# MyColor Lighting for Gauge Pack (ICM) – CGEA 1.3

## Functional Description

This feature is only applicable to Ford Mustang variants.

The external Gauge Pack (ICM) gauge color matches the instrument cluster (IPC) gauge color under most circumstances. The Gauge Pack uses CAN signals commanded from the instrument cluster to select either 1 of the 8 pre-defined colors, or to acquire the values for 1 of the 125 custom colors (MyColor). The MyColor is based on 5 levels each of RGB.

The Gauge Pack only has a gauge color that is displayed when in nighttime dimming mode. (The instrument cluster also has Halo color). MyColor illumination shall only be shown during nighttime, determined by CAN signal Dimming\_Lvl. The Gauge Pack gauge color will match the instrument cluster gauge color UNLESS the instrument cluster is in the Warning Red state. The Red Warning state does NOT apply to the Gauge Pack.

## Interfaces

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

**Gauge Pack Color Lighting Function Context Diagram**



### Inputs

#### IR-REQ-345875/A-INTERNAL:

* Operational\_Mode

#### MUX signals on the CAN Bus

##### SIG-REQ-345865/A-CurrentColor\_CmdGage Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| CurrentColor\_CmdGage | 4 |  | SED | 1 | 0 |  | 0 | 15 |
|  |  | Off |  |  |  | 0x0 |  |  |
|  |  | Color1 |  |  |  | 0x1 |  |  |
|  |  | Color2 |  |  |  | 0x2 |  |  |
|  |  | Color3 |  |  |  | 0x3 |  |  |
|  |  | Color4 |  |  |  | 0x4 |  |  |
|  |  | Color5 |  |  |  | 0x5 |  |  |
|  |  | Color6 |  |  |  | 0x6 |  |  |
|  |  | Color7 |  |  |  | 0x7 |  |  |
|  |  | Null |  |  |  | 0x8 |  |  |
|  |  | Color8 |  |  |  | 0x9 |  |  |
|  |  | NotUsed2 |  |  |  | 0xA |  |  |
|  |  | NotUsed3 |  |  |  | 0xB |  |  |
|  |  | NotUsed4 |  |  |  | 0xC |  |  |
|  |  | NotUsed5 |  |  |  | 0xD |  |  |
|  |  | NotUsed6 |  |  |  | 0xE |  |  |
|  |  | NotUsed7 |  |  |  | 0xF |  |  |

##### SIG-REQ-345866/A-BlendColorRed\_CmdGage Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| BlendColorRed\_CmdGage | 4 |  | SED | 1 | 0 |  | 0 | 15 |
|  |  | Null |  |  |  | 0x0 |  |  |
|  |  | \_1 |  |  |  | 0x1 |  |  |
|  |  | \_2 |  |  |  | 0x2 |  |  |
|  |  | \_3 |  |  |  | 0x3 |  |  |
|  |  | \_4 |  |  |  | 0x4 |  |  |
|  |  | \_5 |  |  |  | 0x5 |  |  |
|  |  | NotUsed1 |  |  |  | 0x6 |  |  |
|  |  | NotUsed2 |  |  |  | 0x7 |  |  |
|  |  | NotUsed3 |  |  |  | 0x8 |  |  |
|  |  | NotUsed4 |  |  |  | 0x9 |  |  |
|  |  | NotUsed5 |  |  |  | 0xA |  |  |
|  |  | NotUsed6 |  |  |  | 0xB |  |  |
|  |  | NotUsed7 |  |  |  | 0xC |  |  |
|  |  | NotUsed8 |  |  |  | 0xD |  |  |
|  |  | NotUsed9 |  |  |  | 0xE |  |  |
|  |  | NotUsed10 |  |  |  | 0xF |  |  |

