# My Gauges Display and Control Function – S550 – CGEA 1.3

## Functional Description

My Gauges Display and Control Function allows the driver to configure the display of custom gauges. These gauges can be displayed in the Information On Demand Area by navigating through the Pony Menu.

The Pony Menu is triggered by the Pony Quick Action Menu button on the steering wheel switch.

User can navigate to Configure My Gauges screen and select the desired gauges by pressing the OK button. User shall be able to select up to a maximum of three gauges.

When the user checks a third gauge, all the other entries are greyed out and can no longer be selected. When the user unchecks one of three gauges, all entries become active again and can be selected.

After selection, the configured gauges are displayed under Show My Gauges entry in Pony menu.

Until the gauges are configured for the first time, a blank screen is displayed on the IoD area. Similarly, if the user disables all the gauges, a blank screen is to be shown.

The Information on Demand Menu also contains screens for pre-defined gauges. The pre-defined gauges can have a headline and additional detail which helps user with clear information. But the user configured My gauges screen do not display a headline. This allows for extra space and hence a larger size for gauge display. This helps in easier gauge data interpretation mostly in performance driving modes.

The menu items in the Configure My Gauges list will be appropriately displayed based on the vehicle content.

For example, in V8 engine, only Vacuum gauge is present. But for other engines, Boost/ Vacuum gauge is displayable. Similarly temperature gauges for Automatic and Manual transmission differ.

## Interfaces

### Interface Context Diagram (I/O Block Diagram)

**Figure 1 Gauge Display Control Function Context Diagram**



### Inputs

* + - * Based on Vehicle Content, the relevant input Configurations are to be taken from the Reference STSS
      * MyGaugesSel\_Cfg – EOL Config Parameter for My Gauges Feature
      * Operational\_Mode
      * M/C\_Display\_Status
      * MyGauges\_Sel1\_MC\_Prev
      * MyGauges\_Sel2\_MC\_Prev
      * MyGauges\_Sel3\_MC\_Prev
      * L\_OK\_Switch\_Press
      * L\_CursorUp\_Switch\_Press
      * L\_CursorDown\_Switch\_Press
      * L\_Pony\_QuickActionMenu\_Button\_Press

1. Input IDs and Details

|  |  |  |  |
| --- | --- | --- | --- |
| **Input\_ID** | **Input Name** | **Data Source** | **Description** |
| 1 | Air to Fuel Ratio Display | Air to Fuel Ratio Gauge Display - CGEA1.3 | Displays the numerical value of the air to fuel ratio in the engine |
| 2 | Air to Fuel Ratio Virtual Gauge display | Air to Fuel Ratio Gauge Display - CGEA1.3 | Use to display virtual Air to Fuel ratio display |
| 3 | Cylinder Head Temperature Display | Cylinder Head Temperature (CHT) Gauge Display | Displays the numerical value of the cylinder head temperature in selected units. |
| 4 | Cylinder Head Temperature Virtual Gauge Display | Cylinder Head Temperature (CHT) Gauge Display | Use to display virtual cylinder head temperature gauge display |
| 5 | Oil\_Pressure\_Display | Oil Pressure Virtual Gauge Display Sensor Based – CGEA1.3 | Output Oil pressure numeric display |
| 6 | Oil\_Pressure\_Virtual\_Gauge\_  Indication | Oil Pressure Virtual Gauge Display Sensor Based – CGEA1.3 | Output Oil pressure gauge Indication |
| 7 | Inlet Air Temperature Display | Inlet Air Temperature Gauge Display – CGEA1.3 | Displays the numerical value of the cylinder head temperature in selected units. |
| 8 | Inlet Air Temperature Virtual Gauge Display | Inlet Air Temperature Gauge Display – CGEA1.3 | Used to display the virtual Inlet Air temperature gauge display |
| 9 | Transmission Temperature Display | Transmission Fluid Temperature Virtual Gauge Display - CGEA1.3 | Numerical value of the transmission fluid temperature. |
| 10 | Transmission Temperature Virtual Gauge Indication | Transmission Fluid Temperature Virtual Gauge Display - CGEA1.3 | Virtual pointer position. |
| 11 | Boost Vacuum Display | Boost/Vacuum Virtual Gauge Display – CGEA1.3 | Displays the numerical value of the pressure or vacuum in intercooler. |
| 12 | Boost Vacuum Virtual Gauge Indication | Boost/Vacuum Virtual Gauge Display – CGEA1.3 | Use to display pressure or vacuum gauge display |
| 13 | Vacuum\_Display | Vacuum Gauge – CGEA1.3 | Output numeric display if configured to be a virtual gauge |
| 14 | Vacuum\_Virtual\_Gauge\_  Indication | Vacuum Gauge – CGEA1.3 | Output virtual gauge indication |
| 15 | Battery Voltage numeric display | Battery Voltage Virtual Gauge Display – CGEA1.3 | Used to display the numeric value of the vehicle’s battery voltage. |
| 16 | Manifold Charge Temperature Display | Manifold Charge Temperature Gauge Display – CGEA1.3 | Used to display the numeric value of the manifold charge temp. |
| 17 | Manifold Charge Temperature Virtual Gauge Display | Manifold Charge Temperature Gauge Display – CGEA1.3 | Used to display the manifold charge temp virtual gauge indication. |
| 18 | Intercooler Coolant Temperature Display | Intercooler Coolant Temperature Gauge Display – CGEA1.3 | Used to display the numeric value of the temperature of coolant in the supercharger. |
| 19 | Intercooler Coolant Temperature Virtual Gauge Display | Intercooler Coolant Temperature Gauge Display – CGEA1.3 | Used to display the virtual gauge indication of the temperature of coolant in the supercharger. |

