C or 77°F temperature setpoint(Auto system).
**State:** 25_5 (0x16)
Transmitted whenever the user issues a request for 22nd coolest position(Manual system), 25.5 °C or 78°F temperature setpoint(Auto system).
**State:** 26_0 (0x17)
Transmitted whenever the user issues a request for 23rd coolest position(Manual system), 26.0 °C or 79°F temperature setpoint(Auto system).
**State:** 26_5 (0x18)
Transmitted whenever the user issues a request for 24th coolest position(Manual system), 26.5 °C or 80°F temperature setpoint(Auto system).
**State:** 27_0 (0x19)
Transmitted whenever the user issues a request for 25th coolest position(Manual system), 27.0 °C or 81°F temperature setpoint(Auto system).
**State:** 27_5 (0x1A)
Transmitted whenever the user issues a request for 26th coolest position(Manual system), 27.5 °C temperature setpoint(Auto system).
**State:** 28_0 (0x1B)
Transmitted whenever the user issues a request for 27th coolest position(Manual system), 28.0 °C or 82°F temperature setpoint(Auto system).
**State:** 28_5 (0x1C)
Transmitted whenever the user issues a request for 28th coolest position(Manual system), 28.5 °C or 83°F temperature setpoint(Auto system).
**State:** 29_0 (0x1D)
Transmitted whenever the user issues a request for 29th coolest position(Manual system), 29.0 °C or 84°F temperature setpoint(Auto system).
**State:** 29_5 (0x1E)
Transmitted whenever the user issues a request for 30th coolest position(Manual system), 29.5 °C or 85°F temperature setpoint(Auto system).
**State:** HI (0x1F)
Transmitted whenever the user issues a request for full heat(Manual system) or HI/maximum temperature setpoint(Auto system)..

3.8.8 Upon receipt of these signals with state ≠ No_Request the RCCM shall immediately change the temperature setting and transmit the corresponding signal states for temperature displays subject to the following exceptions and additional requirements:

3.8.8.1 When receiving quick, successive changes of states ≠ No_Request (possible if the user changes the temperature very quickly within a short period of time – see above), the RCCM shall only transmit signal states for temperature displays that agree with the temperatures received from the CSD and shall do so no quicker than once every 20 msec +/-10%.

3.8.8.2 The RCCM shall change the temperature setting to the transmitted value or equivalent without changing the current type of units (°C or °F) being used. i.e. If vehicle is currently set-up to display temperature in °F, then the RCCM shall first convert incoming value to °F per table in Appendix B and then change setpoint to this value.

3.8.8.3 If the Vehicle State = a Normal Run state and the Climate system is in the off state when a valid signal for driver and/or passenger temperature is received, then the RCCM shall turn the climate system on per the state logic requirements (using the next state specified for a temp input) and use the set temp value contained in the signal.

3.8.9 If/when the EFP includes an absolute position rotary knob, it shall use the following signals to communicate that a setpoint adjustment has been requested (Ref section 3.1 above for more details on possible states).

| | | |
|---|---|---|
| EFP Temp Knob Status | **Message:** | Remote_Climate_Data |
| | **Signals:** | FrtTe_An_Actl |

## 3.9 Front Blower Speed Display

3.9.1 Indication/display shall be in the form of a blower graphic along with the appropriate number of manual blower bars/indicators. The RCCM shall transmit the applicable state for these signals per the applicable state logic section(s) of the Climate Module Functional Specification.

3.9.2 The signal used to provide indication for the front blower speed is as follows:

| | | |
|---|---|---|
| Press status: | **Message:** | None |
| | **Signal:** | None |
| Indicator status: | **Message:** | Clmt_Button_Stat2 |
| | **Signal:** | Front_Blower_Indicate |

*3.9.2.1* **State** Indicators Off
*Defined as data range 0x00*
The CSD and EFP shall turn off all blower indications when this state is received i.e. none of the blower bars shall be highlighted. The RCCM shall transmit this signal state whenever the user selects a "blower speed" of zero per the applicable state logic section(s) of the ECP/RCCM Functional Specification.

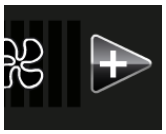
3.9.2.2 **State:** 1_Indicator_On thru 14_Indicators_On *(Blower speeds 1-14)*
*Defined as data range 0x1 - 0xE*
The CSD and EFP shall only display the blower speed corresponding to the valid values within this range as outlined in the illustration below (The RCCM shall only transmit these values). No other values within this range are currently supported. If an unsupported state is received, the CSD and EFP shall treat as if it had received the Display_Blank state and turn off entire blower display.

**State** = 0x0 (Off – No Bars highlighted)
**State** = 0x1 (Speed 1 - Bar 1 highlighted)
**State** = 0x2 (Speed 2 - Bars 1-2 highlighted)
**State** = 0x3 (Speed 3 - Bars 1-3 highlighted)
**tate** = 0x4 (Speed 4 - Bars 1-4 highlighted)
**State** = 0x5 (Speed 5 - Bars 1-5 highlighted)
**State** = 0x6 (Speed 6 - Bars 1-6 highlighted)
**State** = 0x7 (Speed 7 - Bars 1-7 highlighted)

3.9.2.3 **State:** Display_Blank
*Defined as data range 0xF*
The CSD shall blank off the blower display when this state is received i.e. the all blower bars shall not be visible at all. The EFP shall turn off all blower indicators. The RCCM shall transmit this signal state whenever the "blower display" state is listed as off (0) within of the applicable state logic sections of the ECP/RCCM Functional Specification.

## 3.10 Front Blower Speed Selection (Conventional up/down buttons)

3.10.1 The CSD and EFP shall use the following signals to communicate that a blower speed adjustment has been requested via press of a blower up or down button.



| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Blwr_Inc_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Blwr_Inc_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Blwr_Dec_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Blwr_Dec_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

3.10.2 The blower speed selection shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button.

## 3.11 Front Blower Speed selection (Direct/Slider interface)

3.11.1 The CSD shall use the following signals to communicate that a front blower adjustment has been requested via any of the following methods:

- Selection of specific front blower speed by press of a button/location within a range of blower speeds
- Movement of a blower "slider" across a range of blower speeds
- Voice command for a valid blower speed (ref voice command section below)

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signal:** | Frt_Blower_Speed2 |

3.11.2 **D**-When CSD provides a "slider" type interface for blower speed selection the user may change the speed very quickly and pass thru several speeds in a short period of time. Consequently, the CSD shall limit transmission of Frt_Blower_Speed2 signal to no quicker than once every 20 msec +/-10%.

3.11.3 While slider type interface is being used to adjust blower speed and the signal(s) are being transmitted, the CSD shall continue to update the blower speed display per the applicable signal states it receives from the RCCM.

*For example, if the blower speed is 1 and the user drags slider to increase to 7 within 80 msec then only 4 Frt_Blower_Speed2 updates would be sent out 20 msec +/- 10% apart and the blower speed display would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between speed request and display update over CAN for simplicity - 60msec in this example):*

*a) 20 msec after first starting to move slider from 1 Frt_Blower_Speed2 = 2 →*
*b) 20 msec later Frt_Blower_Speed2= 4 →*
*c) 20 msec later Frt_Blower_Speed2= 6 →*
*d) 20 msec later Frt_Blower_Speed2= 7 when the user removes finger from touchscreen - Display changes from 1 to 2 →*
*e) 20 msec later Display changes from 2 to 4→*
*f) 20 msec later Display changes from 4 to 6→*
*g) 20 msec later Display changes from 6 to 7 (display reflects final selection within maximum allowable time per latency requirements)*

3.11.4 The sync system shall transmit all commands for a specific blower speed per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for one of the other states are satisfied.
**State:** Blower_Speed_1 (0x01)
Transmitted whenever the user issues request for blower speed 1
**State:** Blower_Speed_2 (0x02)
Transmitted whenever the user issues request for blower speed 2
**State:** Blower_Speed_3 (0x03)
Transmitted whenever the user issues request for blower speed 3
**State:** Blower_Speed_4 (0x04)
Transmitted whenever the user issues request for blower speed 4
**State:** Blower_Speed_5 (0x05)
Transmitted whenever the user issues request for blower speed 5
**State:** Blower_Speed_6 (0x06)
Transmitted whenever the user issues request for blower speed 6
**State:** Blower_Speed_7 (0x07)
Transmitted whenever the user issues request for blower speed 7
**State:** Min_Blower (0x08)
Transmitted whenever the user issues voice command for minimum blower speed
**State:** Max_Blower (0x09)
Transmitted whenever the user issues voice command for maximum blower speed.
**State:** Zero_Blower (0x0A)
Transmitted whenever the user issues request for blower speed 0
**State:** Not_Used (0x0B-0x0F)
These states are included as a design protect only and shall never be transmitted by the CSD. In the event any of these states are received, the ECP shall treat as if it has received **State** = No_Request

3.11.5 Upon receipt of these signals with state ≠ No_Request the RCCM shall immediately change the blower speed and transmit the corresponding signal states for blower display subject to the following exceptions and additional requirements:

3.11.5.1 When receiving quick, successive changes of states ≠ No_Request (possible if the user changes the blower speed very quickly within a short period of time – see above), the RCCM shall only transmit signal states for blower speed that agree with the settings received from the CSD and shall do so no quicker than once every 20 msec +/-10%.

3.11.5.2 If the Vehicle State = a Normal Run state and the Climate system is in the off state when a valid signal for blower is received, then the RCCM shall turn the climate system on per the state logic requirements (using the next state specified for blower input) and use the blower speed setting contained in the signal.

3.11.6 If/when the EFP includes an absolute position rotary knob, it shall use the following signals to communicate that a blower adjustment has been requested (Ref section 3.1 above for more details on possible states).

| | | |
|---|---|---|
| EFP Blower Knob Status | **Message:** | Remote_Climate_Data |
| | **Signals:** | FrtBlwr_An_Actl |

3.11.7 **D/E** -Indication/display for what blower speed has been selected shall also be made available on the 'Home' screen(as applicable) and the climate status bar

## 3.12 Air Distribution Selection and Indication

3.12.1 **E**-The Windscreen air distribution mode shall always be selectable via a separate Defrost "hard" button on the EFP. This separate Defrost button shall act as an override changing air distribution state to Windscreen only, regardless of previous air distribution status. (ref Section 10 within Climate Module functional spec for details)

3.12.2 **E**-Indication for Windscreen shall be provided on/within the "hard" button on the EFP in addition to the Windscreen indication within the touchscreen (see 3.5.4 below).

3.12.3 Manual selection for all air distribution modes within the touchscreen (including Windscreen) shall be via three separate air distribution buttons. These three air distribution buttons/modes shall be selectable in any combination – Windscreen, Panel and Floor.

3.12.4 Indications for air distribution within the touchscreen shall be via separate indicators associated with each of the three air distribution buttons.

3.12.5 Graphics for the air distribution selections within the touchscreen shall be executed as part of a mode man type layout per Global DNA. There shall be no separate Windscreen override button(as described in 3.5.1) in the touchscreen. (see example below)

3.12.6 The signals used to select and provide indication for the manual air distribution modes are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

Windscreen Mode:

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Windscreen_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Windscreen_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Windscreen_Btn_Stt |

3.12.6.1 Per regulatory requirements if a defrost icon (  ) is included on the Windscreen mode button, the CSD shall ensure that an indicator is displayed as part of the button and that the color of the indication is yellow.

Panel Mode:

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Panel_Pressed |

| | | |
|---|---|---|
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Panel_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Panel_Btn_Stt |

Floor Mode:

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Floor_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Floor_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Floor_Btn_Stt |

xxx_Btn_Stt

3.12.6.2 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The CSD shall use graphical expression to communicate that the associated button is selectable(Enabled) and set any included indicator to off(Inactive).

3.12.6.3 **State:** Active *(used as an Enabled_Active equivalent state)*
*Defined as data range (0x1)*
The CSD shall use graphical expression to communicate that the associated button is selectable(Enabled) and set any included indicator to on(Active).

3.12.6.4 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The CSD shall not change graphics for an associated button to reflect a pressed state, a graphical expression shall be used to communicate that this button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, and any applicable indication shall be set off (Inactive).

3.12.6.5 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The CSD shall not change graphics for an associated button to reflect a pressed state, a graphical expression shall be used to communicate that this button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, and any applicable indication shall be set on (Active).

3.12.7 Indication/display of which air distribution mode(or combination of modes) has been selected shall also be made available on the 'Home' screen(as applicable) and the climate status bar. See sections 3.19, 5, 7, 9 for details on how the air distribution mode shall be displayed in these screens/areas.

3.12.8 Requirements for the above states shall be applicable for all signals using the xxx_Btn_Stt naming convention throughout the remainder of this specification unless otherwise noted.

## 3.13 Power function

3.13.1 Signals used to select and provide indication for the power function are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the ECP Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st<br>Frt_Btn_Status_2nd |
| | **State:** | Front_Power_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **State:** | Front_Power_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Front_Power_Btn_Stt |

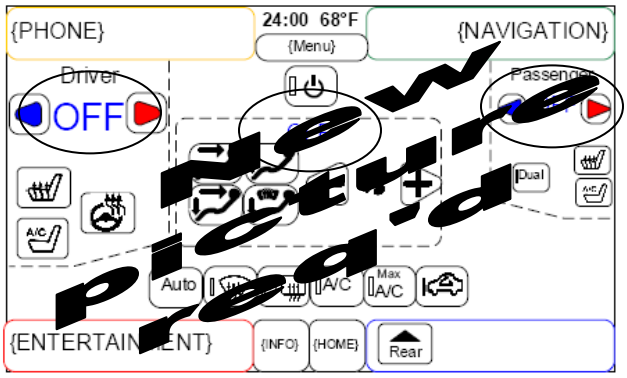
3.13.2 The power button is also used to enable special user preferences so shall support press and hold functionality. Consequently, the press status signal state outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button.

3.13.3 When the climate system is turned off:

3.13.3.1 **R-**The RCCM shall transmit **Signal:** Front_Power_Btn_Stt, **State** = Enabled_Inactive

3.13.3.2 **R-**The RCCM shall transmit signal states for all other buttons/indications per the applicable requirements for the power off state outlined within the Climate Module Functional Specification

3.13.3.3 When the CSD receives **Signal:** Front_Power_Btn_Stt, **State** = Enabled_Inactive(per above), it shall ignore all of the signals for the temperature settings, the manual blower speed indications and display the word OFF in the corresponding fields (See illustration below). However, if Message**:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), the CSD shall continue to display setpoint temperatures and blower speed information (Reference section 2.21 below for additional details).




3.13.3.4 When the EFP receives **Signal:** Front_Power_Btn_Stt, **State** = Enabled_Inactive(per above), it shall ignore all of the signals for the manual blower speed indications and ensure that all manual blower speed indications are turned OFF. Indications for all other climate functions such as conditioned seats, rear defrost etc. shall operate per applicable signal states. However, if Message**:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), the EFP shall continue to display indications per the Multiple Input Selection requirements within the Climate Module functional specification.

## 3.14 Defrost function:

3.14.1 Defrost may be included as a separate "hard" button on the EFP but is not necessary within the touchscreen since all individual air distribution modes can be selected and/or de-selected.

3.14.2 Consequently, the Defrost_Pressed state within **Message:** Clmt_Button_Stat4, **Signal:** Frt_Btn_Status_1st is included as a design protect only.

3.14.2.1 The Defrost_Pressed state shall never be transmitted by the CSD. In the event this signal state is received by the RCCM, the RCCM shall treat is if it has received the None_Pressed state.

3.14.2.2 The CSD shall ignore the state of **Signal:** Defrost_Btn_Stt entirely.

3.14.3 Signals used to select and provide indication for the Defrost function on the EFP (if applicable) are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Defrost_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Defrost_Btn_Stt |

## 3.15 Max Defrost function (if applicable):

3.15.1 Signals used to select and provide indication for the Max Defrost function are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Max_Defrost_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Max_Defrost_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Max_Defrost_Btn_Stt |

3.15.2 Per regulatory requirements, the CSD shall ensure that when the Max Defrost function is included an indicator is displayed as part of the button and that the color of the indication is yellow.

## 3.16 Max A/C function:

3.16.1 **E-**Max A/C shall always be selectable via a separate "hard" button on the EFP in addition to a touchscreen selection.

3.16.2 **E-**Indication for Max A/C shall be provided on/within the "hard" button on the EFP in addition to an indication within the touchscreen.

3.16.3 Signals used to select and provide indication for the Max A/C function are as follows: and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Max_AC_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Max_AC_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Max_AC_Btn_Stt |

## 3.17 Dual function:

3.17.1 Signals used to select and provide indication for the dual function are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Dual_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Dual_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Dual_Button_Stt |

*NOTE: Dual function may not be included as part of the EFP. In these cases, the EFP shall simply ignore the above signal requirements i.e. never transmit the Dual_Pressed state and never react to the Dual_Button_Stt signal.*

## 3.18 Link function:

3.18.1 This following, dedicated signal/states supporting a Link function/press are included as a design protect only. In the event a Link function is included as a replacement for the Dual function, the CSD and/or EFP shall utilize the signal states for the Dual function (see above), translating the Dual_Button_Stt state it receives to properly set indication for a Link function i.e. when Dual function indication would be set to On, Link function shall be set to Off and vice versa. The CSD and/or EFP shall never transmit the Link_Pressed state and never react to the Link_Button_Stt signal.

3.18.2 Signals used to select and provide indication for a “link” function are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Link_Pressed |

| | | |
|---|---|---|
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Link_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Link_Button_Stt |

*NOTE: Link function may not be included as part of the EFP. In these cases, the EFP shall simply ignore the above signal requirements i.e. never transmit the Link_Pressed state and never react to the Link_Button_Stt signal.*

## 3.19 Driver Focused Mode function

3.19.1 Signals used to select and provide indication for the Driver Focused Mode function are as follows and the ECP shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | DrvrFcsdMde_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | DrvrFcsdMde_Btn_Stt |

## 3.20 Rear Defrost

3.20.1 Signals used to select and provide indication for the rear defrost function are as follows:


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Rear_Defrost_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Rear_Defrost_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Rear_Defrost_Btn_Stt |

3.20.2 Per regulatory requirements, the CSD shall ensure that when the Rear Defrost function is included an indicator is displayed as part of the button and that the color of the indication is yellow.

*The operational logic for the Rear Defrost function is not part of the base climate controls state logic. The functional strategy for this function i.e. response to ignition cycles, power cycles, faults etc are outlined in the applicable section(s) within the Climate Module Functional Specification or CX-0117.*

## 3.21 A/C function

3.21.1 Signals used to select and provide indication for the A/C function are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |


| | | |
|---|---|---|
| | **Signals:** | Frt_Btn_Status_1st<br>Frt_Btn_Status_2nd |
| | **State:** | AC_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **State:** | AC_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | AC_Btn_Stt |

## 3.22 Heat function

3.22.1 Signals used to select and provide indication for the Heat function are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st<br>Frt_Btn_Status_2nd |
| | **State:** | Heat_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **State:** | Heat_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Heat_Btn_Stt |

3.22.2 The Heat function is not included as a hard button input on the EFP. Consequently, the Heat_Pressed state in EFP Signal is included for design protection only and shall never be transmitted by the EFP. In the event this signal state is received by the RCCM, the RCCM shall treat as if it has received the None_Pressed state.