##### SIG-REQ-345867/A-BlendColorBlue\_CmdGage Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| BlendColorBlue\_CmdGage | 4 |  | SED | 1 | 0 |  | 0 | 15 |
|  |  | Null |  |  |  | 0x0 |  |  |
|  |  | \_1 |  |  |  | 0x1 |  |  |
|  |  | \_2 |  |  |  | 0x2 |  |  |
|  |  | \_3 |  |  |  | 0x3 |  |  |
|  |  | \_4 |  |  |  | 0x4 |  |  |
|  |  | \_5 |  |  |  | 0x5 |  |  |
|  |  | NotUsed1 |  |  |  | 0x6 |  |  |
|  |  | NotUsed2 |  |  |  | 0x7 |  |  |
|  |  | NotUsed3 |  |  |  | 0x8 |  |  |
|  |  | NotUsed4 |  |  |  | 0x9 |  |  |
|  |  | NotUsed5 |  |  |  | 0xA |  |  |
|  |  | NotUsed6 |  |  |  | 0xB |  |  |
|  |  | NotUsed7 |  |  |  | 0xC |  |  |
|  |  | NotUsed8 |  |  |  | 0xD |  |  |
|  |  | NotUsed9 |  |  |  | 0xE |  |  |
|  |  | NotUsed10 |  |  |  | 0xF |  |  |

##### SIG-REQ-345868/A-BlendColorGrn\_CmdGage Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| BlendColorGrn\_CmdGage | 4 |  | SED | 1 | 0 |  | 0 | 15 |
|  |  | Null |  |  |  | 0x0 |  |  |
|  |  | \_1 |  |  |  | 0x1 |  |  |
|  |  | \_2 |  |  |  | 0x2 |  |  |
|  |  | \_3 |  |  |  | 0x3 |  |  |
|  |  | \_4 |  |  |  | 0x4 |  |  |
|  |  | \_5 |  |  |  | 0x5 |  |  |
|  |  | NotUsed1 |  |  |  | 0x6 |  |  |
|  |  | NotUsed2 |  |  |  | 0x7 |  |  |
|  |  | NotUsed3 |  |  |  | 0x8 |  |  |
|  |  | NotUsed4 |  |  |  | 0x9 |  |  |
|  |  | NotUsed5 |  |  |  | 0xA |  |  |
|  |  | NotUsed6 |  |  |  | 0xB |  |  |
|  |  | NotUsed7 |  |  |  | 0xC |  |  |
|  |  | NotUsed8 |  |  |  | 0xD |  |  |
|  |  | NotUsed9 |  |  |  | 0xE |  |  |
|  |  | NotUsed10 |  |  |  | 0xF |  |  |

##### SIG-REQ-345869/A-Dimming\_Lvl Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| Dimming\_Lvl | 8 |  | SED | 1 | 0 |  | 0 | 253 |
|  |  | Off |  |  |  | 0x0 |  |  |
|  |  | Night\_1 |  |  |  | 0x1 |  |  |
|  |  | Night\_2 |  |  |  | 0x2 |  |  |
|  |  | Night\_3 |  |  |  | 0x3 |  |  |
|  |  | Night\_4 |  |  |  | 0x4 |  |  |
|  |  | Night\_5 |  |  |  | 0x5 |  |  |
|  |  | Night\_6 |  |  |  | 0x6 |  |  |
|  |  | Night\_7 |  |  |  | 0x7 |  |  |
|  |  | Night\_8 |  |  |  | 0x8 |  |  |
|  |  | Night\_9 |  |  |  | 0x9 |  |  |
|  |  | Night\_10 |  |  |  | 0xA |  |  |
|  |  | Night\_11 |  |  |  | 0xB |  |  |
|  |  | Night\_12 |  |  |  | 0xC |  |  |
|  |  | Day\_1 |  |  |  | 0xD |  |  |
|  |  | Day\_2 |  |  |  | 0xE |  |  |
|  |  | Day\_3 |  |  |  | 0xF |  |  |
|  |  | Day\_4 |  |  |  | 0x10 |  |  |
|  |  | Day\_5 |  |  |  | 0x11 |  |  |
|  |  | Day\_6 |  |  |  | 0x12 |  |  |
|  |  | Unknown |  |  |  | 0xFE |  |  |
|  |  | Invalid |  |  |  | 0xFF |  |  |