### Outputs

* MyGauges\_Sel1\_MC
* MyGauges\_Sel2\_MC
* MyGauges\_Sel3\_MC
* MyGauges\_Sel1\_NumericVal
* MyGauges\_Sel1\_VirtualInd
* MyGauges\_Sel2\_NumericVal
* MyGauges\_Sel2\_VirtualInd
* MyGauges\_Sel3\_NumericVal
* MyGauges\_Sel3\_VirtualInd

## Function/Performance

### Operational Modes

| **Mode** | **Differentiating Vehicle Conditions** |
| --- | --- |
| Sleep Mode | OFF |
| Limited Mode | OFF |
| Normal Mode | Gauge Display ON / OFF |
| Crank Mode | Gauge Display ON / OFF |

The above table references the setting of the flags as per this section. However, the actual Gauge Display operation is defined in the Message Center section of this SPSS.

### Voltage Levels

Refer to the Cluster Features Table located in the Operational Modes and Voltage Range Strategies of this SPSS.

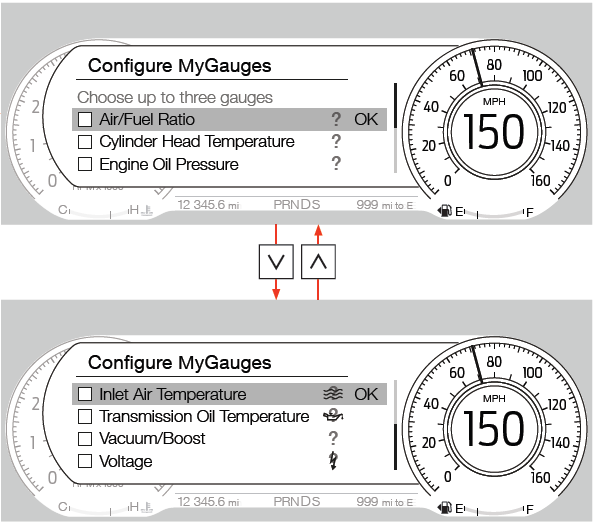
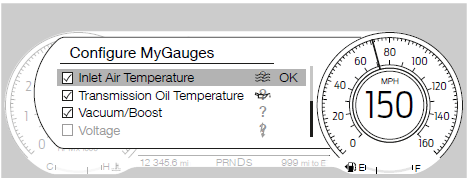
### Human-Machine Interface

#### Visual

#### Indicator Graphics / Display Format

Configuring the desirable Gauges is achieved through Pony Quick Action Menu. The menu items list provided is a sample. The list is variable based on the vehicle content . See Ford Studio released Drawing and VAPS model for exact graphics.