## 3.23 Recirc function

3.23.1 Signals used to select and provide indication for the Recirc function are as follows and the RCCM shall transmit the applicable state for the Recirc_Btn_Stt indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st<br>Frt_Btn_Status_2nd |
| | **States:** | Recirc_Pressed<br>Auto_Recirc_Pressed<br>Outside_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **States:** | Recirc_Pressed<br>Auto_Recirc_Pressed<br>Outside_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |

| | | |
|---|---|---|
| | **Signal:** | Recirc_Btn_Stt |
| | | Auto_Recirc_Btn_Stt |
| | | Outside_Btn_Stt |

3.23.2 The Auto_Recirc_Pressed and Outside_Pressed states are included for design protection only and shall never be transmitted by the EFP or CSD. In the event either of these signal states are received by the RCCM, the RCCM shall treat as if it has received the None_Pressed state.

3.23.3 The Auto_Recirc_Btn_Stt and Outside_Btn_Stt signals are included for design protection only and shall never be transmitted by the RCCM. The EFP and CSD shall ignore these signals entirely.

## 3.24 Cabin Air Refresh function

3.24.1 Signals used to select and provide indication for the Cabin Air Refresh function are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable ~~state logic~~ section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | AAR_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | AAR_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | AAR_Btn_Stt |

3.24.2 The Cabin Air Refresh function is not included as a hard button input on the EFP. Consequently, the AAR_Pressed state in EFP signal is included for design protection only and shall never be transmitted by the EFP. In the event this signal state is received by the RCCM, the RCCM shall treat as if it has received the None_Pressed state.

## 3.25 Heated Front Windshield function(if equipped)

3.25.1 Signals used to select and provide indication for the heated windshield function are as follows:

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Htd_Frt_Wsh_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | Htd_Frt_Wsh_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Htd_Frt_Wsh_Btn_Stt |

*The operational logic for the Heated Front Windshield function is not part of the base climate controls state logic. The functional strategy for this function i.e. response to ignition cycles, power cycles, faults etc are outlined in the applicable section(s) within the Climate Module Functional Specification.*

## 3.26 Auto function

3.26.1 Signals used to select and provide indication for the Auto function are as follows:


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | AUTO_Pressed |
| | | AUTO_Lo_Pressed |
| | | AUTO_Med_Pressed |
| | | AUTO_Hi_Pressed |
| | | AUTO_Inc_Pressed |
| | | AUTO_Dec_Pressed |
| ECG status: | **Message:** | ECG_Climate_Set |
| | **Signals:** | Frt_Btn_Status_1st_2 |
| | **State:** | AUTO_Pressed |
| | | AUTO_Lo_Pressed |
| | | AUTO_Med_Pressed |
| | | AUTO_Hi_Pressed |
| | | AUTO_Inc_Pressed |
| | | AUTO_Dec_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | AUTO_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signals:** | Front_AUTO_Btn_Stt |
| | | Front_AUTO_Label |
| | | Front_AUTO_Blwr_Lvl |

3.26.2 Some vehicles support multiple Auto settings so that *whenever the user selects the Auto function the blower will be automatically controlled with a maximum speed based on the setting.* Depending on vehicle configuration these Auto blower settings can be selected via a single button (to cycle thru settings), via separate buttons for each setting or via increment and decrement buttons.

<u>Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)</u>

3.26.2.1 State: Auto_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the Auto button to turn on the Auto function or change the Auto blower setting (if equipped).

3.26.2.2 State: Auto_(Lo/Med/Hi)_Pressed
The CSD shall transmit this state whenever the user presses the Auto button for the corresponding setting (Lo, Med or Hi). These states shall only be transmitted when CSD is configured with separate "buttons" for each of the Auto blower settings

Any other module that supports Auto selection via a climate interface shall also transmit this state to command the climate system to operate at a specific Auto blower setting (Lo, Med or High) as applicable. The module may transmit these states based on selection of a particular user profile and/or user selection from within a phone app etc.

3.26.2.3 State: Auto_Inc_Pressed

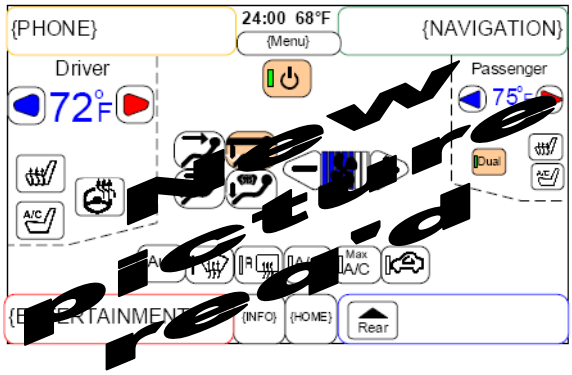
The CSD and/or any other module that supports Auto selection via a climate interface shall transmit this state whenever the user presses the Auto 'Up' button to increase the Auto blower setting (if equipped).

3.26.2.4 State: Auto_Dec_Pressed
The CSD and/or any other module that supports Auto selection via a climate interface shall transmit this state whenever the user presses the Auto 'Down' button to decrease the Auto blower setting (if equipped).

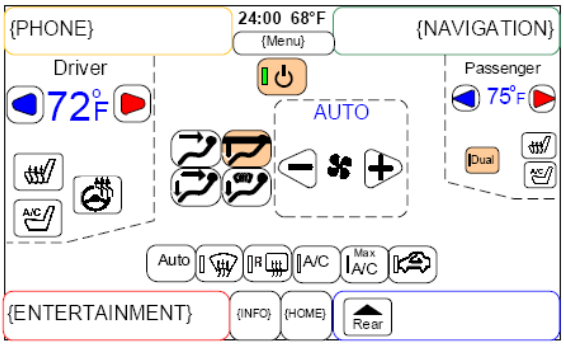
Front_AUTO_Btn_Stt
3.26.2.5 Reference sections 2.6.1.1 to 2.6.1.4 for details on signal states.

Front_AUTO_Label
3.26.2.6 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever system is not operating in any form of auto state as defined within the applicable state logic section(s) of the Functional Specification.

Upon receipt of this signal state, the CSD shall simply display information per the other signals with no additional Auto indications or displays - See illustration below




3.26.2.7 **State:** Blower
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever system is operating in a 'partial' auto state where blower speed is controlled automatically while air distribution has been manually selected. Whenever the RCCM is transmitting this state, it shall ensure all other signal states are transmitted per the applicable state logic section(s) of the Climate Module Functional Specification.
Upon receipt of this signal state, the CSD shall include shading or other graphical method(s) that make it clear that only the blower speed is being automatically controlled - See illustration below.

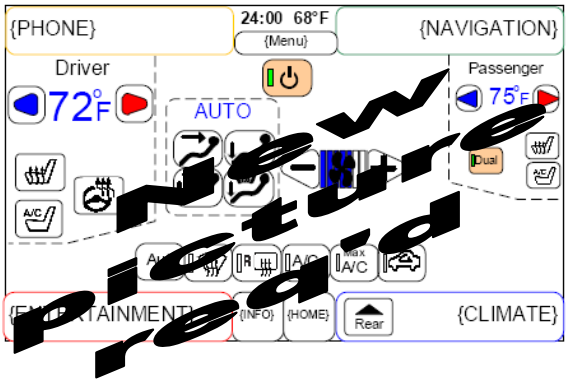


3.26.2.8 **State:** Mode

*Defined as data range (0x2)*

The RCCM shall transmit this state whenever system is operating in a 'partial' auto state where air distribution (i.e. mode) is controlled automatically while the blower speed has been manually selected. Whenever the RCCM is transmitting this state, it shall ensure all other signal states are transmitted per the applicable state logic section(s) of the Climate Module Functional Specification.

Upon receipt of this signal state, the CSD shall include shading or other graphical method(s) that make it clear that only air distribution is being automatically controlled - See illustration below.

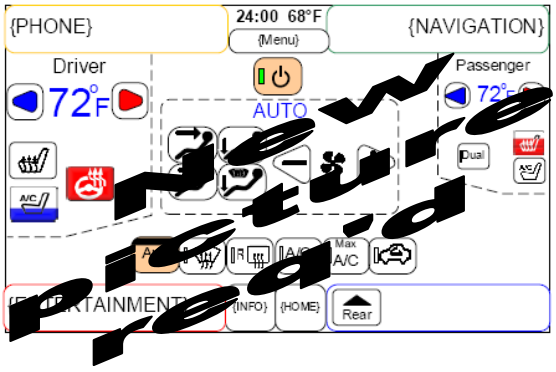



3.26.2.9 **State:** Full

*Defined as data range (0x3)*

The RCCM shall transmit this state whenever system is operating in a 'full' auto state where both air distribution and the blower speed are controlled automatically. Whenever the RCCM is transmitting this state, it shall ensure all other signal states are transmitted per the applicable state logic section(s) of the Climate Module Functional Specification.

Upon receipt of this signal state, the CSD shall include shading or other graphical method(s) that make it clear that both air distribution and the blower speed are being automatically controlled - See illustration below.




3.26.3 The EFP shall only base Auto indication state on the Front_AUTO_Btn_Stt and Front_Auto_Blwr_Lvl signal states. It does not need to consider signal Front_AUTO_Label for any reason and shall ignore this signal entirely.

Front_AUTO_Blwr_Lvl

*This signal is used to indicate what automatic blower level has been selected by user.*

*NOTE: Not all vehicles may support this additional functionality. If vehicle does not support Auto blower settings, the CSD shall simply ignore this signal.*

3.26.3.1 **State:** None
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the system is NOT in a 'full' Auto mode (Front_AUTO_Btn_Stt = Enabled_Inactive or Disabled)

Upon receipt of this signal state, the CSD, EFP and any other module that supports a climate interface shall ensure all Auto blower indications are set to Off.

3.26.3.2 **State:** Low
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the system is in a 'full' Auto mode (Front_AUTO_Btn_Stt = Enabled_Active or Unused) and user has selected a Low Auto blower setting per the applicable state logic section(s) of the Functional Specification.

Upon receipt of this signal state, the CSD, EFP and any other module that supports a climate interface shall set the left (or bottom) most indication for Auto blower to On and/or list the Auto blower setting as 'Low' within any applicable pop-ups or dialog boxes.

3.26.3.3 **State:** Medium
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the system is in a 'full' Auto mode (Front_AUTO_Btn_Stt = Enabled_Active or Unused) and user has selected a Medium Auto blower setting per the applicable state logic section(s) of the Functional Specification.

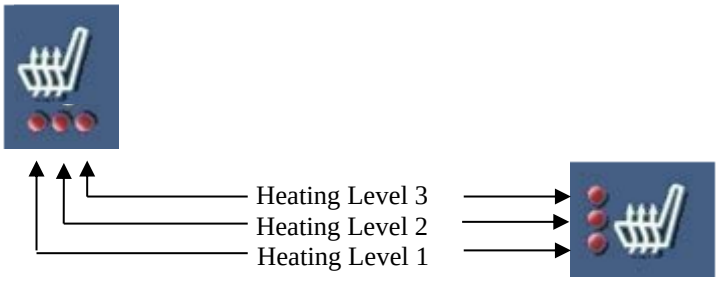
Upon receipt of this signal state, the CSD, EFP and any other module that supports a climate interface shall set the left and middle (or bottom and middle) indication for Auto blower to On and/or list the Auto blower setting as 'Medium' within any applicable pop-ups or dialog boxes.

3.26.3.4 **State:** High
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the system is in a 'full' Auto mode (Front_AUTO_Btn_Stt = Enabled_Active or Unused) and user has selected a High Auto blower setting per the applicable state logic section(s) of the Functional Specification.

Upon receipt of this signal state, the CSD, EFP and any other module that supports a climate interface shall set all three indications for Auto blower to On and/or list the Auto blower setting as 'High' within any applicable pop-ups or dialog boxes.

# 3.27 Front Heated Seats

3.27.1 The Heated Seat setting is a manual adjustment of between 1 and 3 levels of heating. The indicators shall be orientated with indication for warmest setting (Heating Level 3) positioned on right (for horizontal display) or at top (for vertical display) - see illustration below



3.27.2 These requirements for indicator orientation shall also apply to any 'hard' front heated seat controls included as part of an EFP. Furthermore, orientation on centerstack display and EFP (horizontal vs. vertical) shall be the same.

3.27.3 In some cases, the vehicle may also support Automatic control of heated seat function which depending on vehicle configuration can be turned on and off via the same button used to select heating level OR via a dedicated Auto Heated Seat button.

The signals to be used for the front heated seat interface between the RCCM and CSD and/or EFP(as applicable) are outlined below.

*NOTE: The functional strategy for heated seats i.e.setting sequencing, response to ignition cycles, power cycles, faults etc are outlined in the applicable section(s) within the Climate Module Functional Specification.*

### 3.27.4 Left Hand side Heated Seat

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | LHS_Htd_Seat_Pressed |
| | | LHS_Htd_Seat1_Pressed |
| | | LHS_Htd_Seat2_Pressed |
| | | LHS_Htd_Seat3_Pressed |
| | | LHS_Seat_Off_Pressed |
| | | LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | LHS_Htd_Seat_Pressed |
| | | LHS_Htd_Seat1_Pressed |
| | | LHS_Htd_Seat2_Pressed |
| | | LHS_Htd_Seat3_Pressed |
| | | LHS_Seat_Off_Pressed |
| | | LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | LHS_Cond_Seat_Status |
| | | LHS_Htd_Seat_Btn_Stt |
| | **Message:** | Clmt_Button_Stat2 |
| | | LHS_Auto_Seat_Btn_Stt |

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.27.4.1 State: LHS_Htd_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Left Hand Side heated seat button i.e. CSD and/or EFP is configured with a single "button" for toggling thru the heated seat settings).

3.27.4.2 State: LHS_Htd_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side heated seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate "buttons" for each of the heated seat settings)

3.27.4.3 State: LHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side seat off button to turn off the heated seat. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen "buttons" for each of the heated seat settings

3.27.4.4 State: LHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Left Hand Side heated seat i.e. CSD and/or EFP is configured with a single touchscreen "button" for turning Auto control of heated seat on.

LHS_Cond_Seat_Status

3.27.4.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned off. Upon receipt of this signal state the CSD and EFP shall ensure all heated seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.4.6 **State:** Level_1_Cooling thru Level_3_Cooling
*Defined as data range (0x1 – 0x3)*
These states are not applicable for vehicles with heated only seats. Consequently, the RCCM shall never transmit these states. In the event any of these signal states are received, the CSD and EFP shall treat the same as if it had received the off state.

3.27.4.7 **State:** Level_1_Heating
*Defined as data range (0x4)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single heated seat indicator intended to signify setting of 1 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.4.8 **State:** Level_2_Heating
*Defined as data range (0x5)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two heated seat indicators intended to signify a setting of 2 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.4.9 **State:** Level_3_Heating
*Defined as data range (0x6)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three heated seat indicators intended to signify a setting of 3 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.4.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Left Hand side Heated Seat input shall be disabled as described within section 3.6.6.3

LHS_Htd_Seat_Btn_Stt

This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified elsewhere to determine button and indicator settings.

LHS_Auto_Seat_Btn_Stt

3.27.4.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto heated seat function is turned off and that any included front Left Hand side Auto heated seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.27.4.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Heated Seat function is turned on and that any included front Left Hand side Auto heated seat button is selectable(Enabled) with any associated indicator set to on(Active).

3.27.4.13 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Heated Seat function is turned off and that any included front Left Hand side Auto heated seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.27.4.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality is prevented from being turned off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Heated Seat function is turned on and that any included front Left Hand side Auto heated seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the LHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the LHS_Auto_Seat_Btn_Stt indicator signal*

## 3.27.5 Right Hand side Heated Seat

CSD Press status: **Message:** Clmt_Button_Stat4
**Signals:** Frt_Btn_Status_1st
Frt_Btn_Status_2nd
**State:** RHS_Htd_Seat_Pressed

| | | |
|---|---|---|
| | | RHS_Htd_Seat1_Pressed<br>RHS_Htd_Seat2_Pressed<br>RHS_Htd_Seat3_Pressed<br>RHS_Seat_Off_Pressed<br>RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **State:** | RHS_Htd_Seat_Pressed<br>RHS_Htd_Seat1_Pressed<br>RHS_Htd_Seat2_Pressed<br>RHS_Htd_Seat3_Pressed<br>RHS_Seat_Off_Pressed<br>RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | RHS_Cond_Seat_Status<br>RHS_Htd_Seat_Btn_Stt |
| | **Message:** | Clmt_Button_Stat2<br>RHS_Auto_Seat_Btn_Stt |

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.27.5.1 State: RHS_Htd_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Right Hand Side heated seat button i.e. CSD and/or EFP is configured with a single "button" for toggling thru the heated seat settings.

3.27.5.2 State: RHS_Htd_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front right Hand Side heated seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate "buttons" for each of the heated seat settings

3.27.5.3 State: RHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Right Hand Side seat off button to turn off the heated seat. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen "buttons" for each of the heated seat settings

3.27.5.4 State: RHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Right Hand Side heated seat i.e. CSD and/or EFP is configured with a single touchscreen "button" for turning Auto control of heated seat on.

RHS_Cond_Seat_Status

3.27.5.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned off. Upon receipt of this signal state CSD and EFP shall ensure all heated seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.5.6 **State:** Level_1_Cooling thru Level_3_Cooling
*Defined as data range (0x1 – 0x3)*
These states are not applicable for vehicles with heated only seats. Consequently, the RCCM shall never transmit these states. In the event any of these signal states are received, the CSD and EFP shall treat the same as if it had received the off state.

3.27.5.7 **State:** Level_1_Heating
*Defined as data range (0x4)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single heated seat indicator intended to signify setting of 1 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.5.8 **State:** Level_2_Heating
*Defined as data range (0x5)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two heated seat indicators intended to signify a setting of 2 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.5.9 **State:** Level_3_Heating
*Defined as data range (0x6)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three heated seat indicators intended to signify a setting of 3 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.27.5.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Right Hand side Heated Seat input shall be disabled as described within section 3.6.6.3

RHS_Htd_Seat_Btn_Stt
This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified elsewhere to determine button and indicator settings.

RHS_Auto_Seat_Btn_Stt
3.27.5.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto heated seat function is turned off and that any included front Right Hand side Auto heated seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.27.5.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Heated Seat function is turned on and that any included front Right Hand side Auto heated seat button is selectable(Enabled) with any associated indicator set to on(Active).

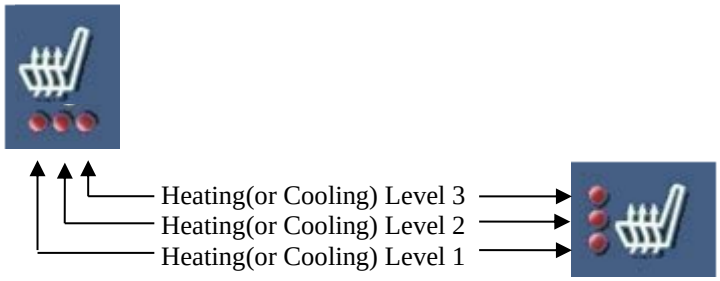
3.27.5.13 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Heated Seat function is turned off and that any included front Right Hand side Auto heated seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.27.5.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality is prevented from being turned off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Heated Seat function is turned on and that any included front Right Hand side Auto heated seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the RHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the RHS_Auto_Seat_Btn_Stt indicator signal*

## 3.28 Front Conditioned (Heated and Cooled) Seats

3.28.1 The Heated and Cooled Seat setting is a manual adjustment of between 1 and 3 levels of heating or cooling. The indicators for both shall be orientated with indication for warmest setting (Heating Level 3) or coolest setting (Cooling Level 3) positioned on right (for horizontal display) or at top (for vertical display) - see illustration below




These requirements for indicator orientation shall also apply to any 'hard' front heated and cooled seat controls included as part of an EFP. Furthermore, orientation on centerstack display and EFP (horizontal vs. vertical) shall be the same.

3.28.2 In some cases, the vehicle may also support Automatic control of heated and cooled seat functions which depending on vehicle configuration can be turned on and off via the same buttons used to select heating and cooling level OR via a dedicated Auto Conditioned Seat button.

*NOTE: The details for the Messages/Signals transmitted to the SCMF(seat module) to turn these functions on or off, along with all other functional strategies for heated and cooled seats i.e. setting sequencing, response to ignition cycles, power cycles, faults etc are outlined in the applicable section(s) within the Climate Module Functional Specification.*

The signals to be used for the front heated and cooled seat interface between the RCCM and CSD and/or EFP(as applicable) are outlined below.

### 3.28.3 Left Hand side Cooled Seat


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | LHS_Cld_Seat_Pressed |
| | | LHS_Cld_Seat1_Pressed |
| | | LHS_Cld_Seat2_Pressed |
| | | LHS_Cld_Seat3_Pressed |
| | | LHS_Seat_Off_Pressed |
| | | LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | LHS_Cld_Seat_Pressed |
| | | LHS_Cld_Seat1_Pressed |
| | | LHS_Cld_Seat2_Pressed |
| | | LHS_Cld_Seat3_Pressed |
| | | LHS_Seat_Off_Pressed |
| | | LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | LHS_Cond_Seat_Status |
| | | LHS_Cld_Seat_Btn_Stt |
| | **Message:** | Clmt_Button_Stat2 |
| | **Signal:** | LHS_Auto_Seat_Btn_Stt |

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.28.3.1 State: LHS_Cld_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Left Hand Side cooled seat button i.e. CSD and/or EFP is configured with a single “button” for toggling thru the cooled seat settings.

3.28.3.2 State: LHS_Cld_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side cooled seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate “buttons” for each of the cooled seat settings

3.28.3.3 State: LHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side seat off button to turn off seat conditioning. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen “buttons” for each of the conditioned seat settings

3.28.3.4 State: LHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Left Hand Side conditioned seat i.e. CSD and/or EFP is configured with a single touchscreen “button” for turning Auto control of conditioned seat on.

LHS_Cond_Seat_Status

3.28.3.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated and cooled seats are turned off. Upon receipt of this signal state CSD and EFP shall ensure all heated and cooled seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.3.6 **State:** Level_1_Cooling
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's cooled seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single cooled seat indicator intended to signify cooling setting of 1 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.3.7 **State:** Level_2_Cooling
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's cooled seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two cooled seat indicators intended to signify a cooling setting of 2 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.3.8 **State:** Level_3_Cooling
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's cooled seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three cooled seat indicators intended to signify a cooling setting of 3 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.3.9 **State:** Level_1_Heating thru Level_3_Heating
*Defined as data range (0x4 – 0x6)*
These states are only transmitted when the Left Hand side heated seats are turned on. Reference section 2.18.2 below for details.

3.28.3.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Left Hand side Cooled Seat input shall be disabled as described within section 3.6.6.3

LHS_Cld_Seat_Btn_Stt

This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified elsewhere to determine button and indicator settings.

LHS_Auto_Seat_Btn_Stt

3.28.3.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's cooled seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned off and that any included front Left Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.28.3.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's cooled seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned on and that any included front Left Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to on(Active).

3.28.3.13 **State:** ~~Unused~~ Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's cooled seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned off and that any included front Left Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.28.3.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's cooled seats are being automatically controlled and any applicable Auto functionality is prevented from being turned off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned on and that any included front Left Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the LHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the LHS_Auto_Seat_Btn_Stt indicator signal*

## 3.28.4 Left Hand side Heated Seat

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | LHS_Htd_Seat_Pressed |
| | | LHS_Htd_Seat1_Pressed |
| | | LHS_Htd_Seat2_Pressed |
| | | LHS_Htd_Seat3_Pressed |
| | | LHS_Seat_Off_Pressed |
| | | LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | LHS_Htd_Seat_Pressed |
| | | LHS_Htd_Seat1_Pressed |
| | | LHS_Htd_Seat2_Pressed |
| | | LHS_Htd_Seat3_Pressed |

LHS_Seat_Off_Pressed
LHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable)

Indicator status: **Message:** Clmt_Button_Stat1
**Signal:** LHS_Cond_Seat_Status
LHS_Htd_Seat_Btn_Stt

**Message:** Clmt_Button_Stat2
**Signal:** LHS_Auto_Seat_Btn_Stt

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.28.4.1 State: LHS_Htd_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Left Hand Side heated seat button i.e. CSD and/or EFP is configured with a single "button" for toggling thru the heated seat settings).

3.28.4.2 State: LHS_Htd_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side heated seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate "buttons" for each of the heated seat settings)

3.28.4.3 State: LHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Left Hand Side seat off button to turn off seat conditioning. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen "buttons" for each of the conditioned seat settings

3.28.4.4 State: LHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Left Hand Side conditioned seat i.e. CSD and/or EFP is configured with a single touchscreen "button" for turning Auto control of conditioned seat on.

LHS_Cond_Seat_Status

3.28.4.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated and cooled seats are turned off. Upon receipt of this signal state CSD and EFP shall ensure all heated and cooled seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.4.6 **State:** Level_1_Cooling thru Level_3_Cooling
*Defined as data range (0x1 – 0x3)*
These states are only transmitted when the Left Hand side cooled seats are turned on. Reference section 2.17.1 above for details.

3.28.4.7 **State:** Level_1_Heating
*Defined as data range (0x4)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single heated seat indicator intended to signify a heating setting of 1 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.4.8 **State:** Level_2_Heating
*Defined as data range (0x5)*

The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two heated seat indicators intended to signify a heating setting of 2 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.4.9 **State:** Level_3_Heating
*Defined as data range (0x6)*
The RCCM shall transmit this state whenever the Front Left Hand side occupant's heated seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three heated seat indicators intended to signify a heating setting of 3 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.4.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Left Hand side Heated Seat input shall be disabled as described within section 3.6.6.3

LHS_Htd_Seat_Btn_Stt
This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified elsewhere to determine button and indicator settings.

LHS_Auto_Seat_Btn_Stt
3.28.4.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned off and that any included front Left Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.28.4.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned on and that any included front Left Hand side Auto Conditioned seat button is selectable(Enabled) with any associated indicator set to on(Active).

3.28.4.13 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned off and that any included front Left Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.28.4.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Left Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality is prevented from being turned

off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Left Hand side Auto Conditioned Seat function is turned on and that any included front Left Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the LHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the LHS_Auto_Seat_Btn_Stt indicator signal*

## 3.28.5 Right Hand side Cooled Seat


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signal:** | Frt_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | RHS_Cld_Seat_Pressed |
| | | RHS_Cld_Seat1_Pressed |
| | | RHS_Cld_Seat2_Pressed |
| | | RHS_Cld_Seat3_Pressed |
| | | RHS_Seat_Off_Pressed |
| | | RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | RHS_Cld_Seat_Pressed |
| | | RHS_Cld_Seat1_Pressed |
| | | RHS_Cld_Seat2_Pressed |
| | | RHS_Cld_Seat3_Pressed |
| | | RHS_Seat_Off_Pressed |
| | | RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | RHS_Cond_Seat_Status |
| | | RHS_Cld_Seat_Btn_Stt |
| | **Message:** | Clmt_Button_Stat2 |
| | **Signal:** | RHS_Auto_Seat_Btn_Stt |

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.28.5.1 State: RHS_Cld_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Right Hand Side cooled seat button i.e. CSD and/or EFP is configured with a single "button" for toggling thru the cooled seat settings.

3.28.5.2 State: RHS_Cld_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Right Hand Side cooled seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate "buttons" for each of the cooled seat settings

3.28.5.3 State: RHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Right Hand Side seat off button to turn off seat conditioning. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen "buttons" for each of the conditioned seat settings

3.28.5.4 State: RHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Right Hand Side conditioned seat i.e. CSD and/or EFP is configured with a single touchscreen "button" for turning Auto control of conditioned seat on.

RHS_Cond_Seat_Status

3.28.5.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated and cooled seats are turned off. Upon receipt of this signal state CSD and EFP shall ensure all heated and cooled seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.5.6 **State:** Level_1_Cooling
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's cooled seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single cooled seat indicator intended to signify cooling setting of 1 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.5.7 **State:** Level_2_Cooling
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's cooled seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two cooled seat indicators intended to signify a cooling setting of 2 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.5.8 **State:** Level_3_Cooling
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's cooled seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three cooled seat indicators intended to signify a cooling setting of 3 and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.5.9 **State:** Level_1_Heating thru Level_3_Heating
*Defined as data range (0x4 – 0x6)*
These states are only transmitted when the Right Hand side heated seats are turned on. Reference section 2.18.4 below for details.

3.28.5.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Right Hand side Cooled Seat input shall be disabled as described within section 3.6.6.3

RHS_Cld_Seat_Btn_Stt

This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified above to determine button and indicator settings.

RHS_Auto_Seat_Btn_Stt

3.28.5.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's cooled seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned off and that any included front Right Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.28.5.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's cooled seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned on and that any included front Right Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to on(Active).

3.28.5.13 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's cooled seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned off and that any included front Right Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.28.5.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's cooled seats are being automatically controlled and any applicable Auto functionality is prevented from being turned off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned on and that any included front Right Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the RHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the RHS_Auto_Seat_Btn_Stt indicator signal*

## 3.28.6 Right Hand side Heated Seat

CSD Press status:
**Message:** Clmt_Button_Stat4
**Signals:** Frt_Btn_Status_1st
Frt_Btn_Status_2nd
**State:** RHS_Htd_Seat_Pressed
RHS_Htd_Seat1_Pressed
RHS_Htd_Seat2_Pressed
RHS_Htd_Seat3_Pressed
RHS_Seat_Off_Pressed
RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable)

| | | |
|---|---|---|
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st |
| | | E_Frt_Btn_Status_2nd |
| | **State:** | RHS_Htd_Seat_Pressed |
| | | RHS_Htd_Seat1_Pressed |
| | | RHS_Htd_Seat2_Pressed |
| | | RHS_Htd_Seat3_Pressed |
| | | RHS_Seat_Off_Pressed |
| | | RHS_Auto_Seat_Pressed (for dedicated Auto Seat button if applicable) |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | RHS_Cond_Seat_Status |
| | | RHS_Htd_Seat_Btn_Stt |
| | **Message:** | Clmt_Button_Stat2 |
| | **Signal:** | RHS_Auto_Seat_Btn_Stt |

Frt_Btn_Status_1st / E_Frt_Btn_Status_1st(2nd)

3.28.6.1 State: RHS_Htd_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated front Right Hand Side heated seat button i.e. CSD and/or EFP is configured with a single "button" for toggling thru the heated seat settings.

3.28.6.2 State: RHS_Htd_Seat(1/2/3)_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front right Hand Side heated seat button for the corresponding setting (1-3). These states shall only be transmitted when CSD and/or EFP is configured with separate "buttons" for each of the heated seat settings

3.28.6.3 State: RHS_Seat_Off_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the front Right Hand Side seat off button to turn off seat conditioning. This state shall only be transmitted when CSD and/or EFP is configured with separate touchscreen "buttons" for each of the conditioned seat settings

3.28.6.4 State: RHS_Auto_Seat_Pressed
The CSD and/or EFP shall transmit this state whenever the user presses the dedicated Auto control button for the front Right Hand Side conditioned seat i.e. CSD and/or EFP is configured with a single touchscreen "button" for turning Auto control of conditioned seat on.

RHS_Cond_Seat_Status

3.28.6.5 **State:** Off
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated and cooled seats are turned off. Upon receipt of this signal state CSD and EFP shall ensure all heated and cooled seat indicators are turned off and use graphical expression to communicate that the associated button is selectable(Enabled).

3.28.6.6 **State:** Level_1_Cooling thru Level_3_Cooling
*Defined as data range (0x1 – 0x3)*
These states are only transmitted when the Right Hand side cooled seats are turned on. Reference section 2.17.1 above for details.

3.28.6.7 **State:** Level_1_Heating
*Defined as data range (0x4)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the single heated seat indicator intended to signify a heating setting of 1 and use graphical expression to communicate that the associated button is selectable (Enabled).

3.28.6.8 **State:** Level_2_Heating
*Defined as data range (0x5)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the second from the lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the two heated seat indicators intended to signify a heating setting of 2 and use graphical expression to communicate that the associated button is selectable (Enabled).

3.28.6.9 **State:** Level_3_Heating
*Defined as data range (0x6)*
The RCCM shall transmit this state whenever the Front Right Hand side occupant's heated seats are turned on at the third from lowest setting. Upon receipt of this signal state, the CSD and EFP shall turn on the three heated seat indicators intended to signify a heating setting of 3 and use graphical expression to communicate that the associated button is selectable (Enabled).

3.28.6.10 **State:** Disabled
*Defined as data range (0x7)*
This signal state is included to communicate to the CSD and EFP that the Right Hand side Heated Seat input shall be disabled as described within section 3.6.6.3

RHS_Htd_Seat_Btn_Stt
This signal is redundant and included as a design protect only. The CSD and EFP(if applicable) shall ignore this signal and use xxx_Cond_Seat_Status and xxx_Auto_Seat_Btn_Stt signals as specified elsewhere to determine button and indicator settings.

RHS_Auto_Seat_Btn_Stt
3.28.6.11 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality can be turned on by the user. Upon receipt of this signal state CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned off and that any included front Right Hand side Auto Conditioned Seat button is selectable(Enabled) with any associated indicator set to off (Inactive).

3.28.6.12 **State:** Active (*used as an Enabled_Active equivalent state*)
*Defined as data range (0x1)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality can be turned off by the user. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned on and that any included front Right Hand side Auto Conditioned seat button is selectable(Enabled) with any associated indicator set to on(Active).

3.28.6.13 **State:** Disabled *(used as a Disabled_Inactive equivalent state)*
*Defined as data range (0x2)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being manually controlled by the user (level 1-3 or off) and any applicable Auto functionality is prevented from being turned on. Upon receipt of this signal state the CSD and EFP(if applicable)

shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned off and that any included front Right Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to off (Inactive).

3.28.6.14 **State:** Unused *(used as a Disabled_Active equivalent state)*
*Defined as data range (0x3)*
The RCCM shall transmit this state whenever the front Right Hand side occupant's heated seats are being automatically controlled and any applicable Auto functionality is prevented from being turned off. Upon receipt of this signal state the CSD and EFP(if applicable) shall use graphical expression to communicate that the front Right Hand side Auto Conditioned Seat function is turned on and that any included front Right Hand side Auto Conditioned Seat button cannot be selected (Disabled) i.e. 'greyed out' or other similar expression, with any associated indicator set to on (Active).

*NOTE: Some of the above signals and states are used for implementation of Automatic Conditioned Seats Feature and may not be supported on all programs. If vehicle does not support Auto conditioned seat control, the CSD shall never transmit the RHS_Auto_Seat_Pressed signal state and the CSD and EFP(if applicable) shall simply ignore the RHS_Auto_Seat_Btn_Stt indicator signal*

## Heated Steering Wheel

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Frt_Btn_Status_1st<br>Frt_Btn_Status_2nd |
| | **State:** | Htd_Strg_Whl_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Frt_Btn_Status_1st<br>E_Frt_Btn_Status_2nd |
| | **State:** | Htd_Strg_Whl_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat1 |
| | **Signal:** | Htd_Strg_Whl_Btn_Stt |

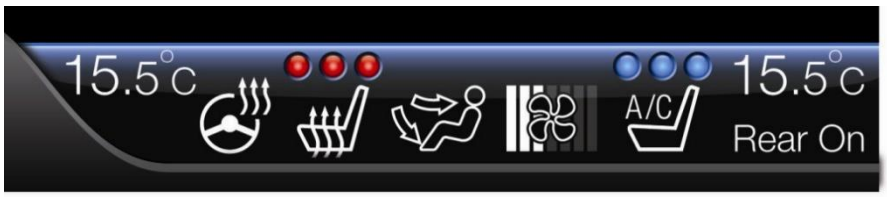
Htd_Strg_Whl_Btn_Stt

3.28.7 Reference sections 3.6.6.1 to 3.6.6.4 for details on signal states.

3.28.8 The RCCM acts as master for the Heated Steering Wheel function. It shall monitor the above press status signal from the CSD and turn the Heated Steering Wheel on or off with each press. The RCCM transmits the above indicator status message to turn the indication in the CSD on or off. NOTE: This indicator status message is NOT used by the Heated Steering Wheel Module (HSWM) to turn the function on or off. The RCCM shall transmit a separate message and signal to the HSWM Module to turn the function on or off.

*NOTE: The details for the Message/Signal transmitted to the HSWM to turn the function on or off along with all other functional strategies for heated steering wheel i.e. setting sequencing, response to ignition cycles, power cycles, faults etc are outlined in the applicable section(s) within the Climate Module Functional Specification.*

# 4 Touchscreen Status Bar



4.1.1 **D-**The following climate status information shall be displayed in a Status bar for vehicles with a Touchscreen:
Driver and Passenger Setpoint Displays
Off indication (when climate system power is off)
Blower indication
Air distribution indication (if no indication is included on EFP)
Auto indication (when climate is operating in full auto state)
Conditioned seats (if no indications are included on EFP)
Heated Steering Wheel (if no indications are included on EFP or other hard controls)
Rear Zone Climate Control Status (if applicable and no indication included on climate module)

4.1.2 **D-**Whenever the Vehicle State = a Normal Run state, this status bar and the above information must be visible at all times unless the user is actively moving thru specific secondary screens. If and when the status bar is minimized in this way, any attempted changes to the displayed information that are the direct result of a user adjustment shall cause the status bar to automatically return to normal size OR shall trigger a "pop-up" display to appear for a short period of time in order to display the new status (ref section 6) for specifics on pop-up displays and trigger req'ts).

*The term Pop-up display used within these requirements is defined as a type of display that is used to inform the customer that they have made an adjustment and to provide them details on the new setting. It is made prominent via both its size and location on the screen. Furthermore it is temporary in nature, disappearing after a short period of time.*

4.1.3 **D-Driver/Passenger setpoint displays** - The Driver's and Passenger's setpoint temperatures shown in the CSD display's status bar shall comply with the same message, signal and display requirements as specified for the main, front climate screen (section 3.5).

4.1.4 **D-Blower indication** - The front, blower speed indication shown in the CSD's status bar shall comply with the same message, signal and display requirements as specified for the main front climate screen (section 3.9) with the exceptions noted in the Auto Indication and Climate Power Off sections (2.19.6/2.19.7) below.

4.1.5 **D-Air Distribution Mode indication** - The CSD shall display the appropriate graphic for the active front, manual air distribution mode. This indication shown in the CSD status bar shall use the same message and indicator status signals as the ones used for the main climate screen's manual air distribution mode buttons (see section 3.12.6). If the indicator status signals for all three of these manual air distribution modes = Enabled_Inactive, the air distribution portion of the status bar shall be blank - See illustration below.


4.1.6 **D-Auto indication** - When the RCCM transmits the signals that indicate the climate system is operating in a 'full' auto state (as defined in section 2.15.1.5), the CSD shall ignore the indicator status signal states for mode and blower and display the word "AUTO" in the area normally used to display the mode and blower status – See illustration below.


4.1.7 **D-Climate Power Off** - When the climate system is turned off (**Message:** Clmt_Button_Stat1 **Signal:** *Front_Power_Btn_Stt*, **State** = Inactive), the CSD shall ensure that the driver and passenger setpoints within the status bar are blank and the words "CLIMATE OFF" are displayed in place of the air distribution mode

and blower speed (See illustration below). However, if Message**:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), the CSD shall continue to display setpoint temperatures and blower speed information (Reference section 2.21 below for additional details).


### 4.1.8 Climate controlled seat setting

4.1.8.1 The climate controlled seat setting shown in the CSD's status bar will use the same message and indicator status signals as the ones used for the main climate screen's climate controlled seat settings.

4.1.8.2 Indication shall be displayed in the form of a seat graphic (either Cooled or Heated) along with the appropriate number of indicators (1-3 blue for cooling or 1-3 red for heating). There shall be separate displays and indications for driver vs. passenger settings – see example below.


4.1.8.3 When the climate controlled seats are turned off, the seat graphics and indicators shall blank off.

The status bar display for the climate controlled seats shall remain unchanged when the climate controls are turned on or off.

### 4.1.9 Heated Steering Wheel setting

4.1.9.1 The heated steering wheel setting shown in the CSD's status bar will use the same message and indicator status signals as the ones used for the main climate screen's heated steering wheel setting.

4.1.9.2 Indication shall be displayed in the form of a heated steering wheel graphic. When the heated steering wheel is turned off, the graphic shall blank off – see example of graphic below.


4.1.9.3 The status bar display for the heated steering wheel shall remain unchanged when the climate controls are turned on or off.

## 4.2 Diagnostics Display

4.2.1 Whenever **Message:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), The CSD shall default to a dedicated climate control diagnostic screen and continue to display the climate information that is normally included in the climate status bar, within this diagnostic screen per the applicable signals from the RCCM. The RCCM shall be responsible for transmitting the signals so the appropriate diagnostic information is displayed.

4.2.2 **D-**Other non-climate functions (including any on the touchscreen) shall remain operational. If subsequent activity requires navigation away from this dedicated climate control diagnostics screen, the information must continue to be displayed in the area normally reserved for the Climate Control Status bar – See illustrations below for an example.

# 5 Touchscreen – Manual Rear Zone Climate Control(if equipped)


## 5.1 Rear Temperature Selection (Conventional up/down buttons)

5.1.1 The CSD and EFP shall use the following signals and listed states to communicate that a rear temperature adjustment has been requested via press of a rear temperature up or down button.


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| Indicator status | **Message:** | None |
| | **Signal Name:** | None |
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Dec_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Dec_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

5.1.2 The Rear temperature selection via up/down buttons shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button.

## 5.2 Rear temperature selection (Direct/Slider interface)

5.2.1 The CSD shall use the following signals to communicate that a rear temperature adjustment has been requested via any of the following methods:

- Selection of specific temperature setting by press of a button/location within a range of temperature settings.
- Movement of a temperature "slider" across a range of temperature settings

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signal:** | Rear_Temp |

5.2.2 **D**-When CSD provides a "slider" type interface for temperature setting the user may change the setting very quickly and pass thru many settings in a short period of time. Consequently, the CSD shall limit transmission of Rear_Temp signal to no quicker than once every 20 msec +/-10%.

5.2.3 While slider type interface is being used to adjust the rear temperature setting and the signal is being transmitted, the CSD shall continue to update the display for the rear temperature setting per the applicable signal states it receives from the RCCM.

*For example, if the rear setting is Level 3 Cooling and the user drags slider to increase to Maximum heating in 100 msec then only 5 Rear_Temp updates would be sent out 20 msec +/- 10% apart and the display would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between setpoint request and display update over CAN for simplicity):*

*a) 20 msec after first starting to move slider from Level_3_Cooling, Rear_Temp = Level_2_Cooling →*
*b) 20 msec later Rear_Temp = Level_1_Cooling →*
*c) 20 msec later Rear_Temp = Level_1_Heating →*
*d) 20 msec later Rear_Temp = Level_3_Heating - Display changes from Level 3 cooling to Level 2 cooling →*
*e) 20 msec later Rear_Temp = Max_Heating when the user removes finger from touchscreen - Display changes from Level 2 cooling to Level 1 cooling →*
*f) 20 msec later Display changes from Level 1 cooling to Level 1 heating →*
*g) 20 msec later Display changes from Level 1 heating to Level 3 heating →*
*i) 20 msec later Display changes from Level 3 heating to Maximum heating (display reflects final rear temperature setting within maximum allowable time per latency requirements)*

5.2.4 The sync system shall transmit all commands for a specific temperature setting per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for one of the other states are satisfied.
**State:** Max_Cooling (0x01)
Transmitted whenever the user issues request for rear temperature, maximum cooling
**State:** Level_3_Cooling (0x02)
Transmitted whenever the user issues request for rear temperature, level 3 cooling
**State:** Level_2_Cooling (0x03)
Transmitted whenever the user issues request for rear temperature, level 2 cooling
**State:** Level_1_Cooling (0x04)
Transmitted whenever the user issues request for rear temperature, level 1 cooling
**State:** No_Heating_Cooling (0x05)
Transmitted whenever the user issues request for rear temperature, no additional heating or cooling
**State:** Level_1_Heating (0x06)
Transmitted whenever the user issues request for rear temperature, level 1 heating
**State:** Level_2_Heating (0x07)

Transmitted whenever the user issues request for rear temperature, level 2 heating
**State:** Level_3_Heating (0x08)
Transmitted whenever the user issues request for rear temperature, level 3 heating
**State:** Max_Heating (0x09)
Transmitted whenever the user issues request for rear temperature, maximum heating
**State:** Not_Used (0x0A-0x0F)
These states are included as a design protect only and shall never be transmitted by the CSD. In the event any of these states are received, the ECP shall treat as if it has received **State** = No_Request

5.2.5 Upon receipt of this signal with state ≠ No_Request the RCCM shall immediately change the rear temperature setting and transmit the corresponding signal states for temperature display subject to the following exceptions and additional requirements:

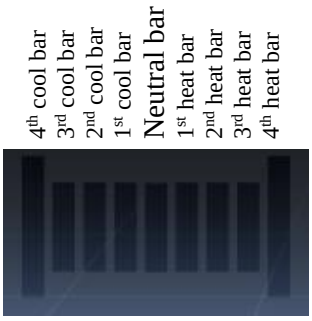
5.2.5.1 When receiving quick, successive changes of states ≠ No_Request (possible if the user changes the setpoints very quickly within a short period of time – see above), the RCCM shall only transmit signal states for temperature settings that agree with the settings received from the CSD and shall do so no quicker than once every 20 msec +/-10%.

5.2.6 If the Vehicle State = a Normal Run state and the Climate system is in the off state when a valid signal for rear temperature is received, then the RCCM shall turn the climate system on per the state logic requirements (using the next state specified for a temp input) and use the temperature setting contained in the signal.

## 5.3 Rear Temperature Indication

5.3.1 The CSD and EFP shall use the following message, signals and listed states to display the rear temperature selection or show a blank area.

Indicator status




**Message:** Clmt_Button_Stat3
**Signal**: Rr_Temp_Detents
**State:**
No_Bars (0x00) - No temp bars turned on
4_Cool_Bars (0x01) - 1st, 2nd, 3rd, 4th cool bars and Neutral bar
3_Cool_Bars (0x02) - 1st, 2nd, 3rd cool bars and Neutral bar
2_Cool_Bars (0x03) - 1st, 2nd cool bars and Neutral bar
1_Cool_Bar (0x04) - 1st cool bar and Neutral bar
Nuetral_Bar_Only (0x05) - Neutral bar
1_Heat_Bar (0x06) - 1st heat bar and Neutral bar
2_Heat_Bars (0x07) - 1st, 2nd heat bars and Neutral bar
3_Heat_Bars (0x08) - 1st, 2nd, 3rd heat bars and Neutral bar
4_Heat_Bars (0x09) - 1st, 2nd, 3rd, 4th heat bars and Neutral bar
Display_Blank (0x0A) - Nothing visible in area

Unused (0x0B-0x3F) - This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received, the CSD and EFP shall treat the same as if it had received the off state.

## 5.4 Rear Blower Speed Display

5.4.1 The CSD and EFP shall use the following message, signals and listed states to display the rear blower speed selection or show a blank area.

Indicator status: **Message:** Clmt_Button_Stat3
**Signal:** Rr_Blower_Indicate
Defined as data range 0x0 – 0xF (see below for details)

Signal **State** = 7_Indicators_On (0x7) - Bars 1-7 displayed
Signal **State** = 6_Indicators_On (0x6) - Bars 1-6 displayed
Signal **State** = 5_Indicators_On (0x5) - Bars 1-5 displayed
Signal **State** = 4_Indicators_On (0x4) - Bars 1-4 displayed
Signal **State** = 3_Indicators_On (0x3) - Bars 1-3 displayed
Signal **State** = 2_Indicators_On (0x2) - Bars 1-2 displayed
Signal **State** = 1_Indicator_On (0x1) - Bar 1 displayed

Signal **State** = Indicators_Off (0x0) – All blower bars turned off
Signal **State** = Display_Blank – (0xF) – Nothing visible in this area

5.4.2 The CSD and EFP shall ignore any states that are not defined above and maintain last valid state. If no valid state can be recalled, default to **State** = Display_Blank.

## 5.5 Rear blower speed selection (Conventional up/down buttons)

5.5.1 The CSD and EFP shall use the following signals and listed states to communicate the user's rear blower speed selection to the RCCM.

CSD Press status: **Message:** Clmt_Button_Stat4
**Signals:** Rr_Btn_Status_1st
Rr_Btn_Status_2nd
**State:** Blwr_Inc_Pressed

EFP Press status: **Message:** Remote_Climate_Data
**Signal:** E_Rr_Btn_Status_1st
**Signal:** E_Rr_Btn_Status_2nd
**State:** Blwr_Inc_Pressed

Indicator status **Message**: None
**Signal:** None

CSD Press status: **Message:** Clmt_Button_Stat4
**Signals:** Rr_Btn_Status_1st
Rr_Btn_Status_2nd
**State:** Blwr_Dec_Pressed

EFP Press status: **Message:** Remote_Climate_Data
**Signal:** E_Rr_Btn_Status_1st
**Signal:** E_Rr_Btn_Status_2nd
**State:** Blwr_Dec_Pressed

Indicator status **Message:** None
**Signal:** None

5.5.2 The rear blower speed selection shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button

## 5.6 Rear Blower Speed selection (Direct/Slider interface)

5.6.1 The CSD shall use the following signals to communicate that a rear blower adjustment has been requested via any of the following methods:

- Selection of specific blower speed by press of a button/location within a range of blower speeds
- Movement of a blower "slider" across a range of blower speeds

CSD Press status **Message:** Clmt_Button_Stat4
**Signal:** Rear_Blower_Speed

5.6.2 **D**-When CSD provides a "slider" type interface for rear blower speed selection the user may change the speed very quickly and pass thru several speeds in a short period of time. Consequently, the CSD shall limit transmission of Rear_Blower_Speed signal to no quicker than once every 20 msec +/-10%.

5.6.3 While slider type interface is being used to adjust rear blower speed and the signal(s) are being transmitted, the CSD shall continue to update the rear blower speed display per the applicable signal states it receives from the RCCM.

*For example, if the rear blower speed is 1 and the user drags slider to increase to 7 within 80 msec then only 4 Rear_Blower_Speed updates would be sent out 20 msec +/- 10% apart and the rear blower speed display would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between speed request and display update over CAN for simplicity - 60msec in this example):*

*h) 20 msec after first starting to move slider from 1 Rear_Blower_Speed = 2 →*
*i) 20 msec later Rear_Blower_Speed = 4 →*
*j) 20 msec later Rear_Blower_Speed = 6 →*
*k) 20 msec later Rear_Blower_Speed = 7 when the user removes finger from touchscreen - Display changes from 1 to 2 →*
*l) 20 msec later Display changes from 2 to 4→*
*m) 20 msec later Display changes from 4 to 6→*
*n) 20 msec later Display changes from 6 to 7 (display reflects final selection within maximum allowable time per latency requirements)*

5.6.4 The sync system shall transmit all commands for a specific blower speed per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for one of the other states are satisfied.
**State:** Blower_Speed_1 (0x01)
Transmitted whenever the user issues request for blower speed 1
**State:** Blower_Speed_2 (0x02)
Transmitted whenever the user issues request for blower speed 2
**State:** Blower_Speed_3 (0x03)
Transmitted whenever the user issues request for blower speed 3
**State:** Blower_Speed_4 (0x04)
Transmitted whenever the user issues request for blower speed 4
**State:** Blower_Speed_5 (0x05)
Transmitted whenever the user issues request for blower speed 5
**State:** Blower_Speed_6 (0x06)
Transmitted whenever the user issues request for blower speed 6
**State:** Blower_Speed_7 (0x07)
Transmitted whenever the user issues request for blower speed 7
**State:** Min_Blower (0x08)
Transmitted whenever the user issues voice command for minimum blower speed
**State:** Max_Blower (0x09)

Transmitted whenever the user issues voice command for maximum blower speed.
**State:** Zero_Blower (0x0A)
Transmitted whenever the user issues request for blower speed 0
**State:** Not_Used (0x0B-0x0F)
These states are included as a design protect only and shall never be transmitted by the CSD. In the event any of these states are received, the ECP shall treat as if it has received **State** = No_Request

## 5.7 Rear Lock function:

5.7.1 The signals used to select and provide indicator status for the Rear climate control lock feature are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the ECP/RCCM Functional Specification.


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signal:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Rear_Lock _Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | Rear_Control_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat3 |
| | **Signal:** | Rr_Lock_Btn_Stt |

5.7.1.1 **State:** Enabled_Inactive
*Defined as data range (0x0)*
The CSD shall use graphical expression to communicate that the associated button is selectable(Enabled) and both the CSD and EFP shall set any included indicator to off(Inactive).

5.7.1.2 **State:** Active
*Defined as data range (0x1)*
The CSD shall use graphical expression to communicate that the associated button is selectable(Enabled) and both the CSD and EFP shall set any included indicator to on(Active).

5.7.1.3 **State:** Disabled
*Defined as data range (0x2)*
This state is only included as a design protect for rear lock button and shall never be transmitted by the RCCM. If the CSD or EFP receives this state it shall respond as if it has received the Enabled_Inactive state.

5.7.1.4 **State:** Unused
*Defined as data range (0x3)*
This state is only included as a design protect for rear lock button and shall never be transmitted by the RCCM. If the CSD or EFP receives this state it shall respond as if it has received the Enabled_Inactive state.

## 5.8 Rear Power function:

5.8.1 The signals used to select and provide indicator status for the Rear climate power state are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the ECP/RCCM Functional Specification.


| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Rear_Power_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | Rear_Power_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat3 |
| | **Signal:** | Rr_Power_Btn_Stt |
| | | Rr_On_Indicator |

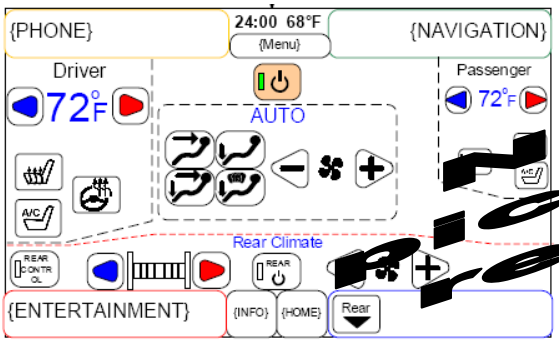
Rr_On_Indicator

5.8.1.1 This signal is redundant and included as a design protect only. The CSD and EFP shall ignore this signal and use Rr_Power_Btn_Stt to determine button and indicator settings.

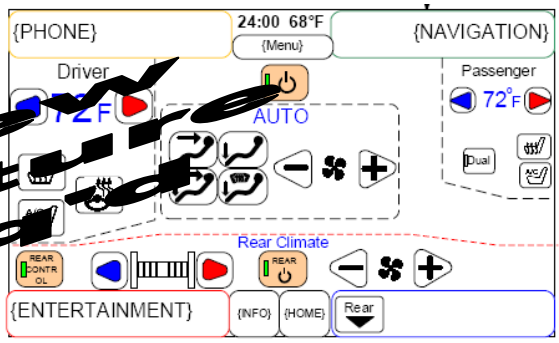
5.8.2 **E-**When the Rear system is off via press of the front climate system power button (or via a press of the rear system power button within the front climate screen or EFP), the RCCM shall transmit the temperature and blower indicator status signal states so that all temp and blower bars/indicators are turned off – See signal state descriptions in sections 3.1.2 and 3.2.2 above and illustrations below for additional details.

5.8.3 **E-**When the Rear system is on and the rear seat controls are controlling the Rear system, the RCCM shall transmit the temperature and blower indicator status signal states so that the temp and blower display areas are blank (in addition to turning the Rear Power On per ECP/RCCM Functional Specification) – See signal state descriptions in sections 3.1.2 and 3.2.2 above and illustrations below for additional details.

**Rear Climate System - Power off**




**Rear Climate System – Rear controlling System**



# 6 Touchscreen- Automatic Rear Zone Climate Control(if equipped)


**6.1** **NOTE:** None of the Auto Rear Zone functions are included as hard button inputs on the EFP. Consequently…

6.1.1 The EFP press signals in Remote_Climate_Data message are included for design protection only and the pressed signal states shall never be transmitted by the EFP. In the event any of these this signal state is received by the RCCM, the RCCM shall treat as if it has received the None_Pressed state.

6.1.2 None of the Indicator status signals are used by the EFP. The EFP shall simply ignore any and all of the below indicator signals for Auto Rear Zone.

6.1.3 **NOTE:** The Auto Rear system can be either a standard tri-zone system with one rear zone OR a quad-zone system with two rear zones, one for 2nd row and one for 3rd row. For tri-zone systems, the CSD and RCCM shall simply ignore the 3rd row signals and use 2nd row signals.

## 6.2 Rear Zone Setpoints

### 2nd Row

6.2.1 The CSD shall use the following signals to determine what value shall be displayed for rear system's 2nd row setpoint.

| | | |
|---|---|---|
| Press status | **Message:** | None |
| | **Signal:** | None |
| Indicator Status | **Message:** | Clmt_Button_Stat3 |
| | **Signals:** | Rr_LHS_Set_Temp_Dig1 |
| | | Rr_LHS_Set_Temp_Dig2 |
| | | Rr_LHS_Set_Temp_Dig3 |
| | | Rr_Set_Temp_Units |

Rr_LHS_Set_Temp_Dig1-2

6.2.1.1 **States:** 0 thru 9, L, O, H, I
*Defined as data range* (0x0 - 0x9, 0xA, 0xB, 0xC, 0xD respectively)
The CSD shall display the number or letter corresponding to the signal state in the rear setpoint display area designated for digit 1 or 2 as applicable.

6.2.1.2 **State:** Blank
*Defined as data range (0xE – 0xF)*
The CSD shall not display anything in the rear display area designated for digit 1 or 2 as applicable.

Rr_LHS_Set_Temp_Dig3

6.2.1.3 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display a third digit for rear setpoint.

6.2.1.4 **State:** _0
*Defined as data range (0x1)*
The CSD shall display .0 (decimal point followed by zero) as the third digit for rear setpoint.

6.2.1.5 **State:** _5
*Defined as data range (0x2)*
The CSD shall display .5 (decimal point followed by five) as the third digit for rear setpoint.

6.2.1.6 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the ECP. In the event this signal state is received by the CSD, it shall not display a third digit for rear setpoint.

Rr_Set_Temp_Units

6.2.1.7 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display anything following the applicable setpoint value.

6.2.1.8 **State:** Celsius
*Defined as data range (0x1)*
The CSD shall display shall display °C after the applicable setpoint value.

6.2.1.9 **State:** Fahrenheit
*Defined as data range (0x2)*
The CSD shall display shall display °F after the applicable setpoint value.

6.2.1.10 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall not display anything following the applicable setpoint value.

### 3rd Row

6.2.2 The CSD shall use the following signals to determine what value shall be displayed for rear system's 3rd row setpoint.

| | | |
|---|---|---|
| Press status | **Message:** | None |
| | **Signal:** | None |
| Indicator Status | **Message:** | Clmt_Button_Stat3 |
| | **Signals:** | Rr_RHS_Set_Temp_Dig1 |
| | | Rr_RHS_Set_Temp_Dig2 |
| | | Rr_RHS_Set_Temp_Dig3 |
| | | Rr_Set_Temp_Units |

Rr_RHS_Set_Temp_Dig1-2

6.2.2.1 **States:** 0 thru 9, L, O, H, I
*Defined as data range* (0x0 - 0x9, 0xA, 0xB, 0xC, 0xD respectively)
The CSD shall display the number or letter corresponding to the signal state in the rear setpoint display area designated for digit 1 or 2 as applicable.

6.2.2.2 **State:** Blank
*Defined as data range (0xE – 0xF)*
The CSD shall not display anything in the rear display area designated for digit 1 or 2 as applicable.

Rr_RHS_Set_Temp_Dig3

6.2.2.3 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display a third digit for rear setpoint.

6.2.2.4 **State:** _0
*Defined as data range (0x1)*
The CSD shall display .0 (decimal point followed by zero) as the third digit for rear setpoint.

6.2.2.5 **State:** _5
*Defined as data range (0x2)*
The CSD shall display .5 (decimal point followed by five) as the third digit for rear setpoint.

6.2.2.6 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the ECP. In the event this signal state is received by the CSD, it shall not display a third digit for rear setpoint.

Rr_Set_Temp_Units

6.2.2.7 **State:** Off
*Defined as data range (0x0)*
The CSD shall not display anything following the applicable setpoint value.

6.2.2.8 **State:** Celsius
*Defined as data range (0x1)*
The CSD shall display shall display °C after the applicable setpoint value.

6.2.2.9 **State:** Fahrenheit
*Defined as data range (0x2)*
The CSD shall display shall display °F after the applicable setpoint value.

6.2.2.10 **State:** Unused
*Defined as data range (0x3)*
This signal state is included as a placeholder and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall not display anything following the applicable setpoint value.

## 6.3 Rear Zone setpoint selection (Conventional up/down buttons)

6.3.1 The CSD shall use the following signals and listed states to communicate that a 2nd or 3rd row rear temperature adjustment has been requested via press of a rear temperature up or down button.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |

| | | |
|---|---|---|
| | **State:** | LHS_Temp_Inc_Pressed (2nd row) |
| | **State:** | RHS_Temp_Inc_Pressed (3rd row) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| | **State:** | RHS_Temp_Inc_Pressed |
| Indicator status | **Message:** | None |
| | **Signal Name:** | None |
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Dec_Pressed (2nd row) |
| | **State:** | RHS_Temp_Dec_Pressed (3rd row) |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | LHS_Temp_Inc_Pressed |
| | **State:** | RHS_Temp_Inc_Pressed |
| Indicator status: | **Message:** | None |
| | **Signal:** | None |

6.3.2 The rear 2nd and 3rd row setpoint selections shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button.

## 6.4 Rear Zone setpoint selection (Direct/Slider interface)

6.4.1 The CSD shall use the following signals to communicate that a 2nd or 3rd row setpoint adjustment has been requested via any of the following methods:

- Selection of specific setpoint by press of a button/location within a range of temperature setpoints.
- Movement of a temperature "slider" across a range of temperature setpoints

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rear_Set_Temp (2nd row) |
| | | Third_Rear_Set_Temp (3rd row) |

6.4.2 **D**-When CSD provides a "slider" type interface for setpoint selection the user may change the setpoint very quickly and pass thru many temperatures in a short period of time. Consequently, the CSD shall limit transmission of Rear_Set_Temp and Third_Rear_Set_Temp signals to no quicker than once every 20 msec +/- 10%.

6.4.3 While slider type interface is being used to adjust setpoint(s) and the signal(s) are being transmitted, the CSD shall continue to update the setpoint display(s) per the applicable signal states it receives from the RCCM.

*For example, if the 2nd row's setpoint is 16°C and the user drags slider to increase by 10°C (i.e. to 26°C) in 100 msec then only 5 Rear_Set_Temp updates would be sent out 20 msec +/- 10% apart and the setpoint display*

*would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between setpoint request and display update over CAN for simplicity):*

*j) 20 msec after first starting to move slider from 16°C Rear_Set_Temp = 17.5°C →*
*k) 20 msec later Rear_Set_Temp = 19.5°C →*
*l) 20 msec later Rear_Set_Temp = 22.0°C →*
*m) 20 msec later Rear_Set_Temp = 24.5°C - Display changes from 16°C to 17.5°C →*
*n) 20 msec later Rear_Set_Temp = 26.0°C when the user removes finger from touchscreen - Display changes from 17.5°C to 19.5°C →*
*o) 20 msec later Display changes from 19.5°C to 22.0°C →*
*p) 20 msec later Display changes from 22.0°C to 24.5°C →*
*q) 20 msec later Display changes from 24.5°C to 26.0°C (display reflects final setpoint selection within maximum allowable time per latency requirements – 60msec in this example)*

6.4.4 The sync system shall transmit all commands for a specific temperature in units of °C only, per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for the other state are satisfied.
**State:** LO (0x01)
Transmitted whenever the user issues a request for LO or minimum temperature setpoint
**State:** 15_5 (0x02)
Transmitted whenever the user issues a request for 15.5 °C or 60°F temperature setpoint.
**State:** 16_0 (0x03)
Transmitted whenever the user issues a request for 16.0 °C or 61°F temperature setpoint.
**State:** 16_5 (0x04)
Transmitted whenever the user issues a request for 16.5 °C or 62°F temperature setpoint.
**State:** 17_0 (0x05)
Transmitted whenever the user issues a request for 17.0 °C or 63°F temperature setpoint.
**State:** 17_5 (0x06)
Transmitted whenever the user issues a request for 17.5 °C temperature setpoint.
**State:** 18_0 (0x07)
Transmitted whenever the user issues a request for 18.0 °C or 64°F temperature setpoint.
**State:** 18_5 (0x08)
Transmitted whenever the user issues a request for 18.5 °C or 65°F temperature setpoint.
**State:** 19_0 (0x09)
Transmitted whenever the user issues a request for 19.0 °C or 66°F temperature setpoint.
**State:** 19_5 (0x0A)
Transmitted whenever the user issues a request for 19.5 °C or 67°F temperature setpoint.
**State:** 20_0 (0x0B)
Transmitted whenever the user issues a request for 20.0 °C or 68°F temperature setpoint.
**State:** 20_5 (0x0C)
Transmitted whenever the user issues a request for 20.5 °C or 69°F temperature setpoint.
**State:** 21_0 (0x0D)
Transmitted whenever the user issues a request for 21.0 °C or 70°F temperature setpoint.
**State:** 21_5 (0x0E)
Transmitted whenever the user issues a request for 21.5 °C or 71°F temperature setpoint.
**State:** 22_0 (0x0F)
Transmitted whenever the user issues a request for 22.0 °C or 72°F temperature setpoint.
**State:** 22_5 (0x10)
Transmitted whenever the user issues a request for 22.5 °C temperature setpoint.
**State:** 23_0 (0x11)
Transmitted whenever the user issues a request for 23.0 °C or 73°F temperature setpoint.
**State:** 23_5 (0x12)
Transmitted whenever the user issues a request for 23.5 °C or 74°F temperature setpoint.
**State:** 24_0 (0x13)

Transmitted whenever the user issues a request for 24.0 °C or 75°F temperature setpoint.
**State:** 24_5 (0x14)
Transmitted whenever the user issues a request for 24.5 °C or 76°F temperature setpoint.
**State:** 25_0 (0x15)
Transmitted whenever the user issues a request for 25.0 °C or 77°F temperature setpoint.
**State:** 25_5 (0x16)
Transmitted whenever the user issues a request for 25.5 °C or 78°F temperature setpoint.
**State:** 26_0 (0x17)
Transmitted whenever the user issues a request for 26.0 °C or 79°F temperature setpoint.
**State:** 26_5 (0x18)
Transmitted whenever the user issues a request for 26.5 °C or 80°F temperature setpoint.
**State:** 27_0 (0x19)
Transmitted whenever the user issues a request for 27.0 °C or 81°F temperature setpoint.
**State:** 27_5 (0x1A)
Transmitted whenever the user issues a request for 27.5 °C temperature setpoint.
**State:** 28_0 (0x1B)
Transmitted whenever the user issues a request for 28.0 °C or 82°F temperature setpoint.
**State:** 28_5 (0x1C)
Transmitted whenever the user issues a request for 28.5 °C or 83°F temperature setpoint.
**State:** 29_0 (0x1D)
Transmitted whenever the user issues a request for 29.0 °C or 84°F temperature setpoint.
**State:** 29_5 (0x1E)
Transmitted whenever the user issues a request for 29.5 °C or 85°F temperature setpoint.
**State:** HI (0x1F)
Transmitted whenever the user issues a request for HI or maximum temperature setpoint

6.4.5 Upon receipt of these signals with state ≠ No_Request the RCCM shall immediately change the 2nd and/or 3rd row setpoint temperatures and transmit the corresponding signal states for setpoint displays subject to the following exceptions and additional requirements:

6.4.5.1 When receiving quick, successive changes of states ≠ No_Request (possible if the user changes the setpoints very quickly within a short period of time – see above), the RCCM shall only transmit signal states for setpoint displays that agree with the temperatures received from the CSD and shall do so no quicker than once every 20 msec +/-10%.

6.4.5.2 The RCCM shall change the 2nd and/or 3rd row's setpoint to the transmitted value or equivalent without changing the current type of units (°C or °F) being used. i.e. If vehicle is currently set-up to display temperature in °F, then the RCCM shall first convert incoming value to °F per table in Appendix B and then change setpoint to this value.

## 6.5 Rear blower speed display

### 2nd Row

6.5.1 The CSD shall use the following message, signals and listed states to display the 2nd row's rear blower speed selection or show a blank area.

Indicator status: **Message:** Clmt_Button_Stat3
**Signal:** Rr_Blower_ Indicate
Defined as data range 0x0 – 0xF (see below for details)

Signal **State** = 7_Indicators_On (0x7) - Bars 1-7 displayed
Signal **State** = 6_Indicators_On (0x6) - Bars 1-6 displayed
Signal **State** = 5_Indicators_On (0x5) - Bars 1-5 displayed
Signal **State** = 4_Indicators_On (0x4) - Bars 1-4 displayed
Signal **State** = 3_Indicators_On (0x3) - Bars 1-3 displayed
Signal **State** = 2_Indicators_On (0x2) - Bars 1-2 displayed
Signal **State** = 1_Indicator_On (0x1) - Bar 1 displayed

Signal **State** = Indicators_Off (0x0) – All blower bars turned off
Signal **State** = Display_Blank – (0xF) – Nothing visible in this area

6.5.2 **D**-The CSD shall ignore any states that are not defined above and maintain last valid state. If no valid state can be recalled, default to **State** = Display_Blank.

### 3rd Row

6.5.3 The CSD shall use the following message, signals and listed states to display the 3rd row's rear blower speed selection or show a blank area.

Indicator status: **Message:** Clmt_Button_Stat7
**Signal:** Rr_RHS_Blower_ Indicate
Defined as data range 0x0 – 0xF (see below for details)

Signal **State** = 7_Indicators_On (0x7) - Bars 1-7 displayed
Signal **State** = 6_Indicators_On (0x6) - Bars 1-6 displayed
Signal **State** = 5_Indicators_On (0x5) - Bars 1-5 displayed
Signal **State** = 4_Indicators_On (0x4) - Bars 1-4 displayed
Signal **State** = 3_Indicators_On (0x3) - Bars 1-3 displayed
Signal **State** = 2_Indicators_On (0x2) - Bars 1-2 displayed
Signal **State** = 1_Indicator_On (0x1) - Bar 1 displayed

Signal **State** = Indicators_Off (0x0) – All blower bars turned off
Signal **State** = Display_Blank – (0xF) – Nothing visible in this area

**D**-The CSD shall ignore any states that are not defined above and maintain last valid state. If no valid state can be recalled, default to **State** = Display_Blank.

## 6.6 Rear blower speed selection (Conventional up/down buttons)

6.6.1 The CSD shall use the following signals and listed states to communicate the user's 2nd and 3rd row rear blower speed selection to the RCCM.

CSD Press status: **Message:** Clmt_Button_Stat4
**Signals:** Rr_Btn_Status_1st
Rr_Btn_Status_2nd
**State:** Blwr_Inc_Pressed
**State:** Third_Blwr_Inc_Pressed

| | | |
|---|---|---|
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | **Signal:** | E_Rr_Btn_Status_2nd |
| | **State:** | Blwr_Inc_Pressed |
| | **State:** | Third_Blwr_Inc_Pressed |
| Indicator status | **Message:** | None |
| | **Signal:** | None |
| CSD Press status: | **Message** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Blwr_Dec_Pressed |
| | **State:** | Third_Blwr_Dec_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | **Signal:** | E_Rr_Btn_Status_2nd |
| | **State:** | Blwr_Dec_Pressed |
| | **State:** | Third_Blwr_Dec_Pressed |
| Indicator status | **Message:** | None |
| | **Signal:** | None |

6.6.2 The 2nd and 3rd row rear blower speed selection shall support press and hold functionality. Consequently, the press status signal states outlined above must be transmitted by CSD and EFP upon initial press and continue to be transmitted while user presses the button

## 6.7 Rear Blower Speed selection (Direct/Slider interface)

6.7.1 The CSD shall use the following signals to communicate that a 2nd or 3rd row rear blower adjustment has been requested via any of the following methods:

- Selection of specific blower speed by press of a button/location within a range of blower speeds
- Movement of a blower "slider" across a range of blower speeds

| | | |
|---|---|---|
| CSD Press status | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rear_Blower_Speed |
| | | Third_Rear_Blower_Speed |

6.7.2 **D**-When CSD provides a "slider" type interface for rear blower speed selection the user may change the speed very quickly and pass thru several speeds in a short period of time. Consequently, the CSD shall limit transmission of Rear_Blower_Speed and Third_Rear_Blower_Speed signals to no quicker than once every 20 msec +/-10%.

6.7.3 While slider type interface is being used to adjust rear blower speed and the signal(s) are being transmitted, the CSD shall continue to update the rear blower speed display per the applicable signal states it receives from the RCCM.

*For example, if the rear blower speed (for 2nd row) is 1 and the user drags slider to increase to 7 within 80 msec then only 4 Rear_Blower_Speed updates would be sent out 20 msec +/- 10% apart and the rear blower speed display would be updated to reflect these same changes. This would work as follows (assuming 60ms latency between speed request and display update over CAN for simplicity - 60msec in this example):*

*o) 20 msec after first starting to move slider from 1 Rear_Blower_Speed = 2 →*
*p) 20 msec later Rear_Blower_Speed = 4 →*
*q) 20 msec later Rear_Blower_Speed = 6 →*
*r) 20 msec later Rear_Blower_Speed = 7 when the user removes finger from touchscreen - Display changes from 1 to 2 →*
*s) 20 msec later Display changes from 2 to 4→*
*t) 20 msec later Display changes from 4 to 6→*
*u) 20 msec later Display changes from 6 to 7 (display reflects final selection within maximum allowable time per latency requirements)*

6.7.4 The sync system shall transmit all commands for a specific 2nd or 3rd blower speed per the valid signal states listed here:

**State:** No_Request (0x00)
Transmitted unless the conditions for one of the other states are satisfied.
**State:** Blower_Speed_1 (0x01)
Transmitted whenever the user issues request for blower speed 1
**State:** Blower_Speed_2 (0x02)
Transmitted whenever the user issues request for blower speed 2
**State:** Blower_Speed_3 (0x03)
Transmitted whenever the user issues request for blower speed 3
**State:** Blower_Speed_4 (0x04)
Transmitted whenever the user issues request for blower speed 4
**State:** Blower_Speed_5 (0x05)
Transmitted whenever the user issues request for blower speed 5
**State:** Blower_Speed_6 (0x06)
Transmitted whenever the user issues request for blower speed 6
**State:** Blower_Speed_7 (0x07)
Transmitted whenever the user issues request for blower speed 7
**State:** Min_Blower (0x08)
Transmitted whenever the user issues voice command for minimum blower speed
**State:** Max_Blower (0x09)
Transmitted whenever the user issues voice command for maximum blower speed.
**State:** Zero_Blower (0x0A)
Transmitted whenever the user issues request for blower speed 0
**State:** Not_Used (0x0B-0x0F)
These states are included as a design protect only and shall never be transmitted by the CSD. In the event any of these states are received, the ECP shall treat as if it has received **State** = No_Request

## 6.8 Air Distribution Selection and Indication

6.8.1 The signals used to select and provide indication for the 2nd and 3rd row manual rear air distribution modes are as follows and the RCCM shall transmit the applicable state for the Indicator status signals per the applicable state logic section(s) of the Climate Module Functional Specification.

Panel Mode:

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Panel_Pressed |
| | **State:** | Third_Panel_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |

| | | |
|---|---|---|
| | **State:** | Panel_Pressed |
| | **State:** | Third_Panel_Pressed |
| Floor Mode: | | |
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Floor_Pressed |
| | **State:** | Third_Floor_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | Floor_Pressed |
| | **State:** | Third_Floor_Pressed |
| Single Mode Toggle: | | |
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Frt_Btn_Status_2nd |
| | **State:** | Panel_Floor_Pressed |
| | **State:** | Third_Pnl_Flr_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | Panel_Floor_Pressed |
| | **State:** | Third_Pnl_Flr_Pressed |
| Indicator status(ALL): | **Message:** | Clmt_Button_Stat3 |
| | **Signal:** | Rr_Panel_Btn_Stt |
| | **Signal:** | Rr_Floor_Btn_Stt |
| | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Rr_Third_Panel_Btn_Stt |
| | **Signal:** | Rr_Third_Floor_Btn_Stt |

## 6.9 Rear Auto Button:

6.9.1 The signals used to select and provide indicator status for the 2nd and 3rd row rear Auto function are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | AUTO_Pressed |
| | **State:** | Third_AUTO_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | **Signal:** | E_Rr_Btn_Status_2nd |
| | **State:** | AUTO_Pressed |
| | **State:** | Third_AUTO_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat3 |
| | **Signal:** | Rr_AUTO_Btn_Stt |

| | | |
|---|---|---|
| | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Rr_Third_AUTO_Btn_Stt |

## 6.10 Rear Power function:

6.10.1 The signals used to select and provide indicator status for the 2nd and 3rd row rear climate power state are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Rear_Power_Pressed |
| | **State:** | Third_Rr_Pwr_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |
| | **State:** | Rear_Power_Pressed |
| | **State:** | Third_Rr_Pwr_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat3 |
| | **Signal:** | Rr_Power_Btn_Stt |
| | | Rr_On_Indicator |
| | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Rr_Third_Power_Btn_Stt |

Rr_On_Indicator

6.10.1.1 This signal is only used to control the 'Rear Lock' telltale in the rear climate module. Consequently, the CSD shall ignore this signal and only use Rr_Power_Btn_Stt and Rr3rd_Power_Btn_Stt signals to determine button and indicator settings.

6.10.2 **E-**When the Rear system is off via press of the front climate system power button (or via a press of the rear system power buttons within the front climate screen), the RCCM shall transmit the temperature and blower indicator status signal states for applicable row so that the temp setpoint display is blank and blower bars/indicators are turned off.

## 6.11 Rear "Lock" function:

6.11.1 The signals used to select and provide indicator status for the Rear climate "lock" status are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification. **NOTE:** The following signals shall be used regardless of which display/screen (i.e. 2nd or 3rd row views) the Rear climate "lock" function is accessed from

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Rear_Lock_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signals:** | E_Rr_Btn_Status_1st |
| | | E_Rr_Btn_Status_2nd |

| | | |
|---|---|---|
| | **State:** | Rear_Lock_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Rr_Lock_Btn_Stt |

## 6.12 Rear Synch function:

6.12.1 The signals used to select and provide indicator status for the Rear synchronization function are as follows and the RCCM shall transmit the applicable state for the Indicator status signal per the applicable state logic section(s) of the Climate Module Functional Specification.

6.12.2 NOTE: When a rear, quad zone climate system is synched via this function, the CSD shall transmit press status for all of the user's climate selections (per above) via the signal state for the 2nd row.

| | | |
|---|---|---|
| CSD Press status: | **Message:** | Clmt_Button_Stat4 |
| | **Signals:** | Rr_Btn_Status_1st |
| | | Rr_Btn_Status_2nd |
| | **State:** | Third_Synch_Pressed |
| EFP Press status: | **Message:** | Remote_Climate_Data |
| | **Signal:** | E_Rr_Btn_Status_1st |
| | **Signal:** | E_Rr_Btn_Status_2nd |
| | **State:** | Rear_Synch_Pressed |
| Indicator status: | **Message:** | Clmt_Button_Stat7 |
| | **Signal:** | Rr_Synch_Btn_Stt |

## 6.13 Rear Zone Selection (Quad Zone Systems)

6.13.1 The CSD shall support navigation between 2nd and 3rd row interfaces within a touchscreen. The navigation shall consist of buttons to switch view/interface between 2nd row controls, 3rd row controls and status display(if applicable). The operational state logic for navigating between screens shall be handled by the CSD. However the RCCM needs to know which view is active to support proper Synchronization control etc. Consequently, the active view shall be determined based on the following message and Signal states from the CSD.

| | |
|---|---|
| **Message:** | Clmt_Button_Stat4 |
| **Signal:** | ClimtRearViewR_D_Stat |

ClimtRearViewR_D_Stat

6.13.2 **State:** Not_Displayed
*Defined as data range (0x0)*
Transmitted whenever the CSD is not displaying the rear climate

6.13.3 **State:** Both
*Defined as data range (0x1)*
Transmitted whenever the CSD is displaying an interface showing both 2nd and 3rd row climate status at the same time.

6.13.4 **State:** Second Row
*Defined as data range (0x2)*
Transmitted whenever the CSD is displaying an interface showing 2nd row climate status and controls.

6.13.5 **State:** Third Row
*Defined as data range (0x3)*
Transmitted whenever the CSD is displaying an interface showing 3rd row climate status and controls.

## 6.14 Air Quality Status

6.14.1 The CSD shall support the transmission of signals to provide additional assessments of air quality based on actual PM levels and other system information. The Rear Climate module shall then use this information to change HMI displays and verbiage accordingly.

*The requirements for how air quality is assessed are not included within this specification are outside the scope of these requirements. These requirements shall be determined as part of the GUI design standards and/or other HMI/Sync system requirements.*

6.14.2 The signals used to provide the air quality assessment are as follows:

| | |
|---|---|
| **Message:** | **PartMttrCabn_Stat_Immed** |
| **Signal:** | PmCabnLvl_D_Stat |
| | PmCabn_D_Stat |

PmCabnLvl_D_Stat

*6.14.2.1* **State** Not_Known
*Defined as data range 0x0*
The Rear climate module shall include a default highlight or background for the displayed PM data it receives from the RCCM. Additionally, the text "unknown" (or approved alternative) may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.2* **State** Pm_Level_1_Best
*Defined as data range 0x1*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.3* **State** Pm_Level_2
*Defined as data range 0x2*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.4* **State** Pm_Level_ 3
*Defined as data range 0x3*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.5* **State** Pm_Level_ 4
*Defined as data range 0x4*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the

scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.6* **State** Pm_Level_ 5
*Defined as data range 0x5*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.7* **State** Pm_Level_ 6_Worst
*Defined as data range 0x6*
The Rear climate module shall include a colored highlight or background for the displayed PM data it receives from the RCCM. Additionally, a specific classification may also be displayed in addition to the actual PM data. The specific color and classification associated with this level are outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.8* **State** Not_Used
*Defined as data range 0x7*
This signal state is included as a design protect only. Consequently, the CSD shall never transmit this state. If the Rear climate module receives this state it shall respond as if it has received 'Unknown' state.

PmCabn_D_Stat

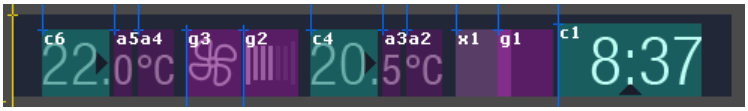
*6.14.2.9* **State** NotKnown
*Defined as data range 0x0*
The Rear climate module shall display an icon or other graphic to communicate current status of air filtering system in addition to displaying the PM data it receives from the RCCM. The specific icon or graphic associated with this 'NotKnown' status is outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.10* **State** Filtering_Off
*Defined as data range 0x1*
The Rear climate module shall display an icon or other graphic to communicate current status of air filtering system in addition to displaying the PM data it receives from the RCCM. The specific icon or graphic associated with this 'filtering off' status is outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.11* **State** Filtering_On
*Defined as data range 0x2*
The Rear climate module shall display an icon or other graphic to communicate current status of air filtering system in addition to displaying the PM data it receives from the RCCM. The specific icon or graphic associated with this 'filtering on' status is outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

*6.14.2.12* **State** Filtering_Complete
*Defined as data range 0x3*
The Rear climate module shall display an icon or other graphic to communicate current status of air filtering system in addition to displaying the PM data it receives from the RCCM. The specific icon or graphic associated with this 'filtering complete' status is outside the scope of these requirements. These specific requirements can be found in H26g screen flow specification for Sync.

# 7 NON-Touchscreen Status Bar




7.1.1 The following climate status information shall be displayed in the Status bar for vehicles with a display that does not include any touch inputs.

Driver and Passenger Setpoint Displays (if no displays are included in EFP)
Blower indication (if no indication is provided in EFP)
Mode indication (if no indicators are included on the EFP)

Indications for all other necessary climate status incl. conditioned seats, heated steering wheel and rear zone shall be included on the EFP or other centerstack controls

7.1.2 **D-**Whenever the Vehicle State = a Normal Run state, this status bar and the above information must be visible at all times unless the user is actively moving thru specific secondary screens. If and when the status bar is minimized in this way, any attempted changes to the displayed information that are the direct result of a user adjustment shall cause the status bar to automatically return to normal size OR shall trigger a "pop-up" display to appear for a short period of time in order to display the new status (ref section 6) for specifics on pop-up displays and trigger req'ts).

7.1.3 **D- Driver/Passenger setpoint displays** - The Driver's and Passenger's setpoint temperatures shown in the CSD display's status bar shall comply with the same message, signal and display requirements as specified for the main, front climate screen (section 3.5).

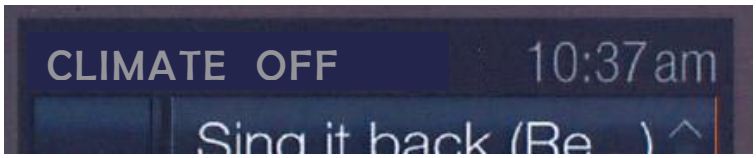
7.1.4 **D- Blower indication** - The front, blower speed indication shown in the CSD's status bar shall comply with the same message, signal and display requirements as specified for the main front climate screen (section 3.9) with the exceptions noted in the Auto Indication and Climate Power Off sections (2.19.6/2.19.7) below.

7.1.5 **D -Air Distribution Mode indication** - The CSD shall display the appropriate graphic for the active front, manual air distribution mode. This indication shown in the CSD status bar shall use the same message and indicator status signals as the ones used for the main climate screen's manual air distribution mode buttons (see section 3.12.6). If the indicator status signals for all three of these manual air distribution modes = Enabled_Inactive, the air distribution portion of the status bar shall be blank - See illustration below.


7.1.6 **D- Auto indication** – If the CSD's status bar displays both the manual blower speed AND manual air distribution modes, the CSD shall ignore these indicator status signal states and display the word "AUTO" in the area normally used to display the blower speed and air distribution mode whenever the RCCM transmits the signals that indicate the climate system is operating in a 'full' auto state (as defined in section 2.15.1.5), – See illustration below.

7.1.6.1 **D**- If the CSD's status bar display does NOT display both the manual blower speed AND manual air distribution modes, the CSD shall continue to display blower speed and air distribution mode indications per signals states received from ECP.

7.1.7 **D-Climate Power Off -** When the climate system is turned off (**Message:** Clmt_Button_Stat1 **Signal:** *Front_Power_Btn_Stt*, **State** = Inactive), the CSD shall ensure that the words "CLIMATE OFF' are displayed across the area normally used to display the Climate information (See illustration below). However, if Message**:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), the CSD shall continue to display setpoint temperatures and blower speed information (Reference section 5.2 below for additional details).




## 7.2 Diagnostics Display

7.2.1 Whenever **Message:** Clmt_Button_Stat2, **Signal:** CC_Diagnostics_Active = Yes (0x0), The CSD shall continue to display the climate information normally included in the status bar per the applicable signals from the RCCM. The RCCM shall be responsible for transmitting the signals so the appropriate diagnostic information is displayed.

7.2.2 **D-** Other non-climate functions shall remain operational. If subsequent activity requires navigation away from a display with the climate status, the climate information normally included in the status bar shall be re-displayed whenever the climate status would normally be displayed.

# 8 Pop-up Displays/Status Bar triggers

**8.1** The CSD shall support the activation of any applicable pop-up displays for ALL climate control functions as outlined within this section regardless of whether or not indication is provided on the EFP.

**8.2** With the exception of the requirements for displaying Active Air Refresh status per requirements below, displaying of all climate menus, pop-ups, status messages etc, shall only be triggered as the direct result of a user initiated adjustment. Any secondary effects of a user adjustment, a load shed condition or any other non-user initiated system response shall not trigger a pop-up display or re-display the status bar.

**8.3** All direct user adjustments shall trigger these displays even if the adjustment does not result in a status change. For example, if the system is currently operating at a minimum blower speed = 1 and the user attempts to adjust the blower speed lower, the status bar shall be re-displayed (or pop-up display shall be activated) to display the updated blower speed which in this case, would still be = 1.

**8.4** Consequently, the following signal states used to trigger a climate pop-up display or re-display the climate status bar and, with the exception of the UFC_xxx states, shall only be transmitted by the Climate Module based on on user selection of the associated function or the xxx_Pressed or None_Pressed states for the associated function transmitted by the CSD. The UFC_xxx states shall be transmitted per requirements noted below.

**8.5** In turn, the CSD shall only display climate pop-ups, status messages etc for any of the functions listed in this section if the associated signal state is received within one of the x_x_x_User_Adj signals from the RCCM per requirements below. This includes, but is not limited to pop-ups for temperature setpoints, blower speed, smart auto blower setting etc.

**NOTE:** Requirements for triggering display of interactive climate menu(s) are detailed in section 3.2 above.

**8.6** NOTE: To prevent race conditions, ensure proper response from the Climate module and ensure proper feedback to the user, the RCCM shall ensure that all of the control bits for updated status signals within these messages are set simultaneously(or before) changing the state of the xxx_User_Adj signals within the corresponding message

8.6.1 'None'(0x00) is the default state for the following messages. Unless specified otherwise any states other than 'None'(0x00) shall only be set temporarily when the corresponding button/function is selected. The signal state shall return to 'None'(0x00) after button/function is selected i.e. next CAN transmission, to enable the triggering of pop-up(s) for subsequent user selections.

8.6.2 A single button selection can result in changes to more than one status bit/signal. Consequently, whenever a pop-up is triggered per these requirements, the CSD shall consider all control bits for status signals and update the status for all functions appearing in any given pop-up display accordingly.

**Message:** Clmt_Button_Stat1, **Signal:** CC_Fr_Btn_User_Adj

8.6.3 **State:** None
Transmitted unless the conditions for one of the other states are satisfied.

8.6.4 **State:** Save_MyTemp_Selection
NOTE: This state is included as a design protect only since My Temp is not currently supported. Consequently, the RCCM shall never transmit this state. If the CSD receives this signal state it shall treat as if it has received State = None.

8.6.5 **State:** Use_My_Temp_Selection
NOTE: This state is included as a design protect only since My Temp is not currently supported. Consequently, the RCCM shall never transmit this state. If the CSD receives this signal state it shall treat as if it has received State = None.

8.6.6 **State:** Fr_AUTO_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the AUTO_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.7 **State:** AC_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the AC_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.8 **State:** Recirc_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Recirc_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.9 **State:** Fr_Power_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Front_Power_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.10 **State:** Max_AC_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Max_AC_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.11 **State:** Fr_Air_Dist_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of any of the following signal states from either the EFP('hard' button) or CSD(Voice command only):

Windscreen_Pressed
Panel_Pressed
Floor_Pressed
Defrost_Pressed

8.6.12 **State:** Defrost_Selection
This signal state is included as a design protect and shall never be transmitted by the RCCM. In the event this signal state is received by the CSD, it shall treat as if it has received State = Fr_Air_Dist_Selection.

8.6.13 **State:** Max_Defrost_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Max_Defrost_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.14 **State:** Rear_Defrost_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Rear_Defrost_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.15 **State:** Dual_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Dual_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).
NOTE: This state is included as a design protect only since Dual is currently being made available via a touchscreen 'soft' button only. Consequently, the RCCM shall never transmit this state. If the CSD receives this signal state it shall treat as if it has received State = None.

8.6.16 **State:** HSW_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Htd_Strg_Whl_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.17 **State:** LHS_Htd_St_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via activation of a front, left heated seat 'hard' button or a voice command for a front, left heated seat status. Climate module shall continue to transmit this state until these adjustments are no longer detected.

8.6.18 **State:** RHS_Htd_St_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via activation of a front, right heated seat 'hard' button or a voice command for a front, right heated seat status change (either heating or cooling). Climate module shall continue to transmit this state until these adjustments are no longer detected.

8.6.19 **State:** Htd_WS_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the Htd_WS_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.20 **State:** UFC_Active
Transmitted after a calibratable delay of (0-30) seconds whenever the RCCM detects either of the following:

8.6.20.1 Vehicle State transition from ‘Remote Start’ to ‘Normal Run’ and Ultra Fresh Cabin(UFC) feature status is ‘Active’ with ≥ (0-30) seconds remaining on UFC timer as defined within the applicable section(s) of the Climate Module Functional Specification.

8.6.20.2 Vehicle State transition from ‘Off’ to ‘Normal Run’ and UFC feature status is ‘Active’ as defined within the applicable section(s) of the Climate Module Functional Specification.

8.6.20.3 Upon receipt of this signal state the CSD shall temporarily display a pop-up or transient message indicating that the Active Air Refresh operation is currently active.

8.6.21 **State:** UFC_Complete
Transmitted after a calibratable delay (0-30) seconds whenever the RCCM detects either of the following:

8.6.21.1 Vehicle State transition from 'Off' to 'Normal Run' and UFC feature status is 'Complete' as defined within the applicable section(s) of the Climate Module Functional Specification.

8.6.21.2 Vehicle State is 'Normal Run' and UFC feature status has changed from 'Active' to 'Complete' as defined within the applicable section(s) of the Climate Module Functional Specification.

8.6.21.3 Upon receipt of this signal state the CSD shall temporarily display a pop-up or transient message indicating that the Active Air Refresh operation has been is successfully completed.

8.6.22 **State:** UFC_Interupted
Transmitted whenever the RCCM detects that UFC feature status has changed from 'Active' to 'Incomplete' as defined within the applicable section(s) of the Climate Module Functional Specification.

8.6.22.1 Upon receipt of this signal state the CSD shall temporarily display a pop-up or transient message indicating that the Active Air Refresh operation has been interupted.

8.6.23 **States:** LHS_Cld_St_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via activation of a front, left cooled seat 'hard' button or a voice command for a front, left cooled seat status change. RCCM shall continue to transmit this state until these adjustments are no longer detected.

8.6.24 **State:** RHS_Cld_St_Selection Transmitted whenever the RCCM detects an attempted user adjustment via activation of a front, right cooled seat 'hard' button or a voice command for a front, right cooled seat status change. RCCM shall continue to transmit this state until these adjustments are no longer detected.

**Message:** Clmt_Button_Stat2 **Signal:** CC_Fr_Stat_User_Adj

8.6.25 **State:** None (0x0)
Transmitted unless the conditions for the other state are satisfied.

8.6.26 **State:** FLHS_SetPt_Selection (0x1)
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of any of the following states from either the EFP('hard' button) or CSD(Voice command only):
LHS_Temp_Inc_Pressed
LHS_Temp_Dec_Pressed

Also transmitted whenever RCCM detects a change in the state of signal FrtTe_An_Actl from EFP

The EFP shall continue to transmit this state until these adjustments are no longer detected.

8.6.27 **State:** FRHS_SetPt_Selection (0x2)
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of any of the following states from either the EFP('hard' button) or CSD(Voice command only):
RHS_Temp_Inc_Pressed
RHS_Temp_Dec_Pressed

The EFP shall continue to transmit this state until these adjustments are no longer detected.

8.6.28 **State:** Fr_Blwr_Spd_Selection (0x3)
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of any of the following states from either the EFP('hard' button) or CSD(Voice command only):

Blwr_Inc_Pressed
Blwr_Dec_Pressed

8.6.29 **State:** DrvrFcsdMde_Selection (0x4)
Transmitted whenever the RCCM detects an attempted user adjustment via activation of the Driver Focused Mode ‘hard’ override button.

8.6.30 **State:** LHS_AUTO_St_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the LHS_Auto_Seat_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.31 **State:** RHS_AUTO_St_Selection
Transmitted whenever the RCCM detects an attempted user adjustment via receipt of the RHS_Auto_Seat_Pressed signal state from either the EFP('hard' button) or CSD(Voice command only).

8.6.32 **States:** Unused (0x5 – 0x07)
These signal states are included as a placeholder and shall never be transmitted by the RCCM. In the event one of these signal states is received by the CSD, it shall treat as if it has received State = None.

**Message:** Clmt_Button_Stat3 **Signal:** CC_Rr_Stat_User_Adj
8.6.33 **State:** None
Transmitted unless the conditions for one of the other states are satisfied.

8.6.34 **State:** RLHS_SetPt_Selection
Transmitted whenever the ECP detects an attempted user adjustment via movement of the rear, leftside temperature knob(within front Climate module), activation of a rear, leftside temperature 'hard' button(within front Climate module), or a voice command for rear, leftside temperature. The ECP shall continue to transmit this state until these adjustments are no longer detected.

8.6.35 **State:** RRHS_SetPt_Selection
Transmitted whenever the ECP detects an attempted user adjustment via movement of the rear, rightside temperature knob(within front Climate module), activation of a rear, rightside temperature 'hard' button(within front Climate module) or a voice command for rear, rightside temperature. The Climate module shall continue to transmit this state until these adjustments are no longer detected.

8.6.36 **State:** Rr_Blwr_Spd_Selection
Transmitted whenever the ECP detects an attempted user adjustment via movement of the rear blower knob(within front Climate module), activation of a rear blower speed 'hard' button (within front Climate module) or voice command for rear blower speed. ECP shall continue to transmit this state until these adjustments are no longer detected.

8.6.37 **State:** Rr_Power_Selection
Transmitted whenever the Climate module detects an attempted user adjustment via activation of the Power 'hard' button for the Rear system (within front ECP).

8.6.38 **State:** Rr_Control_Selection
Transmitted whenever the Climate module detects an attempted user adjustment via activation of the Rear Control 'hard' button for the Rear system (within front Climate module).

8.6.39 **State:** Rr_AUTO_Selection
Transmitted whenever the Climate module detects an attempted user adjustment via activation of the Rear Auto 'hard' button for the Rear system (within front Climate module).

8.6.40 **State:** Rr_Mode_Selection
Transmitted whenever the Climate module detects an attempted user adjustment via activation of any of the air distribution 'hard' buttons for the Rear system (within front Climate module).

8.6.41 **States:** Unused
These signal states are included as a placeholder and shall never be transmitted by the ECP. In the event one of these signal states is received by the CSD, it shall treat as if it has received State = None.

**8.7** The status bar shall not be re-displayed and no pop-up displays shall be activated as the result of an adjustment of any control via a touchscreen.

**8.8** **D-** When re-displaying the climate status bar, the entire status bar shall be re-displayed if any single function included within the status bar is adjusted per a change in the above signal states.

**8.9** When activating a pop-up display, only a pop-up for the function being adjusted shall be displayed. Furthermore, only one pop-up display shall be visible at a time. If two or more applicable functions are being adjusted at the same time (**State** ≠ None in more than one of the above signals), the CSD shall display per the first of these signals it receives.

**8.10** A pop-up display may also be used while the status bar is still active in order to provide additional feedback to the customer (that they have made an adjustment). In these cases, it shall also only be triggered as the direct result of a user initiated adjustment and therefore only be triggered via receipt of the above signals.

*Any requirements for if/when pop-ups are displayed and/or the appearance of the pop-up displays incl. size, transitions, duration etc. not included within this specification are outside the scope of these requirements and shall be determined as part of the GUI design standards and/or other HMI system requirements.*

# 9 RCCM(Remote Climate Control Module) to ECG (Enhanced Central Gateway) Interface

**9.1** In Autonomous vehicle applications the RCCM shall receive and respond to ECG for climate control functionality using Messages/signals as outlined within this specification.

# 10 RCCM to Sync/Voice commands Interface

**10.1** If the vehicle is appropriately equipped, the RCCM shall receive and respond to climate control voice commands via the following messages from the Sync module:

**Message:** Clmt_Button_Stat4

*The system receives a momentary press of a button to activate the microphone for voice operation. The microphone remains active for a time period after receiving the last command.*

**10.2** **D-**The following climate features/functions shall be controllable via voice commands

| |
|---|
| Temperature Increase |
| Temperature Decrease |
| Temperature <Lo--HI> |
| Maximum Temperature |
| Minimum Temperature |

**10.3 D**-The above temperature commands shall only result in changes to the driver's temperature setting.

**10.4** Priority shall be givento "hard" and "soft" button inputs over voice commands.

***10.5*** **D**-When a "hard" or "soft" button is pressed, the voice command session shall be terminated until the next voice button press.

**10.6** The Sync module shall make use of the signals within the following message to determine the current status of the climate features:

**Messages:** Clmt_Button_Stat1

## 10.7 Driver's Temperature Setpoint (voice control)

10.7.1 The **Message:** Clmt_Button_Stat4, **Signal:** Drv_Set_Temp shall be used to set the driver setpoint temperature to a specific value when a specific temperature (or maximum temperature or minimum temperature) is spoken by the user.

10.7.1.1 The sync system shall transmit all VR commands for a specific temperature in units of °C only, per the valid signal states listed in Driver and Passenger setpoint selection (Direct/Slider interface) section above:

10.7.1.2 **D-**The sync system shall inform the driver when a requested set temp value is not valid.

## 10.8 Voice Blower Limiting

*While in certain air distribution modes the blower speed may be limited during voice sessions and/or phone calls. Furthermore, if and when the blower is limited after being manually adjusted by the user, the blower indications may be adjusted to agree with manual blower setting(1-7) closest to actual blower speed. When blower is set for automatic operation, blower speed will not be displayed regardless of whether or not the speed is being limited. Any manual adjustments of blower speed, while limited, shall be relative to the limited speed.*

10.8.1 **R-**Status of Voice Blower Limiting strategy (enabled vs disabled) shall be configurable via both Factory and User requests. Ref. Climate Module Functional Specification for specific requirements.

10.8.2 **D** -The sync system shall transmit the following signal to request blower speed limiting when the voice system microphone is active.

**Message:** Clmt_Button_Stat4
**Signal:** Voice_Blower_Limit
**State:** NoRequest

10.8.3 Shall default to this state whenever a voice session (incl. phone call) is inactive

**State:** Request

10.8.4 Transmitted whenever the user activates a voice session or whenever a phone call is initiated or received via Sync (including emergency calls).

10.8.5 **R-**The RCCM shall monitor this signal and limit the blower speed to a maximum value when the signal **State** = Request. Ref. Climate Module Functional Specification for specific requirements.

10.8.6 **R-**If Message Clmt_Button_Stat4 goes missing while blower limiting is active, the RCCM shall turn off blower limiting and treat as if receiving a "No Request" command.

10.8.7 **R-**The maximum blower speed shall be calibratable. Ref Climate Module Functional Specification for specific requirements.

10.8.8 **R-**Blower limiting will not be applied when climate control is in Max Defrost or Defrost mode.

10.8.9 **R-** Blower limiting can be turned off via adjustment of various climate functions (Ref. Climate Module Functional Specification for specific requirements).

# 11 RCCM to Embedded modem (support for mobile applications)

**11.1** The RCCM shall transmit the following signal to report the current status of UFC feature to the vehicle system. *If the vehicle is appropriately equipped, the embedded modem can use this signal to report the UFC status to the customer via a mobile app and/or other user interfaces.*

**Message:** Clmt_Button_Stat2
**Signal:** UltraFreshCabn_D_Stat

11.1.1 **State:** Null
NOTE: This state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If a module receives this signal state, it shall treat as if it has received State = Not_Supported

11.1.2 **State:** Inactive
Transmitted unless the conditions for one of the other states are satisfied.

11.1.3 **State:** Active
Transmitted whenever the UFC is active as defined within the applicable section(s) of the Climate Module Functional Specification.

11.1.4 **State:** Complete
Transmitted whenever the UFC cycle has been successfully completed as defined within the applicable section(s) of the Climate Module Functional Specification.

11.1.5 **State:** Interrupted
Transmitted whenever the UFC cycle has been interrupted as defined within the applicable section(s) of the Climate Module Functional Specification.

11.1.6 **State:** Not_Supported
Transmitted if the RCCM has not been configured to support this feature.

11.1.7 **State:** Not_Used1
NOTE: This state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If a module receives this signal state, it shall treat as if it has received State = Not_Supported

11.1.8 **State:** Not_Used2
NOTE: This state is included as a design protect only. Consequently, the RCCM shall never transmit this state. If a module receives this signal state, it shall treat as if it has received State = Not_Supported

# 12 RCCM to Conditioned Front Seats Interface

*Details for these messages and all other functional requirements for this interface can be found in the Climate Module Panel Functional specification.*

# 13 Climate Module(RCCM) to PCM (for inverter override strategy)

**13.1** When a determination is made that an equipped power inverter is at risk of overheating, the PCM shall transmit the following signal to the Climate module to request an override of climate settings.

**Message:** TBD
**Signal:** ClimtCool_D_RqPt

13.1.1 **State:** RequestOff
The Climate module shall take no special action(s) and shall continue to operate normally as defined within the applicable section(s) of the Climate Module Functional Specification.

13.1.2 **State:** RequestOn
Upon transition to this state (from any of the other states) the Climate module shall override the current climate settings in an effort to cool the cabin. The specific overrides shall be made per requirements outlined within the applicable section(s) of the Climate Module Functional Specification.

13.1.3 **State:** Reserved_1
This signal state is included as a design protect only. Consequently, the PCM shall never transmit this state. If the Climate module receives this state, it shall respond as if it has received 'RequestOff' state.

13.1.4 **State:** Reserved_2
This signal state is included as a design protect only. Consequently, the PCM shall never transmit this state. If the Climate module receives this state, it shall respond as if it has received 'RequestOff' state.

# 14 General Requirements

**14.1 Outside Air Temperature(OAT) Display -** The OAT value is calculated by the RCCM and sent out via the following CAN message for display:

**Message:** Climate_Control_Data
**Signal:** Outside_Air_Temp_Stat

14.1.1 The RCCM shall always report the value within this message in °C per the corresponding signal states listed in Appendix A.

*The OAT shall be displayed per the following requirements:*

14.1.2 **I,D-**OAT display shall only be located within centerstack of vehicle visible to both driver and passenger.

14.1.3 **D-**OAT shall be displayed in either °C or °F based on user selection for temperature units. The CSD shall be responsible for converting the value it receives via the above message (always in °C) to °F using the table if necessary.

14.1.4 **D-**The OAT value shall always be displayed in whole degrees only. When data is received via the above signal in 0.5°C increments and the value is to be displayed in °C units, the 0.5° portion shall be ignored/dropped.

14.1.5 **D-** The OAT shall only be displayed when ignition status = Run or Start.

14.1.6 **D-**The OAT shall be displayed regardless of whether or not the climate controls are in an on or off state (as defined in the Climate Module Functional Specification).

14.1.7 **D** The OAT shall be displayed regardless of whether or not climate status information is displayed on the CSD.

14.1.8 **Button/knob presses (hard or soft) -** Latency timing and other button press timing for features such as "press & hold" operation shall comply with requirements described in CX-0027**.**

**14.2 E,D-Car Modes -** Normal climate control functionality including display of the climate control status within the CSD and EFP shall be enabled in all defined car mode states. Only functional restrictions based on the normal response to changes in ignition status that may occur as a result of being in one of these car modes shall be permitted**.**

**14.3 E-Backlighting -** Climate Control functions located within the EFP must be illuminated whenever the headlamps are ON regardless of ignition position. This is an FMVSS 101 requirement**.**

*EFP backlighting is controlled directly via a CAN message – The CSD and/or RCCM shall have no control over EFP backlighting.*

**14.4 E-**EFP shall awake in response to a change in backlighting message to ensure backlighting remains on, but must vote for the network to go to sleep as applicable.

**14.5 D- "MENU" Button on EFP, Touchscreen or both (if present) -** When an input is provided to display climate status and/or controls on a display (i.e. a Menu button or climate area within a touchscreen) and when this input is selected**:**

The CSD shall display the main, front climate control screen.
The on /off state for all of the climate functions shall remain unchanged.

**14.6 E,D Initialization -** The CSD and EFP shall default all climate status displays and indications to off during initialization**.**

**14.7 Processing Redundant Climate Control Inputs -***Depending on option content within some vehicles, a particular climate control function may be controlled via 3 different inputs - a "hard" button press on the EFP, a "soft" button press on a touchscreen or from a voice command***.**

14.7.1 In turn, the RCCM may receive these climate inputs from 2 different sources - via the three separate CAN messages below:

- **D-Message:** Clmt_Button_Stat4 (transmitted by the CSD) utilizes common signals for both voice and touchscreen inputs. Consequently, the CSD shall arbitrate between overlapping voice and touchscreen inputs before transmitting this message (with touchscreen button press taking precedence – See "Sync/voice command section above)

- **E-Message:** Remote_Climate_Data (transmitted by the EFP) shall be used to communicate the climate inputs from the "hard" button presses on the EFP.

14.7.2 **R-**The RCCM shall respond to each redundant input in the order received and register each status change. The redundant input signals shall be treated as separate commands. For example, if the RCCM receives 2 inputs ("hard" button from EFP and touchscreen button) that overlap in the time received and with each commanding a common function, then the EFP shall act on both inputs and make 2 separate adjustments.

14.7.3 The status and associated limitations defined above for a "stuck" button/input shall be cleared when that button/input is no longer considered "stuck".

# 15 Missing Messages

*Log DTC as appropriate and initiate the default responses outlined below.*

## 15.1 D- Message Clmt_Button_Stat2 missing from RCCM to CSD

15.1.1 If the message is missing, the CSD shall maintain the current temperature setting and blower speed indications for as long as the message is missing and the Vehicle state = a 'Normal Run' state. When Vehicle state changes to ≠ a 'Normal Run' state, the temperature setting and blower speed displays and/or indications are to blank off. If the message is missing when Vehicle state changes from ≠ a 'Normal Run' state to = a 'Normal Run' state, the temperature setting and blower speed displays and/or indications shall remain off. All other climate status indications shall update normally per the other applicable message(s) from the RCCM.

15.1.2 The CSD shall resume normal operation immediately upon receipt of a valid message from RCCM per the signal states within the valid message.

## 15.2 E- Message Clmt_Button_Stat2 missing from RCCM to EFP

15.2.1 If the message is missing, the EFP shall maintain the current blower speed indications for as long as the message is missing and the Vehicle state = a 'Normal Run' state. When Vehicle state changes to ≠ a 'Normal Run' state, the blower speed displays and/or indications are to blank off. If the message is missing when Vehicle state changes from ≠ a 'Normal Run' state to = a 'Normal Run' state, the setpoint and blower speed displays and/or indications shall remain off. All other climate status indications shall update normally per the other applicable message(s) from the RCCM.

15.2.2 The EFP shall resume normal operation immediately upon receipt of a valid message from RCCM per the signal states within the valid message.

## 15.3 D- Message Clmt_Button_Stat1 missing from RCCM to CSD

15.3.1 If this message is missing, the CSD shall maintain the current climate status indications for as long as the message is missing and the Vehicle state = a 'Normal Run' state. When Vehicle state changes to ≠ a 'Normal Run' state, all climate status displays and/or indications that are based on signal states within this message shall turn off. If the message is missing when Vehicle state changes from ≠ a 'Normal Run' state to = a 'Normal Run' state, all climate status displays and/or indications that are based on signal states within this message shall remain off. *NOTE: The RCCM shall continue to respond normally to messages it receives from the CSD (Touchscreen and/or Voice commands).*

15.3.2 The CSD shall resume normal operation immediately upon receipt of a valid message from RCCM per the signal states within the valid message.

## 15.4 E- Message Clmt_Button_Stat1 missing from RCCM to EFP

15.4.1 If this message is missing, the EFP shall maintain the current climate status indications for as long as the message is missing and the Vehicle state = a 'Normal Run' state. When Vehicle state changes to ≠ a 'Normal Run' state, all climate status displays and/or indications that are based on signal states within this message shall turn off. If the message is missing when Vehicle state changes from ≠ a 'Normal Run' state to = a 'Normal Run' state, all climate status displays and/or indications that are based on signal states within this message shall remain off. *NOTE: The RCCM shall continue to respond normally to messages it receives from the EFP.*

15.4.2 The EFP shall resume normal operation immediately upon receipt of a valid message from RCCM per the signal states within the valid message.

## 15.5 D- Any of the following Messages missing from RCCM to CSD
**ParticulateMatterData1**
**ParticulateMatterData2**

15.5.1 If any of these messages are missing, the CSD shall continue to display the last valid signal data received from the RCCM, until the message is missing continuously for 60 seconds (this shall be calibratable from 5 to 60 seconds in 5 second increments)

15.5.2 When any of these messages is missing continuously for 60 or more seconds, the CSD shall stop displaying the data that it receives in the missing message(s) and blank out the areas where this data would normally be displayed.

15.5.3 The CSD shall resume normal operation immediately upon receipt of valid message(s) from RCCM per the signal states within the valid message(s).

## 15.6 Message Clmt_Button_Stat4 missing from CSD or ECG to RCCM

15.6.1 If this message is missing, the RCCM shall continue to operate normally. The RCCM shall also respond normally to the receipt of a valid message.

## 15.7 Message PartMttrCabn_Stat_Immed missing from CSD to Rear Climate Module

15.7.1 If this message is missing, the Rear climate module shall default all of the signal states it normally receives within this message to the 'Unknown' state. The Rear climate module shall respond normally to the receipt of a valid message.

## 15.8 Message Remote_Climate_Data missing from EFP to RCCM

15.8.1 If this message is missing, the RCCM shall continue to operate normally. The RCCM shall also respond normally to the receipt of a valid message.

## 15.9 BOTH Messages Clmt_Button_Stat4_xxx and Remote_Climate_Data_xxx missing from CSD & EFP to RCCM while Ignition_Status = Run:

15.9.1 If both of these messages are missing while Ignition_Status (CAN signal) = Run, the RCCM shall continue to operate in the current state. After 60 continuous seconds (calibrate 5 to 60 seconds in 5 second increments) of both messages missing while Ignition_Status = Run, the RCCM shall default to the default defrost state as defined in the climate module functional specification. NOTE: If the system is in the OFF state after 60 continuous seconds of both messages missing while Ignition_Status = Run, it shall turn on and default to the Defrost state per above. The RCCM shall continue to send current status to EFP, CSD and IC.

## 15.10 D- Message Climate_Control_Data missing from RCCM to CSD

15.10.1 The CSD utilizes this message to determine what outside temperature to display. The last valid signal state from the ECP shall be used for the display until this message is missing continuously for 60 seconds (this shall be calibratable from 5 to 60 seconds in 5 second increments).

15.10.2 When this message is missing continuously for 60 or more seconds, the CSD shall stop displaying an outside temperature and replace with 'dashes' in place of the temperature value. Units of measure shall continue to be displayed per the user selection.

15.10.3 If this message is missing and no valid signal state has been received (i.e. right after an ignition cycle etc), the CSD shall display 'dashes' in place of the temperature value. Units of measure shall continue to be displayed per the user selection.

15.10.4 Modules acting on receipt of this message shall resume normal operation immediately upon receipt of a valid message from RCCM per the signal states within the valid message.

## 15.11 Message TBD missing from PCM to Climate Module(RCCM)

15.11.1 If this message is missing, the Climate module shall default state of the signal it normally receives within this message to the 'RequestOff' state. The Climate module shall respond normally to the receipt of a valid message.

# 16 Faulted Messages/Signals

*Log DTC as appropriate and initiate the default responses outlined below.*

## 16.1 D- Signal Outside_Air_Temp_Stat = "Invalid" from RCCM to CSD (and IC)

16.1.1 The receiving module(s) utilize this message to determine what outside temperature to display. The last valid signal state from the RCCM shall be used for the display until this signal is invalid continuously for 60 seconds (this shall be calibratable from 5 to 60 seconds in 5 second increments).

16.1.2 When the invalid signal state has been received continuously for 60 or more seconds, the receiving module(s) shall stop displaying an outside temperature and replace with 'dashes' in place of the temperature value. Units of measure shall continue to be displayed per the user selection.

16.1.3 If this signal state is Invalid and no valid signal state has been received (i.e. right after an ignition cycle etc), the CSD shall display 'dashes' in place of the temperature value. Units of measure shall continue to be displayed per the user selection.

16.1.4 Modules acting on receipt of this signal shall resume normal operation immediately upon receipt of a valid signal state from ECP.

## 16.2 D- Signal Outside_Air_Temp_Stat = "Unknown" from RCCM to CSD (and IC)

16.2.1 The receiving module(s) utilize this message to determine what outside temperature to display. The last valid signal state from the ECP shall be used for the display until this signal = Unknown continuously for 60 seconds (this shall be calibratable from 5 to 60 seconds in 5 second increments).

16.2.2 When the Unknown signal state has been received continuously for 60 or more seconds, the receiving module(s) shall stop displaying an outside temperature incl. associated units of measure. The space used for outside temperature shall simply be left completely blank.

16.2.3 If this signal state is Unknown and no valid signal state has been received (i.e. right after an ignition cycle etc), the CSD shall leave the space used for outside temperature incl. associate units of measure completely blank.

16.2.4 Modules acting on receipt of this signal shall resume normal operation immediately upon receipt of a valid signal state from RCCM.

# Appendix A

**Message:** (MS-CAN)_Climate_Control_Data….(HS-CAN)_BodyInformation_1
**Signal:** Outside_Air_Temp_Stat
Data Range and °F conversion for display

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| -40.0 | 0x00 | -40 |
| -39.5 | 0x01 | -39 |
| -39.0 | 0x02 | -38 |
| -38.5 | 0x03 | -37 |
| -38.0 | 0x04 | -36 |
| -37.5 | 0x05 | -35 |
| -37.0 | 0x06 | -35 |
| -36.5 | 0x07 | -34 |
| -36.0 | 0x08 | -33 |
| -35.5 | 0x09 | -32 |
| -35.0 | 0x0A | -31 |
| -34.5 | 0x0B | -30 |
| -34.0 | 0x0C | -29 |
| -33.5 | 0x0D | -28 |
| -33.0 | 0x0E | -27 |
| -32.5 | 0x0F | -26 |
| -32.0 | 0x10 | -26 |
| -31.5 | 0x11 | -25 |
| -31.0 | 0x12 | -24 |
| -30.5 | 0x13 | -23 |
| -30.0 | 0x14 | -22 |
| -29.5 | 0x15 | -21 |
| -29.0 | 0x16 | -20 |
| -28.5 | 0x17 | -19 |
| -28.0 | 0x18 | -18 |
| -27.5 | 0x19 | -17 |
| -27.0 | 0x1A | -17 |
| -26.5 | 0x1B | -16 |
| -26.0 | 0x1C | -15 |
| -25.5 | 0x1D | -14 |
| -25.0 | 0x1E | -13 |
| -24.5 | 0x1F | -12 |
| -24.0 | 0x20 | -11 |
| -23.5 | 0x21 | -10 |
| -23.0 | 0x22 | -9 |
| -22.5 | 0x23 | -8 |
| -22.0 | 0x24 | -8 |
| -21.5 | 0x25 | -7 |
| -21.0 | 0x26 | -6 |
| -20.5 | 0x27 | -5 |
| -20.0 | 0x28 | -4 |
| -19.5 | 0x29 | -3 |
| -19.0 | 0x2A | -2 |

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| -18.5 | 0x2B | -1 |
| -18.0 | 0x2C | 0 |
| -17.5 | 0x2D | 1 |
| -17.0 | 0x2E | 1 |
| -16.5 | 0x2F | 2 |
| -16.0 | 0x30 | 3 |
| -15.5 | 0x31 | 4 |
| -15.0 | 0x32 | 5 |
| -14.5 | 0x33 | 6 |
| -14.0 | 0x34 | 7 |
| -13.5 | 0x35 | 8 |
| -13.0 | 0x36 | 9 |
| -12.5 | 0x37 | 10 |
| -12.0 | 0x38 | 10 |
| -11.5 | 0x39 | 11 |
| -11.0 | 0x3A | 12 |
| -10.5 | 0x3B | 13 |
| -10.0 | 0x3C | 14 |
| -9.5 | 0x3D | 15 |
| -9.0 | 0x3E | 16 |
| -8.5 | 0x3F | 17 |
| -8.0 | 0x40 | 18 |
| -7.5 | 0x41 | 19 |
| -7.0 | 0x42 | 19 |
| -6.5 | 0x43 | 20 |
| -6.0 | 0x44 | 21 |
| -5.5 | 0x45 | 22 |
| -5.0 | 0x46 | 23 |
| -4.5 | 0x47 | 24 |
| -4.0 | 0x48 | 25 |
| -3.5 | 0x49 | 26 |
| -3.0 | 0x4A | 27 |
| -2.5 | 0x4B | 28 |
| -2.0 | 0x4C | 28 |
| -1.5 | 0x4D | 29 |
| -1.0 | 0x4E | 30 |
| -0.5 | 0x4F | 31 |
| 0.0 | 0x50 | 32 |
| 0.5 | 0x51 | 33 |
| 1.0 | 0x52 | 34 |
| 1.5 | 0x53 | 35 |
| 2.0 | 0x54 | 36 |
| 2.5 | 0x55 | 37 |

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| 3.0 | 0x56 | 37 |
| 3.5 | 0x57 | 38 |
| 4.0 | 0x58 | 39 |
| 4.5 | 0x59 | 40 |
| 5.0 | 0x5A | 41 |
| 5.5 | 0x5B | 42 |
| 6.0 | 0x5C | 43 |
| 6.5 | 0x5D | 44 |
| 7.0 | 0x5E | 45 |
| 7.5 | 0x5F | 46 |
| 8.0 | 0x60 | 46 |
| 8.5 | 0x61 | 47 |
| 9.0 | 0x62 | 48 |
| 9.5 | 0x63 | 49 |
| 10.0 | 0x64 | 50 |
| 10.5 | 0x65 | 51 |
| 11.0 | 0x66 | 52 |
| 11.5 | 0x67 | 53 |
| 12.0 | 0x68 | 54 |
| 12.5 | 0x69 | 55 |
| 13.0 | 0x6A | 55 |
| 13.5 | 0x6B | 56 |
| 14.0 | 0x6C | 57 |
| 14.5 | 0x6D | 58 |
| 15.0 | 0x6E | 59 |
| 15.5 | 0x6F | 60 |
| 16.0 | 0x70 | 61 |
| 16.5 | 0x71 | 62 |
| 17.0 | 0x72 | 63 |
| 17.5 | 0x73 | 64 |
| 18.0 | 0x74 | 64 |
| 18.5 | 0x75 | 65 |
| 19.0 | 0x76 | 66 |
| 19.5 | 0x77 | 67 |
| 20.0 | 0x78 | 68 |
| 20.5 | 0x79 | 69 |
| 21.0 | 0x7A | 70 |
| 21.5 | 0x7B | 71 |
| 22.0 | 0x7C | 72 |
| 22.5 | 0x7D | 73 |
| 23.0 | 0x7E | 73 |
| 23.5 | 0x7F | 74 |
| 24.0 | 0x80 | 75 |

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| 24.5 | 0x81 | 76 |
| 25.0 | 0x82 | 77 |
| 25.5 | 0x83 | 78 |
| 26.0 | 0x84 | 79 |
| 26.5 | 0x85 | 80 |
| 27.0 | 0x86 | 81 |
| 27.5 | 0x87 | 82 |
| 28.0 | 0x88 | 82 |
| 28.5 | 0x89 | 83 |
| 29.0 | 0x8A | 84 |
| 29.5 | 0x8B | 85 |
| 30.0 | 0x8C | 86 |
| 30.5 | 0x8D | 87 |
| 31.0 | 0x8E | 88 |
| 31.5 | 0x8F | 89 |
| 32.0 | 0x90 | 90 |
| 32.5 | 0x91 | 91 |
| 33.0 | 0x92 | 91 |
| 33.5 | 0x93 | 92 |
| 34.0 | 0x94 | 93 |
| 34.5 | 0x95 | 94 |
| 35.0 | 0x96 | 95 |
| 35.5 | 0x97 | 96 |
| 36.0 | 0x98 | 97 |
| 36.5 | 0x99 | 98 |
| 37.0 | 0x9A | 99 |
| 37.5 | 0x9B | 100 |
| 38.0 | 0x9C | 100 |
| 38.5 | 0x9D | 101 |
| 39.0 | 0x9E | 102 |
| 39.5 | 0x9F | 103 |
| 40.0 | 0xA0 | 104 |
| 40.5 | 0xA1 | 105 |
| 41.0 | 0xA2 | 106 |
| 41.5 | 0xA3 | 107 |
| 42.0 | 0xA4 | 108 |
| 42.5 | 0xA5 | 109 |
| 43.0 | 0xA6 | 109 |
| 43.5 | 0xA7 | 110 |
| 44.0 | 0xA8 | 111 |
| 44.5 | 0xA9 | 112 |
| 45.0 | 0xAA | 113 |

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| 45.5 | 0xAB | 114 |
| 46.0 | 0xAC | 115 |
| 46.5 | 0xAD | 116 |
| 47.0 | 0xAE | 117 |
| 47.5 | 0xAF | 118 |
| 48.0 | 0xB0 | 118 |
| 48.5 | 0xB1 | 119 |
| 49.0 | 0xB2 | 120 |
| 49.5 | 0xB3 | 121 |
| 50.0 | 0xB4 | 122 |
| 50.5 | 0xB5 | 123 |
| 51.0 | 0xB6 | 124 |
| 51.5 | 0xB7 | 125 |
| 52.0 | 0xB8 | 126 |
| 52.5 | 0xB9 | 127 |
| 53.0 | 0xBA | 127 |
| 53.5 | 0xBB | 128 |
| 54.0 | 0xBC | 129 |
| 54.5 | 0xBD | 130 |
| 55.0 | 0xBE | 131 |
| 55.5 | 0xBF | 132 |
| 56.0 | 0xC0 | 133 |
| 56.5 | 0xC1 | 134 |
| 57.0 | 0xC2 | 135 |
| 57.5 | 0xC3 | 136 |
| 58.0 | 0xC4 | 136 |
| 58.5 | 0xC5 | 137 |
| 59.0 | 0xC6 | 138 |
| 59.5 | 0xC7 | 139 |
| 60.0 | 0xC8 | 140 |
| 60.5 | 0xC9 | 141 |
| 61.0 | 0xCA | 142 |
| 61.5 | 0xCB | 143 |
| 62.0 | 0xCC | 144 |
| 62.5 | 0xCD | 145 |
| 63.0 | 0xCE | 145 |
| 63.5 | 0xCF | 146 |
| 64.0 | 0xD0 | 147 |
| 64.5 | 0xD1 | 148 |
| 65.0 | 0xD2 | 149 |
| 65.5 | 0xD3 | 150 |
| 66.0 | 0xD4 | 151 |

| Outside Temperature | | |
|---|---|---|
| °C | Signal State | °F |
| 66.5 | 0xD5 | 152 |
| 67.0 | 0xD6 | 153 |
| 67.5 | 0xD7 | 154 |
| 68.0 | 0xD8 | 154 |
| 68.5 | 0xD9 | 155 |
| 69.0 | 0xDA | 156 |
| 69.5 | 0xDB | 157 |
| 70.0 | 0xDC | 158 |
| 70.5 | 0xDD | 159 |
| 71.0 | 0xDE | 160 |
| 71.5 | 0xDF | 161 |
| 72.0 | 0xE0 | 162 |
| 72.5 | 0xE1 | 163 |
| 73.0 | 0xE2 | 163 |
| 73.5 | 0xE3 | 164 |
| 74.0 | 0xE4 | 165 |
| 74.5 | 0xE5 | 166 |
| 75.0 | 0xE6 | 167 |
| 75.5 | 0xE7 | 168 |
| 76.0 | 0xE8 | 169 |
| 76.5 | 0xE9 | 170 |
| 77.0 | 0xEA | 171 |
| 77.5 | 0xEB | 172 |
| 78.0 | 0xEC | 172 |
| 78.5 | 0xED | 173 |
| 79.0 | 0xEE | 174 |
| 79.5 | 0xEF | 175 |
| 80.0 | 0xF0 | 176 |
| 80.5 | 0xF1 | 177 |
| 81.0 | 0xF2 | 178 |
| 81.5 | 0xF3 | 179 |
| 82.0 | 0xF4 | 180 |
| 82.5 | 0xF5 | 181 |
| 83.0 | 0xF6 | 181 |
| 83.5 | 0xF7 | 182 |
| 84.0 | 0xF8 | 183 |
| 84.5 | 0xF9 | 184 |
| 85.0 | 0xFA | 185 |
| 85.5 | 0xFB | 186 |
| 86.0 | 0xFC | 187 |
| 86.5 | 0xFD | 188 |
| 87.0 | 0xFE* | 189 |
| 87.5 | 0xFF* | 190 |

* These Signal states may correspond with specific CAN encodings for ‘Unknown’ and/or ‘Invalid’ states. In the event a conflict exists the CAN encodings shall take precedence.

# Appendix B

| °C Setpoint | °F Setpoint |
|---|---|
| LO | LO |
| 15.5 | 60 |
| 16.0 | 61 |
| 16.5 | 62 |
| 17.0 | 63 |
| 17.5 | 64 |
| 18.0 | 64 |
| 18.5 | 65 |
| 19.0 | 66 |
| 19.5 | 67 |
| 20.0 | 68 |
| 20.5 | 69 |
| 21.0 | 70 |
| 21.5 | 71 |
| 22.0 | 72 |

| °C Setpoint | °F Setpoint |
|---|---|
| 22.5 | 73 |
| 23.0 | 73 |
| 23.5 | 74 |
| 24.0 | 75 |
| 24.5 | 76 |
| 25.0 | 77 |
| 25.5 | 78 |
| 26.0 | 79 |
| 26.5 | 80 |
| 27.0 | 81 |
| 27.5 | 82 |
| 28.0 | 82 |
| 28.5 | 83 |
| 29.0 | 84 |
| 29.5 | 85 |
| HI | HI |