##### SIG-REQ-345864/A-BlendedColor\_CmdGage Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size**  **(bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min.** | **Max.** |
| BlendedColor\_CmdGage | 2 |  | SED | 1 | 0 |  | 0 | 3 |
|  |  | Off |  |  |  | 0x0 |  |  |
|  |  | On |  |  |  | 0x1 |  |  |
|  |  | Null |  |  |  | 0x2 |  |  |
|  |  | NotUsed |  |  |  | 0x3 |  |  |

### IR-REQ-345877/A-Outputs

* Gauge\_Color (Color of Gauge Pack back lighting during nighttime dimming)

## Function/Performance

### F-REQ-345878/A-Operational Modes

|  |  |
| --- | --- |
| **Mode** | **Differentiating Vehicle Conditions** |
| Sleep Mode | Disabled |
| Limiting Mode | Disabled |
| Normal Mode | Enabled / Disabled |
| Crank Mode | Enabled / Disabled |

### Voltage Levels

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

### Human-Machine Interface

#### Visual

#### Indicator Graphics / Display Format

Refer to program specific display library for related messages.

##### Indicator Color Coordinates

Reference MyColor REQUIREMENTS

##### Indicator Characteristics

#### Audio

None

#### Switch Control Logic

None

### PFM-REQ-345879/A-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

##### Option\_Check MyColor Diagnostic Configuration Flowcharts

None

##### Gauge\_Color

The color of the displayed Gauges are determined by applying the logic in the table below. After the determination of the color is made, the color of the displayed gauges must be modified to agree with these values.

##### F-REQ-345872/A-Gauge\_Color Values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CurrentColor\_CmdGage Signal** | **BlendedColor\_ CmdGage Signal** | **BlendColorRed\_ CmdGage Signal** | **BlendColorBlue\_ CmdGage Signal** | **BlendColorGrn\_ CmdGage Signal** | **Gauge\_Color\*\*** |
| OFF | OFF | X | X | X | OFF (No Gauge Color) |
| Color1 | \*OFF (0x0) | X | X | X | \*Ice Blue |
| Color2 | OFF (0x0) | X | X | X | White |
| Color3 | OFF (0x0) | X | X | X | Green |
| Color4 | OFF (0x0) | X | X | X | Purple |
| Color5 | OFF (0x0) | X | X | X | Blue |
| Color6 | OFF (0x0) | X | X | X | Orange |
| Color7 | OFF (0x0) | X | X | X | Red |
| Color8 | OFF (0x0) | X | X | X | Highland Green |
| X | On (0x1) | MyColor\_Red | MyColor\_Blue | MyColor\_Grn | MyColor\*\*\* |
| All other cases | | | | | \*Ice Blue |

\* Default values if no color selection has ever been selected or received.

\*\*Day Time illumination is white. Night Time illumination (dimming\_lvl = 0x1 to 0xC) is Gauge\_Color.

\*\*\*See MyColor Lighting Control Function STSS for definition of MyColor coordinates.

#### F-REQ-345876/A-Operation Description (supports algorithm flowchart /state diagram)

* MyColor illumination shall only be shown during nighttime, determined by CAN signal Dimming\_Lvl.

#### FS-REQ-346021/A-Function Safety Classification (EMC)

Class B

#### Memory Storage

##### NVM-REQ-345873/A-Functional Parameters

| **Parameter Name** | **Description** | **Value at**  **Battery Connect** | **Value at Module Wake-up** |
| --- | --- | --- | --- |
| Operational\_Mode | 4 state indicator for cluster operational mode | Limited | Limited or Normal or Crank |
| CurrentColor\_CmdGage | This CAN signal value is modified by the Cluster SETUP menu, stored in cluster EEPROM, and the Cluster Gauge color and Gauge Pack gauge color changes to the value indicated. | 0x0 (Off) | Do Not Init |
| BlendedColor\_CmdGage | This CAN signal value is modified by the Cluster SETUP menu, stored in cluster EEPROM, and the Cluster Gauge color and Gauge Pack gauge color changes to the value indicated. | 0x0 (Off) | Do Not Init |
| BlendColorRed\_CmdGage | This CAN signal value is modified by the Cluster SETUP menu, stored in cluster EEPROM, and the Cluster Gauge color and Gauge Pack gauge color changes to the value indicated. | 0x0 (Null) | Do Not Init |
| BlendColorBlue\_CmdGage | This CAN signal value is modified by the Cluster SETUP menu, stored in cluster EEPROM, and the Cluster Gauge color and Gauge Pack gauge color changes to the value indicated. | 0x0 (Null) | Do Not Init |
| BlendColorGrn\_CmdGage | This CAN signal value is modified by the Cluster SETUP menu, stored in cluster EEPROM, and the Cluster Gauge color and Gauge Pack gauge color changes to the value indicated. | 0x0 (Null) | Do Not Init |
| Dimming\_Lvl | CAN input signal that defines dimming level for back lighting. See VEHICLE INTERIOR ILLUMINATION WITH DAYTIME DIMMING Engineering Specification. | As per ES | As per ES |
| Gauge\_Color | This internal variable is the displayed Cluster Gauge color. Default value is 0x0 (Ice Blue) for indeterminate conditions. This is only applicable during night time dimming conditions.  Note: This can be stored in battery backed memory or in EEPROM at supplier’s discretion. | 0x0 (Ice Blue) | Do Not Init |

##### NVM-REQ-345874/A-Color Constants

| **Parameter Name** | **Description** | **Range** | **Units** | **Resolution** | **Init Value** |
| --- | --- | --- | --- | --- | --- |
| B | Blue component of MyColor backlighting | 1 – 5 | Unitless | 1 | 5 |
| G | Green component of MyColor backlighting | 1 – 5 | Unitless | 1 | 5 |
| R | Red component of MyColor backlighting | 1 – 5 | Unitless | 1 | 5 |

#### Reconfigurable Telltale

Not Applicable

#### Prove Out

Not Applicable

#### Message Center Msg

Not Applicable

## Error Handling

None

## Diagnostics

### Self Test

None

### Engineering Test Mode

None

### Part II Performance

None

## Reference Specification

ES-AR3T-1A278-A

## Revision History

**SPSS Module Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision Level** | **Name** | **Change Description** | **Date** |
| 1.0 | T.Budzier/S. Watkins | Initial Release. Initial assumptions:  1. Center gauge will get My Color only at night similar to cluster and intensity specification is same as main cluster. Correct 2. Day time will be white lighting same as cluster. Correct 3. **No red gauge warning** (gauge turning to red) required for center cluster at any condition.  Correct 4. Center gauge will have clear lens same as cluster.  Correct 5. The pointers will be red color same as cluster.  Correct | 3/5/2013 |
| 1.1 | A. Venuturupalli  S. Watkins | This update is to correct an inconsistency between the MyColor IPC STSS (v4.1) and MyColor ICM STSS (v1.0) regarding the CAN signal used to determine Day/Night.  Added the statement below to Section 1.1 and Section 1.2.5.2 in the document:  “MyColor illumination shall only be shown during nighttime, determined by CAN signal Dimming\_Lvl.” | 10/31/2014 |
| 2.0 | S. Watkins | MY19 Mustang Feature Car (Bullet) is adding a pre-defined color of “Highland Green”. Thus, we are adding this as “Color8”.  Approved per DI CC 9/7/2017 (Offline approval 9/5/2017).  Changes shown in green:   1. Section 1.1 – Updated description to show there are now 8 pre-defined colors 2. Section 1.1.2 – Added new state 0x9 of “Highland Green” to CurrentColor\_CmdGage. 3. Section 1.2.5.1.2 – Gauge\_Color – Added row for Color8 of Highland Green. | 9/5/2017 |
| 2.1 | V. Patel | Initial release for VSEM requirements migration | 2/28/2019 |