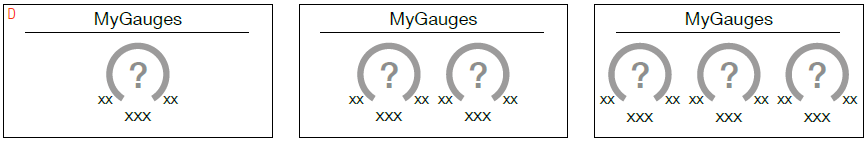
|  |  |  |
| --- | --- | --- |
| **Menu Level 1** | **Menu Level 2** | **Menu Level 3** |
| **T: Pony** |  |  |
| # Status Screen |  |  |
| # Exhaust Mode |  |  |
| # Track Apps |  |  |
| # Performance Shift Indicator |  |  |
| # Launch Control |  |  |
| # My Gauges 🡪 [ OK ] | **T : Gauges** |  |
| # My Color | # Show My Gauges |  |
|  | # Configure MyGauges Cluster 🡪 [OK] | **T : Configure My Gauges** |
|  |  | Info : Choose up to three gauges |
|  |  | * Air/Fuel Ratio |
|  |  | * Cylinder Head Temperature |
|  |  | * Engine Oil Pressure |
|  |  | * Inlet Air Temperature |
|  |  | * Transmission Oil Temperature |
|  |  | * Vacuum/Boost |
|  |  | * Voltage |
|  |  | * Manifold Charge Temperature |
|  |  | * IC Coolant Temperature |

Sample Screen available for enabling or disabling gauge display When the user checks a third gauge, all the other entries are greyed

out and can no longer be selected. When the user unchecks one of

three gauges, all entries become active again and can be selected



Sample IOD area – My Gauges screen showing one or more gauges when enabled for display through Pony Menu

##### Indicator Color Coordinates

Reference section COLOR & ILLUMINATION REQUIREMENTS (GRAPHICS)

##### Indicator Characteristics

Refer to Message Center X Display\_Y Button Interface Section, where X and Y are appropriate values in this document.

#### Audio

None

#### Switch Control Logic

Consumer access to the Gauge Display Control Configuration shall be as specified in the Message Center\_SHMI Displays\_5 Button Interface (STSS).

### System Accuracy

Within a 100msec of receiving a message that results in a change of state the cluster will update the display to the proper status.

### Operation: Performance and Functional

#### Subsystem Algorithm Flowchart / State Diagram

1. **CAN Diagnostic Routine Flowchart**



1. Acronyms for Gauge Selected Values

|  |  |  |
| --- | --- | --- |
| Gauge Name | Acronym (Value) | VALUE |
| None Selected | NONE | 0x0 |
| Air Fuel Ratio | AIR\_FUEL\_RATIO | 0x1 |
| Cylinder Head Temperature | CYL\_HD\_TEMP | 0x2 |
| Engine Oil Pressure | ENG\_OIL\_PRESS | 0x3 |
| Inlet Air Temperature | INLET\_AIR\_TEMP | 0x4 |
| Transmission Oil Temperature | TRANS\_OIL\_TEMP | 0x5 |
| Vacuum/ Boost Gauge | VAC\_BOOST | 0x6 |
| Vacuum Only | VAC\_ONLY | 0x7 |
| Battery | BATT | 0x8 |
| Manifold Charge Temperature | MFLD\_CHRG\_TEMP | 0x9 |
| Intercooler Coolant Temperature | IC\_CLNT\_TEMP | 0xA |

This table is provided for convenience of interpretation. The availability of menu items depends on vehicle type

1. My Gauges – First Selected Gauge- Setup Request Messages based upon MYGAUGES\_SETUP\_MC

|  |  |  |  |
| --- | --- | --- | --- |
| **MC\_Display\_Status** | **MyGauges\_Sel1\_MC\_Prev** | **M/C Switch Selection Event** | **MyGauges\_Sel1\_MC** |
| MYGAUGES\_SETUP\_MC | 0x0 | Up/ Down for Navigation  +  OK for Select | 0x1-0xA  Based on the current selection |
| 0x1-0xA | Up/ Down for Navigation  +  OK for Select/ Deselect | 0x0  Disabled if no gauges are selected |

Note: MYGAUGES\_SETUP\_MC must be Enabled (0x1) to display this menu.

Note: If My Gauge Sel1 is disabled, then MyGauges\_Sel2\_MC selection content gets pulled up to My Gauge Selection 1. Similarly, Gauge 3 Selection content gets pulled up to Gauge 2 selection.

Note: If both Gauge 1 and Gauge 2 selection is disabled, then Gauge 3 selection will become Gauge 1

1. My Gauges – Second Selected Gauge- Setup Request Messages based upon MYGAUGES\_SETUP\_MC

|  |  |  |  |
| --- | --- | --- | --- |
| **MC\_Display\_Status** | **MyGauges\_Sel2\_MC\_Prev** | **M/C Switch Selection Event** | **MyGauges\_Sel2\_MC** |
| MYGAUGES\_SETUP\_MC | 0x0 | Up/ Down for Navigation  +  OK for Select | 0x1-0xA  Based on the current selection |
| 0x1-0xA | Up/ Down for Navigation  +  OK for Select/ Deselect | 0x0  Disabled if no gauges are selected |

Note: MYGAUGES\_SETUP\_MC must be Enabled (0x1) to display this menu.

1. My Gauges – Third Selected Gauge- Setup Request Messages based upon MYGAUGES\_SETUP\_MC

|  |  |  |  |
| --- | --- | --- | --- |
| **MC\_Display\_Status** | **MyGauges\_Sel3\_MC\_Prev** | **M/C Switch Selection Event** | **MyGauges\_Sel3\_MC** |
| MYGAUGES\_SETUP\_MC | 0x0 | Up/ Down for Navigation  +  OK for Select | 0x1-0xA  Based on the current selection |
| 0x1-0xA | Up/ Down for Navigation  +  OK for Select/ Deselect | 0x0  Disabled if no gauges are selected |

Note: MYGAUGES\_SETUP\_MC must be Enabled (0x1) to display this menu.

1. **Gauge Display Selection Function Flowchart**

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1. **Flowchart to Update My Gauges Display**

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#### Operation Description (supports algorithm flowchart /state diagram)

* The My Gauges Display Control Function allows the driver to configure which gauges will be displayed in IoD Area for My Gauges. The Pony Quick Action Menu is used to display the configured gauges.
* The list of available gauges for selection depends on the vehicle content. For example:
  + Axle temperature gauge will be present for S550 GT PP only
  + Gauges applicable for Automatic Transmission only will not be showed for Manual transmission type
  + V8 engine has Vacuum only gauge where as other engines have Boost/ Vacuum gauge. The corresponding config information is to be processed to decide on which menu item is to be enabled
* When user is in the “configure MyGauges “ screen (navigated through Pony QAM options), an Up or Down button press will highlight the next Menu Item selection. An OK button press on this screen, will set the MyGauges\_Sel\*\_MC output to the highlighted selection. The OK button press can perform an enable or disable operation appropriately
* If only one item is enabled, then the corresponding Gauge info is stored in MyGauges\_Sel1\_MC Flag
* The menu items will be sorted in alphabetical order. In the list, the first enabled selection is stored in MyGauges\_Sel1\_MC\_Flag. The next selected gauge or menu item will be stored in MyGauges\_Sel2\_MC Flag
* The MyGauges\_Sel\*\_MC Flag data get readjusted based on the number of gauges selected. For example, if three gauges are already selected and the user deselects “any” of the gauges, then MyGauges\_Sel1\_MC and MyGauges\_Sel2\_MC will hold a valid Gauge and MyGauges\_Sel3\_MC will be set to NONE. Similarly, if two gauges are de-selected, only MyGauges\_Sel1\_MC will have a valid Gauge info and the remaining will be set to NONE(0x0)
* When the user checks a third gauge, all the other entries are greyed out and can no longer be selected. When the user unchecks one of three gauges, all entries become active again and can be selected
* The Numerical Value to be displayed for the selected gauges is stored in MyGauges\_Sel\*\_NumericVal and it is updated similar to above logic
* The Virtual Indication to be displayed for the selected gauges is stored in MyGauges\_Sel\*\_VirtualInd and it is updated similar to above logic
* The Gauge display sizes may vary depending on Normal, Sport or Track views. Refer to the HMI guidelines on the appropriate wallpapers

#### Function Safety Classification (EMC)

B

#### Memory Storage

| **Parameter Name** | **Description** | **Value at Battery connect** | **Value at**  **Module Wake-up** |
| --- | --- | --- | --- |
| M/C\_Display\_Status | Input to this routine that is a State Indicator to identify which text is currently being displayed on Message Center display. | See Message Center\_SHMI Displays\_5 Button Interface STSS | See Message Center\_SHMI Displays\_5 Button Interface STSS |
| Operational\_Mode | Input to this routine that is a 4 State indicator for cluster operational mode | As per Operational Modes and Voltage Range Strategies Section (STSS) | As per Operational Modes and Voltage Range Strategies Section (STSS) |
| L\_OK\_Switch\_Press | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 |
| L\_CursorUp\_Switch\_Press | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 |
| L\_CursorDown\_Switch\_Press | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 |
| L\_Pony\_QuickActionMenu\_Button\_Press | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 | See Message Center – M3 Display with Message Center and Quick Action Menu Button Interface – CGEA 1.3 |
| MyGauges\_Sel\*\_MC | Use to identify which gauges are newly configured as User desired Gauges in the My Gauges screen | NONE (0x0) | NONE (0x0) |
| MyGauges\_Sel\*\_MC\_Prev | Use to identify which gauges are previously configured as User desired Gauges in the My Gauges screen | NONE (0x0) | Use Stored Value |
| MyGauges\_Sel\*\_NumericVal | Numeric Indication of the user selected gauge | 0x0 | 0x0 |
| MyGauges\_Sel\*\_VirtualInd | Virtual Pointer position of the user selected gauge | BLANK or REST | BLANK or REST |
| Air to Fuel Ratio Display | Displays the numerical value of the air to fuel ratio in the engine. | Inactive | Inactive |
| Air to Fuel Ratio Virtual Gauge display | Use to display virtual Air to Fuel ratio display | Inactive | Inactive |
| Cylinder Head Temperature Display | Displays the numerical value of the cylinder head temperature in selected units. | Inactive | Inactive |
| Cylinder Head Temperature Virtual Gauge display | Use to display virtual cylinder head temperature gauge display | Inactive | Inactive |
| Oil\_Pressure\_Virtual\_Gauge\_  Indication | Output Oil pressure gauge Indication | Inactive | Inactive |
| Oil\_Pressure\_Display | Output Oil pressure numeric display | Inactive | Inactive |
| Inlet Air Temperature Display | Displays the numerical value of the cylinder head temperature in selected units. | Inactive | Inactive |
| Inlet Air Temperature Virtual Gauge display | Use to display virtual Oil Pressure gauge display | Inactive | Inactive |
| Transmission Temperature Display | Displays the numerical value of the transmission fluid temperature in selected units. | Inactive | Inactive |
| Transmission Temperature Virtual Gauge Display | Use to display virtual Transmission fluid temperature gauge display | Inactive | Inactive |
| Vacuum\_Display | Output numeric display if configured to be a virtual gauge | 0 | 0 |
| Vacuum\_Virtual\_Gauge\_  Indication | Output virtual gauge indication | 0 Chaplet | 0 Chaplet |
| Vac\_Gauge\_Display\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to None at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |
| Boost\_Vac\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to None at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |
| Boost Vacuuum Display | Displays the numerical value of the pressure or vacuum in intercooler. | Inactive | Inactive |
| Boost Vacuum Virtual Gauge Indication | Use to display pressure or vacuum gauge display | Inactive | Inactive |
| Boost\_Vac\_Display\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to Disabled at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |
| MyGaugesSel\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to Disabled at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |
| Enable\_Gauge\_Flag | Internal Flag to enable and reorder MyGauges STSS outputs | 0x0 | 0x0 |
| Disable\_Gauge\_Flag | Internal Flag to Disable and reorder MyGauges STSS outputs | 0x0 | 0x0 |
| Manifold Charge Temperature Display | Displays the numerical value of the manifold charge temperature | Inactive | Inactive |
| Manifold Charge Temperature Virtual Gauge Display | Displays the virtual gauge indication of the manifold charge temperature | Inactive | Inactive |
| MCT\_Display\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to Disabled at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |
| Intercooler Coolant Temperature Display | Displays the numeric value of temperature of coolant in the supercharger | Inactive | Inactive |
| Intercooler Coolant Temperature Virtual Gauge Display | Displays the virtual gauge indication of temperature of coolant in the supercharger | Inactive | Inactive |
| ICT\_Display\_Cfg | State indicator for feature presence controlled via CAN at EOL at VO plant. Set to Disabled at Cluster Supplier Manufacturing Plant | Use Stored Value | Use Stored Value |

#### Prove Out

No

#### Reconfigurable Telltale

No

#### Message Center Msg

None

## Error Handling

### Missing Message Strategy

There is no missing message strategy for this STSS.

## Diagnostics

### Self Test

None

### Engineering Test Mode

None

### Part II Performance

**Supported Diagnostic Trouble Codes (DTCs)**

| **DTC** | **Description** | **When Logged** |
| --- | --- | --- |
| NONE | This specification does not contain DTCs but defers all DTC logic to the each Input Source’s specification. Refer Section 1.6 |  |

**DID DE00**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Block**  **Num** | **Block Description** | **Size (bits)** | **Byte** | **Bit** | **State: Description** | **"0"** | **"1"** | **Default** | **Comments** |
| PACKETED BLOCKS | |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| $XX | Option Content (B&A) | 1 | \* | \* | Configure My Gauges | Disabled | Enabled | Disabled |  |
| \*Byte and bit location to be identified in Part II Specification for this cluster | | | | | | | | | |

Refer to all the DID bits needed for enabling or disabling gauges in the Menu as per the Reference Specs

## Reference Specification

* Air to Fuel Ratio Gauge Display - CGEA1.3
* Cylinder Head Temperature (CHT) Gauge Display
* Oil Pressure Virtual Gauge Display Sensor Based – CGEA1.3
* Inlet Air Temperature Gauge Display – CGEA1.3
* Transmission Fluid Temperature Virtual Gauge Display - CGEA1.3
* Boost/Vacuum Virtual Gauge Display – CGEA1.3
* Vacuum Gauge – CGEA1.3
* Battery Voltage Virtual Gauge Display – CGEA1.3
* Manifold Charge Temperature Gauge Display – CGEA1.3
* Intercooler Coolant Temperature Gauge Display – CGEA1.3

## Revision History

**STSS Module Revision History**

| **Revision Level** | **Name** | **Change Description** | **Date** |
| --- | --- | --- | --- |
| 1.0 | R. Chalanti | Initial Release, based upon request from S550 Team for MCA  Based on S550 Concept & Interface Document v008.pdf from Icon Incar | 2/12/16 |
| 1.1 | V. Patel | This update adds support for two more gauge displays to the available selection of MyGauge display:  Manifold Charge Temperature Gauge and  Intercooler Coolant Temperature Gauge  DI CC approval: 3/2/2018  All updates are in red.  Section 1.2.1, figure 1: Incremented the ID count to 19.  Section 1.2.2: Added variables required from the MCT and ICT gauges as inputs.  Section 1.3.3.2: Added the two new items in the example menu structure.  Section 1.3.5.1, table 1.1: Added the new items to the table, and provided ID to each.  Section 1.3.5.1, table 1.2, 1.3, 1.4: Incremented max Setup value to include the two new gauge IDs.  Section 1.3.5.4: Added init values for the new gauge display parameters. | 3/8/2018 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |