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|  | | | Instrument Cluster | | | | | |  | | | |
|  | | | | | | | | | | | | |
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| **10192897** | | | | **IP34 PHEV Full TFT 12.3’’ IPK** | | | | | | |
|  | **10260221** | | | | **AS24 PHEV Full TFT 12.3’’ IPK** | | | | | | |  |
|  | **10260222** | | | | **EP21 EV Full TFT 12.3’’ IPK** | | | | | | |  |
|  | **10356936** | | | | **AS26 EV Full TFT 12.3’’ IPK** | | | | | | |  |
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| Part 1: Technical Overview | | | | CTS IP3x 711.05 | | | 2014/11/26 | | | Refer to SOR | | |
| Part 2: Interface Description | | | | IP3X\_Cluster\_Part\_2\_Spec\_V1.2.2.pdf | | | 2015/3/28 | | | Refer to SOR | | |
| Part 3: Detailed Functional Specification | | | |  | | |  | | |  | | |
| Part 4: Diagnostics Specification | | | |  | | |  | | |  | | |
|  | | | | | | | | | | | | |
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# Introduction

### Confidentiality

The information in this specification is in strict confidence and should only be divulged on a need to know basis. A confidentiality agreement between SAIC Motor Technical Centre and recipient parties must be in place prior to distribution.

### Purpose of specification

The specification serves as written assignment for the development of IP31 Instrument Cluster, referred to in this specification as the cluster. It documents the current stage of development of the project and constitutes the definitive design information. The purpose of this document is to define the interfaces between the cluster and the rest of the vehicle electrical system. Functionality is defined in part 1(CTS IP31 711.01) && part 3 of the component specification.

# General Functions

## Power Moding Status

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **System Power Mode** | ***SysPwrMd*** CAN signal from Gateway to indicate key status:  0x0=Off  0x01=ACC  0x02=Run  0x03=Crank Request | **2** | **0~3** |
| **System Backup Power Mode** | ***SysBPM*** CAN signal from BCM for power mode backup.  0x0=Off  0x01=ACC  0x02=Run  0x03=Crank | **2** | **0~3** |
| **System Backup Power Mode Enabled** | ***SysBPMEnbd*** CAN signal from BCM to indicate whether enable backup power mode.  0x0=False  0x1=Ture | **2** | **0~3** |
| **ignition relay**  **(KL15 Hardwired)** | Hardwired input from Ignition position II (ignition on). | **1** | **0~1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **cluster Power mode status** | Internal signal to indicate the power mode status for cluster.  0x0=Off  0x01=ACC  0x02=Run  0x03=Crank | **2** | **0~3** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Cluster KL15 fault** | The cluster has detected an inconsistency between the CAN ignition status and its hardwired input. | **1** | **0~1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **KL15 Fault Time** | ***insKL15FaultTimePrm*** Time in seconds after detecting a KL15 fault that the output **Cluster KL15 fault** becomes TRUE. | **4** | **1** | **0 ~ 15** |
| **KL15 CAN ENABLE** | ***insKL15CANEnPrm*** If true, the variable **Cluster KL15 status** is determined by the condition hardwired KL15 OR CAN KL15. If false, only hardwired input used. | **1** | **1** | **0 ~ 1** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **KL15 CAN** | Internal signal to indicate the status from CAN Bus. | **1** | **0 ~ 1** |

### Functionality description

[Req\_IPK\_PowerModing\_ 0]

The cluster receives the ignition status from the CAN network and from a hardwired input and uses these to determine its ignition status. CAN network status is prior to the hardwire input, but if CAN network is missing, the hardwire input status would determine the cluster ignition status.

These two ignition state sources should be identical in most circumstances however due to latency delays across the network it is likely that the CAN signal will lag the hardwired input by a matter of milliseconds. Only under CAN failure conditions (or by a short circuit in the vehicle harness) will these signal states differ for any thing other than a brief period of time.

[Req\_IPK\_PowerModing\_ 0]

If the cluster detects the condition where **KL15 Hardwired** is ‘TRUE’ for greater than **KL15 Fault Time** then **Cluster KL15 fault** becomes TRUE.

[Req\_IPK\_PowerModing\_ 0]

If the ignition relay is high but CAN network is OFF, then the whole vehile enters the remote start-up mode and cluster should not be illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cluster power mode status**  **==oFF** | if | **(System Backup Power Mode Enabled&& System Backup Power Mode == 00) or**  **( ! (System Backup Power Mode Enabled) ) && System Power Mode == 00)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cluster power mode status**  **==ACC** | if | **(System Backup Power Mode Enabled && System Backup Power Mode == 01) or**  **( ! (System Backup Power Mode Enabled) ) && System Power Mode == 01)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **KL15 CAN** | if | **(System Backup Power Mode Enabled && System Backup Power Mode == 02) or**  **( ! (System Backup Power Mode Enabled) ) && System Power Mode == 02)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cluster power mode status**  **==RUN** | if | **(KL15 CAN && KL15 CAN ENABLE) or**  **(ignition relay && CAN missing)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cluster power mode status**  **==Crank** | if | **(System Backup Power Mode Enabled&& System Backup Power Mode = =03) or**  **( ! (System Backup Power Mode Enabled) ) && System Power Mode = =03)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Cluster KL15 Status** | if | **cluster power mode status==run or crank** |

**Tab.1 True value Table**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CAN Signal** | | | **Ignition Relay**  **Hardwire input** | | **Cluster Power mode Status** | |
| **System Backup Power Mode Enable** | **System Backup Power Mode** | **System Power Mode** | |  | |  |
| False | X | OFF | | X | | OFF |
| False | X | ACC | | X | | ACC |
| False | X | RUN | | X | | RUN(点亮) |
| False | X | CRANK | | X | | CRANK(点亮) |
| False | X | Missing | | X | | 保持System Power Mode的上一个正确状态 |
| True | OFF | X | | X | | OFF |
| True | ACC | X | | X | | ACC |
| True | RUN | X | | X | | RUN(点亮) |
| True | CRANK | X | | X | | CRANK(点亮) |
| True | Missing | X | | X | | 保持System Backup Power Mode的上一个正确状态 |
| Missing | X | OFF | | X | | OFF |
| Missing | X | ACC | | X | | ACC |
| Missing | X | RUN | | X | | RUN(点亮) |
| Missing | X | CRANK | | X | | CRANK(点亮) |
| Missing | X | Missing | | 1 | | RUN(点亮) |
| Missing | X | Missing | | 0 | | OFF |

## Work Mode Overview

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/\* Work mode chart need to discuss with supplier.\*/ and need referene hmi specification.

**Sleep Mode**: The whole cluster enters sleep status. The quiescent current rearches minimus.

**Standby Mode**: Some functions work at this mode.

When KL15 is OFF and cluster is wake up and **driver** **door** is open(***DrvrDoorOpenSts changes from 0 to 1/2/3***), cluster will display door open welcome page for **door open welcome time.**

However if driver door is closed (***DrvrDoorOpenSts=0***) and vehicle is locked through exterior lock(***VehLckngSta=3***), then IPK should immediately extinguish.

So above all: the door open welcome display starts from the last **any** door open from 0 to 1/2/3. And the period depends on **the point *VehLckngSta* change to 3** or **Door open welcome time.**

Input signals:

|  |  |  |  |
| --- | --- | --- | --- |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |
| **Lock status** | ***VehLckngSta*** CAN signal from SMU that indicates the status of the locking system:  $0=Unlock  $1=SPE  $2=Interior Lock  $3=Exterior Lock  $4=Super lock  $5=Reserved  $6=Reserved  $7=Unknow | **1** | **0 ~ 1** |

Values in non-volatile memory:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Constants** | **Description** | **No  of bits** | **Init**  **(Hex)** | **Value** |
| **door open welcome time** | ***insDoorOpenWelTimePrm*** the time in 1s increment that the door open welcome page display | **6** | **0F**  **(15s)** | **0~3F** |

**Active Mode**: All functions are acitved and work. For example, CAN Tx/Rx on, illumination on, tachometer&&speedometer work, LCD on and related functions work.

## Wake-up Inputs

The following Hardwired inputs shall cause the cluster microcontroller to wake up from **Sleep Mode**.

1. KL.15
2. CAN NETWORK
3. EPB Hardwire (IP34)

## High and Low Voltage Operation

It must satisfy the Standard: SMTC 9 800 001 Vehicle Power Management Specification.

## Network management and Diagnostic reuiqrements

For network management, it must satisfy the standards:

1. SMTC 2 800 002 CAN Node Design Requirements.
2. SMTC 3 800 002 CAN Node Verification and Validation.

For diagnostic, it must satisfy the standards:

1. SMTC 2 800 004 Technical requirement for ECU Diagnostic Development.
2. SMTC 2 800 007 Technical requirements for ECU programming.
3. SMTC 3 800 008 ECU Diagnostic Test Specification.
4. Part 4.

## Tx signal strategy

See NRS file and DBC.

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Fuel consumption related** | | | |
| ***AvgFuelCsump*** | Displayed AFC in TC accumulate memory. | **8** | **0~25.5L/100km** |
| ***AvgFuelCsumpV*** | When AFC display --.-, then set to 1(invalid) | **1** | **0 ~ 1** |
| ***~~InsFuelCsump~~*** | ~~Displayed IFC~~ | **~~8~~** | **~~0~25.5L/100km~~** |
| ***~~InsFuelCsumpV~~*** | ~~When IFC display --.-, then set to 1(invalid)~~ | **~~1~~** | **~~0 ~ 1~~** |
| ***ClstrElecRngToEPT*** | Displayed Electreic RTE; | **10** | **0~1023km** |
| ***ClstrFuelRngToEPT*** | Displayed Fuel RTE; | **10** | **0~1023km** |
| **calander related** | | | |
| ***CalendarDay*** | Refer to section of calemdar | **5** | **0 ~ 31** |
| ***CalendarMonth*** | Refer to section of calemdar | **4** | **1 ~ 12** |
| ***CalendarYear*** | Refer to section of calemdar | **8** | **0 ~ 255** |
| ***HourOfDay*** | Refer to section of calendar | **5** | **0 ~ 23** |
| ***MinuteOfHour*** | Refer to section of calendar | **6** | **0 ~ 59** |
| ***SecsOfMinute*** | Refer to section of calendar | **6** | **0 ~ 59** |
| ***TimeDspFmt*** | Refer to section of calendar | **1** | **0 ~ 1** |
| **CHIME related** | | | |
| ***ChmCmdSndCndcPrd*** | Refer to CHIME SEPC. | **8** | **0 ~ 255** |
| ***ChmCmdSndDutyCyc*** | Refer to CHIME SEPC. | **8** | **0 ~ 255** |
| ***ChmCmdSndLoctnFL*** | Refer to CHIME SEPC. | **1** | **0 ~ 1** |
| ***ChmCmdSndLoctnFR*** | Refer to CHIME SEPC. | **1** | **0 ~ 1** |
| ***ChmCmdSndLoctnRL*** | Refer to CHIME SEPC. | **1** | **0 ~ 1** |
| ***ChmCmdSndLoctnRR*** | Refer to CHIME SEPC. | **1** | **0 ~ 1** |
| ***ChmCmdSndTone*** | Refer to CHIME SEPC. | **4** | **0 ~16** |
| **Menu setting related** | | | |
| ***ClstrDistUnt*** | CAN signal of cluster distance units.  0=km  1=miles | **1** | **0 ~ 1** |
| ***ClstrFuelCsumpUnt*** | CAN signal of Cluster fuel consumption unit  0=L/100km  1=mpg(UK)  2=mpg(US)  3=km/L | **2** | **0 ~ 3** |
| ***ClstrIllumLvl*** | CAN signal of Cluster Illumination Level  0=Low Luminance  1=Normal Luminance  2= High Luminance  3=Reserved | **2** | **0 ~ 3** |
| ***ClstrOvrSpdThrshld*** | CAN signal of Cluster Overspeed Threshold  Physical Range:0-63\*5, 5/bit  //单位切换时就近5的倍数取整； | **6** |  |
| **cluster over speed status** | ***ClstrOverSpdFnHstrSts***  1 =ON, 0=OFF | **1** | **0 ~ 1** |
| ***ClstrTempUnt*** | CAN signal of Cluster temperature unit  0=Celsius degree  1=Fahrenheit degree  2=Not available  3=Reserved | **2** | **0 ~ 3** |
| ***DspMeasSys*** | 0 = kph.  1 = MPH.  When cluster’s Distance unit is ‘km’, the signal is equal to ‘0’; else the signal is equal to ‘1’. | **1** | **0 ~ 1** |
| ***IPCWhlTyrMontrSysRstReq*** | CAN signal of TPMS reset request.  Cluster should send value 0 all the time as menu reset in FICM not in cluster. | **1** | **0 ~ 1** |
| ***LanggSetng*** | Decided by insLangPrm.  0 =Chinese; 1= UK English; | **7** | **0 ~ 24** |
| **cluster tyre pressure unit** | ***ClstrTyrePreUnt*** // not in DBC  0=bar, 1=kpa, 2=psi, 3=reserved | **2** | **0~3** |
| **theme adjust** | ***ClstrThemeSetngAdjFI***  0=default 1=classical, 2=reserved, 3=reserved. | **2** | **0 ~ 3** |
| **theme adjust request** | ***ClstrThemeSetngAdjReqA***  0=false; 1=true | **1** | **0 ~ 1** |
| **press button related** | | | |
| ***ClstrDownBtnSts*** | CAN signal of cluster down button status  0=No press  1=Short press  2=Long press  3=Reserved  Note: This signal will send to FICM, when cluster tab in MEDIA or Contact(phone), cluster send the down button status. Cluster should send down button status 0 all time in other tabs. | **2** | **0 ~ 3** |
| ***ClstrEnterBtnSts*** | CAN signal of Cluster Enter Button Status  0=No Press  1=Short Press  2=Long Press  3=Reserved | **2** | **0 ~ 3** |
| ***ClstrLeftBtnSts*** | CAN signal of Cluster Left Button Status  0=No Press  1=Short Press  2=Long Press  3=Reserved | **2** | **0 ~ 3** |
| ***ClstrRightBtnSts*** | CAN signal of Cluster Right Button Status  0=No Press  1=Short Press  2=Long Press  3=Reserved | **2** | **0 ~ 3** |
| ***ClstrUpBtnSts*** | CAN signal of Cluster Up Button Status  0=No Press  1=Short Press  2=Long Press  3=Reserved  Note: This signal will send to FICM, when cluster tab in MEDIA or Contact(phone), cluster send the up button status. Cluster should send up button status 0 all time in other tabs. | **2** | **0 ~ 3** |
| **Warning indication related** | | | |
| ***AirbagWrnngIndF*** | CAN signal indicate the status of ‘SRS Lamp’:  0=False.  1=True.  When **srs LED FAIL** is TRUE, the signal value will be set to 1, otherwise set to 0.  Note: default value should 0 | **1** | **0 ~ 1** |
| ***ClstrDspdABSWrnng*** | CAN signal of Cluster Displayed Antilock brake system warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdACCSysWrnng*** | CAN signal of Cluster Displayed Adaptive Cruise Control System Warning  0=No Warning  1=Warning  Cluster should send value 0 in AS24, as AS24have no ACC Function.  Cluster should send value 1 if have FVCM Fault Message, send value 0 if not have FVCM Fault Message  Note: Cluster use this signal to explain FVCM Fault message. | **1** | **0 ~ 1** |
| ***ClstrDspdAdvFrtLSW*** | CAN signal of Cluster Displayed Advanced front lighting system Warning (AFS System)  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdAEBSysWrnng*** | CAN signal of Cluster Displayed Autonomous emergency braking system Warning  0=No Warning  1=Warning  Cluster should send value 0 in AS24, as AS24 have no AEB Function.  Cluster should send value 0 in all projects | **1** | **0 ~ 1** |
| ***ClstrDspdAirbagWrnng*** | CAN signal of Cluster Displayed Airbag Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “SRS echo Message” status | **1** | **0 ~ 1** |
| ***ClstrDspdAltrWrnng*** | CAN signal of Cluster Displayed Alternator Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “ALTERNATOR CHARGE echo Message” status  Note: AS24 & IP34 have not related message display, it should send 0 as default value | **1** | **0 ~ 1** |
| ***ClstrDspdASpdLmtrWrnng*** | CAN signal of Cluster Displayed ASL fault Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “ASL Fault echo Message” status | **1** | **0 ~ 1** |
| ***ClstrDspdAutoholdWrnng*** | CAN signal of Cluster Displayed Autohold Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “autohold fault echo message” status | **1** | **0 ~ 1** |
| ***ClstrDspdBatRplmntRqdW*** | CAN signal of Cluster Displayed Battery Replacement Required Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “battery fail message” status | **1** | **0 ~ 1** |
| ***ClstrDspdBMSWrnng*** | CAN signal of Cluster Displayed BMS Warning  0=No Warning  1=Warning  Cluster should send value correct value according to **“HVBATTERY FAULT** echo message”. | **1** | **0 ~ 1** |
| ***ClstrDspdBrkSysWrnng*** | CAN signal of Cluster Displayed Brake System Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “brake System echo Message” status | **1** | **0 ~ 1** |
| ***ClstrDspdCCWrnng*** | CAN signal of Cluster Displayed Cruise control Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “cruise fault echo message” status | **1** | **0 ~ 1** |
| ***ClstrDspdClntTemWrnng*** | CAN signal of Cluster Displayed Coolant temperature Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “high coolant temp Message” status | **1** | **0 ~ 1** |
| ***ClstrDspdCIOvhtdWrnng*** | CAN signal of Cluster Displayed Clutch Overheated Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “clutch overheated Message” status  Note: AS24 & IP34 have not related message display, it should send 0 as default value | **1** | **0 ~ 1** |
| ***ClstrDspdClswWrnng*** | CAN signal of Cluster Displayed Clutch Switch Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “clutch switch fault message” status  Note: AS24 & IP34 have not related message display, it should send 0 as default value | **1** | **0 ~ 1** |
| ***ClstrDspdDayTimeRLW*** | CAN signal of Cluster Displayed Day time running lamp Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdElecParkngBW*** | CAN signal of Cluster Displayed Electronic Parking Brake Warning (EPB Fault)  0=No Warning  1=Warning  Cluster should send value correct value according to “EPB fault lamp On” status | **1** | **0 ~ 1** |
| ***~~ClstrDspdEleclBrkDW~~***  **~~(AS24)~~** | ~~CAN signal of Cluster Displayed Electrical Brake Distribution Warning (EBD)~~  ~~0=No Warning~~  ~~1=Warning~~  ~~Cluster should send value 0~~ | **~~1~~** | **~~0 ~ 1~~** |
| ***ClstrDspdEnDrvByWireW*** | CAN signal of Cluster Displayed Engine Drive By Wire Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “drive by wire Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdEPSWrnng*** | CAN signal of Cluster Displayed Electric Power Steering Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “EPS fault level 1 echo message or EPS fault level 2 echo message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdEPTWrnng*** | CAN signal of Cluster hvbrid system fault Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “**hybrid system fault** Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdEVPWrnng*** | CAN signal of Cluster EVP fault Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “**EVP fault** Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdFCWSysWrnng*** | CAN signal of Cluster FCW system fault Warning  0=No Warning  1=Warning  ~~Cluster should send value correct value according to “~~**~~FCW System fault~~** ~~Message” status.~~  Cluster should send value 0 in all projects | **1** | **0 ~ 1** |
| ***ClstrDspdFuelSnsrWrnng*** | CAN signal of Cluster Displayed Fuel Sensor Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “FUEL SIGNAL ERROR echo MESSAGE” status. | **1** | **0 ~ 1** |
| ***ClstrDspdFuelSts*** | CAN signal of Cluster Displayed Fuel Status  0=Fuel Status OK  1= Fuel Status Low  2=Fuel Status Critical  3=Reserved (MM suggest: Out of Range) | **1** | **0 ~ 3** |
| ***ClstrDspdFVCMSnsrWrnng*** | CAN signal of Cluster Displayed Front View Camera Module Sensor Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “Sensor block message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdHDCWrnng*** | CAN signal of Cluster Displayed Hill Descent Control Warning(HDC)  0=No Warning  1=Warning  Cluster should send value correct value according to “hdc Fault message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdHillHoldWrnng*** | CAN signal of Cluster Displayed Hill Hold Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “hhc fail message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdHVDCDCChrgW*** | CAN signal of Cluster Displayed DCDC Charge fault message  0=No Warning  1=Warning  Cluster should send value correct value according to **“DCDC Charge fault** message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdIgnRelayWrnng*** | CAN signal of Cluster Displayed Ignition RelayWarning  0=No Warning  1=Warning  Cluster should send value correct value according to “ignition relay failed message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdInfoMsk*** | CAN signal of Cluster Displayed Information Mask  0=Do not use data  1=Use data  Cluster should send value 1 after the cluster selfcheck finished. | **1** | **0 ~ 1** |
| ***ClstrDspdInvdKeyWrnng*** | CAN signal of Cluster Displayed Invalid Key Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “engine disabled message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdLBrkLghtWrnng*** | CAN signal of Cluster Displayed Left Brake Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdLDipdBeamLW*** | CAN signal of Cluster Displayed Left Dipped Beam Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdLDircnIndLW*** | CAN signal of Cluster Displayed Left Direction Indication Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdLDWSysFlt*** | CAN signal of Cluster Displayed Lane Departure Warning System Fault  0=No Warning  1=Warning  ~~Cluster should send value correct value according to “LDW FAULT Echo Message” status.~~  Cluster should send value 0 in all projects | **1** | **0 ~ 1** |
| ***ClstrDspdLSideLghtW*** | CAN signal of Cluster Displayed Left Side Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdMalflndrLghtW*** | CAN signal of Cluster Displayed Malfunction Indicator Light Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “MIL echo Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdOilPrsLowW*** | CAN signal of Cluster Displayed Oil Pressure Low Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “OIL PRESSURE Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdPACMWrnng*** | CAN signal of Cluster Displayed PACM Fault Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “**PACM Fault** Message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdPDCWrnng*** | CAN signal of Cluster Displayed Park Distance Control Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “pdc system failed message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdPEWrnng*** | CAN signal of Cluster Displayed Passive Entry Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “peps ANTENNA fault message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdRBrkLghtWrnng*** | CAN signal of Cluster Displayed Right Brake Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdRDipdBeamLW*** | CAN signal of Cluster Displayed Right Dipped Beam Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdRDircnIndLW*** | CAN signal of Cluster Displayed Right Direction Indication Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdRevsLampWrnng*** | CAN signal of Cluster Displayed Reverse Lamp Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdRrFogLghtW*** | CAN signal of Cluster Displayed Rear Fog Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdRSideLghtW*** | CAN signal of Cluster Displayed Right Side Light Warning  0=No Warning  1=Warning | **1** | **0 ~ 1** |
| ***ClstrDspdSASUncalWrnng*** | CAN signal of Cluster Displayed Steering Angle Sensor Uncalibartion Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “SAS uncalibration ECHO MESSAGE” status. | **1** | **0 ~ 1** |
| ***ClstrDspdSASWrnng*** | CAN signal of Cluster Displayed Steering Angle Sensor Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “SAS fault ECHO MESSAGE” status. | **1** | **0 ~ 1** |
| ***ClstrDspdSCSWrnng*** | CAN signal of Cluster Displayed Stability Control System Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “DSC Fault message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdScurtKeyBatLW*** | CAN signal of Cluster Displayed Security Key Battery Low Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “key battery low message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdSpdAstSysW*** | CAN signal of Cluster Displayed Speed Assist System Warning  0=No Warning  1=Warning  Cluster should send value 0 in AS22, as AS22 have no SAS Function | **1** | **0 ~ 1** |
| ***ClstrDspdSpStBtnWrnng*** | CAN signal of Cluster Displayed Stop Start Button Warning  0=No Warning  1=Warning  Cluster should send value correct value according to start stop button failed message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdSpStWrnng*** | CAN signal of Cluster Displayed Stop Start Warning  0=No Warning  1=Warning  Cluster should send value correct value according to stop start fault message” status.  Note: AS24 & IP34 have not related message display, it should send 0 as default value | **1** | **0 ~ 1** |
| ***ClstrDspdSysRdyAudW*** | CAN signal of Cluster Displayed system ready status  0=No Warning  1=Warning  Cluster should send value correct value according to input signal **EPTRdy** status. | **1** | **0 ~ 1** |
| ***ClstrDspdTCCMWrnng*** | CAN signal of Cluster Displayed TCCM Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “TCCM fault echo message” status.  Note: AS24 & IP34 have not related message display, it should send 0 as default value | **1** | **0 ~ 1** |
| ***ClstrDspdTCSWrnng*** | CAN signal of Cluster Displayed TCS Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “TC fault message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdTrWrnng*** | CAN signal of Cluster Displayed TCS Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “Gear display=EP” status. | **1** | **0 ~ 1** |
| ***ClstrDspdTyrePrsSts*** | CAN signal of Cluster Displayed Tyre pressure status  0=No Warning  1=Low Tyre  2=System failure  3=Reserved  // only for indirect TPMS; for dTPMS send 3; | **2** | **0 ~ 3** |
| ***ClstrDspdWshrFludLowW*** | CAN signal of Cluster Displayed Washer Fluid Low Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “low washer fluid message” status. | **1** | **0 ~ 1** |
| ***ClstrDspdPwrLftgtSysW*** | CAN signal of Cluster Displayed power lift gate fault Warning  0=No Warning  1=Warning  Cluster should send value correct value according to “power lift gate fault message” status. | **1** | **0 ~ 1** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| **Gauge display related** | | | |
| ***ClstrDspdFuelLvlSgmt*** | CAN signal of Cluster Displayed Fuel Level Segment  0=1st Segment Flash  1=1st Segment On(Low fuel echo Message low or critical )  2=2ed Segment On  3=3rd Segment On  4=4th Segment On  5=5th Segment On  6=6th Segment On  7=7th Segment On  8=8th Segment On | **4** | **0 ~ F** |
| ***ClstrDspdVehSpd*** | The displayed speed value by speedometer.  The max value is 240 km/h to match speedometer scale line.  When speed signal from SCS is missing, the displayed speed signal will be set to 255. | **8** | **0 ~ 240** |
| ***FuelLvlPcnt*** | CAN signal of percent of current tank level divide 'Fuel Total Capacity'.  The signal value= Fuel quantity/ Fuel total capacity\*100/0.39256 | **8** | **0 ~ 255** |
| ***FuelLvlPcntV*** | CAN signal of indicating whether ‘FUEL LEVEL PERCENT’ CAN signal is valid.  0=valid,  1=invalid.  If fuel sensor value is out of range, the signal value is 1, otherwise the value is 0. | **1** | **0 ~ 1** |
| ***FuelTotCapct*** | CAN signal of Fuel tank max quantity  The signal value= fuel tank total capacity | **12** | **0 ~ 511 L** |
| ***OdoPriy*** | Current odometer value not considering ODO OFFSET. | **24** | **0 ~ 16777215** |
| ***RmnDrvngDist*** | CAN signal of cluster displayed Range to empty. 1km/bit  //Fuel RTE + Electric RTE | **12** | **0-4095** |
| **SIA display** | | | |
| ***ClstrSIADate*** | CAN signal of Cluster SIA date  24 bit(Y 8bit,M 8bit, D 8bit) | **24** |  |
| ***ClstrSIADist*** | CAN signal of Cluster SIA distance  0-65535 km | **16** |  |
| ***SIADatePriy*** | The signal is equal to the date information of ICE when cluster do ‘SIA Reset’ operation. | **24** |  |
| ***SIAOdoPriy*** | The signal is equal to the odometer value when cluster do ‘SIA Reset’ operation. | **24** |  |
| **FICM LVDS related** | | | |
| ***ClstrTabReq*** | CAN signal of Cluster Tab Request  $0=Trip-computer;  $1=Navigation;  $2=Media;  $3=Call;  $4=Warning Information Centre;  $5=Setting;  $6=Active Safety;  0x7=Voice Recognition  $8~$15=Reserved; | **4** |  |
| **others** | | | |
| ***DiagnosticRespIPK*** | Refer to diagnostic standards. |  |  |
| ***DTCInformationIPK*** | Refer to diagnostic standards. |  |  |
| ***keep-network-IPK*** | Refer to network standards. |  |  |
| ***VINClstr*** | The last 8 bytes of Vehicle Identifier Number stored in cluster’ EEPROM. | **64** |  |
| ***Clstr10KmTick*** | When cluster’s VIN signal doesn’t match with BCM’s VIN signal, cluster will send the value of ‘1’ every 10 km. | **1** | **0 ~ 1** |
|  |  |  |  |
| **no use** | | | |
| ***BCMConfignUpdt*** | No use | **64** |  |
| ***EnOilLifeRstReq*** | Engine Oil life Reset Requirement  0x0=Flase;  0x1=True. | **1** | **0~1** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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|  |  |  |  |

## Rx signal strategy

Considering the special of all signals that belong to the frame of ***GW\_HSC3\_Fr00***(0x169),IPK need to take some action when the signal’s value changed from ‘1’ to ‘0’.

For signals as below, IPK should not respond directly unless it keep as ‘0’ for at least 2s;

***XxxAvlbly, including TCMAvlbly, TCCMAvlbly, SDMAvlbly, SCUAvlbly, SCSAvlbly, SASAvlbly,PDCAvlbly, EPBAvlbly, ECMAvlbly, DHLAvlbly etc.***

For ***EPSAvlbly***, IPK should respond instantly once the signal’s value changed to ‘0’.

# Gauge in LCD

For EV/HEV, the following gauge are required:

* Odometer
* Tripmeter
* Power Meter, which shows the efficiency of output power, in %.
* Speedometer
* Fuel Gauge
* SOC, which shows the remaining battery capacity, in %.

The tachometer, motor speed, current, voltage can display in TC as a page named “hybrid information” or even as a gauge according to the HMI requirement.

## Odometer

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **distance Count** | ***DistRCAvgDrvn*** CAN signal from ABS/DSC ECU.  E=N\*1/8 meters. | **13** | **0 ~ 8191** |
| **Distance Count Validity** | ***DistRCAvgDrvnV*** CAN signal from ABS/DSC to indicate whether ‘**distance Count**’ signal is valid.  0= valid;  1= invalid. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Odo display value** | Odometer value in whole km (or miles) used for the Odometer display. | **24** | **0~16777215** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **odo store** | ***insOdoStorePrm*** Stored Current odometer distance in secure memory and can never be reset (in metres). | **32** | **0** | **0 ~ FFFFFFFF** |
| **odo offset** | ***insOdoOffestPrm*** The value used to remove mileage gained during manufacture. 0 km to 255km. | **8** | **0** | **0 ~ 255** |
| **Units** | ***insUnitsPrm*** 0 = km/h, 1=mph. | **1** | **0** | **0 ~ 1** |
| **Odo inc factor** | ***insOdoIncFactorPrm*** The threshold above which an incorrect odo increment is determined.1 meter/bit. | **8** | **14**  **(20 meters)** | **0 ~ 255** |
| **odo coeffi** | ***insOdoCoffiPrm*** the coefficient for odo consumption. 0.1/bit.  Notes: the value can not be set to ‘0’. | **4** | **A**  **( 1 )** | **1 ~ 15** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| --- | --- | --- | --- | --- |
| **Last distance Count** | Previous distance count data from ABS/DSC ECU via CAN, to be held in NRZ RAM and secured with mirror image to prevent data loss during reset/ low voltage condition | **13** | **0** | **0~8191** |
| **odo** | Actual Current odometer distance in 1m increments to be held in NRZ RAM and secured with mirror image to prevent data loss during reset/ low voltage condition. | **32** | **00** | **0~4294 x 106** |
| **odo inc distance** | The incremental distance, in meters, traveled since last odo update to be held in NRZ RAM and secured with mirror image to prevent data loss during reset/ low voltage condition. | **8** | **0** | **0 ~ 255** |

### Functionality Description

The odometer will display the total distance driven by the vehicle **Odo display value** that has a resolution of 1 km (or 1 mile dependant upon the units selected).

[Req\_IPK\_ODO\_ 0]

The odometer shall be capable of displaying a 6 digit number **Odo display value**. The max value of **odo** is 999999.99km, when this is reached it shall not be possible to either exceed this value nor to roll-over to zero.

[Req\_IPK\_ODO\_ 0]

The Odo display value can be offset by up to 255km in order to mask kilometerage/mileage gained during the manufacturing/delivery process using odo offset.

The **Odo display value** will be determined from the actual value of odometer distance **odo** less the value **odo offset**.

The current odometer distance **odo** is stored in secure memory **odo store** every 2 km. The odometer distance **odo** will be held in NRZ RAM and its integrity must be ensured. The integrity of this value is to be monitored and if found to be corrupt the odometer in RAM needs to be restored from EEPROM back-up **odo store**.

The odometer will be backed up in EEPROM every 2km (resolution 2km) in one of 16 EEPROM locations in 16bit format. The secure memory must only allow a value to be written that is greater than the current value.

When **Distance Count Validity** is **valid (= 0)**, the odometer value is derived from **distance Count** data from the ABS/DSC ECU via CAN, which is stored in the cluster as **Last distance Count**. The **distance Count** is updated periodically and the difference between these two values is used to calculate the incremental odometer distance.

And when KL.15 is from off to on **OR** **Distance Count Validity** is invalid (= 1), cluster should give the next frist received valid **distance Count** signal (when **Distance Count Validity** is **valid (= 0)**) as the new benchmark. This strategy should be applied in ODO, Trip and related distance computations.

**Odo/Trip Increment Filtering:**

When **Distance Count Validity** is **valid (= 0)**, the cluster must perform a check that the difference between 2 consecutive **distance Count**values is reasonable. It shoud do this by checking that the difference between the two values of **distance Count** is less than **Odo inc factor**.

If the difference is reasonable, then difference between the two **distance Count** values is used to increment the odometer value.

If the difference is unreasonable, then the difference between the two **distance Count** values is rejected and not used to increment the odometer value.

Each time a value is rejected an error counter is incremented to a max of 0xF.

Each time a value is reasonable the error counter is decremented to a min of 0x0.

When the value of the error counter >/= 5, the cluster should set a DTC (see part 4 spec).

When the value of the error counter ==0, the cluster should reset a DTC (see part 4 spec).

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Odo display value** | = | **odo - odo offset** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **odo inc distance** | = | **(distance Count - Last distance Count) x odo coeffi** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Odo** | = | **odo + odo INC DISTANCE** |

### Functional Behaviour

**KL30 and KLR**

At the moment KL.30 (battery) is being connected, the odometer distance **odo** will be read from EEPROM. The odometer display will be blank unless preview mode is requested by the trip computer button being pressed.

**~~KL30 and KLR (Preview Mode)~~**

~~The current odometer,~~ **~~Odo display value~~**~~, will be displayed according to preview strategy.~~

**KL.15 (CLUSTER KL15 STATUS)**

**distance Count** is monitored and converted to an incremental distance. This incremental distance is added to the current odometer, **odo**.

## ~~Tripmeter~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **odo** | Current odometer distance in 10m increments. | **24** | **0 ~ 16777215** |
| **trip Reset** | A reset of the trip 1 counter is required. This occurs via the trip computer menu. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Trip display value** | Tripmeter value in 0.1km (or miles) used for the Tripmeter display | **16** | **0 ~ 999.9** |

### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **trip\_odo** | The odometer reading when the tripmeter was last reset | **24** | **0 ~ 16777215** |
| **Trip** | The calculated value of the tripmeter in 0.1km | **24** | **0 ~ 16777215** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **VIN** | ***insVINPrm*** The Vehicle Identity Number. | **136** | **17 \* 0xFF 1** | **17\*0xff** |
| **Roll over value** | ***insTripRollOverPrm*** Roll over to zero at trip value of; 1= 9999.9 0 = 999.9. | **1** | **1** | **0 ~ 1** |

**Note:** the default value of parameter ‘**VIN**’ is 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF 0xFF.

### Functionality Description

The tripmeter will display the distance driven by the vehicle since the Tripmeter was last reset, either manually or automatically at roll over, and is calculated to a resolution of 0.1 km.

For values up to 999.9 km (or miles dependant upon **Units**), it is displayed at a resolution of 0.1 km (or miles). For values of greater than 999.9 km (or miles) the resolution of the display is reduced to 1km (or miles). The roll over (auto reset to zero) value of the trip is configured in E2PROM by **Roll over value**.

The displayed value **Trip display value** shall be a quantised version of the calculated tripmeter value **Trip,** this being calculated from the current odometer value **Odo** and the odometer value when the tripmeter was last reset **trip odometer**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Trip** | = | **odo - trip\_odo** |

### Functional Behaviour

**KL30 and KLR**

The tripmeter display will be blank.

**~~KL30 and KLR (Preview Mode)~~**

**~~Trip~~** ~~and~~ **~~Trip display value~~** ~~are calculated and~~ **~~Trip display value~~** ~~made available. /\*only for TFT cluster\*/~~

**KL.15 (CLUSTER KL15 STATUS)**

**Trip** and **Trip display value** are calculated and **Trip display value** made available.

**KL.50 (CLUSTER KL15 STATUS)**

**Trip** and **Trip display value** are calculated and **Trip display value** made available.

**Note:**

The trip display shall be inhibited and replaced by the text ‘Error’ if the Vehicle Identity Number in EEPROM is set to its default value **or** IPK’s VIN is not mateched with BCM’s VIN.

More details please see the specification: *260607\_BM10\_NMC1\_Body\_controller\_Redundant\_Data\_Pt3\_specification\_1.8.pdf*

## Power Meter

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **POWER efficiency** | ***EPTDrvEfncyInd*** 12 bit CAN signal of motor power data from HCU, E = (N\*1-27) (%) | **7** | **0 ~ 127** |
| **POWER efficiency validity** | ***EPTDrvEfncyIndV*** 1 bit CAN signal,  0x0=Valid;  0x1=Invalid. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **POWER angle** | The power angle corresponding to the current PtSysPwr**.** 0 to 270 degrees. | **16** | **0 ~ 65535** |

### Values in non-volatile memory

Note: the following parameter in red need adjusted according to HMI resources. For different dial display these parameters may be totally different and for segment these parameter may even not appliable.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~POWER max angle~~** | ***~~insPowerMaxAnglePrm~~*** ~~The Power angle (with respect to OFF) corresponding to the maximum power marked on the Power scale.~~ | **~~9~~** | **~~10F~~**  **~~(271 deg)~~** | **~~0 ~ 360~~** |
| **~~POWER angle 1~~** | ***~~insPower1AnglePrm~~*** ~~The 1~~~~st~~ ~~intermediate power angle (with respect to OFF) corresponding to the 1~~~~st~~ ~~intermediate power.~~ | **~~9~~** | **~~04A~~**  **~~(74 deg)~~** | **~~0 ~ 360~~** |
| **~~POWER angle 2~~** | ***~~insPower2AnglePrm~~*** ~~The 2~~~~nd~~ ~~intermediate power angle (with respect to OFF) corresponding to the 2~~~~nd~~ ~~intermediate power.~~ | **~~9~~** | **~~0c5~~**  **~~(197 deg)~~** | **~~0 ~ 360~~** |
| **~~POWER max speed~~** | ***~~insPowerMaxPowerPrm~~*** ~~The maximum power in % indicated on the power scale.~~ | **~~8~~** | **~~64~~**  **~~(100%)~~** | **~~0 ~ 255~~** |
| **~~POWER 1 speed~~** | ***~~insPower1PowerPrm~~*** ~~The 1~~~~st~~ ~~intermediate power in % corresponding to the 1~~~~st~~ ~~intermediate power angle.~~ | **~~8~~** | **~~0~~**  **~~0%~~** | **~~0 ~255~~** |
| **~~POWER 2 speed~~** | ***~~insPower2PowerPrm~~*** ~~The 2~~~~nd~~ ~~intermediate power in% corresponding to the 2~~~~nd~~ ~~intermediate power angle..~~ | **~~8~~** | **~~5A~~**  **~~(90%)~~** | **~~0 ~ 255~~** |
| **~~POWER max MINUS speed~~** | ***~~insPowerMaxPowerPrm~~*** ~~The maximum minus power in % indicated on the power scale.~~ | **~~8~~** | **~~-19~~**  **~~(-25%)~~** | **~~-255 ~0~~** |
| **~~POWER 1 MINUS speed~~** | ***~~insPower1MinusPowerPrm~~*** ~~The 1~~~~st~~ ~~intermediate minus power in % corresponding to the 1~~~~st~~ ~~intermediate power angle.~~ | **~~8~~** | **~~-0A~~**  **~~(-10%)~~** | **~~-255 ~0~~** |
| **POWER sweep** | ***insPowerSweepPrm*** If true, the tacho sweeps from zero to max at KL15 ON. | **1** | **1** | **0 ~1** |
| **~~POWER OUTPUTING FLAG HYSTERESIS~~** | ***~~insPoweroutputHysPrm~~*** ~~The value of hysteresis, in % units, to be used before the power outputing flag is reset.~~ | **~~4~~** | **~~4~~** | **~~0 ~15~~** |
| **~~POWER OUTPUTING FLAG TIME~~** | ***~~insPoweroutputingTimePrm~~*** ~~The time in seconds, that the power is outputing before the power outputing flag is set.~~ | **~~4~~** | **~~3~~** | **~~0 ~15~~** |
| **POWER rising filter damping** | ***insPowerRisingFilterDampPrm*** The value of power rising filter constant. | **4** | **1** | **0 ~15** |
| **POWER Falling filter damping** | ***insPowerFallingFilterDampPrm*** The value of power falling filter constant. | **4** | **1** | **0 ~15** |
| **sweep time** | ***insSweepTimePrm*** The time in 0.1 second increments that the power, fuel, SOC gauges sweep from min to max or from max to min. Offset of 0.5 second. | **4** | **5** | **0 ~15** |
| **sweep pause time** | ***insSweepPauseTimePrm*** The time in 0.1 second increments that the power, fuel, soc gauges pause at max indication. | **4** | **5** | **0 ~15** |
| **~~POWER POINTER OFFSET~~** | ***~~insPowerPointerOffsetPrm~~***  ~~Offset value in stepper motor steps, to allow calibration of the pointer zero position. This value is a signed 8bit value.~~ | **~~8~~** | **~~0~~** | **~~-128 ~ +127~~** |
| **POWER sweep start delay** | ***insSweepStartDelayPrm*** If true, the power pointer sweep is delayed by 1 sec. | **1** | **1** | **0 ~1** |
| **~~POWER sweep stepper Restart~~** | ***~~insSweepStepperRestartPrm~~*** ~~If true, the power pointer sweep is restarted if interrupted.~~ | **~~1~~** | **~~1~~** | **~~0 ~1~~** |

### Functional Description

The motor power meter is used to display the powertrain system power in kilowatt. The displayed power value will be derived from the MOTOR POWER CAN signal via CAN network. If the MOTOR POWER is a plus value, which means that the powertrain system produces power to propel the vehicle. While the MOTOR POWER is a minus value, the powertrain system is converting partial vehicle kinetic energy into electric energy.

The displayed power will be derived from the **POWER efficiency** signal via the CAN network.

The powermeter pointer will be capable of remaining within +/-2% of the maximum indicated value of the **POWER efficiency** signal. The powermeter pointer must be able to travel from OFF to 100% in 1 sec when a step input is applied and the rising and falling damping constants are set to 0x01. The powermeter pointer will require damping to hide minor fluctuations in the power. The pointer damping of the powermeter is the responsibility of the supplier.

When the **POWER efficiency** less than -25 %, the pointer will point to -25%.

When the **POWER efficiency** signal is missing for 3s, the pointer will point to the OFF position.

~~The powermeter monitors~~ **~~motorpower~~** ~~and after~~ **~~POWEROUTPUTing flag time~~** ~~of it being greater than 4% the~~ **~~POWEROUTPUTIng flag~~** ~~is set. The~~ **~~POWEROUTPUTing flag~~** ~~is reset when~~ **~~MOTOR POWER~~** ~~falls below~~ **~~POWEROUTPUTing flag hysteresis~~**~~.~~

~~If a CAN time-out condition exists for the~~ ***~~PtSysPwr~~*** ~~signal after an initial start up delay (3 sec) following KL15 on, then the~~ **~~POWEROUTPUTing flag~~** ~~is set. The~~ **~~POWEROUTPUTing flag~~** ~~is not reset while this CAN time-out condition exists.~~

When **READY SYSTEM FLAG** is false, point to OFF;

The cluster calculates the **POWER angle** from the **POWER efficiency** input by interpolation between the closest calibration points (-25%~0%, 0%~100%).

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~POWER angle~~** | ~~=~~ | **~~(POWER efficiency +50 / Tacho max speed) x Tacho max angle~~** |

~~The cluster determines the status of~~ **~~POWEROUTPUTing flag.~~**

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~poweroutputing flag (set)~~**  **~~poweroutputing flag (reset)~~** | ~~IF~~  ~~IF~~ | **~~(MOTORPOWER > 5kw for time>poweroutputing flag time) or~~ *~~PtSysPwr~~* ~~CAN Time-out (~~**~~from 3 sec after KL15 on~~**~~)~~**  **~~motorpower < (5kw - poweroutputing flag hysteresis) and (!~~*~~PtSysPwr~~* ~~CAN Time-out)~~** |

### Functional Behaviour

**KL.30 & KLR**

The powermeter will point to OFF.

**KL.15 (CLUSTER KL15 STATUS) & KL50**

When KL15 is first true; after a 1 second delay to accommodate power pointer OFF, the powermeter should sweep from OFF to **power max speed** if configured to do so by **power sweep**. The duration of the power sweep from min to max is **sweep time.** The pointer shall pause at max for **sweep pause time**. The duration of the power sweep from max to min is **sweep time.** After which the powermeter will return to OFF; then calculate and point to the current value of **power angle**.

~~The powermeter will determine the status of the~~ **~~poweroutputing flag~~**~~.~~

## Speedometer

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Vehicle speed** | ***VehSpdAvgDrvn*** CAN signal of road speed data from ABS/DSC ECU, 0.015625 km/h/bit. | **15** | **0 ~ 511.984 km/h** |
| **Vehicle speed validity** | ***VehSpdAvgDrvnV*** CAN signal to indicate the validity of **Vehicle speed**.  $0=Valid;  $1=Invalid. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **SPEEDO ANGLE** | The speedo angle corresponding to the current **VEHICLE SPEED.** 0 to *TBD* degrees. | **16** | **0 ~ 65535** |
| **displayed speed** | Internal signal considering **cORRECTED SPEED** x **units correction factor** and current selected units based on CAN signal. | **8** | **0 ~ 255** |

### Values in non-volatile memory

Note: the following parameter in red need adjusted according to HMI resources. For different dial display these parameters may be totally different and for digital display these parameter may even not appliable.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Constant Name** | **Description** | **No of bits** | **Initial Value** | **Value** |
| **~~Speedo max angle~~** | ***~~insSpeedoMaxAnglePrm~~*** ~~The Speedo angle (with respect to 0 km/h) corresponding to the maximum speed marked on the Speedo scale.~~ | **~~9~~** | **~~tbd~~** | **~~0~270 degrees~~** |
| **~~SPEEDO angle 1~~** | ***~~insSpeedo1AnglePrm~~*** ~~The 1~~~~st~~ ~~intermediate Speedo angle (with respect to 0 km/h) corresponding to the 1~~~~st~~ ~~intermediate engine speed.~~ | **~~9~~** | **~~tbd~~** | **~~0~270 degrees~~** |
| **~~SPEEDO angle 2~~** | ***~~insSpeedo2AnglePrm~~*** ~~The 2~~~~nd~~ ~~intermediate Speedo angle (with respect to 0 km/h) corresponding to the 2~~~~nd~~ ~~intermediate engine speed.~~ | **~~9~~** | **~~tbd~~** | **~~0~270 degrees~~** |
| **~~SPEEDO max speed~~** | ***~~insSpeedoMaxSpeedPrm~~*** ~~The maximum vehicle speed in the marked unit indicated on the speedo scale.~~ | **~~8~~** | **~~tbd~~** | **~~0~260 km/h~~** |
| **~~SPEEDO 1 speed~~** | ***~~insSpeedo1SpeedPrm~~*** ~~The 1~~~~st~~ ~~intermediate vehicle speed in the marked unit corresponding to the 1~~~~st~~ ~~intermediate Speedo angle.~~ | **~~8~~** | **~~tbd~~** | **~~0~260 km/h~~** |
| **~~SPEEDO 2 speed~~** | ***~~insSpeedo2SpeedPrm~~*** ~~The 2~~~~nd~~ ~~intermediate vehicle speed in the marked unit corresponding to the 2~~~~nd~~ ~~intermediate Speedo angle..~~ | **~~8~~** | **~~tbd~~** | **~~0~260 km/h~~** |
| **SPEEDO rising filter damping** | ***insSpeedoRisingFilterDampPrm*** The value of speedo rising filter constant. | **4** | **1** | **0~15** |
| **speedo Falling filter damping** | ***insSpeedoFallingFilterDampPrm*** The value of speedo falling filter constant. | **4** | **1** | **0~15** |
| **speedo sweep** | ***insSPeedoSweepPrm*** If true, the speedo sweeps from zero to max at KL15 ON. | **1** | **1** | **0 ~1** |
| **sweep time** | ***insSweepTimePrm*** The time in 0.1 second increments that the tacho, speedo,temperature and fuel gauges sweep from min to max or from max to min. Offset of 0.5 second. | **4** | **5** | **0~15** |
| **sweep pause time** | ***insSweepPauseTimePrm*** The time in 0.1 second increments that the tacho, speedo,temperature and fuel gauges pause at max indication. | **4** | **5** | **0~15** |
| **sweep start delay time** | ***insSweepStartDelayTimePrm*** The time in 0.1 second increments that the tacho, speedo, fuel, temp gauges sweep is delayed.  Notes: If ‘0’ means no delay. | **4** | **A** | **0 ~15** |
| **~~sweep stepper Restart~~** | ***~~insSweepStepperRestartPrm~~*** ~~If true, the tacho/speedo pointer sweep is restarted if interrupted.~~ | **~~1~~** | **~~1~~** | **~~0 ~1~~** |
| **Adjust constant** | ***insSpeedoAdjustConstantPrm*** % adjustment of the indicated vehicle speed value. 1 bit = 0.2%, offset value is 100%.  0 ~ 127 = 100% ~ (100+25.4)%,  128 = invalid,  129 ~ 255 = (100 – 0.2)% ~ (100 - 25.4)%. | **8** | **19**  **(105 %)** | **0 ~ +/- 25.4** |
| **speedometer halo parameter upper limit** | ***insSpeedoHaloUpperLmtPrm*** | **8** | **96**  **(150km/h)** | **0~FF** |
| **speedometer halo parameter lower limit** | ***insSpeedoHaloLowerLmtPrm*** | **8** | **0**  **(0km/h)** | **0~FF** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| --- | --- | --- | --- | --- |
| **speed signal Correction FActor** | Correction factor, in 0.1% inc of input speed signal calculated from the ABS and actual tyre rolling circumferences. (1000 = 100% = no correction) | **16** | **64** | **1 ~ 200%** |
| **cORRECTED SPEED** | Speed calculated from the **Vehicle Speed, speed signal Correction FActor** and **Adjust CONSTANT** | **8** | **00** | **0 ~ 255** |
| **units correction factor** | km/h units = 1;  Mph units = 1.61 | **1** | **1** | **1 ~ 1.61** |

### Functional Description

The speedometer is used to display the vehicle speed in km/h in analogue form. Additionally, the vehicle speed is displayed in MPH for certain markets.

All speedometer calculations take place in units of km/h.

**DISPLAYED SPEED** shall be limited to the range of 0 ~ 220 km/h and 0 ~ 140 mph.

**VEHICLE SPEED** is calculated in the ABS/DSC ECU based on a single value of tyre rolling circumference of **ABS TYRE ROLLING CIRC.**

The value of the **ACTUAL TYRE ROLLING CIRC** of the actual tyres fitted to the vehicle is stored in EEPROM.

The zero position of the pointer can be adjusted by an offset EEPROM parameter **SPEEDO POINTER OFFSET** to enable calibration in production.

The pointer damping of the speedometer is the responsibility of the supplier.

When **Vehicle speed validity** is invalid (= 1), cluster set **Vehicle speed** to 0 and don’t care CAN signal status. Otherwise cluster will indicate according to **Vehicle speed** CAN signal value.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **displayed speed** | = | **Vehicle speed** x **units correction factor** x **Adjust constant** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SPEEDO ANGLE** | = | **(DISPLAYED SPEED/ SPEEDO MAX SPEED) X SPEEDO MAX ANGLE** |

The display should incorporate hysteresis of +/- 0.5 km/h (Mph), which means if the calculated display speed is fluctuating within 0.5 km/h; the actual speedo display should not change.

If the cluster has a digital speed, the analog speed and digital speed should be matched without any toloracne, especially in analog speedometer scale lines zone.

### Functional behaviour

**KL30 and KLR**

The speedometer will point to 0.

**KL.15 (CLUSTER KL15 STATUS) && KL50**

When KL15 is first true; speedo do the sweep strategy according to related parameters.

Then, the speedometer shall calculate and point to the current value of **SPEEDO ANGLE**.

## Fuel Gauge

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √  30L | √  **37L** | × | × |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **raw fuel quantity** | Quantity of fuel read from ADC and applied to anti-slosh algorithm, in millilitres. | **16** | **0 ~ 65535** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **fuel consumption** | ***FuelCsump*** CAN signal from EMS of rolling count of the micro-litre sum of the injector pulse volumes.  E=N\*16 | **12** | **0 ~ 4095** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **fuel status** | ***insLowFuelSts*** Internal signal indicates Low Fuel status for use by dot-matrix display and warning lamp functions.  00 = Fuel Status OK.  01 = Fuel Status Low.  10 = Fuel Status Critical. | **2** | **0 ~ 2** |
| **Fuel total capacity** | ***FuelTotCapct*** CAN signal of Fuel tank max quantity | **12** | **0 ~ 511 L** |
| **Fuel level percent** | ***FuelLvlPcnt*** CAN signal of percent of current tank level divide 'Fuel Total Capacity'. | **8** | **0 ~ 100%** |
| **fuel level percent validity** | ***FuelLvlPcntV*** CAN signal of indicating whether ‘**FUEL LEVEL PERCENT**’ CAN signal is valid.  0=valid,  1=invalid. | **1** | **0 ~ 1** |

### Values in non-volatile memory

Note: the following parameter in red need adjusted according to HMI resources. For dial display these parameters may even not appliable.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **fuel Resistance x1** | ***insFuelResX1Prm*** Resistance characteristic value X1 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X2** | ***insFuelResX2Prm*** Resistance characteristic value X2 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X3** | ***insFuelResX3Prm*** Resistance characteristic value X3 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X4** | ***insFuelResX4Prm*** Resistance characteristic value X4 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X5** | ***insFuelResX5Prm*** Resistance characteristic value X5 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X6** | ***insFuelResX6Prm*** Resistance characteristic value X6 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X7** | ***insFuelResX7Prm*** Resistance characteristic value X6 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Resistance X8** | ***insFuelResX8Prm*** Resistance characteristic value X6 in 1ohm units. | **9** | **See 3.5.4.2** | **0 ~ 511 Ω** |
| **fuel Litres Y1** | ***insFuelLitreY1Prm*** Fuel quantity characteristic value Y1 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y2** | ***insFuelLitreY2Prm*** Fuel quantity characteristic value Y2 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y3** | ***insFuelLitreY3Prm*** Fuel quantity characteristic value Y3 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y4** | ***insFuelLitreY4Prm*** Fuel quantity characteristic value X4 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y5** | ***insFuelLitreY5Prm*** Fuel quantity characteristic value Y5 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y6** | ***insFuelLitreY6Prm*** Fuel quantity characteristic value Y6 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y7** | ***insFuelLitreY7Prm*** Fuel quantity characteristic value Y5 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel Litres Y8** | ***insFuelLitreY8Prm*** Fuel quantity characteristic value Y6 in ml. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel critical low threshold** | ***insFuelSeg1ThresPrm*** The percentage of fuel in %, below which gauge in red flashes. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel low threshold** | ***insFuelSeg2ThresPrm*** The percentage of fuel in %, below which gauge changes to red. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel upper percent** | ***insFuelUpperPecPrm*** The quantity of fuel percent in % as the fuel gauge’s max position.  **E=N\*0.5** | **8** | **See 3.5.4.2** | **0~100%** |
| **fuel lower percent** | ***insFueLowerPecPrm*** The quantity of fuel percent in % as the fuel gauge’s min position.  **E=N\*0.4** | **8** | **See 3.5.4.2** | **0~100%** |
| **fuel display hysteresis**  **CFB：确认一下如何使用？** | ***insFuelDisplayHysPrm*** The quantity of fuel, in ml, above any threshold that is required to illuminate a segment after it has been extinguished. | **16** | **See 3.5.4.2** | **0 ~ 63000 ml** |
| **fuel refill qty** | ***insFuelRefillQtyPrm*** The quantity of fuel, in ml, above which the cluster recognises that fuel has been added. | **16** | **1388**  **(5 L)** | **0 ~ 63000 ml** |
| **Fuel Rising Rate** | ***insFuelRisingRatePrm*** The rate at which the quantity of fuel can rise, in ml per second. | **16** | **12** | **0 ~ 4095 ml** |
| **Fuel falling Rate** | ***insFuelFallingRatePrm*** The rate at which the quantity of fuel can fall, in ml per second. | **16** | **12** | **0 ~ 4095 ml** |
| **fuel Resistance LowER TOLERANCE** | ***insFuelLowerTolerancePrm*** Resistance value in 1 ohm units, which is subtracted from the parameter ***insFuelResX6Prm*** .to calculate the lower threshold for the out-of-range detection. | **8** | **See 3.5.4.2** | **0 ~ 255 Ω** |
| **fuel Resistance UPPER TOLERANCE** | ***insFuelUpperTolerancePrm*** Resistance value in 1 ohm units, which is added to the parameter ***insFuelResX1Prm*** .to calculate the upper threshold for the out-of-range detection. | **8** | **See 3.5.4.2** | **0 ~ 255 Ω** |
| **FUEL SEGMENT 1 FLASH ENABLE** | ***insFuelSeg1FlashPrm***  fuel segment 1 flash enabled when ‘TRUE’. | **1** | **1** | **0~1** |
| **fuel tank total capacity** | ***insFuelTankTotalCapacity*** Fuel tank max capacity.  1 Litre/bit without offset. | **8** | **See 3.5.4.2** | **0 ~ 255 L** |
| **fuel tank type** | ***insFuelTankType*** Fuel tank type:  Fuel tank type:  0= 55L, 2WD (AS22).  1= 55L, 4WD (AS22).  2= 45L (IP31)  3= 50L (IP31)  4= 30L (IP34)  5= 65L (IS12 Major)  6= 38L (AS24) | **3** | **See 3.5.4.2** | **0 ~ 8** |

### Functional Description

**// 两段线性：**

1. **fuel low threshold~ fuel upper percent 线性变化；**
2. **fuel LOWER percent~ fuel low threshold线性变化；**

**// 小于fuel low threshold变红；**

**小于fuel critical low threshold闪烁；**

**高于fuel upper percent保持在最高油量显示（gauge为满格显示）；**

**小于fuel LOWER percent保持在最低油量显示（gauge为空）**；

// **fuel low threshold在UI上对应gauge中的最下方一格上边缘的油量百分比！**

In the event that the cluster detects an out-of-range fuel sender value, the value of the anti-sloshed fuel quantity, **Fuel quantity,** from the last known valid sender value is used. From this value of **Fuel quantity**, the quantity of fuel used by the engine fuel injectors, according to CAN signal **fuel consumption**, is continually subtracted to give an updated value. This calculation continues until KL15 is switched OFF or until the sender signal becomes valid again.

At the next ignition cycle when KL15 becomes TRUE, if the sender value is again out-of-range, the gauge should be extinguished and yellow ‘low fuel’ telltale will flash, and the echo message ‘Fuel signal error’ will be displayed. The detail strategies please see ‘Low fuel warning && Fuel signal error’ section. The warnings will be cancelled immediately if the fuel sender return to normal and the fuel gauge will display the actual fuel quantity at once.

The fuel sensor is continuously monitored for an out-of-range condition. The sensor is defined to be out-of-range, when the measured resistance value is found to be below the minimum sender resistance configured in EEPROM **fuel Resistance x5** minus the **FUEL RESISTANCE LOWER TOLERANCE** or if the measured value is above the maximum sender resistance in EEPROM **fuel Resistance x1**plus the **FUEL RESISTANCE UPPER TOLERANCE.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **fuel status = 00 (ok)** | if | **cluster kl15 status && fuel level precent >=fuel low threshold / fuel tank total capacity)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **fuel status = 01 (low)** | if | **cluster kl15 status && fuel level precent < (fuel low threshold / fuel tank total capacity)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **fuel status = 10 (critical)** | if | **cluster kl15 status && fuel level precent < (fuel critical low threshold / fuel tank total capacity)** |

#### Fuel Sender Characteristics

**IP34:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Volume(L)** | **1.6L** | **3.7L** | **5.6L** | **12.4L** | **18L** | **24L** | **26L** | **29.2L** |
| **Height (mm)** | **17** | **28** | **38** | **70** | **96** | **123** | **132** | **148** |
| **Resistance(Ω)** | **200±2** | **187±2** | **176±2** | **140±2** | **111±2** | **81±2** | **71±2** | **52±2** |

**AS24:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Volume(L)** | **0.5** | **3** | **5** | **9** | **19** | **28** | **34** | **37** |
| **Height (mm)** | **8.8±2** | **29.9±2** | **41.1±2** | **61.3±2** | **109.0±2** | **150.8±2** | **179.2±2** | **194.2±2** |
| **Resistance(Ω)** | **200±5** | **187±4** | **178±4** | **161±4** | **118±3** | **79±3** | **53±3** | **40±2** |

#### Values Table in non-volatile memory

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project** | **AS24** | **IP34** |  |  |  |
| **fuel tank type** | **6** | **4** |  |  |  |
| **fuel tank total capacity(L)** | **25**  **37L** | **1E**  **30L** |  |  |  |
| **fuel Resistance x1** | **C8**  **200 ohm** | **C8**  **200 ohm** |  |  |  |
| **fuel Resistance x2** | **187ohm** | **BB**  **187ohm** |  |  |  |
| **fuel Resistance x3** | **178ohm** | **B0**  **176 ohm** |  |  |  |
| **fuel Resistance x4** | **161ohm** | **8C**  **140 ohm** |  |  |  |
| **fuel Resistance x5** | **118ohm** | **6F**  **111 ohm** |  |  |  |
| **fuel Resistance x6** | **79ohm** | **51**  **81ohm** |  |  |  |
| **fuel Resistance X7** | **35**  **53ohm** | **47**  **71 ohm** |  |  |  |
| **fuel Resistance X8** | **28**  **40ohm** | **34**  **52 ohm** |  |  |  |
| **fuel Litres Y1** | **01F4**  **0.5L** | **0640**  **1.6L** |  |  |  |
| **fuel Litres Y2** | **0BB8**  **3L** | **0E74**  **3.7L** |  |  |  |
| **fuel Litres Y3** | **1388**  **5L** | **15E0**  **5.6L** |  |  |  |
| **fuel Litres Y4** | **2328**  **9L** | **3070**  **12.4L** |  |  |  |
| **fuel Litres Y5** | **4A38**  **19L** | **4650**  **18L** |  |  |  |
| **fuel Litres Y6** | **6D60**  **28L** | **5DC0**  **24L** |  |  |  |
| **fuel Litres Y7** | **84D0**  **34L** | **6590**  **26L** |  |  |  |
| **fuel Litres Y8** | **9088**  **37L** | **7210**  **29.2L** |  |  |  |
| **fuel critical low threshold** | **0007**  **(7%)** | **000A**  **(10%)** |  |  |  |
| **fuel low threshold** | **000E**  **(14%)** | **0012**  **(18%)** |  |  |  |
| **fuel upper percent** | **B6**  **(91%)** | **B4**  **(90%)** |  |  |  |
| **fuel lower percent** | **04**  **(1.6%)** | **0E**  **(5.6%)** |  |  |  |
| **fuel display hysteresis** | **07D0**  **2L** | **07D0**  **2L** |  |  |  |
| **fuel Resistance LowER TOLERANCE** | **06** | **0F** |  |  |  |
| **fuel Resistance UPPER TOLERANCE** | **19** | **0A** |  |  |  |

## SOC

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **hv battery soc** | ***BMSPackSOCDsp*** CAN signal of SOC data from HCU ECU. In 0.1bit without offset. | **10** | **0 ~ 1024** |
| **hv battery soc Valid** | ***BMSPackSOCDspV*** validity of CAN signal BMSPackSOC  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **soc yellow indication lamp** |  | **1** | **0 ~ 1** |
| **soc whitw indication lamp** |  | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **SOC upper percent** | ***insSOCUpperPecPrm*** The quantity of SOC percent in % as the SOC gauge’s max position in 1%/bit | **8** | **64**  **(100%)** | **0~100%** |
| **SOC lower percent** | ***insSOCLowerPecPrm*** The quantity of SOC percent in % as the SOC gauge’s min position in 1%/bit | **8** | **00**  **(0%)** | **0~100%** |
| **soc display hysteresis** | ***InsSocDisplayHysPrm*** the value of SOC, below any segment threshold, that is required to extinguish the segment after it has been illuminated, in 1%/bit | **4** | **3** | **0 ~ 15%** |
| **soc sweep enable** | ***insSocSweepPrm*** If true, the SOC sweeps from segment 1 to 8 at KL15 ON. | **1** | **1** | **0 ~ 1** |
| **soc yellow indication lamp enable** | ***insSocYelLampEnPrm*** SOC yellow indication lamp enable when TRUE. | **1** | **1** | **0 ~ 1** |
| **LOW SOC LAMP ON THRESHOLD** | ***insLowSOCOnThrePrm*** low SOC lamp on threshold, in 1%/bit | **8** | **AS24/IP34**  **B (11%)**  **AS26/EP21**  **19(25%)** | **0~100%** |
| **LOW SOC LAMP FLASH THRESHOLD** | ***insLowSOCFlashThrePrm*** low SOC lamp flash threshold, in 1%/bit | **8** | **AS24/IP34**  **6 (6%)**  **AS26/EP21**  **0A(10%)** | **0~100%** |

### Functional Description

**For AS24/IP34:**

Display is updated in interval of **tacho display update time**. And display adds or reduces one segment at most every update.

Once one segment has been illuminated, it can only be extinguished when the value of SOC falls below the segment threshold by greater than **soc display hysteresis**.

**SOC upper percent 和 SOC lower percent之间按均分差值显示；**

**For AS26/EP21:**

**1、 两段线性：**

1. **LOW SOC LAMP ON THRESHOLD ~ SOC upper percent 线性变化；**
2. **SOC LOWER percent ~ LOW SOC LAMP ON THRESHOLD线性变化；**

**2、低SOC策略和上下限值策略：**

**（1） 小于LOW SOC LAMP ON THRESHOLD 格段变红；**

**（2） 小于LOW SOC LAMP FLASH THRESHOLD格段红色闪烁；**

**（3） 高于SOC upper percent保持在最高油量显示（gauge为满格显示）；**

**（4） 小于SOC LOWER percent保持在最低油量显示（gauge为空）**；

**3、** **LOW SOC LAMP ON THRESHOLD在UI上对应gauge中的最下方一格上边缘的电量百分比！**

### Functional Behaviour

**KL.30 & KL.R**

The function is not active.

**KL.15 & KL.50**

The function is active.

# Warnings with Telltales/Symbols in LCD

Warnings that are supported by tell-tales shall operate in the following manner:

1. The tell-tale shall be illuminated whenever the input conditions are ‘TRUE’.
2. If configured to do so in E2PROM, an echo message is displayed in the TFT display for a time also configurable in E2PROM.
3. Should multiple warnings exist, they are to be displayed in the order that the events occurred.
4. ~~The echo message for each warning fills the ‘Main Zone’ of the display.~~
5. ~~The echo message for each warning is displayed once only unless it is a ‘repeat-on-shutdown’ message, in which case it is displayed for a second time at KL15 off.~~
6. Echo messages **and telltale** are prevented from being displayed until ‘**ECHO MESSAGE INHIBIT PERIOD**’ after KL15 On **except READY telltale.**
7. ~~In general warnings with tell-tales do not have static messages; the exception is PAB and SRS lamp fail warnings.~~
8. If configured to do so in E2PROM, a single audible warning shall accompany the echo message.
9. ~~To reduce the annoyance of repetitive fault events, the number of gongs for each warning shall be limited to 10 during each ignition cycle.~~
10. Telltales that are required to flash at the same frequency as others must have their flashes synchronised, i.e Low Fuel, High Temp and Seat Belt.
11. ~~Tell-tales that can be dimmed should be illuminated at their daytime level during the lampcheck sequence.~~
12. ~~Echo messages are normally displayed for~~ **~~ECHO MESSAGE DISPLAY TIME~~**~~, however ‘instant’ messages which the driver has direct control of are cancelled immediately that their input conditions cease to be true. The following are ‘Instant’ tell-tale echo messages:~~

* ~~Cruise Standby and Cruise Active~~
* ~~DSC off~~
* ~~TC off~~
* ~~Main beam on~~
* ~~Seatbelt Unfastened (Driver && Passenger)~~
* ~~TCCM active(TCCM status echo message)~~

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Telltale Name** | **Colour** | **Symbol** | **Dimming Strategy** | **LED**  **/Display in LCD** | **Notes** |
| 1 | Cruise control | Yellow/Green |  | Y | LCD |  |
| 2 | Engine Coolant Temperature Warning | Red |  |  | LCD |  |
| 3 | Drive by Wire Warning | Yellow |  |  | LCD |  |
| 4 | Malfunction Indicator Lamp Warning | Yellow |  |  | LCD |  |
| 5 | Alternator Charging Fault Warning | Red |  |  | LCD |  |
| ~~6~~ | ~~Stop Start State Indication~~ | ~~Green~~ |  | ~~Y~~ | LCD |  |
| 7 | Low Oil Pressure | Red |  |  | LCD |  |
| 8 | TPMS Fault&& Tyre Low Warning | Yellow |  |  | LCD |  |
| ~~9~~ | ~~Stop Start Fault Warning~~ | ~~Yellow~~ |  |  | LCD |  |
| 10 | EPS Fault && SAS Fault Warning && ESCL Warning | Yellow/Red |  |  | LCD |  |
| 11 | ABS fault warning | Yellow |  |  | LCD |  |
| 12 | Driver and passenger Seatbelt unfastened warning | Red |  |  | LCD |  |
| 13 | SRS fault warning | Red |  |  | LCD |  |
| 14 | Main beam on indication | Blue |  | Y | LCD |  |
| 15 | Left direction indicator on warning | Green |  |  | LCD |  |
| 16 | Right direction indicator on warning | Green |  |  | LCD |  |
| 17 | EPB status && Autohold indication | Red/Green |  |  | LCD |  |
| 18 | EPB fault warning | Yellow |  |  | LCD |  |
| 19 | IMMO fail && Key battery low && Alarm indication | Red |  |  | LCD |  |
| 20 | SCS active&&fault | Yellow |  |  | LCD |  |
| 21 | SCS Off warning | Yellow |  | Y | LCD |  |
| 22 | Brake System Warning/Ibooster wanring | Red/Yellow |  |  | LCD |  |
| 23 | Low fuel level warning | Yellow |  |  | LCD |  |
| ~~24~~ | ~~Eco Indication~~ | ~~Green~~ |  | ~~Y~~ | LCD |  |
| 25 | Low beam, dipped beam Indication | Yellow/Green |  | Y | LCD |  |
| 26 | TCCM active/fault warning | Yellow/Green |  |  | LCD |  |
| 27 | HDC Active/Fault | Yellow/Green |  |  | LCD | The symbol styling maybe need be changed. |
| 28 | Rear fog warning | Yellow |  | Y | LCD |  |
| 29 | Front Fog Warning | Green |  | Y | LCD |  |
| 30 | Lights on Warning (Sidelights) | Green |  | Y | LCD |  |
| ~~31~~ | ~~Gear overheat warning~~ | ~~Red/Yellow~~ |  |  | LCD | ~~Only for DCT 250~~ |
| ~~32~~ | Plug In Charging Status | Yellow |  |  | LCD | Outer Hardwire Control |
| ~~33~~ | Charger Connection Indication | Red |  |  | LCD | Outer Hardwire Control |
| ~~34~~ | Hybrid System Fault Warning | Red |  |  | LCD |  |
| ~~35~~ | Motor Overheating Warning | Red |  |  | LCD |  |
| ~~36~~ | HV Battery Fault Warning | Red |  |  | LCD |  |
| ~~37~~ | HV Battery Shut Off Warning | Yellow |  |  | LCD |  |
| ~~38~~ | Low SOC Warning | Yellow |  |  | LCD |  |
| ~~39~~ | READY Indication | Green |  |  | LCD |  |

## Lamp Check Synchronisation – replaced by the welcome animation

The function is replaced by the welcome animation.

See HMI Specification.

## Cruise Control & ASL

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| CC:√  ASL:√ | CC:√  ASL: X | CC:√  ASL:√ | CC:√  ASL: X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **cruise Active** | ***EPTCCAH*** CAN signal from EMS for cruise control active status  0 = False, 1 = True. | **1** | **0 ~ 1** |
| **cruise Standby** | ***EPTCCEnbd*** CAN signal from EMS for cruise control standby status  0 = False, 1 = True. | **1** | **0 ~ 1** |
| **cruise fault** | ***EPTCCFltPrst*** CAN signal from EMS for cruise control fault status 0 = False, 1 = True. | **1** | **0 ~ 1** |
| **Cruise/ASL Target Speed** | ***EPTCCTrgtSpd*** CAN signal from HCU for cruise control target speed in units of 1/16 (km/h or mph); | **12** | **0 ~ 4095** |
| **lamp check status** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |
| **displayed speed** | Internal signal considering **cORRECTED SPEED** x **units correction factor** and current selected units based on CAN signal. | **8** | **0 ~ 255** |
| **ASL STatus** | ***EPTASLSts*** CAN signal from EMS for ASL status: 0 = Off, 1 = Active (Limiting), 2 = Standby, 3 =Entry conditions incorrect, 4 = Active (Overspeed), 5 = Fault, 6 & 7 = n/a. | **3** | **0 ~ 5** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **cruise Active Lamp (GREEN)** | Illuminate the green Cruise Active Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **cruise fault Lamp (Yellow)** | Illuminate the yellow Cruise Fault Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **cruise standby Lamp (YELLOW)** | Illuminate the yellow Cruise Standby Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **~~cruise Active echo message~~** | ~~Warning in LCD when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **cruise standby echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **cruise Fault echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **ASL system yellow lamp** | Illuminate the yellow ASL Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **ASL system green lamp** | Illuminate the green ASL Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **ASL system Fault message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **asl display target speed** | Value of speed limit to be displayed in LCD in current selected units, if ASL is enabled. | **8** | **0 ~ 255** |
| **asl audible warning** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **cruise Active Lamp (green) enable** | ***insCruiseActLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **cruise standby Lamp (yellow) enable** | ***insCruiseStbyEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **cruise Active Echo Message enable** | ***insCruiseActEchoMesEnPrm*** Echo message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **cruise standby Echo Message enable** | ***insCruiseStbyEchoMesEnPrm*** Echo message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **cruise fault Echo Message enable** | ***insCruiseFaultEchoMesEnPrm*** Echo message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~cruise Lamp check enable~~** | ***~~insCruiseLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **3** | **0~15** |
| **ECHO MESSAGE INHIBIT PERIOD** | ***insEchoMesInhibPeriodPrm*** The duration, in seconds, for which the echo messages are inhibited from being displayed in the LCD.  Notes: except SRS and PAB related, which are inhibited by special parameter. | **4** | **6**  **(6 sec)** | **0~15** |
| **Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **Adjust constant** | ***insSpeedoAdjustConstantPrm*** % adjustment of the indicated vehicle speed value. 1 bit = 0.2%, offset value is 100%.  0 ~ 127 = 100% ~ (100+25.4)%,  128 = invalid,  129 ~ 255 = (100 – 0.2)% ~ (100 - 25.4)%. | **8** | **19**  **(105%)** | **0 ~ +/- 25.4** |
| **cruise fault gong enable** | ***insCruiseFaultGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **ASL green lamp ENABLE** | ***insASLActiveLampEnPrm*** | **1** | **1** | **0 ~ 1** |
| **ASL green lamp flash enable** | ***insASLActiveLampFlashEnPrm*** | **1** | **1** | **0 ~ 1** |
| **ASL FAULT MESSAGE ENABLE** | ***insASLFaultMesEnPrm*** The ASL Fault message is enabled when “TRUE‟. | **1** | **1** | **0 ~ 1** |
| **ASL yellow lamp enbale** | ***insASLStandbyLampEnPrm*** | **1** | **1** | **0 ~ 1** |
| **asl yellow lamp flash enable** | ***insASLStandbyLampFlashEnPrm*** | **1** | **1** | **0 ~ 1** |
| **ASL AUDIBLE WARNING GONG1 ENABLE** | ***insASLAudWEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| --- | --- | --- | --- | --- |
| **speed signal Correction FActor** | Correction factor, in 0.1% inc of input speed signal calculated from the ABS and actual tyre rolling circumferences. (1000 = 100% = no correction) | **16** | **64** | **1 ~ 200%** |
| **cORRECTED SPEED** | Speed calculated from the **Vehicle Speed, speed signal Error** and **Adjust constsant** | **8** | **00** | **0 ~ 255** |

### Functional Description

The **Cruise lamp** is used to indicate to the driver the status of the Cruise Control System. This is a bi-coloured warning lamp where yellow is the **cruise standby Lamp** and green is **cruise Active Lamp**. The **cruise Active echo message, cruise fault echo message** and **cruise standby echo message** are used to emphasise the state of the cruise control system.

As this warning may be illuminated under normal conditions at night, its illumination is fed from a PWM controlled supply, which reduces the brightness to a value given by a CAN signal, if the side lights are on.

The **cruise standby echo message** informs the driver that the cruise control system is in standby and that the system is ready to be made active/set.

The **cruise Active echo message** informs the driver that the cruise control system is set and displays the target speed that the cruise control system will try to maintain.

The target speed is displayed in the appropriate vehicle units. Since the target speed that is published by the EMS originates from the ABS/DSC vehicle speed signal, the cluster must perform the same mathematical correction that is performed by the speedometer on the vehicle speed signal. This is with the exception of ‘units’ correction, this being performed by the EMS to enable the driver of a km/h vehicle to increment in units of km/h and the driver of a mph vehicle to increment in units of mph. If this correction to the target speed was not implemented, there would be a noticeable discrepancy between the displayed speed in the speedometer and the CRUISE/ASL TARGET SPEED.

In the event that the EMS detects a fault with the Cruise Control system, the **cruise Active Lamp** is flashed 3 times (under the control of the EMS) while the **cruise standby Lamp** is off. At this time the **cruise fault echo message** is displayed to inform the driver of the fault.

The **cruise Active echo message, cruise standby echo message** and the **cruise fault echo message** are displayed for **echo message period.**

When cruise is first activated and set, the cruise control system adopts the current vehicle speed as its target speed. This target speed can then be increased or decreased using the cruise control up and down rotary switches. If the target speed is changed, the CRUISE/ASL TARGET SPEED message be re-displayed with the new target speed. The cluster must monitor the value of the target speed and update the cruise active echo message with the latest target speed. ~~The cluster should display the~~ **~~cruise Active echo message~~** ~~with the current target speed for~~ **~~echo message period~~** ~~after the target speed is set and for~~ **~~echo message period~~** ~~after the vehicle has achieved its target speed, either rising or falling, with a tolerance of +/- 2 km/h or mph (dependant upon speed units selected).~~

If during cruise active, cruise is disabled, (for example by pressing the brake); the previously set target speed is retained for future use by the EMS.

Attention:when the IPK get the value of Target speed from EMS,the IPK first need multiply it with ***insSpeedoAdjustConstantPrm***,and this value maybe a numerical with decimal,so here, IPK have to deal with it before use it to display,and the way ofdata processing  according to the last decision with EMS is round it by ignore all decimal directly.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cruise Active Lamp (GREEN)**  **on** | if | **(Cluster KL15 status && cruise Active Lamp (GREEN) enable && Cruise Standby && cruise Active && cruise fault == 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cruise fault Lamp (Yellow)**  **Flash at 0.5Hz; 1 sec off, 1 sec on** | if | **(Cluster KL15 status && cruise standby Lamp (yellow) enable && cruise fault)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cruise standby Lamp (YELLOW)** | if | **(Cluster KL15 status && cruise standby Lamp (YELLOW) enable && cruise standby && !cruise Active && cruise fault == 0)** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~cruise Active echo message (on)~~** | ~~if~~ | **~~(Cluster KL15 status && cruise Active Lamp (GREEN) enable && cruise Active Echo Message enable && cruise Active && Cruise Standby && cruise fault == 0)~~** |

~~The display CC target Speed = [CRUISE/ASL TARGET SPEED X ADJUST CONSTANT ] ( 取整)~~

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~cruise Active echo message (off)~~** | ~~if~~ | **~~(!cruise Active Lamp) or~~**  **~~!cruise Active Echo Message enable or~~**  **~~target speed = (displayed speed+/-2 kmh/mph)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cruise standby echo message** | if | **(Cluster KL15 status && cruise standby Lamp (YELLOW) enable && cruise standby && !cruise Active && cruise fault ==0) && cruise standby Echo Message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **cruise fault echo message (on)** | if | **(Cluster KL15 status && cruise Active Lamp (GREEN) enable && cruise fault Echo Message enable && cruise fault)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **cruise fault echo message && cruise fault gong enable** |

### Functional Description: Active Speed Limiter

The Active Speed Limiter (ASL) system is an extension of the Cruise Control system that when active, automatically restricts the speed of the vehicle to that of the set-point determined by the driver. ASL can only be active when Cruise Control is not active.

An audible warning is used to emphasise the **ASL fault**  warning to the driver, if configured to do so by **ASL AUDIBLE WARNING GONG1 ENABLE** being TRUE.

When ASL is in states 1, 2, 3, or 4 and ASL SET POINT > 10 km/h or mile/h, the value of the set-point (for example ,Max:120 ) is displayed in the LCD.(refer to UE, it is at the same position with CC.)

If the driver attempts to activate the ASL while the set-point is not valid (state 3), then the displayed set-point digits will be flashed on and off at a rate of 1Hz for a minimum period of **ECHO MESSAGE PERIOD**. Please note that state 3 will only be active momentarily before moving to state 2 but the flashing of the set-point must continue until it has been displayed for **ECHO MESSAGE PERIOD**.

The ASL set-point is transmitted to the cluster in the signal **ASL Set point** and is displayed in the appropriate vehicle units i.e. the same as the trip/odo.

The display ASL target Speed = [**CRUISE/ASL TARGET SPEED X ADJUST CONSTANT** ] (取整).

Similar to the CRUISE/ASL TARGET SPEED, since the target speed that is published by the EMS originates from the ABS/DSC vehicle speed signal, the cluster must perform the same mathematical correction that is performed by the speedometer on the vehicle speed signal. This is with the exception of ‘units’ correction, this being performed by the EMS to enable the driver of a km/h vehicle to increment in units of km/h and the driver of a mph vehicle to increment in units of mph. If this correction to the target speed was not implemented, there would be a noticeable discrepancy between the displayed speed in the speedometer and the CRUISE/ASL TARGET SPEED.

If the transmitted value is zero then the target speed should not be displayed.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL SYSTEM**  **YELLOW LAMP ON** | if | **(CLUSTER KL15 STATUS && ASL SYSTEM YELLOW LAMP ON ENABLE && (ASL STATUS==2 /3 ))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL SYSTEM YELLOW LAMP FLASH (0.5HZ)** | if | **(CLUSTER KL15 STATUS && ASL SYSTEM YELLOW LAMP FLASH ENABLE && ASL STATUS==5 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL SYSTEM GREEN LAMP ON** | if | **(CLUSTER KL15 STATUS && ASL SPEED LAMP ENABLE && (ASL**  **STATUS==1 ) && ASL SET POINT!=0 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL SYSTEM GREEN LAMP FLASH (0.5HZ)** | if | **(CLUSTER KL15 STATUS && ASL GREEN LAMP ENABLE && ASL STATUS==4 && ASL SET POINT!=0 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL SYSTEM FAULT MESSAGE** | if | **(CLUSTER KL15 STATUS && ASL FAULT MESSAGE ENABLE && ASL STATUS==5 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ASL AUDIBLE WARNING GONG1** | if | **(Cluster KL15 status && ASL AUDIBLE WARNING GONG1 ENABLE && (ASL SYSTEM GREEN LAMP FLASH OR ASL SYSTEM FAULT MESSAGE))** |

### Functional Behaviour

**KL.30**

The outputs **cruise Active Lamp,** **cruise Active echo message, cruise standby Lamp,** **cruise standby echo message**, **cruise fault echo message** are off.

The outputs **ASL Active lamp, ASL standby lamp** and **ASL audible warning** are off.

**KL.R**

The outputs **cruise Active Lamp,** **cruise Active echo message, cruise standby Lamp,** **cruise standby echo message** and **cruise fault echo message** are off.

The outputs **ASL Active lamp, ASL standby lamp** and **ASL audible warning** are off.

**KL.15 (Cluster KL15 status) && KL50**

The inputs are monitored and the status of the outputs **cruise Active Lamp,** **cruise Active echo message, cruise standby Lamp,** **cruise standby echo message** and **cruise fault echo message** are determined, and the CRUISE/ASL TARGET SPEED determined.

The inputs are monitored and the status of the outputs **ASL Active lamp, ASL standby lamp** and **ASL audible warning** are determined; The ASL set point is displayed.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:

CC:(yellow and green); ASL: (yellow and green).

### LCD Messages

For detail refer to UE.

## High Engine Coolant Temperature

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | × | × |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **engine COOLANT TEMPERATURE** | ***EnClntTem*** CAN signals from EMS for the temperature in ºC of the engine coolant transmitted. 1 deg / bit with -40 deg offset. | **8** | **- 40 to +215 ºC** |
| **engine COOLANT TEMPERATURE validity** | ***EnClntTemV*** CAN signals from EMS to indicate **engine COOLANT TEMPERATURE** signal validity.  0= valid;  1= invalid. | **1** | **0 ~ 1** |
| **high Temp warning status** | Internal signal that indicates High Temperature status for use by message display and warning lamp functions.  00 = Temp OK.  01 = Temp Low  10 = Temp High.  11 = Temp Critical. | **2** | **0 ~ 2** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **high coolant temp Lamp** | Illuminate the High Coolant Temp Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **high coolant temp echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **~~coolant low echo message~~** | ~~Warning in LCD when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **high temp**  **threshold** | ***insTempHighThresPrm*** The engine  coolant temperature, in ºC, above which the high temp warning lamp is illuminated.  0.75deg / bit with -48 deg offset. | **8** | **E0** |  |
| **CRITICAL TEMP**  **THRESHOLD** | ***insTempCriticalThresPrm*** The engine coolant temperature, in ºC, above which the high temp warning lamp is flashed. 0.75deg / bit with -48 deg offset. | **8** | **E6** |  |
| **LOW TEMP**  **THRESHOLD** | ***insTempLowThresPrm*** The engine  coolant temperature, in ºC, at or below  which the low temp warning lamp is illuminated. 0.75deg / bit with -48 deg  offset | **8** | **82** |  |
| **SOAK BACK**  **DELAY** | ***insTempSoakDelayDurationPrm*** The  period of time, in seconds, after the  READY SYSTEM FLAG is ‘TRUE’ and before the engine coolant temperature warning lamp can be illuminated / flashed in red | **8** | **14** |  |
| **TEMP WARNING**  **HYSTERESIS** | ***insTempWarnHysPrm*** The required  temperature, in ºC, below/above a warning threshold, in order to cancel the warning, in unit of 0.75deg / bit | **4** | **4**  **(3℃)** |  |
| **high coolant temp lamp enable** | ***insHighTempEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **coolant low lamp enable** | ***insCoolantLowLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **high coolant temp echo message enable** | ***insHighTempEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **high coolant temp gong enable** | ***insHighTempGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **high coolant temp Lamp** is used to indicate to the driver that the temperature of the engine coolant fluid is too high. The **high coolant temp Lamp** has two thresholds for lamp on and lamp flash. The **high coolant temp echo message** and **Audible warning gong1** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

When **high coolant temp warning Status** changes from Temp OK (00) to Temp High (10) the tell-tale is illuminated constantly and, if enabled to do so, the echo message is displayed and a gong sounded. Should the temperature continue to rise and **high coolant temp warning Status** change to Temp Critical (11), the lamp is flashed and the echo message and gong are repeated (if enabled).

If, however, **high coolant temp warning Status** is Temp Critical (11) and the temperature decreases so that **high coolant temp warning Status** is Temp High (10), the tell-tale changes from flashing to constant but the echo message and gong are suppressed (if enabled).

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TEMP WARNINGSTATUS = 00**  **(OK)** | if | **CLUSTER KL15 STATUS & (LOW TEMP THRESHOLD <TEMP <**  **(HIGH TEMP THRESHOLD)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TEMP WARNINGSTATUS = 01**  **(LOW)** | if | **CLUSTER KL15 STATUS & (TEMP <= LOW TEMP THRESHOLD)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TEMP WARNINGSTATUS =10**  **(HIGH)** | if | **CLUSTER KL15 STATUS & (HIGH TEMP THRESHOLD <=TEMP<**  **CRITICAL TEMP THRESHOLD)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TEMP WARNINGSTATUS =11**  **(CRITICAL)** | if | **CLUSTER KL15 STATUS & (TEMP >= CRITCAL TEMP THRESHOLD)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **COOLANT TEMP LAMP BLUE**  **(ON)** | if | **(CLUSTER KL15 STATUS & LOW COOLANT TEMP LAMP ENABLE & COOLANT TEMP WARNING STATUS = 01 )**  **OR**  **(CLUSTER KL15 STATUS & LOW TEMP LAMP ENABLE( BLUE) & COOLANT TEMP LAMP CHECK ENABLE & LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **COOLANT TEMP LAMP RED**  **(ON)** | if | **(CLUSTER KL15 STATUS & HIGH COOLANT TEMP LAMP ENABLE & COOLANT TEMP WARNING STATUS = 10& (! SOAK BACK FLAG) )**  **OR**  **(CLUSTER KL15 STATUS & HIGH TEMP LAMP ENABLE(RED)& COOLANT TEMP**  **LAMP CHECK ENABLE & LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HIGH COOLANT TEMP LAMP**  **RED (FLASH AT 0.5HZ; 1 SEC**  **ON, 1 SEC OFF )** | if | **(CLUSTER KL15 STATUS & HIGH COOLANT TEMP LAMP ENABLE(RED) &**  **COOLANT TEMP WARNING STATUS = 11& (! SOAK BACK FLAG) )** |

**Illustration of High Coolant Temperature Lamp Flash.**

**Off**

**Period = 2 sec**

**Off time = 1 sec**

**On time = 1 sec**

**On**

**Note: That the OFF half cycle is to be first.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **high coolant temp Message** | if | **(Cluster KL15 status & high coolant temp Status = 10 & ! SOAK BACK FLAG) & high coolant temp echo message enable)**  **or**  **(Cluster KL15 status & high coolant temp Status = 11 & ! SOAK BACK FLAG) & high coolant temp echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AUDIBLE WARNING GONG1** | if | **CLUSTER KL15 STATUS & high coolant temp Message &**  **HIGH COOLANT TEMP GONG ENABLE** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SOAK BACK FLAG** | if | **CLUSTER KL15 STATUS & (ENGINE RUNNING FLAG** <**= SOAK BACK DELAY)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ENGINE RUNNING FLAG (SET)** | if | **(ENGINE SPEED > 400 RPM) FOR TIME > ENGINE RUNNING FLAG TIME**  **OR**  ***EnSpd*** **CAN TIME-OUT (**from 3 sec after KL15 on**)** |
| **ENGINE RUNNING FLAG (RESET)** | IF | **(ENGINE SPEED < (400 RPM - ENGINE RUNNING FLAG HYSTERESIS) && (!*EnSpd*** **CAN TIME-OUT))**  **OR**  **!CLUSTER KL15** |

### Functional Behaviour

**KL.30**

The outputs **high coolant temp Lamp,** **high coolant temp echo message, coolant low echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **high coolant temp Lamp,** **high coolant temp echo MESSAGE, coolant low echo message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **high coolant temp Lamp,** **high coolant temp echo message** **, coolant low echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **high coolant temp Lamp,** **high coolant temp echo message** **, coolant low echo message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE

## Drive By Wire warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | × | × |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **drive by wire status** | ***EnNonEmsnRltdMalfA*** CAN signal from EMS that the EMS has a non-emissions related fault when ‘TRUE’. | **1** | **0 ~ 1** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **drive by wire Lamp** | Illuminate the DBW Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **drive by wire echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **drive by wire lamp enable** | ***insDBWLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **drive by wire echo message enable** | ***insDBWEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **drive by wire gong enable** | ***insDBWGongEnPrm*** Audible warning enabled when True. | **1** | **1** | **0 ~ 1** |
| **drive by wire static warning enable** | ***insDBWSWarningEnPrm*** static warning enabled when True. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **drive by wire LAMP** | if | **(Cluster KL15 status && drive by wire lamp enable && drive by wire Status )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **drive by wire Message** | if | **(Cluster KL15 status && drive by wire Status && READY SYSTEM FLAG && drive by wire echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(drive by wire echo Message && drive by wire gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **drive by wire Lamp, Audible warning gong1** and the **drive by wire echo message** are off.

**KL.R**

The outputs **drive by wire Lamp, Audible warning gong1** and the **drive by wire echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **drive by wire Lamp, Audible warning gong1** and the **drive by wire echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **drive by wire Lamp, Audible warning gong1** and the **drive by wire echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE.

## Malfunction Indicator Lamp warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | × | × |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **mil active status** | ***EnEmsnRltdMalfA*** CAN signal from EMS ECU to indicate whether MIL request is active:  $1=True;  $0=False | **1** | **0 ~ 1** |
| **MIL Warning status** | ***EnEmsnRltdMalfIndReq*** CAN signal from EMS ECU that which indication request exists:  $0=Continuous Indication  $1=No Indication  $2=Flashing 1 Hertz Indication  $3=Flashing 2 Hertz Indication  $4=Flashing 0.5 Hertz Indication | **3** | **0 ~ 7** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **MIL Lamp** | Illuminate the MIL Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **MIL echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **MIL lamp enable** | ***insMILLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~MIL lamp check enable~~** | ***~~insMILLampCheckEnPrm~~*** ~~Lamp check enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **MIL echo message enable** | ***insMILEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **mil gong enable** | ***insMILGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MIL LAMP**  **(ON)** | if | **(Cluster KL15 status && MIL lamp enable && (mil active status = =1) && (MIL Warning status == 0) )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MIL LAMP**  **(flash)**  **at 1 hz; 0.5 sec off, 0.5 sec on** | if | **(Cluster KL15 status && MIL lamp enable && (mil active status = =1) && (MIL Warning status = =2) )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MIL LAMP**  **(flash)**  **at 2 hz; 0.25 sec off, 0.25 sec on** | if | **(Cluster KL15 status && MIL lamp enable && (mil active status = =1) && (MIL Warning status = =3) )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MIL LAMP**  **(flash)**  **at 0.5 hz; 1 sec off, 1 sec on** | if | **(Cluster KL15 status && MIL lamp enable && (mil active status == 1) && (MIL Warning status = =4) )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MIL echo Message** | if | **(Cluster KL15 status && (mil active status == 1) && (MIL Warning status= =0) && system ready flag for 2s && MIL echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(MIL echo Message && mil gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **MIL Lamp, Audible warning gong1** and the **MIL echo message** are off.

**KL.R**

The outputs **MIL Lamp, Audible warning gong1** and the **MIL echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **MIL Lamp, Audible warning gong1** and the **MIL echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **MIL Lamp, Audible warning gong1** and the **MIL echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE.

## DCDC Charging warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **DCDC CHARGER STATUS** | ***HVDCDCSta*** CAN signals from HCU for battery charge status.  0x0=Standby;  0x1=Reserved;  0x2=Buck;  0x3=DC Link Discharge;  0x4=Reserved;  0x5=Failure;  0x6=Reserved;  0x7=Reserved. | **3** | **0 ~ 7** |
| **Load Shed status** | ***VehLdShedLvl*** CAN signal to indicate the status of Vehicle Load shed:  $0=No Power Risk  $1=Low Power Risk  $2=Middle Power Risk  $3=High Power Risk  $4=PMDC-broken  $5 ~ $7=reserved | **3** | **0 ~ 7** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **SYSTEM READY FALG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ALTERNATOR CHARGE Lamp** | Illuminate the Alternator Charge Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **ALTERNATOR CHARGE echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ALTERNATOR CHARGE lamp enable** | ***insAltChLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~ALTERNATOR CHARGE lamp check enable~~** | ***~~insAltChLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **ALTERNATOR CHARGE echo message enable** | ***insAltChEchoMesPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **ALTERNATOR CHARGE gong enable** | ***insAltChGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **load shed echo message enable** | ***insLoadShedMesPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **charging fault echo message enable** | ***insChrFltMesPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **ALTERNATOR CHARGE Lamp** is used to indicate to the driver that the charging output from the alternator to the battery is low. The **ALTERNATOR CHARGE echo message** and **Audible warning gong1** are used to emphasise the fault to the driver. The message is displayed in the dot-matrix LCD for **echo message period**. The echo message is inhibited until the **SYSTEM READY** is TRUE. The status of the echo message prior to**SYSTEM READY**being TRUE is ignored, and **not** saved or stored to be displayed after the **SYSTEM READY**becomes TRUE. The echo message is only displayed after this period if the conditions are still valid.

The **ALTERNATOR CHARGE Lamp** is illuminated during the start-up lamp check sequence if **ALTERNATOR CHARGE check enable** and **lamp check status** are both ‘TRUE’. It remains illuminated until **lamp check status** becomes ‘FALSE”. Note however, that even if the lamp check feature for this is not enabled, the lamp will be illuminated at **Cluster KL15 status** ON by virtue of the engine not running and thus the alternator output being 0 volts.

If signalor **DCDC CHARGER STATUS** or **PMU\_lOADSHELD status** is timeout, then should the **ALTERNATOR CHARGE Lamp** be illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ALTERNATOR CHARGE LAMP** | if | **(Cluster KL15 status** **& ALTERNATOR CHARGE lamp enable &（DCDC CHARGER STATUS ==0/5 or PMU\_lOADSHELD status==4） ~~or~~**  **~~(Cluster KL15 status~~****~~& ALTERNATOR CHARGE lamp enable & ALTERNATOR CHARGE lamp check enable & lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ALTERNATOR CHARGE Message** | if | **(Cluster KL15 status** **& (dcdccharger status==5)& SYSTEM READY & ALTERNATOR CHARGE echo message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **load shed level-2 echo message** | if | **(load shed echo message enable && Load Shed status = =2)** |

Text 更新：“12伏电池电量低 限制部分用电器功能”” Power Low Partial Device Limited”

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **load shed level-3 echo message** | if | **(load shed echo message enable && Load Shed status = =3)** |

Text 更新：“ 12伏电池电量低 请启动车辆！” Power Low Please Start Vehicle”

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~load shed level-4 echo message~~** | ~~if~~ | **~~(Cluster KL15 status && load shed echo message enable && Load Shed status = =4 && !system ready flag)~~** |

~~新增Text：“12伏电池电量低 请启动车辆！”” Power Low Please Start Vehicle” 伴随Repeat Gong；~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **12V charging system fault** | if | **(Cluster KL15 status && charging fault echo message enable && Load Shed status = =4 && system ready flag)** |

新增Text：” 12伏~~电池~~充电系统故障””12V Battery Charging System Fault” 伴随Repeat Gong；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(ALTERNATOR CHARGE Message && ALTERNATOR CHARGE gong enable) or**  **((load shed level-2 echo message**  **or**  **load shed level-3 echo message) && load shed gong enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **repeat gong** | if | **~~load shed level-4 echo message or~~  12V charging system fault & ALTERNATOR CHARGE gong enable** |

### Functional Behaviour

**KL.30**

The outputs **ALTERNATOR CHARGE Lamp, Audible warning gong1** and the **ALTERNATOR CHARGE echo message** are off.

**KL.R**

The outputs **ALTERNATOR CHARGE Lamp, Audible warning gong1** and the **ALTERNATOR CHARGE echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **ALTERNATOR CHARGE Lamp, Audible warning gong1** and the **ALTERNATOR CHARGE echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **ALTERNATOR CHARGE Lamp, Audible warning gong1** and the **ALTERNATOR CHARGE echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Dot Matrix Messages

For detail refer to UE.

## Low Oil Pressure warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | × | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **OIL PRESSURE status** | ***EnOilPrsLowIO*** CAN signal from SMU that the oil pressure is too low when ‘TRUE’. | **1** | **0 ~ 1** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **engine running flag** | Internal signal from tachometer function that is ‘TRUE’ when **ENGINE speed** > 400 rpm for > ***insEngRunTimePrm***. | **1** | **0 ~ 1** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **OIL PRESSURE Lamp** | Illuminate the Oil Pressure Warning Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **OIL PRESSURE echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Oil pressure lamp enable** | ***insOilPresLampEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **~~Oil pressure lamp check enable~~** | ***~~insOilPresLampCheckEnPrm~~*** ~~Lamp enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **Oil pressure echo message enable** | ***insOilPresEchoMesPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **oil pressure gong enable** | ***insOilPresGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Internal signal

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **oil pressure status before start/stop active** | Record the latest oil pressure status before start/stop system is active. | **1** | **0 ~ 1** |

### Functional Description

The **OIL PRESSURE Lamp** is used to indicate to the driver that the engine oil pressure is too low. The **OIL PRESSURE echo message** and **Audible warning gong1** are used to emphasise the fault to the driver. The message is displayed in the dot-matrix LCD for **echo message period**. The echo message is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being TRUE is ignored, and **not** saved or stored to be displayed after the **READY SYSTEM FLAG** becomes TRUE. The echo message is only displayed after this period if the conditions are still valid. The **OIL PRESSURE Lamp** is illuminated during the start-up lamp check sequence if **Oil pressure lamp check enable** and **lamp check status** are both ‘TRUE’. It remains illuminated until **lamp check status** becomes ‘FALSE”

~~In specially, if it is a stop start vehicle, because engine often enter into stop start mode (engine speed is very low or zero) under EMS’s control, the oil pressure lamp will be illuminated without any filters. It will arouse user’s unease, so we apply the following strategy:~~

~~If the oil pressure lamp has been illuminated before stop start system is active (~~**~~Stop start status =0, 1, 5~~**~~), the lamp should be on continually.~~

~~If the oil pressure lamp has been off before stop start system is active (~~**~~Stop start status =0, 1, 5~~**~~), the lamp should be off continually.~~

In specially, since the **READY SYSTEM FLAG** puts to 0 before the **OIL PRESSURE STATUS** puts to 0, which may cause that the LED may flash once when KL15 off. So here needs a time delay of **2 seconds** for this LED to shield this bug.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **OIL PRESSURE LAMP** | if | **(Cluster KL15 status & Oil pressure lamp enable & OIL PRESSURE Status &READY SYSTEM FLAG & engine running flag ) for 2s or**  **(Cluster KL15 status & Oil pressure lamp enable & OIL PRESSURE Status & !READY SYSTEM FLAG) for 2s OR**  **~~(Cluster KL15 status & Oil pressure lamp enable & oil pressure lamp check enable & lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **OIL PRESSURE Message** | if | **(OIL PRESSURE LAMP ~~& READY SYSTEM FLAG~~ & engine running flag &Oil pressure echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **OIL PRESSURE Message & OIL PRESSURE gong enable** |

### Functional Behaviour

**KL.30**

The outputs **OIL PRESSURE Lamp, Audible warning gong1** and the **OIL PRESSURE echo message** are off.

**KL.R**

The outputs **OIL PRESSURE Lamp, Audible warning gong1** and the **OIL PRESSURE echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **OIL PRESSURE Lamp, Audible warning gong1** and the **OIL PRESSURE echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **OIL PRESSURE Lamp, Audible warning gong1** and the **OIL PRESSURE echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Dot Matrix Message

For detail refer to UE.

## EPS Fault & SAS Fault & SAS Uncalibration & ESCLwarning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **EpS FAULT status** | ***EPSFlrSts*** CAN signal from EPS ECU that indicates the EPS’s status  0x00 = No fault;  0x01 = general fault;  0x10 = serious fault;  0x11 = Reserve. | **2** | **0 ~ 3** |
| **SAS fault status** | ***StrgWhlAngSnsrFlt*** CAN signal from SAS ECU that the SAS has a fault when ‘TRUE’.  $0= FALSE  $1= TRUE | **1** | **0 ~ 1** |
| **Sas calibration status** | ***StrgWhlAngSnsrCalSts*** CAN signal from SAS ECU that the current SAS calibration status:  0x0 = Unkonw  0x1 = Estimated  0x2 = Calibrated  0x3 = Unkonw | **2** | **0 ~ 3** |
| **ESCL fault status**  **(only IP34, EP21 tbd)** | ***ESCLFlrIndCmd*** CAN signal from ESCL ECU that the current ESCL status:  0x0= No defect failure detected  0x1= Defect failure detected  0x2= Steering wheel is blocked  0x3=Functional limitation failure detected | **2** | **0 ~ 3** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **steering wheel Lamp (red)** | Illuminate the Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **steering wheel lamp (yellow)** | Illuminate the Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **EPS fault level 1 echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **eps fault level 2 echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **SAS fault echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **sas uncalibration echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **escl Fault level 1 echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **escl Fault level 2 echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **escl Fault level 3 echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **EPS lamp enable** | ***insEPSLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~EPS lamp red check enable~~** | ***~~insEPSRedLampCheckEnPrm~~*** ~~Lamp check enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **~~EPS lamp yellow check enable~~** | ***~~insEPSYellLampCheckEnPrm~~*** ~~Lamp check enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **SAS lamp enable** | ***insSASLampEnPrm*** lamp enabled when ‘TRUE’ | **1** | **1** | **0 ~ 1** |
| **ESCL LAMP ENABLE** | ***insESCLLampEnPrm*** lamp enabled when ‘TRUE’ | **1** | **1** | **0 ~ 1** |
| **EPS fault level 1 echo message enable** | ***insEPSFaultL1EchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **EPS fault level 2 echo message enable** | ***insEPSFaultL2EchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **SAS fault echo message enable** | ***insSASFaultEchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **sas uncalibration message enable** | ***insSASUncalibEchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **escl fault level 1 echo message enable** | ***InsESCLFaultL1EchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **escl fault level 2 echo message enable** | ***InsESCLFaultL2EchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **escl fault level 3 echo message enable** | ***NsESCLFaultL3EchoMesEnPrm*** message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **eps gong enable** | ***insEPSGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **SAs gong enable** | ***insSASGongEnPrm*** Audible warning enabled when True. | **1** | **1** | **0 ~ 1** |
| **ESCL GONG ENABLE** | ***insESCLGongEnPrm*** Audible warning enabled when True. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **steering wheel Lamp** is used to indicate one of the following to the driver:

1. EPS system has a fault (yellow means the general fault, and the red means the serious fault)
2. SAS has a fault or uncalibration.
3. ESCL has a fault.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **steering wheel Lamp (red on)** | if | **( (Cluster KL15 status && SAS lamp enable && (SAS fault status or Sas calibration status == !2 ) && !steering wheel Lamp (red flash) ~~or~~**  **~~(Cluster KL15 status && EPS red lamp check enable && lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **steering wheel Lamp (red flash)**  **(flash at 0.5Hz; 1 sec on, 1 sec off )** | if | **(Cluster KL15 status && EPS lamp enable && EPS fault Status == 2 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **steering wheel Lamp (yellow ON)** | if | **(Cluster KL15 status && EPS lamp enable && (EPS fault Status == 1 ) && !steering wheel Lamp (red on))**  **~~or~~**  **~~(Cluster KL15 status && EPS yellow lamp check enable && lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **steering wheel Lamp (yellow FLASH)**  **(flash at 0.5Hz; 1 sec on, 1 sec off )** | if | **(Cluster KL15 status && ESCL lamp enable && (ESCL fault Status STATUS == !0 ) && !steering wheel Lamp (red on) && !steering wheel Lamp (red flash) && !steering wheel Lamp (yellow on))** |

~~Notes: During the lamp check period, if yellow lamp check and red lamp check all are valid, the warning is illuminated for the first half of the period in red and then for the second half of the period in yellow; if yellow lamp check is invalid and red lamp check is valid, the red lamp is illuminated in the whole check period; if yellow lamp check is valid and red lamp check is invalid, the yellow lamp is illuminated in the whole check period.~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **eps fault level 1 echo message**  **(yellow)** | if | **(Cluster KL15 status && EPS fault level 1 echo message enable && (eps fault status == 1 ) && READY SYSTEM FLAG )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **eps fault level 2 echo message**  **(red)** | if | **(Cluster KL15 status && EPS fault level 2 echo message enable && (eps fault status == 2 ) && READY SYSTEM FLAG )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SAS fault ECHO MESSAGE** | if | **(Cluster KL15 status && SAS fault STATUS && SAS fault echo message enable && READY SYSTEM FLAG)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SAS uncalibration ECHO MESSAGE** | if | **(Cluster KL15 status && (SAS calibration STATUS == !2 ) && SAS uncalibration echo message enable && READY SYSTEM FLAG)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **escl fault level 1 echo message**  **(yellow)** | if | **(Cluster KL15 status && ESCL fault level 1 echo message enable && (ESCL fault status ==1 ) && READY SYSTEM FLAG)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **escl fault level 2 echo message**  **(yellow)** | if | **(Cluster KL15 status && ESCL fault level 2 echo message enable && (ESCL fault status ==2 ) && READY SYSTEM FLAG )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **escl fault level 3 echo message**  **(yellow)** | if | **(Cluster KL15 status && ESCL fault level 3 echo message enable && (ESCL fault status ==3 ) && READY SYSTEM FLAG)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(EPS echo fault level 1 echo message** **&& EPS gong enable) or**  **(EPS echo fault level 2 echo message** **&& EPS gong enable) or**  **(SAS fault ECHO MESSAGE && Sas gong enable) or**  **(SAS uncalibration ECHO MESSAGE && Sas gong enable)**  **OR**  **(Cluster KL15 status && ( escl fault level 1 echo message // escl fault level 2 echo message // escl fault level 3 echo message ) && Escl gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **steering wheel Lamp (red)**, **steering wheel Lamp (yellow), Audible warning gong1, eps fault level 1 echo message, eps fault level 2 echo message, escl fault level 1 echo message, escl fault level 2 echo message, escl fault level 3 echo message**

and the **SAS fault echo message, SAS uncalibration ECHO MESSAGE** are off.

**KL.R**

The outputs **steering wheel Lamp (red)**, **steering wheel Lamp (yellow), Audible warning gong1, eps fault level 1 echo message, eps fault level 2 echo message, escl fault level 1 echo message, escl fault level 2 echo message, escl fault level 3 echo message**

and the **SAS fault echo message, SAS uncalibration ECHO MESSAGE** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **steering wheel Lamp (red), steering wheel Lamp (yellow), Audible warning gong1, eps fault level 1 echo message, eps fault level 2 echo message, escl fault level 1 echo message, escl fault level 2 echo message, escl fault level 3 echo message** and the **SAS fault echo message, SAS uncalibration ECHO MESSAGE** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **steering wheel Lamp (red), steering wheel Lamp (yellow), Audible warning gong1, eps fault level 1 echo message, eps fault level 2 echo message, escl fault level 1 echo message, escl fault level 2 echo message, escl fault level 3 echo message**and the **SAS fault echo message, SAS uncalibration ECHO MESSAGE** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is bi-color LED, red with a dominant wavelength of 630 +/- 7 nm; yellow with a dominant wavelength of 590 +/- 4 nm, and all should deliver a luminance of at least 60 cd/m2

### Messages

For detail refer to UE

## Indirect TPMS

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| **iTPMS** | **dTPMS** | | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **tpms status** | ***WhlTyreMontrSts*** CAN signal from DSC for TPMS status  $0= system OK  $1= deflation warning  $2= reset accepted  $3= invalid  $4= system fault  $5= invalid  $6= invalid  $7= TPMS not available | **3** | **0 ~ 7** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **tpms reset** | ***WhlTyreMontrSysRstReq*** CAN signal from cluster to DSC for TPMS reset.  0= False (No request)  1= True (Request) | **1** | **0 ~ 1** |
| **tpms Lamp** | Illuminate the yellow TPMS lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **tpms warn echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **tpms system Fail echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **tpms Lamp enable** | ***insTPMSFailEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **TPMS echo message enable** | ***insTPMSEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **TPMS gong enable** | ***insTPMSGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **tpms type** | ***insTPMSTypePrm***  0=no TPMS  1= indirect TPMS  2=direct TPMS  3=reserved | **2** | AS24/EP21=2, IP34=1 | **0 ~ 3** |

### Functional Description

The TPMS lampis used to indicate to the driver the status of the Tyre Pressure Monitoring System. The **tpms echo message** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

As this is a safety related system, the default value of **tpms status** is 4 i.e. should the CAN signal be missing the yellow lamp is illuminated.

The TPMS must be initialised (reset) when all 4 tyres have been inflated to their correct pressures.

This is done by navigating to the Level 1 menu using either the steering wheel switches or the trip computer switch, whichever is fitted, and selecting the TPMS Reset menu option. Once in the Level 2 TPMS Reset menu, scroll to highlight TPMS Reset and select by pressing enter (or a long press on the TC button). The cluster then sends a TPMS reset signal to the DSC ECU and waits up to 2 seconds for the response. If a “Reset accepted” signal is received, the display will show “TPMS Reset Ok” for **echo message period,** or else it will show “TPMS Reset Failed!” for the same time. When the vehicle is next driven the TPMS recalibrates itself automatically.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms Lamp**  **(ON)** | if | **((CLUSTER KL15 STATUS && TPMS LAMP ENABLE &&**  **TPMS STATUS == 1) OR**  **(TPMS STATUS = =4 for TIME > 90 SEC) ) && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms Lamp**  **(flash at 0.5 hz)** | if | **(CLUSTER KL15 STATUS && TPMS LAMP ENABLE && (TPMS STATUS == 4 for TIME <= 90 SEC) && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms warn echo message** | if | **CLUSTER KL15 STATUS && TPMS STATUS = 1 && TPMS echo message enable && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms system fail echo message** | if | **CLUSTER KL15 STATUS && TPMS STATUS = 4 && TPMS echo message enable && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TPMS Reset OK message** | if | **(tpms status == 2) && TPMS echo message enable && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TPMS Reset failed message** | if | **(t > 2 sec && tpms status != 2) && TPMS echo message enable && tpms type=1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(tpms warn echo message or tpms system fail echo message) && tpms gong enable && tpms type=1** |

### Functional Behaviour

**KL.30**

The outputs **tpms warn Lamp,** **tpms system fail Lamp,** **tpms warn echo message, tpms system fail echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **tpms warn Lamp,** **tpms system fail Lamp,** **tpms warn echo message, tpms system fail echo message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **tpms warn Lamp, tpms system fail Lamp,** **tpms warn echo message, tpms system fail echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **tpms warn Lamp, tpms system fail Lamp,** **tpms warn echo message, tpms system fail echo message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is yellow with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE

## ABS Fault warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **ABS status** | ***ABSIO*** CAN signal from ABS. The ABS system has a fault when ‘TRUE’. | **1** | **0 ~ 1** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ABS Lamp** | Illuminate the ABS Warning Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **ABS echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~ABS lamp check enable~~** | ***~~insABSLampCheckEnPrm~~*** ~~Lamp check enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **ABS Lamp enable** | ***insABSLampEnPrm*** Lamp enabled when true | **1** | **1** | **0 ~ 1** |
| **ABS echo message enable** | ***insABSEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **ABS gong enable** | ***insABSGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

As this is a safety related system, the default status of this lamp is ON i.e. should the CAN signal be missing the lamp is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ABS LAMP** | if | **(cluster kl15 status && ABS Lamp enable && ABS Status) ~~or~~**  **~~(cluster kl15 status && ABS lamp check enable && lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ABS echo Message** | if | **(cluster kl15 status && ABS Status && READY SYSTEM FLAG && ABS echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(ABS echo Message && ABS gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **ABS Lamp, ABS echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **ABS Lamp, ABS echo message** and **Audible warning gong1** are off.

**KL.15 (cluster kl15 status)**

The inputs are monitored and the status of the outputs **ABS Lamp, ABS echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **ABS Lamp, ABS echo message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## HDC Active Indication && Fault warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| × | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **hdc status** | ***HDCSysSts*** CAN signal of HDC function status from SCS ECU:  $0=Normal  $1=Enabled  $2=Active  $3=Failed  $4=Temporarily Inhibited | **3** | **0 ~ 7** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **hdc Lamp** | Illuminate the Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **hdc Fault message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **hdc lamp enable** | ***insHDCLampEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **HDC Fault message enable** | ***insHDCFaultMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **hdc Fault gong enable** | ***insHDCFaultGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **hdc Lamp** is used to indicate one of the following to the driver:

1. HDC system is active.
2. A fault exists with the HDC system.
3. HDC is inhibited.

As this is a safety related system, the default status of this is yellow lamp ON i.e. should the CAN signal be missing the yellow lamp is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hdc LAMP**  **(green)** | if | **[cluster kl15 status && hdc lamp enable &&**  **(hdc Status == 1 )]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hdc LAMP**  **(green)**  **flash at 2 hz, ; 0.25 sec off, 0.25 sec on** | if | **[cluster kl15 status && hdc lamp enable &&**  **(hdc Status == 2 )]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hdc LAMP on**  **(yellow )** | if | **[cluster kl15 status && hdc lamp enable && (hdc Status = =3)] or**  **(cluster kl15 status && hdc lamp enable && hdc red lamp check enable && lamp check status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hdc LAMP flash**  **(yellow )**  **flash at 2 hz, ; 0.25 sec off, 0.25 sec on** | if | **[cluster kl15 status && hdc lamp enable && (hdc Status == 4)]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hdc Fault message** | if | **(cluster kl15 status && READY SYSTEM FLAG && (hdc Status == 3 ) && hdc fault message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(hdc Fault message && hdc Fault gong enable)** |

### Functional Behaviour

**KL.30**

The outputs of **hdc Lamp, hdc fault message** and **AUDIBLE warning gong1** are off.

**KL.R**

The outputs of **hdc Lamp, hdc fault message** and **AUDIBLE warning gong1** are off.

**KL.15 (cluster kl15 status)**

The inputs are monitored and the status of the outputs of **hdc Lamp, hdc fault message** and **AUDIBLE warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs of **hdc Lamp, hdc fault message** and **AUDIBLE warning gong1** are determined.

### Tell-Tale Symbol

The symbols to be illuminated on the dial face are as follows:



The warning is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

The warning is green in colour with a dominant wavelength of 560 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## SCS Active&& Fault warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **DSC status** | ***VSESts*** CAN signal of DSC status from DSC ECU:  0 = Inactive  1 =Active  2 =Fault  3 = Warming Up  4 = Not Ready | **3** | **0 ~ 7** |
| **TC status** | ***TCSOpngSts*** CAN signal of TC status from DSC ECU:  $0=Inactive  $1=Active  $2=Fault | **3** | **0 ~ 7** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **DSC Lamp** | Illuminate the Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **DSC Fault message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **tc Fault message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **dsc lamp enable** | ***insDSCLampEnPrm*** DSC/TC lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **DSC message enable** | ***insDSCMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **tc message enable** | ***insTCMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **DCS Fault gong enable** | ***insDSCFaultGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **tC Fault gong enable** | ***insTCFaultGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **dsc Lamp** is used to indicate one of the following to the driver:

1. A fault exists in the DSC system.
2. A fault exists with the TC system.
3. The DSC system has an intervention event **dsc Lamp** flashes.
4. The TC system has an intervention event **dsc Lamp** flashes.

As this is a safety related system, the default status of this lamp is ON i.e. should the CAN signal be missing the lamp is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **dsc LAMP**  **(on)** | if | **[cluster kl15 status && dsc lamp enable &&**  **(dsc Status == 2 )]**  **or**  **[cluster kl15 status && dsc lamp enable &&**  **(TC Status == 2 )]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **dsc LAMP**  **(flash)**  **at 2Hz; 0.25 sec off, 0.25 sec on** | if | **[cluster kl15 status && dsc lamp enable && (dsc Status = =1) &&! dsc LAMP on]**  **or**  **[cluster kl15 status && dsc lamp enable && (tc Status = =1) &&! dsc LAMP on]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **DSC Fault message** | if | **(cluster kl15 status && READY SYSTEM FLAG &&(dsc Status == 2 ) && dsc message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tC fault message** | if | **(cluster kl15 status && READY SYSTEM FLAG && (TC Status == 2 ) && tc message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(DSC Fault message && DCS Fault gong enable) or**  **(tc Fault message && tC Fault gong enable)** |

### Functional Behaviour

**KL.30**

The outputs of **dsc Lamp, DSC fail message, tC fail message,** and **AUDIBLE warning gong1** are off.

**KL.R**

The outputs of **dsc Lamp, DSC fail message, tC fail message,** and **AUDIBLE warning gong1** are off.

**KL.15 (cluster kl15 status)**

The inputs are monitored and the status of the outputs of **dsc Lamp, DSC fail message, tC fail message,** and **AUDIBLE warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs of **dsc Lamp, DSC fail message, tC fail message,** and **AUDIBLE warning gong1** are determined.

### Tell-Tale Symbol

The symbols to be illuminated on the dial face are as follows:



The warning is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## SCS OFF warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Dsc mode** | ***VSEMd*** CAN signal of DSC mode from DSC ECU:  $0=Off  $1=Normal  $2=Competitive | **3** | **0 ~ 7** |
| **tc mode** | ***TCSOpngMd*** CAN signal of TC mode from DSC ECU:  $0=Off  $1=Normal  $2=Off Road | **3** | **0 ~ 7** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **dsc off lamp** | Illuminate the Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **DSC Off message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **tC Off message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **dsc off lamp enable** | ***insDSCOffLampEnPrm*** DSC/TC off lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **DSC message enable** | ***insDSCMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **tc message enable** | ***insTCMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **dsc off Lamp** is used to indicate one of the following to the driver:

1. The DSC system is off.
2. The TC system is off.

As this is a safety related system, the default status of this lamp is ON i.e. should the CAN signal be missing the lamp is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **dsc off LAMP** | if | **[cluster kl15 status && dsc off lamp enable &&**  **(dsc mode == 0 )]**  **or**  **[cluster kl15 status && dsc off lamp enable &&**  **(TC mode == 0 )]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **DSC Off message** | if | **(cluster kl15 status && READY SYSTEM FLAG && (dsc mode == 0) && dsc message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tC Off message** | if | **(cluster kl15 status && READY SYSTEM FLAG && (TC mode == 0 ) && tc message enable)** |

### Functional Behaviour

**KL.30**

The outputs of **dsc off Lamp, dsc off message** and **tc off message** are off.

**KL.R**

The outputs of **dsc off Lamp, dsc off message** and **tc off message** are off.

**KL.15 (cluster kl15 status)**

The inputs are monitored and the status of the outputs of **dsc off Lamp, dsc off message** and **tc off message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs of **dsc off Lamp, dsc off message** and **tc off message** are determined.

### Tell-Tale Symbol

The symbols to be illuminated on the dial face are as follows:



The warning is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## Brake System warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **EBD STATUS** | ***BrkSysRedBrkTlltReq*** CAN signal from SCS for an EBD failure system warning lamp request when ‘TRUE’.  $1=True;  $0=False | **1** | **0 ~ 1** |
| **Brake Fluid STATUS** | ***BrkFludLvlLow*** CAN signal from SCS for low Brake Fluid Level when ‘TRUE’. | **1** | **0 ~ 1** |
| **brake fluid status validity** | ***BrkFludLvlLowV*** CAN signal from SCS for the validity of **Brake Fluid STATUS**:  $0=Valid,  $1=Invalid | **1** | **0 ~ 1** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **brake System Lamp** | Illuminate the Brake System Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **brake System echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~brake System lamp check enable~~** | ***~~insBrakeSysLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **brake system lamp enable** | ***insBrakeSysLampEnPrm*** lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **brake System echo message enable** | ***insBrakeSysEchoMesPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***InsEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **brake System gong enable** | ***insBrakeSysGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **brake System Lamp** is used to indicate to the driver that one of the following is ‘TRUE’:

1. The ABS has detected an EBD fault.
2. The brake fluid level is low.

The **brake System echo message** and **Audible warning gong1** are used to emphasise an EBD or Brake Fluid fault to the driver. The message is displayed in the LCD for **echo message period**. The **brake System echo message** is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being TRUE is ignored, and **not** saved or stored to be displayed after the **READY SYSTEM FLAG** becomes TRUE. The echo message is only displayed after this period if the conditions are still valid.

The **brake System Lamp** is illuminated during the start-up lamp check sequence if **brake System Lamp check enable** and **lamp check status** are both ‘TRUE’. It remains illuminated until **lamp check status** becomes ‘FALSE”.

As this is a safety related system, the default status of this lamp is ON i.e. should the CAN signal be missing the lamp is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **brake System LAMP** | if | **(Cluster KL15 status && brake system lamp enable &&**  **((Brake Fluid STATUS && brake fluid status validity = 0) or EBD STATUS))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **brake System echo Message** | if | **Cluster KL15 status && ((Brake Fluid STATUS && brake fluid status validity = 0) or EBD STATUS) && READY SYSTEM FLAG && brake System echo message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(brake System echo Message && brake System gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **brake System Lamp, Audible warning gong1** and the **brake System echo message** are off.

**KL.R**

The outputs **brake System Lamp, Audible warning gong1** and the **brake System echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **brake System Lamp, Audible warning gong1** and the **brake System echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **brake System Lamp, Audible warning gong1** and the **brake System echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## Seatbelt Unfastened warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **seat belt driver status** | ***FasnDrvrSbltIndCmd*** CAN signal from SDM that the Seat Belt warning is required:  0x00: drive lamp OFF  0x01: drive lamp ON  0x02: drive lamp Flashing  0x03: reserved | **2** | **0 ~ 3** |
| **Seat belt passenger status** | ***FasnFrtPsngSbltIndCmd*** CAN signal from SDM that the Seat Belt warning is required:  0x00: drive lamp OFF  0x01: drive lamp ON  0x02: drive lamp Flashing  0x03: reserved | **2** | **0 ~ 3** |
|  |  |  |  |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **seat belt Lamp** | Illuminate the Seat Belt Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **seat belt driver echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **seat belt Passenger echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **seat belt lamp enable** | ***insSBeltEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **seat belt reminder message enable** | ***insSBeltEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **seat belt passenger reminder message enable** | ***insSBeltPassEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **Seat belt reminder period** | ***insSBeltRemPeriodPrm*** The duration, in seconds, for which the seat belt reminder gong is given.  0 ~ FE = 0 ~ 254 seconds.  FF = no limit. | **8** | **5A** | **0~255** |
| **Seat belt reminder gong enable** | ***insSBeltRemGongEnPrm*** Seat Belt reminder gong is enabled if TRUE. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **seat belt Lamp** is used to indicate to the driver that the Driver’s (or Passengers’) Seat Belts are not buckled. The **seat belt echo message** and **seat belt Passenger echo message** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**. The echo message is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being TRUE is ignored, and **not** saved or stored to be displayed after the **READY SYSTEM FLAG** becomes TRUE. The echo message is only displayed after this period if the conditions are still valid.

If both **seat belt Lamp** and **Seat Belt Reminder ON** are ‘TRUE’ the **seat belt Lamp** is flashed and, if enabled, an audible warning is given and the echo message is repeated for **echo message period**. The audible warning ceases if the seat belt is buckled or if it exceeds the **Seat belt reminder period** time-out

The seat belt warning functionality is dealt with by the SMU.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **seat belt LAMP (flash)**  **at 0.5Hz; 1 sec on, 1 sec off )** | if | **[Cluster KL15 status && seat belt lamp enable &&**  **((seat belt driver status == 2 ) or (Seat belt passenger status == 2 ))**  **]** |

**Illustration of Seat Belt Warning Lamp Flash.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **seat belt LAMP**  **(ON)** | if | **[Cluster KL15 status && seat belt lamp enable &&**  **((seat belt driver status == 1 ) or (Seat belt passenger status == 1 )) && !seat belt LAMP (flash)]** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **seat belt driver echo message** | if | **(Cluster KL15 status && (seat belt driver status ==2) && READY SYSTEM FLAG && seat belt echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **seat belt Passenger echo message** | if | **(Cluster KL15 status && (Seat belt passenger status= = 2) && READY SYSTEM FLAG && seat belt passenger echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1**  **(repeated)** | if | **(seat belt LAMP (flash) && (time < Seat belt reminder period) && Seat belt reminder gong enable)** |

The repeated GONG1 should be kept synchronization with **seat belt LAMP (flash).**

### Functional Behaviour

**KL.30**

The outputs **seat belt Lamp**, **seat belt driver echo message**, **seat belt Passenger echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **seat belt Lamp**, **seat belt driver echo message**, **seat belt Passenger echo message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **seat belt Lamp**, **seat belt driver echo message**, **seat belt Passenger echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **seat belt Lamp**, **seat belt driver echo message**, **seat belt Passenger echo message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE

## SRS Fault warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **SRS Warning status** | ***AirbagSysFltIndCmd*** CAN signal from Airbag ECU to control SRS’s indication:  0x00: drive lamp OFF  0x01: drive lamp ON  0x02: drive lamp Flashing  0x03: reserved. | **2** | **0 ~ 3** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **SRS Lamp** | Illuminate the SRS Warning Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **SRS echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **SRS Led Fail Message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **SRS lamp fail status** | ***AirbagWrnngIndF*** indicate the status of ‘SRS Lamp’:  0=No Fault.  1=Fault. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **SRS lamp enable** | ***insSRSLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~SRS lamp check enable~~** | ***~~insSRSLampCheckEnPrm~~*** ~~Lamp check enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **SRS echo message enable** | ***insSRSEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~srs lamp fail echo message enable~~** | ***~~insSRSLampFailEchoMesEnPrm~~*** ~~Airbag lamp fail message enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **SRS gong enable** | ***insSRSGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **SRS ECHO MESSAGE INHIBIT PERIOD** | ***insSRSEchoMesInhibPeriodPrm* SRS echo Message** should be prevented from being displayed until ‘**SRS ECHO MESSAGE INHIBIT PERIOD**’ after KL15 On. | **4** | **9**  **(9 sec)** | **0 ~15** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **~~srs LED FAIL~~** | ~~Signal from the LED monitoring circuitry that is TRUE when a failure has been detected.~~ | **~~1~~** | **~~0 ~ 1~~** |

### Functional Description

The **SRS Lamp** is used to indicate to the driver that the SRS ECU has detected a fault. The **SRS echo message** and **Audible warning gong1** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**. The echo message is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being TRUE is ignored, and **not** saved or stored to be displayed after the **READY SYSTEM FLAG** becomes TRUE. The echo message is only displayed after this period if the conditions are still valid.

The **SRS Lamp** is illuminated during the start-up lamp check sequence if **SRS lamp check enable** and **lamp check status** are both ‘TRUE’. It remains illuminated until **lamp check status** becomes ‘FALSE’.

The SRS LED is to be continuously monitored while KL15 is true and a message displayed in the display if it is detected to have failed.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SRS LAMP**  **(on)** | if | **(Cluster KL15 status && SRS lamp enable && (SRS Status = = 1 )) ~~or~~**  **~~(Cluster KL15 status && SRS lamp enable && SRS lamp check enable && lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SRS LAMP**  **(flash)**  **at 0.5Hz; 1 sec on, 1 sec off )** | if | **(Cluster KL15 status && SRS lamp enable && (SRS Status = = 2 ))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **SRS echo Message** | if | **((Cluster KL15 status for time > SRS echo message inhibit period)**  **&& (SRS Status == 1) && READY SYSTEM FLAG && SRS echo message enable)** |

Notes: this message is limited by **SRS ECHO MESSAGE INHIBIT PERIOD**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~SRS Led Fail Message~~** | ~~if~~ | **~~(Cluster KL15 status && srs lamp fail echo message enable && SRS LED FAIL)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(srs echo Message && srs gong enable) or**  **~~(srs led fail message && srs gong enable)~~** |

### Functional Behaviour

**KL.30**

The outputs **SRS Lamp, Audible warning gong1** and **SRS echo message** are off.

**KL.R**

The outputs **SRS Lamp, Audible warning gong1** and **SRS echo message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **SRS Lamp, Audible warning gong1** and the **SRS echo message** are determined. The SRS LED is continuously monitored and  **Srs Led Fail Message** is determined.

**KL.50**

The inputs are monitored and the status of the outputs **SRS Lamp, Audible warning gong1** and the **SRS echo message** are determined. The SRS LED is continuously monitored and  **Srs Led Fail Message** is determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE

## Main Beam On Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **cluster power mode status** | Internal signal to indicate the power mode status for cluster.  0x0=Off  **0x01=ACC**  0x02=Run  0x03=Crank | **2** | **0~3** |
| **~~Auto Main beam status~~** | ***~~AutoMainBeamLghtOn~~*** ~~CAN signal from SMU that the Auto Main Beam lamps are ON when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **main beam status** | ***MainBeamLghtOn*** CAN signal from SMU that the Main Beam lamps are ON when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **main beam Lamp** | Illuminate the Main Beam Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **main beam echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **main beam lamp enable** | ***insMBeamLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~auto main beam lamp enable~~** | ***~~insAutoMBeamLampEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **main beam echo message enable** | ***insMBeamEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~AUTO main beam echo message enable~~** | ***~~insAutoMBeamEchoMesEnPrm~~*** ~~Message enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **main beam Lamp** is used to indicate to the driver that the Main Beam headlamps are ON. The **main beam** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**. In order to avoid nuisance displays for example when the head lights are shortly flashed as a warning signal to other drivers, the CAN status has to be on for 2 seconds before getting the popup && gong (avoid nuisance displays)

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **main beam LAMP** | if | **( (Cluster KL15 status or cluster power mode status==!off) && main beam lamp enable && main beam Status )** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~auto main beam lamp~~** | ~~if~~ | **~~( (Cluster KL15 status or cluster power mode status==!off) && auto main beam lamp enable && Auto Main beam status )~~** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~AUTO main beam echo Message~~** | ~~if~~ | **~~(Cluster KL15 status && AUTO main beam Status TRUE>=2 SECOND && AUTO main beam echo message enable)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **main beam echo Message** | if | **(Cluster KL15 status && main beam Status TRUE>=2 SECOND &&main beam echo message enable)** |

### Functional Behaviour

**KL.30**

The outputs **main beam Lamp** and the **main beam echo message** are off.

**KL.R**

The inputs are monitored and the status of the outputs **main beam Lamp** is determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **main beam Lamp** and the **main beam echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **main beam Lamp** and the **main beam echo message** are determined.

### Tell-Tale Symbol

The Main beam symbol to be illuminated on the dial face is as follows:



~~The Auto Main beam symbol to be illuminated on the dial face is as follows:~~

cid:image004.jpg@01D00895.C704E340

The warning is blue in colour with a dominant wavelength of 466 +/- 6 nm and should deliver a luminance of at least 20 cd/m2.

### Message

For detail refer to UE.

## Left Direction Indicator On warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **DIRECTION INDICATOR lefT HAND STATUS** | ***LDircnIO*** CAN signal from the SMU that the Left-hand DI’s are on when ‘TRUE’. | **1** | **0 ~ 1** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **DIRECTION INDICATOR left HAND Lamp** | Illuminate the DI LH warning lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning tick** | Audible warning TICK request when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning tock** | Audible warning TOCK request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **direction indicator Tick-tock enable** | ***insDITickTockEnPrm*** DI Tick-Tock enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **DIRECTION INDICATOR left HAND Lamp** is used to indicate to the driver the status of the left-hand vehicle direction indicators. These exterior lamps are used independently as left turn indicators and, in conjunction with the right turn indicators, as hazard warning indicators.

The condition of the **DIRECTION INDICATOR left HAND Lamp** is controlled by the **DIRECTION INDICATOR left HAND STATUS** signal; when this is ‘TRUE’, the tell-tale lamp is ON, when ‘FALSE’, the lamp is OFF.

In conjunction with the visible warning of the tell-tale lamp, an audible warning is given, if configured to do so using **direction indicator Tick-tock enable.**  The **Audible warning tick** is given on the rising edge of **DIRECTION INDICATOR left HAND STATUS** and the **Audible warning tock** is given on the falling edge of **DIRECTION INDICATOR RIGHT HAND STATUS.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **DIRECTION INDICATOR left HAND Lamp** | if | **(DIRECTION INDICATOR left HAND STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning tick** | if | **↑DIRECTION INDICATOR left HAND STATUS && direction indicator Tick-tock enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning tock** | if | **↓DIRECTION INDICATOR left HAND STATUS && direction indicator Tick-tock enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs, are determined.

**KL.R**

The inputs are monitored and the status of the outputs, are determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs, are determined.

**KL.50**

The inputs are monitored and the status of the outputs, are determined.

### Tell-Tale Symbol

The symbol to be illuminated by the LED is as follows:



The warning is green with a dominant wavelength of 560 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

There is no messages associated with DI’s.

## Right Direction Indicator On warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **DIRECTION INDICATOR RIGHT HAND STATUS** | ***RDircnIO*** CAN signal from the SMU that the Right-hand DI’s are on when ‘TRUE’. | **1** | **0 ~ 1** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **DIRECTION INDICATOR RIGHT HAND Lamp** | Illuminate the DI RH warning lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning tick** | Audible warning TICK request when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning tock** | Audible warning TOCK request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **direction indicator Tick-tock enable** | ***insDITickTockEnPrm*** DI Tick-Tock enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **DIRECTION INDICATOR RIGHT HAND Lamp** is used to indicate to the driver the status of the right-hand vehicle direction indicators. These exterior lamps are used independently as right turn indicators and, in conjunction with the left turn indicators, as hazard warning indicators.

The condition of the **DIRECTION INDICATOR RIGHT HAND Lamp** is controlled by the **DIRECTION INDICATOR RIGHT HAND STATUS** signal; when this is ‘TRUE’, the tell-tale lamp is ON, when this is ‘FALSE’, the lamp is OFF.

In conjunction with the visible warning of the tell-tale lamp, an audible warning is given, if configured to do so using **direction indicator Tick-tock enable.**  The **Audible warning tick** is given on the rising edge of **DIRECTION INDICATOR RIGHT HAND STATUS** and the **Audible warning tock** is given on the falling edge of **DIRECTION INDICATOR RIGHT HAND STATUS.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **DIRECTION INDICATOR RIGHT HAND Lamp** | if | **(DIRECTION INDICATOR RIGHT HAND STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning tick** | if | ↑**DIRECTION INDICATOR RIGHT HAND STATUS && direction indicator Tick-tock enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning tock** | if | ↓**DIRECTION INDICATOR RIGHT HAND STATUS && direction indicator Tick-tock enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs, are determined.

**KL.R**

The inputs are monitored and the status of the outputs, are determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs, are determined.

**KL.50**

The inputs are monitored and the status of the outputs, are determined.

.

### Tell-Tale Symbol

The symbol to be illuminated by the LED is as follows:



The warning LED is green with a dominant wavelength of 560 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

There is no messages associated with DI’s.

## IMMO Fail && Key Battery Low && Alarm Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **key battery low status** | ***ScurtKeyBatLow*** CAN signal from BCM for key battery status. | **1** | **0 ~ 1** |
| **security key invalid status** | ***ScurtKeyInvd*** CAN signal from BCM for key battery status. | **1** | **0 ~ 1** |
| **Alarm status** | ***ScurtAlrmSts*** CAN signal from BCM that indicates the status of the alarm system.  0x0 = Security system disarmed  0x1 = Security system partially armed with volumetrics disabled.  0x2 = Security system fully armed with volumetrics disabled.  0x3 = Security system disarmed && volumetric sensor fault  0x4 = Unused  0x5 = Security system partially armed with volumetrics enabled.  0x6 = Security system fully armed with volumetrics enabled.  0x7 = Unused | **3** | **0 ~ 7** |
| **Alarm Triggered status** | ***ScurtAlrmTrigd*** CAN signal from BCM that indicates when ‘TRUE’ the Alarm Triggered message is displayed. | **1** | **0 ~ 1** |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |
| **front passager door open status** | ***FrtPsngDoorOpenSts*** CAN signal from BCM for front passager door status:  $0=Front Passenger Door Closed  $1=Front Passenger Open(For latch switch can not detect door ajar status)  $2=Front Passenger Door Ajar  $3=Front Passenger Door Full Open | **2** | **0 ~ 3** |
| **Rear Left Door Open Status** | ***RLDoorOpenSts*** CAN signal from BCM for left-hand rear door status:  $0=Rear Left Door Closed  $1=Rear Left Door Open(For latch switch can not detect door ajar status)  $2=Rear Left Door Ajar  $3=Rear Left Door Full Open | **2** | **0 ~ 3** |
| **Rear Right Door Open Status** | ***RRDoorOpenSts***CAN signal from BCM for right-hand rear door status:  $0=Rear Right Door Closed  $1=Rear Right Door Open(For latch switch can not detect door ajar status)  $2=Rear Right Door Ajar  $3=Rear Right Door Full Open | **2** | **0 ~ 3** |
| **boot open status** | ***LdspcOpenSts*** CAN signal from BCM for boot status:  $0=Load Space Closed  $1=Load Space Open  $2=Reserved  $3=Reserved | **2** | **0 ~ 3** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **vehicle with key lamp** | Illuminate the lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **engine disabled message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **key battery low message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Alarm Triggered message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~vehicle with key lamp check enable~~** | ***~~insVehWKeyLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **security key invalid lamp enable** | ***insSecKeyInvLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **key battery low lamp enable** | ***insKeyBatLowLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **~~Alarm lamp enable~~** | ***~~insAlarmLampEnPrm~~*** ~~Lamp enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **engine disabled message enable** | ***insEngDisMesEnPrm*** The engine disabled warning feature is enabled when true. | **1** | **0** | **0 ~ 1** |
| **key battery low message enable** | ***insKeyBatLowMesEnPrm*** The key battery low warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **Alarm triggered message enable** | ***insAlarmTriggeredMesPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **Alarm triggered time-out** | ***insAlarmTriggeredTime-outPrm*** The max duration for which the warning message is given after all doors are closed. | **8** | **20**  **(32 sec)** | **0 ~ 255** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **engine disabled gong enable** | ***insEngDisGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **key battery low gong enable** | ***insKeyBatLowGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **Alarm Triggered gong enable** | ***insAlarmTriggeredGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
|  |  |  |  |  |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **Rapid flash complete** | For alarm systems with volumetric sensors. ‘TRUE’ when the LED rapid flash period has been completed its 10 second period. | **1** | **0 ~ 1** |

### Functional Description

The key battery low message is displayed when a remote key RF transmission including a low battery status signal has been received by the SMU. When KL15 becomes ‘TRUE’ the SMU will send **key battery status**. **key battery low message** is displayed if **Cluster KL15 status** is ‘TRUE’.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **vehicle with key lamp**  **(ON)** | if | **(Cluster KL15 status && security key invalid lamp enable && security key invalid status) ~~or~~**  **~~(Cluster KL15 status && vehicle with key lamp check enable && lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **vehicle with key lamp**  **(flash)**  **at 0.5 hz; 1 sec off, 1 sec on** | if | **(Cluster KL15 status && key battery low lamp enable && key battery low status &&! vehicle with key lamp (on) )** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~vehicle with key lamp~~**  **~~(RAPID)~~**  **~~at 2 hz; 0.075 sec on, 0.425 sec off~~** | ~~if~~ | **~~( !Cluster KL15 status && Alarm lamp enable && !Rapid flash complete && alarm Status == 101 or 110)~~** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~vehicle with key lamp~~**  **~~(normal)~~**  **~~at 1/3 hz; 0.075 sec on, 2.925 sec off~~** | ~~if~~ | **~~( !Cluster KL15 status && Alarm lamp enable && alarm Status == 001 or 010) or~~**  **~~(!Cluster KL15 status && Alarm lamp enable && Rapid flash complete && alarm Status = =101 or 110)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **engine disabled message** | if | **(Cluster KL15 status && engine disabled message enable && security key invalid status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **key battery low message** | if | **(Cluster KL15 status && key battery low message enable && key battery low status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Alarm Triggered message (ON)** | if | **( !Cluster KL15 status && Alarm Triggered status &&**  **Alarm triggered message enable &&**  **( Driver Door open status == !0 or**  **front passager door open status == !0 or**  **Rear Left Door Open Status == !0 or**  **Rear Right Door Open Status == !0 ) &&**  **~~t <= Alarm triggered time-out )~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Alarm Triggered message (OFF)** | if | **(cluster kl15 status = =1 or**  **(!Cluster KL15 status && all door status==0 && Alarm triggered message enable &&t > Alarm triggered time-out)** |

// Alarm triggered message is special warning message not included in Key ON Type A/B/C nor Key OFF Type A/B.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(engine disabled message && engine disabled gong enable) or**  **(key battery low message && key battery low gong enable) or**  **(Alarm Triggered message (ON) && Alarm Triggered gong enable)** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs **vehicle with key lamp (RAPID), vehicle with key lamp (normal)** and the **Alarm Triggered message** are determined.

When the driver exits and locks the vehicle, the **alarm Status** changes condition from Alarm Off to one of the 4 possible Alarm Set conditions (either Full or Part set and either with or without Volumetrics).

If the **alarm Status** is without Volumetrics; then the **vehicle with key lamp** is flashed at the normal rate of 1/3 Hz, until the alarm is subsequently switched off (as indicated by the condition of **alarm Status**).

If the **alarm Status** is with Volumetrics; then the **vehicle with key lamp** is flashed at the rapid rate of 2Hz for 10 seconds after which it is flashed at normal rate of 1/3 Hz, until the alarm is subsequently switched off (as indicated by the condition of **alarm Status**).

The MS CAN bus will go into sleep mode and the **alarm Status** signal will stop being sent by the SMU. The cluster must continue to flash the **vehicle with key lamp** until the MS CAN bus wakes-up and the **alarm Status** signal = 000,or until the voltage of the battery become flat.

While the alarm is set, if it is triggered the SMU will wake-up the MS CAN bus and publish the **Alarm Triggered status** signal. The cluster must set an **Alarm Triggered flag**. Subsequently, when the driver returns to the vehicle, unlocks it, and opens any door if the **Alarm Triggered** flag is true, the **Alarm Triggered message** is displayed in the LCD until KL.15 becomes ‘TRUE’, or for a timeout period after all doors are closed..

**KL.30 / KL.R (Shutdown mode)**

Input not monitored and message not displayed.

**KL.R**

Input not monitored and message not displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The input is monitored and the status of **vehicle with key lamp (ON), vehicle with key lamp (flash), engine disabled message** and **key battery low message** is determined.

**KL.50**

The input is monitored and the status of **vehicle with key lamp (ON), vehicle with key lamp (flash), engine disabled message** and **key battery low message** is determined.

cid:image001.png@01CF5337.9AA56130

### LCD Messages

For detail refer to UE

## TCCM Active&&Fault warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| × | × | ？ | x |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **tccm active** | ***TrnsfCaseMdAIO*** CAN signal to indicate the 4WD whether is required by switch:  1 = true  0 = false | **1** | **0 ~ 1** |
| **TCCM fault status** | ***TrnsfCaseNonEmsnRltdMalfA*** CAN signal from TCCM:  $1=True;  $0=False | **1** | **0 ~ 1** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **TCCM Lamp** | Illuminate the TCCM Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **TCCM status echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **TCCM fault echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **TCCM status Lamp enable** | ***insTCCMStatusLampEnPrm*** Lamp enabled when true | **1** | **1** | **0 ~ 1** |
| **tccm fault lamp enable** | ***insTCCMFaultLampEnPrm*** Lamp enabled when true | **1** | **1** | **0 ~ 1** |
| **tccm status echo message enable** | ***insTCCMStatusEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **tccm fault echo message enable** | ***insTCCMFaultEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **TCCM gong enable** | ***insTCCMGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **TCCM Lamp (Green)** is used to indicate to the driver that 4x4 system is active, and the **TCCM Lamp (Yellow)** is used to indicate to the driver that 4x4 system has a fault. The **TCCM Status echo message, TCCM fault echo message** and **Audible warning gong1** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TCCM LAMP**  **(Green)** | if | **(cluster kl15 status && TCCM status Lamp enable && tccm active) && ! TCCM LAMP (Yellow)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TCCM LAMP**  **(Yellow)** | if | **(cluster kl15 status && tccm fault lamp enable && TCCM fault status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TCCM status echo message** | if | **(cluster kl15 status && tccm active && tccm status echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TCCM fault echo message** | if | **(cluster kl15 status && TCCM fault status && tccm fault echo message enable && READY SYSTEM FLAG)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(TCCM fault echo message && TCCM gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **TCCM LAMP, TCCM status echo message, TCCM fault echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **TCCM LAMP, TCCM status echo message, TCCM fault echo message** and **Audible warning gong1** are off.

**KL.15 (cluster kl15 status)**

The inputs are monitored and the status of the outputs **TCCM LAMP, TCCM status echo message, TCCM fault echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **TCCM LAMP, TCCM status echo message, TCCM fault echo message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The **TCCM LAMP (Yellow)** is red in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

The **TCCM LAMP (Green)** is green with a dominant wavelength of 560 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

#### Pop-up Message

For detail refer to UE

## EPB Status && Autohold Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **EPB function status** | ***EPBSysStsIndReq*** CAN signal from EPB indicate which status EPB is in:  $0=No Indication;  $1=Continuous Indication;  $2=Flash Rate #1 Indication;  $3=Flash Rate #2 Indication; | **2** | **0 ~ 3** |
| **epb audible require** | ***EPBSysAudWrnngReq*** CAN signal from EPB for audible warning requirement:  0 = No.  1 = single GONG.  2 = Constant GONG. | **2** | **0 ~ 3** |
| **autohold status** | ***AutoholdSysSts*** CAN signal from SCS:  $0 = Off  $1= intervention  $2=standby  $3=error | **2** | **0 ~ 3** |
| **epb hardwire input (IP34)** | Hardwire input from EPB.  0=low;1=high | **1** | **0 ~ 1** |
| **~~lamp check status~~** | ~~Internal signal from lamp check function, the lamp check is active when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **epb status Lamp** | Illuminate the EPB function Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold status lamp** | Illuminate the Auothold status Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold status to switch** | Output the Autohold status to switch via hardwire.  1 = High voltage.  0 = Low voltage.  //Note: The autohold telltale in switch need consider dimming. | **1** | **0 ~ 1** |
| **autohold fault echo message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~epb status lamp check enable~~** | ***~~insEPBStatusLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **epb Status lamp on enable** | ***insEPBStatusLampOnEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **EPB status lamp flash enable** | ***insEPBStatusLampFlashEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **~~autohold status lamp check enable~~** | ***~~insAutoholdStatusLampCheckEnPrm~~*** ~~Lamp enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **autohold Status lamp on enable** | ***insAutoholdStatusLampOnEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **autohold status lamp flash enable** | ***insAutoholdStatusLampFlashEnPrm*** Lamp enabled when true. | **1** | **1** | **0 ~ 1** |
| **autohold fault echo message enable** | ***insAutoholdFtEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **Epb status gong enable** | ***insEPBStatusGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **autohold status gong enable** | ***insAutoholdStatusGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **epb constant audible require period** | ***insEPBConstantGONGPeriodPrm*** The duration, in seconds, for which the EPB constant gong is given.  0 ~ FE = 0 ~ 254 seconds.  FF = No limit. | **8** | **ff** | **0~255** |
| **epb hrdewire detect enable** | ***insEPBHWDetEnPrm*** Audible warning enabled when true. | **1** | **IP34=1**  **AS24,EP21=0** | **0 ~ 1** |

### Functional Description

The **EPB status Lamp** is used to indicate to the driver that EPB system is applied (On/Flash).

The **autohold status lamp** is used to indicate to the driver that Autohold system is in the status of intervention.

The **epb status LAMP** and **autohold status lamp** will be illuminated during the start-up lamp check sequence.

During the lamp check period, if green lamp check and red lamp check all are valid, the warning is illuminated for the first half of the period in red and then for the second half of the period in green; if green lamp check is invalid and red lamp check is valid, the red lamp is illuminated in the whole check period; if green lamp check is valid and red lamp check is invalid, the green lamp is illuminated in the whole check period.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb status LAMP**  **(ON)** | if | **(Cluster KL15 status && epb Status lamp on enable && EPB function status == 1) or**  **( ! Cluster KL15 status && epb Status lamp on enable && (epb hrdewire detect enable && epb hardwire input ==0) or EPB function status == 1 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb status LAMP**  **(flash)** | if | **(Cluster KL15 status && EPB status lamp flash enable && EPB function status == 2)** |

Notes: flash at 2Hz, 0.25 sec off, 0.25 sec on, and ‘off’ first, which is the same with ‘DSC’ lamp flash.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold status lamp**  **(on)** | if | **(Cluster KL15 status && autohold status lamp ON enable && autohold status == 1 &&! (epb status LAMP == on or flash ) )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold fault echo message** | if | **(Cluster KL15 status && autohold fault echo message enable && autohold status== 3 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1**  **(single gong)** | if | **(epb status LAMP == (On** or **flash) && epb audible require == 1 && Epb status gong enable)**  **or**  **autohold fault echo message && AUTOHOLD STATUS GONG ENABLE** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1**  **(Constant gong)** | if | **(epb status LAMP == On && epb audible require == 2 && (Time < epb constant audible require period )&& Epb status gong enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold status to switch**  **(1= high; 0= low)** | if | **(Cluster KL15 status && (autohold status ==( 1 or 2)) )** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs **epb status LAMP** and **Audible warning gong1** are determined.

**KL.R**

The inputs are monitored and the status of the outputs **epb status LAMP** and **Audible warning gong1** are determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **epb status LAMP, autohold status LAMP, autohold status to switch** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **epb status LAMP, autohold status LAMP, autohold status to switch** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The **epb status LAMP** is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

The **autohold status LAMP** is green with a dominant wavelength of 560 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE.

## EPB System Fault Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **EPb fault** | ***EPBSysWrnngIndReq*** CAN signal from EPB that EPB system has some problems or others:  $0=No Indication;  $1=Continuous Indication;  $2=Flash Rate #1 Indication;  $3=Flash Rate #2 Indication; | **2** | **0 ~ 3** |
| **epb audible require** | ***EPBSysAudWrnngReq*** CAN signal from EPB for audible warning requirement:  0 = No.  1 = Single GONG.  2 = Constant GONG. | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **epb fault lamp** | Illuminate the EPB fault Lamp when ‘TRUE’ | **1** | **0 ~ 1** |
| **epb fault message** | Message when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **epb fault lamp on enable** | ***insEPBFaultLampOnEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **epb fault lamp flash enable** | ***insEPBFaultLampFlashEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **epb fault message enable** | ***insEPBFaultMesEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **epb gong enable** | ***insEPBGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **epb fault lamp** is used to the driver that there is a fault about EPB system or EPB system enters into diagnose status. And **Audible warning gong1** is used to emphasise the status to the driver if configured to do so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb fault lamp**  **(on)** | if | **(cluster KL15 status && epb fault == 1 && epb fault lamp on enable && !epb fault lamp flash)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb fault message** | if | **(cluster KL15 status && epb fault == 1 && epb fault message enable && !epb fault lamp flash)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb fault lamp**  **(flash)** | if | **(cluster KL15 status && epb fault == 2 && epb fault lamp flash enable)** |

Notes: flash at 2Hz, 0.25 sec off, 0.25 sec on, and ‘off’ first, which is the same with ‘DSC’ lamp flash.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **epb fault message && (epb audible require== 1 ) && epb gong enable** |

### Functional Behaviour

**KL.30**

The outputs **epb fault LAMP** and **Audible warning gong1** are off.

**KL.R**

The outputs **epb fault LAMP** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

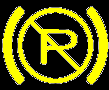
The inputs are monitored and the status of the outputs **epb fault LAMP** and **Audible warning gong1** are decided.

**KL.50**

The inputs are monitored and the status of the outputs **epb fault LAMP** and **Audible warning gong1** are decided.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Message

For detail refer to UE

## Low Fuel Level && Fuel Signal Error warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | × | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **fuel status** | Internal signal that indicates Low Fuel status for use by display and warning lamp functions.  00 = Fuel Status OK.  01 = Fuel Status Low.  10 = Fuel Status Critical. | **2** | **0 ~ 2** |
| **raw fuel quantity** | Quantity of fuel read from ADC and applied to anti-slosh algorithm, in millilitres. | **16** | **0 ~ 65535** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Low fuel Lamp** | Illuminate the Low Fuel Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Low fuel echo Message (yellow)** | Yellow warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Low fuel echo Message (red)** | Red warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Fuel signal error echo message(yellow)** | Yellow warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **fuel segment 1 (flash)** | Flash bottom segment of fuel gauge when TRUE. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Low fuel lamp enable** | ***insLowFuelEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **FUEL SEGMENT 1 FLASH ENABLE** | ***insFuelSeg1FlashPrm***  fuel segment 1 flash enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **Low fuel echo message enable** | ***insLowFuelEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **Low fuel gong enable** | ***insLowFuelGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **fuel signal error echo message enable** | ***insFuelSendErrMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **fuel signal error gong enable** | ***insFuelSendErrAWarnEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Internal signal

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **fuel sender input invalid status** | Indicate an out-of-range fuel sender value was detected when true, | **1** | **0 ~ 1** |

### Functional Description; Low fuel warning

The **Low fuel Lamp** is used to indicate to the driver that the fuel level is low. The **Low fuel Lamp** has two thresholds, for low fuel lamp on and fuel lamp flash along with the 1th fuel segment. The **Low fuel echo message** and **Audible warning gong1** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

When **fuel Status** changes from Fuel OK (00) to Fuel Low (01) the tell-tale is illuminated constantly and, if enabled to do so, the echo message is displayed and a gong sounded. Should the fuel level continue to fall and **fuel Status** change to Fuel Critical (10), the lamp is flashed along with the bottom fuel segment and the echo message and gong are repeated (if enabled),the two lamp should flash synchronously.

If, however, **fuel Status** is Fuel Critical (10) and the fuel level rises so that **fuel Status** is Fuel Low (01), the low fuel lamp and the bottom fuel segment changes from flashing to constant but the echo message and gong are suppressed (if enabled).

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Low fuel LAMP**  **(ON)** | if | **(Cluster KL15 status && Low fuel lamp enable && fuel Status == 01 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Low fuel LAMP**  **(flash)**  **at 0.5Hz; 1 sec off, 1 sec on** | if | **(Cluster KL15 status && Low fuel lamp enable && fuel Status == 10 )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **fuel segment 1 (flash)**  **at 0.5Hz; 1 sec off, 1 sec on )** | if | **(Cluster KL15 status && FUEL SEGMENT 1 FLASH ENABLE && fuel Status == 10 )** |

Note: That the OFF half cycle is to be first.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Low fuel echo Message**  **(yellow)** | if | **(Cluster KL15 status && fuel Status == 01 && Low fuel echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Low fuel echo Message**  **(red)** | if | **(Cluster KL15 status && fuel Status == 10 && Low fuel echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(Low fuel Message && Low fuel gong enable)** |

### Functional Behaviour

**KL.30**

The outputs **Low fuel Lamp, FUEL SEGMENT 1 (FLASH), Audible warning gong1** and the **Low fuel echo message** are off.

**KL.30/KL.R Preview Mode**

The inputs are monitored. The outputs **Low fuel Lamp**, **FUEL SEGMENT 1(FLASH), Audible warning gong1** and the **Low fuel echo message** are off.

**KL.R**

The outputs **Low fuel Lamp, FUEL SEGMENT 1(FLASH), Audible warning gong1** and the **Low fuel echo message** are off.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the outputs **Low fuel Lamp, FUEL SEGMENT 1(FLASH), Audible warning gong1** and the **Low fuel echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **Low fuel Lamp,** **FUEL SEGMENT 1(FLASH), Audible warning gong1** and the **Low fuel echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### LCD Message

For detail refer to UE

### Functional Description: Fuel Signal Error warning

The **FUEL SIGNAL ERROR** warning is used to indicate to the driver that the fuel sender input to cluster is invalid, The **FUEL SIGNAL ERROR echo message** and **Audible warning gong1** are used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

The detail strategy, please refer to section: Fuel Gauge.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Low fuel LAMP (flash)**  **at 0.5Hz; 1 sec off, 1 sec on** | if | **(Cluster KL15 status && Low fuel lamp enable && fuel sender input invalid status )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **FUEL SIGNAL ERROR echo MESSAGE (yellow)** | if | **(Cluster KL15 status && fuel sender input invalid status && fuel signal error echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **FUEL SIGNAL ERROR echo MESSAGE && fuel signal error gong enable** |

### Functional Behaviour

**KL.30**

The outputs **Low fuel Lamp, FUEL SEGMENT 1 (FLASH) ，Audible warning gong1** and the **FUEL SIGNAL ERROR message** are off.

**~~KL.30/KL.R (Preview Mode)~~**

~~The inputs are monitored. The outputs~~ **~~Low fuel Lamp~~**~~,~~ **~~FUEL SEGMENT 1 (FLASH)，Audible warning gong1~~** ~~and the~~ **~~FUEL SIGNAL ERROR echo message~~** ~~are off.~~

**KL.R**

The outputs **Low fuel Lamp, FUEL SEGMENT 1 (FLASH) ，Audible warning gong1** and the **FUEL SIGNAL ERROR echo message** are off.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the outputs **Low fuel Lamp,** **FUEL SEGMENT 1 (FLASH), Audible warning GONG1** and the **FUEL SIGNAL ERROR echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **Low fuel Lamp,** **FUEL SEGMENT 1 (FLASH) ，Audible warning gong1** and the **FUEL SIGNAL ERROR echo message** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is yellow in colour with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60 cd/m2.

### LCD Message

For detail refer to UE

## Low beam, dipped beam indication(Only for LED main beam)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal signal from the ignition status function from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **dipped beam status** | ***DipdBeamLghtOn*** CAN signal from SMU that the Main Beam lamps are ON when ‘TRUE’. | 1 | **0 ~ 1** |
| **Left Dipped Beam Light Failed** | ***LDipdBeamLghtF*** CAN signal from BCM to indicate whether left dipped beam light is failed:  0x1=True; 0x0=False; | **2** | **0~3** |
| **Right Dipped Beam Light Failed** | ***RDipdBeamLghtF*** CAN signal from BCM to indicate whether right dipped beam light is failed:  0x1=True; 0x0=False; | **2** | **0~3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **dipped beam lamp**  **(Green)** | Illuminate the Dipped beam Warning Lamp (Green) when ‘TRUE’. | **1** | **0 ~ 1** |
| **dipped beam lamp**  **(yellow)** | Illuminate the Dipped beam Warning Lamp (Yellow) when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Dipped beam lamp(green) enable** | ***insDipdBeamGreenLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **dipped beam lamp(yellow) enable** | ***insDipdBeamYellLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **Dipped beam light failed GONG enable** | ***insDipdBeamFailGongEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **Dipped beam lamp (green)** is used to indicate to the driver that dipped beam is ON. The **Dipped beam lamp (Yellow)** is used to indicate to the driver that the dipped beam is fault and **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **dipped beam LAMP**  **(Green)** | if | **(cluster kl15 status && Dipped beam lamp(green) enable && dipped beam status) && ! dipped beam LAMP**  **(yellow)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **dipped beam LAMP**  **(yellow)** | if | **(CLUSTER KL15 STATUS && DIPPED BEAM LAMP(YELLOW) ENABLE && (LEFT DIPPED BEAM LIGHT FAILED OR RIGHT DIPPED BEAM LIGHT FAILED)) && ~~! DIPPED BEAM LAMP (GREEN)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **see 5.16** |

### Functional Behaviour

**KL.30**

The outputs are off.

**KL.R**

The outputs are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the statuses of the outputs are determined.

**KL.50**

The inputs are monitored and the statuses of the outputs are determined.

### Tell-tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is bi-color LED, green with a dominant wavelength of 560 +/- 4 nm; yellow with a dominant wavelength of 590 +/- 4 nm, and all should deliver a luminance of at least 60 cd/m2.

### Messages

No message.

#### Pop-up Message

No meesage

#### Static Message

No message.

## Regulate Steering Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **Steering Wheel Angle** | ***StrgWhlAng*** CAN Signal from SAS ECU. 1 bit = 0.0625 degree, offset value is -2048 degree.  0x7FFF=0°;  0xFFFF=Error. | **16** | **0 ~ 65535** |
| **STEERING WHEEL ANGLE VALID** | ***StrgWhlAngV*** Steering Wheel Angle Validity.  0=valid, 1=invalid. | **1** | **0 ~ 1** |
| **Vehicle speed** | ***VehSpdAvgDrvn*** CAN signal of road speed data from ABS/DSC ECU, 0.015625 km/h/bit. | **15** | **0 ~ 511.984 km/h** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **LEFT REGULATE STEERING MESSAGE** | Message Warning request when ‘TRUE'. | **1** | **0 ~ 1** |
| **RIGHT REGULATE STEERING MESSAGE** | Message Warning request when ‘TRUE'. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **regulate steering message enable** | ***insRegulateSteeringMesEnPrm*** The regulate steering warning feature is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **regulate steering audible Warning enable** | ***insRegulateSteeringAudibleWarnEnPrm*** The low washer fluid level audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **regulate steering message** is given for **echo message period** to indicate to the driver that the steering wheel is not right forward.

The Regulate Steering Message is a **popup-warning warning**. It will be displayed once for **ECHO MESSAGE PERIOD** (default value: 5s), this being configurable in E2PROM. When the pop-up message is displayed, it is accompanied by a single audible warning, if configured to do so.

For one ignition cycle, this message will be displayed **only one time**. Once the formula is false the moment KL.15 on, the message will never be displayed, even if it has never been displayed yet.

~~After the pop-up message has been displayed for ECHO MESSAGE PERIOD, if the formula is still true, a~~ **~~static message~~** ~~will be displayed.~~

~~Specialy if~~ *~~SteeringWheelAngle~~* ~~= 0xFFFF the message will not display. And signal~~ *~~SteeringWheelAngle~~* ~~is timeout, the SAS Fault Warning will be triggered.~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **left regulate steering message**  **ON** | if | **READY SYSTEM FLAG↑ deLay 500 ms**  **& (steering wheel angle<= -90°) & (vehicle speed<5km/h) & regulate steering message enable** |

Text ”请向左回正方向盘”.

**Note: ↑**means KL15 Status turns from OFF to ON.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **left regulate steering message off** | if | **READY SYSTEM FLAG & [(steering wheel angle>= -30°) or (vehicle speed>5km/h)] & regulate steering message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **right regulate steering message on** | if | **READY SYSTEM FLAG↑ deLay 500 ms**  **& (steering wheel angle>= 90°) & (vehicle speed<5km/h) & regulate steering message enable** |

Text ”请向右回正方向盘”.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **right regulate steering message off** | if | **READY SYSTEM FLAG & [(steering wheel angle<= 30°) or (vehicle speed>5km/h)] & regulate steering message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(left regulate steering message or right regulate steering message) &** **regulate steering audible Warning enable** |

### Functional Behaviour

**KL.30**

No **regulate steering message** is displayed.

**KL.30 / KL.R (Shutdown mode)**

No **regulate steering message** is displayed.

**KL.R**

No low washer fluid message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the low washer fluid message is determined.

**KL.50**

The inputs are monitored and the status of the low washer fluid message is determined.

### Messages

For detail refer to UE

## Ready

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |
| **LAMP CHECK STATUS** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Ready lamp** | Illuminate ‘READY’ lamp when TRUE. | **1** | **0 ~ 1** |
| **ready echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **AUDIBLE WARNING GONG1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~ready lamp check enable~~** | ***~~insReadyLampCheckEnPrm~~*** ~~Lamp check enabled when TRUE.~~ | **~~1~~** | **~~0~~** | **~~0 ~ 1~~** |
| **ready lamp enable** | ***insReadyLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **ready echo message enable** | ***insReadyEchoMesEnPrm*** message enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **ready gong enable** | ***insReadyGongEnPrm*** Audible warning enabled when TRUE. | **1** | **1** | **0 ~ 1** |

### Functional Description

The System Ready function is used to indicate the driver that the vehicle is ready to take off. After pushing the key to the ‘CRANK’ position (KL.50) and see the ‘READY’ lamp is illuminated for about some seconds, the driver can release the key back to the ‘IGN’ position (KL.15) and prepare to take the vehicle off.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Ready lamp** | if | **(cluster kl15 status & ready lamp enable & SYSTEM READY STATUS) ~~or~~**  **~~(cluster kl15 status & ready lamp check enable & lamp check status)~~** |
| **FORMULA** | | |
| **Power OFF Lamp** | if | **(cluster kl15 status & ready lamp enable & SYSTEM READY STATUS == 0 for 2s)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ready echo message** | if | **(cluster kl15 status & ready echo message enable & SYSTEM READY STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AUDIBLE WARNING GONG1** | if | **(cluster kl15 status & ready gong enable & ready echo message )** |

### Functional Behaviour

**KL.30 & KL.R**

The outputs **Ready lamp** and **ready echo message** are off.

**KL.15 & KL.50**

The inputs are monitored and the status of **Ready lamp** and **ready echo message** are determined.

### Tell-Tale Symbol

, Power OFF.

For detail see HMI Spec.

### Dot Matrix Messages

For detail refer to UE

## Plug In Charging Status

|  |  |  |  |
| --- | --- | --- | --- |
| **AS24** | **IP34** | **EP21** | **AS26** |
| √ | √ see Spec | | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Charge Indication Driver Status** | ***BMSChrgStsIO*** CAN signal from BMS  0x1 open;  0x0 closed; | **1** | **0 ~ 1** |
| **SYSTEM READY STATUS** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |
| **CHARGE ERROR STATUS –tbd**  **(not for AS24)** | ***Xxx*** CAN signal from BMS to indicate charging error status | **?** | **?** |
| **Charging Remaining Time**  **(not for AS24)** | ***ChrgngRmnngTime*** E = N\*1 minute | **10** | **0 ~ 1023** |
| **Charging Remaining Time valid**  **(not for AS24)** | ***ChrgngRmnngTimeV***  0x0=Valid;  0x1=Invalid; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **plug in charging status lamp** | Illuminate the lamp when TRUE. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **plug in charging lamp enable** | ***insPlugInChargingLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **charging error message enable** | ***insChargingErr MesEnPrm*** | **1** | **1** | **0 ~ 1** |
| **key off charging image display period** | ***insKeyOffChargDisPeriod*** 0.5min/bit | **4** | **6**  **(3min)** | **0~15** |

### Functionality Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **plug in charging status lamp** | if | **( cluster kl15 status & plug in charging lamp enable & Charge Indication Driver Status ==0 )** |

**Charging error display (signal tbd):**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **charging error message** | if | **( cluster kl15 status & charging error message enable & CHARGE ERROR STATUS ==? )** |

**Charging remaining time：**

Display Charging remaining time = **Charging Remaining Time；** //需换算成 “小时：分钟”格式，详见UI定义；

If the valid signal is invalid, then display --:--;

### Functional Behaviour

**KL.30 & KL.R**

The picture including charging status/charging error status, clock, electric RTE, SOC and remaining time will display for **key off charging image display period**.

The following picture is an example, for detailed please see HMI.



**KL.15 & KL.50**

The input is monitored and the **plug in charging status lamp** is decided.

### Tell-tale Symbol



### Message

For detail refer to UE

## Charger connection indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **SYSTEM READY STATUS** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |
| **Connect Indication Driver Status** | ***BMSChrgrPlugCnctnIO*** CAN signal from BMS  0x1 open;  0x0 closed; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **charger connection indication lamp** | Illuminate the lamp when TRUE. | **1** | **0 ~ 1** |
| **charger connection ECHO Indication message1** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **charger connection Indication gong** | Audible warning when TRUE | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~charger connection indication lamp check enable~~** | ***~~insChargerConIndiLampCheckEnPrm~~*** ~~Lamp enabled when TRUE.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **charger connection indication lamp enable** | ***insChargerConnectionIndiLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **charger connection Indication Echo message1 ENABLE** | ***insChargerConnectionIndiEchoMes1EnPrm*** Message Warning is enabled when TRUE | **1** | **1** | **0 ~ 1** |
| **charger connection Indication gong ENABLE** | ***insChargerConnectionIndiGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functionality Description

The **charger connection indication lamp** is used to indicate to the driver that the 220V AC charging power cord has been connected to the on-board charger.

When the charger is connected to the 220V AC socket, the switch in **Charger** will be closed, the **Connect Indication Driver Status** will be 0 and **Charger LED** will be illuminated. When the charger is NOT connected to the 220V AC socket, the switch in **Charger** will be open, the **Connect Indication Driver Status**  will be 1 and **Charger LED** will be extinguished.

When charger AC cord connected, **charger connection indication echo message1** and the audible warning are used to remind the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **charger connection indication lamp** | if | **(CLUSTER KL15 STATUS & charger connection indication lamp enable & Connect Indication Driver Status == 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **charger connection indication echo message1** | if | **(CLUSTER KL15 STATUS & charger connection indication echo message1 enable & Connect Indication Driver Status == 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **charger connection Indication gong** | if | **(CLUSTER KL15 STATUS & charger connection indication gong enable & charger connection indication echo message1)** |

### Functional Behaviour

**KL.30 & KL.R**

The **charger connection indication lamp** is controlled directly by exterior switch, and IPK just supply for them.

**KL.15 & KL.50**

The input is monitored and **charger connection indication lamp**, **charger connection indication echo message1, AUDIBLE WARNING GONG1** are decided.

### Tell-tale Symbol



### Dot Matrix Message

For detail refer to UE

## Hybrid System Fault

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **HYBRID SYSTEM FAULT STASTUS** | ***EPTFlt*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |
| **LAMP CHECK STATUS** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **hybrid system fault lamp** | Illuminate the lamp when TRUE. | **1** | **0 ~ 1** |
| **Hybrid system fault echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **AUDIBLE WARNING GONG1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~hybrid system fault lamp check enable~~** | ***~~insHybSysFaultLampCheckEnPrm~~*** ~~Lamp check enabled when TRUE.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **hybrid system fault lamp enable** | ***insHybSysFaultLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **hybrid system fault echo message enable** | ***insHybSysFaultEchoMesEnPrm*** Message enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **Hybrid system fault gong enable** | ***insHybSysFaultGongEnPrm*** Audible warning enabled when TRUE. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **hybrid system fault lamp** is used to show the following faults (TBD):

* ISG inverter fault
* TM inverter fault
* HV Battery fault
* Insulation fault

The **system ready echo message** and **AUDIBLE WARNING GONG1** are used to emphasize the fault to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hybrid system fault lamp** | if | **(cluster kl15 status & hybrid system fault lamp enable & HYBRID SYSTEM FAULT STASTUS)**  **or**  **(cluster kl15 status & hybrid system fault lamp check enable & lamp check status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Hybrid system fault echo message** | if | **(cluster kl15 status & hybrid system fault echo message enable & HYBRID SYSTEM FAULT STASTUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AUDIBLE WARNING GONG1** | if | **(cluster kl15 status & Hybrid system fault gong enable & Hybrid system fault echo message )** |

### Functional Behaviour

**KL.30 & KL.R**

The outputs **Ready lamp**, **ready echo message** and **AUDIBLE WARNING GONG1** are off.

**KL.15 & KL.50**

The inputs are monitored and the status of **Ready lamp**, **ready echo message** and **AUDIBLE WARNING GONG1** are determined.

### Tell-Tale Symbol



### Dot Matrix Messages

For detail refer to UE

## Eco/Normal/Sport Mode Display

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √  See spec | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **MODE SWITCH STATUS** | ***EPTDrvngMdSwSts*** CAN signal  0x0=E-Economy;  0x1=N-Normal;  0x2=S-Sport(M-Mountain);  0x3=H-SOC Hold;  0x4=C-Charge;  **0x5=Eco+(only for EP21)**  0x6~0x7=Reserved. | **3** | **0 ~8** |
| **LAMP CHECK STATUS** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ECono mode lamp** | Illuminate ‘E’ mode indicator lamp when TRUE. | **1** | **0 ~ 1** |
| **normal mode lamp** | Illuminate ‘N’ mode indicator lamp when TRUE. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **normal mode lamp enable** | ***insNLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **E mode LAMP** | if | **(cluster kl15 status & Econo mode lamp enable & MODE SWITCH STATUS ==0x00) or**  **~~(cluster kl15 status & Econo mode lamp check enable & lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **N mode LAMP** | if | **(cluster kl15 status & normal mode lamp enable & MODE SWITCH STATUS ==0x01) or**  **~~(cluster kl15 status & normal mode lamp check enable & lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **S mode LAMP** | if | **(cluster kl15 status & SPORT mode lamp enable & MODE SWITCH STATUS ==0x02)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Eco+ mode LAMP** | if | **(cluster kl15 status & SPORT mode lamp enable & MODE SWITCH STATUS ==0x05)** |

### Functional Behaviour

**KL.30 & KL.R**

The E/N/M mode display is off.

**KL.15 & KL.50**

The inputs are monitored and the status of **econo mode LAMP**, **normal mode LAMP**, **MOUNT Mode lamp** are determined.

### Tell-Tale Symbol

## MOTOR OVERHEATING Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Input and Output Signals

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of**  **bits** | **Value**  **Range**  **(hex)** |
| **Cluster KL15 status** | Cluster Internal signal determined  by KL15HARDWIRED input | **1** | **0 ~ 1** |
| **MOTOR OVERHEATING** | ***EPTMotOvhtdIO*** CAN signal from HCU, 0 = false, 1 = true | **1** | **0 ~ 1** |
| **MOTOR COOLANT FAIL** | ***EPTMotClntFlt*** CAN signal from HCU, 0 = false, 1 = true | **1** | **0 ~ 1** |
| **LAMP CHECK**  **STATUS** | Internal signal from lamp check  function, the lamp check is active  when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **outPUTS** | **Description** | **No of**  **bits** | **Value**  **Range**  **(hex)** |
| **MOTOR coolant fail lamp** | Illuminate the Motor Coolant Fail Lamp when ‘TRUE | **1** | **0 ~ 1** |
| **Motor overheating echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **Motor coolant fail echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **AUDIBLE WARNING GONG1** | Audible warning GONG 1 request  when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Constant Name** | **Description** | **No of**  **bits** | **Initial**  **Value**  **(hex)** | **Value** |
| **~~MOTORTEMP LAMP CHECK ENABLE~~** | ***~~insMOTORTempLampCheckEnPrm~~*** ~~Lamp check enabled when ‘TRUE’.~~ | **~~1~~** | **~~1~~** | **~~0~1~~** |
| **MOTOR TEMP LAMP**  **ENABLE** | ***insMOTORTempEnPrm*** Lamp of red enabled when ‘TRUE’. | **1** | **1** | **0~1** |
| **Motor overheating echo message enable** | ***insMOTOROverheatingEchoMesEnPrm*** Lamp check enabled when ‘TRUE’. | **1** | **1** | **0~1** |
| **Motor coolant fail echo message enable** | ***insMOTORCoolantFailEchoMesEnPrm*** Lamp check enabled when ‘TRUE’. | **1** | **1** | **0~1** |
| **MOTOR TEMP GONG**  **ENABLE** | ***InsMOTORHighTempGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0~1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |

### Functional Description

The **LAMP** is used to indicate to the driver that the e-machine or ISG INVERTER temperature has coolant fail.

When CAN signal ***MotorOverHeating*** is TRUE, the **MOTOR OVERHEATING ECHO MESSAGE** is displayed in LCD.

When CAN signal ***MotorCoolantFail*** is TRUE, the lamp is illuminated and the **MOTOR COOLANT FAIL ECHO MESSAGE** is displayed in LCD.

**The WARNING GONG1** is used to emphasis the status to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MOTOR overheating LAMP RED**  **(ON)** | if | **(CLUSTER KL15 STATUS & MOTOR HIGH TEMP LAMP ENABLE & MOTOR OVERHEATING)**  **OR**  **(CLUSTER KL15 STATUS & MOTOR HIGH TEMP LAMP ENABLE & LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MOTOR OVERHEATING ECHO MESSAGE** | if | **(CLUSTER KL15 STATUS & MOTOR OVERHEATING ECHO MESSAGE ENABLE & MOTOR OVERHEATING)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MOTOR COOLANT FAIL ECHO MESSAGE** | if | **(CLUSTER KL15 STATUS & MOTOR COOLANT FAIL ECHO MESSAGE ENABLE & MOTOR COOLANT FAIL)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AUDIBLE WARNING GONG1** | if | **CLUSTER KL15 STATUS & (MOTOR OVERHEATING ECHO MESSAGE // MOTOR COOLANT FAIL ECHO MESSAGE) & MOTOR TEMP GONG ENABLE** |

### Functional Behavior By Ignition Status

**KL.30**

The outputs **TEMP LAMP, AUDIBLE WARNING GONG1** are off.

**KL.R**

The outputs **ISG TEMP LAMP, AUDIBLE WARNING GONG1** are off.

**KL.15(CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the outputs **ISG TEMP LAMP, MOTOR OVER HEATING ECHO MESSAGE, MOTOR COOLANT FAIL ECHO MESSAGE AUDIBLE WARNING GONG1** are determined.

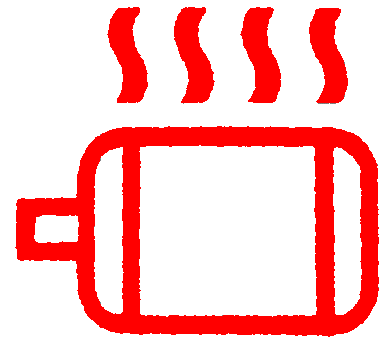
**KL.50**

The inputs are monitored and the status of the outputs **ISG TEMP LAMP, MOTOR OVER HEATING ECHO MESSAGE, MOTOR COOLANT FAIL ECHO MESSAGE, AUDIBLE WARNING GONG1** are determined.

No values are to written to EEPROM during KL50.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



### Dot Matrix Message

For detail refer to UE

## Low SOC Warning Lamp

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **hv battery soc** | ***BMSPackSOCDsp*** CAN signal of SOC data from HCU ECU. In 0.1bit without offset. | **10** | **0 ~ 1024** |
| **hv battery soc Valid** | ***BMSPackSOCDspV*** validity of CAN signal BMSPackSOC  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **LOW SOC WARNING LAMP** | Illuminate the lamp when TRUE. | **1** | **0 ~ 1** |
| **SOC SEGMENT 1 FLASH** | Flash when the bottom segment of SOC starts to flash. The same frequency with the Flash bottom segment of SOC gauge. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **soc segment 1 flash enable** | ***insSocSeg1FlashEnPrm*** SOC segment 1 flash enable when TRUE | **1** | **1** | **0 ~ 1** |
| **soc yellow indication lamp enable** | ***insSocYelLampEnPrm*** SOC yellow indication lamp enable when TRUE. | **1** | **1** | **0 ~ 1** |
| **soc display hysteresis** | ***InsSocDisplayHysPrm*** the value of SOC, below any segment threshold, that is required to extinguish the segment after it has been illuminated, in 1%/bit | **4** | **3** | **0 ~ 15%** |
| **LOW SOC LAMP ON THRESHOLD** | ***insLowSOCOnThrePrm*** low SOC lamp on threshold, in 1%/bit | **8** | **AS24/IP34**  **B (11%)**  **AS26/EP21**  **19(25%)** | **0 ~ 100%** |
| **LOW SOC LAMP FLASH THRESHOLD** | ***insLowSOCFlashThrePrm*** low SOC lamp flash threshold, in 1%/bit | **8** | **AS24/IP34**  **6 (6%)**  **AS26/EP21**  **0A(10%)** | **0 ~ 100%** |

### Functional Description

The **LOW SOC LAMP** is used to indicate to the driver that the soc level is low. The **LOW SOC LAMP** has two thresholds, for low SOC lamp on and SOC lamp flash.

Once the **SOC yellow indication lamp** has beenextinguished, it can only be constantly on when the value of SOC falls below the **LOW SOC LAMP ON THRESHOLD** by lower than **soc display hysteresis**.

Once the **SOC yellow indication lamp** has been constantly on, it can only be flashed when the value of SOC falls below the **LOW SOC LAMP FLASH THRESHOLD** by lower than **soc display hysteresis**.

In other words, since its flash condition is the same with condition for the bottom segment of SOC to flash, so **SOC yellow indication lamp** should flash at the same time with the same frequency when the bottom segment of SOC starts to flash, and stop flash when the bottom segment of SOC stops flash.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **soc yellow indication lamp (ON)** | if | **(Cluster KL15 status & soc yellow indication lamp enable & HV BATTERY SOC< (LOW SOC LAMP ON THRESHOLD - soc display hysteresis) )**  **note:** It need consider **soc display hysteresis.** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **soc yellow indication lamp (flash at 0.5Hz; 1 sec on, 1 sec off )** | if | **(CLUSTER KL15 STATUS & soc yellow indication lamp enable & HV BATTERY SOC< (LOW SOC LAMP FLASH THRESHOLD - soc display hysteresis) )**  **note:** It need **consider soc display hysteresis.** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **segment 1**  **(flash at 0.5Hz; 1 sec on, 1 sec off )** | if | **CLUSTER KL15 STATUS & SOC SEGMENT 1 FLASH ENABLE** |

**Illustration of Low SOC Lamp & SOC segment 1 Flash**



Note: That the OFF half cycle is to be first.

### Functional Behaviour

**KL.30 & KL.R**

The function is not active.

**KL.15 & KL.50**

When KL.15 is first true, SOC meter should sweep if configured to do so by **SOC sweep enable.** The duration of the SOC sweep from segment 1 to 8 is **sweep time**. The sweep should pause at max for **sweep pause time.** The duration of the tacho sweep from 8 to 1 is **sweep time**. Then calculate and illuminate the related segments according to the current value of **hv battery soc**.

## HVBattery Fault Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **HVBATTERY FAULT** | ***BMSFltIndReq*** CAN signal from HCU  0x0= off  0x1= continuous  0x2= flash  0x3= Reserved | **2** | **0 ~ 3** |
| **LAMP CHECK STATUS** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Hvbattery fault lamp** | Illuminate ‘E’ mode indicator lamp when TRUE. | **1** | **0 ~ 1** |
| **HVbattery fault echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **hvbattery fault lamp enable** | ***insHVBatteryFaultLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **hvbattery fault echo message enaBle** | ***InsHVBatteryFaultEhcoMesEnPrm*** Message enabled when TRUE | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **HVBATTERY fAULT audible warning enable** | ***insHVBatteryFaultAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **HVBATTERY FAULT ECHO MESSAGE** is used to indicate the driver that a fault exists in the HVBattery. The **AUDIBLE WARNING GONG1** is used to emphasise the fault to the driver. The message is displayed in the dot-matrix LCD for **ECHO MESSAGE PERIOD**. The echo message is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY FAULT LAMP on** | if | **(cluster kl15 status & HVBATTERY FAULT lamp enable & HVBATTERY FAULT == 1 ) or** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY FAULT LAMP Flash** | if | **(cluster kl15 status & HVBATTERY FAULT lamp enable & HVBATTERY FAULT == 2 )** |

Notes: flash at 2Hz, 0.25 sec off, 0.25 sec on, and ‘off’ first, which is the same with ‘DSC’ lamp flash.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY FAULT ehco message** | if | **cluster kl15 status & HVBATTERY FAULT ehco message enaBle & HVBATTERY FAULT == 1.** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **HVBATTERY FAULT message & HVBATTERY faULT audible warning enable** |

BMSFltIndReq

### Functional Behaviour

**KL.30**

The outputs **HVBATTERY fAULTl LAMP, HVBATTERY fAULTl message** and **Audible warning gong1** are off.

**KL.R**

The outputs **HVBATTERY fAULTl LAMP,** **HVBATTERY faUlT message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **HVBATTERY fAULTl LAMP, HVBATTERY faUlT message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **HVBATTERY fAULTl LAMP,** **HVBATTERY faUlT message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is red in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## HVBattery Shutoff Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **HVBATTERY SHUTOFF** | ***HVBatShutOff*** CAN signal from HCU  0 = false, 1 = true | **1** | **0 ~ 1** |
| **LAMP CHECK STATUS** | Internal signal from lamp check function, the lamp check is active when ‘TRUE’. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Hvbattery shutoff lamp** | Illuminate ‘E’ mode indicator lamp when TRUE. | **1** | **0 ~ 1** |
| **HVbattery shutoff echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~hvbattery shutoff lamp check enable~~** | ***~~insHVBatteryShutoffLampCheckEnPrm~~*** ~~Lamp check enabled when TRUE.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **hvbattery shutoff lamp enable** | ***insHVBatteryShutoffLampEnPrm*** Lamp enabled when TRUE. | **1** | **1** | **0 ~ 1** |
| **hvbattery shutoff echo message enaBle** | ***InsHVBatteryShutoffEhcoMesEnPrm*** Message enabled when TRUE | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **HVBATTERY shutoff audible warning enable** | ***insHVBatteryShutoffAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **HVBATTERY SHUTOFF ECHO MESSAGE** is used to indicate the driver that the HVBattery is shut off. The **AUDIBLE WARNING GONG1** is used to emphasise the fault to the driver. The message is displayed in the dot-matrix LCD for **ECHO MESSAGE PERIOD**. The echo message is inhibited until the **READY SYSTEM FLAG** is TRUE. The status of the echo message prior to **READY SYSTEM FLAG** being

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY shutoff LAMP** | if | **(cluster kl15 status & HVBATTERY shutoff lamp enable & HVBATTERY SHUTOFF) or**  **~~(cluster kl15 status & HVBATTERY shutoff lamp check enable & lamp check status)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY shutoff ehco message** | if | **cluster kl15 status & HVBATTERY shutoff ehco message enaBle & HVBATTERY SHUTOFF.** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **HVBATTERY shutoff message & HVBATTERY shutoff audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **HVBATTERY shutoff LAMP, HVBATTERY shutoff message** and **Audible warning gong1** are off.

**KL.R**

The outputs **HVBATTERY shutoff LAMP,** **HVBATTERY shutoff message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **HVBATTERY shutoff LAMP, HVBATTERY shutoff message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **HVBATTERY shutoff LAMP,** **HVBATTERY shutoff message** and **Audible warning gong1** are determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning LED is yellow in colour with a dominant wavelength of 630 +/- 7 nm and should deliver a luminance of at least 60 cd/m2.

### Messages

For detail refer to UE

## Regen Level Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **regen level** | ***EPTRgtnLvl*** Currently selected regen level indication  0x0=Low/Weak;  0x1=Standard/Moderate;  0x2=High/Aggressive;  0x3=Reserved; | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **regen level display** | Regen level to be displayed in dot-matrix display. |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **regen level ENABLE** | ***insRgtnLvEnPrm*** regen level display enabled when true | **1** | **1** | **0 ~ 1** |
| **regen level message enalbe** | ***insRgtnLvMesEnPrm*** regen level display enabled when true | **1** | **1** | **0 ~ 1** |

### Functional Description

Regen level is used to display the level of regeneration of the vehicle. It has three levels, Low(Weak), Standard(Moderate), High(Aggressive).

The detailed display effect refer to HMI.

Besides it is with message to inform customer:

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **regen level weak message** | if | **cluster kl15 status & regen level enaBle & regen level == 10** |
| **regen level moderate message** | if | **cluster kl15 status & regen level enaBle & regen level == 01 or 21** |
| **regen level aggressive message** | if | **cluster kl15 status & regen level enaBle & regen level == 12** |

## Lights On (Sidelight) & Front Fog & Rear Fog Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √  No Front Fog | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Sidelights status** | ***VehSideLghtSts*** CAN signal from SMU for sidelight on status:  0= no side light on.  1= left side light on only.  2= right side light on only.  3= all side light and license plate light on. | **2** | **0 ~ 3** |
| **front fog status** | ***FrtFogLghtOn*** CAN signal from SMU for front fog on status. | **1** | **0 ~ 1** |
| **rear fog status** | ***RrFogLghtOn*** CAN signal from SMU for rear fog on status. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Light on LAMP** | Illuminate the Lights on Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **front fog LAMP** | Illuminate the Front Fog Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **rear fog LAMP** | Illuminate the Rear Fog Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **sidelights on echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **front fog on echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **rear fog on echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **LightS on LAMP Enable** | ***insLoWLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **front fog Lamp enable** | ***insFrFogLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **rear fog lamp enable** | ***insRrFogLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **sidelights on echo message enable** | ***insSideLightOnEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **front fog on echo message enable** | ***insFrFogOnEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **rear fog on echo message enable** | ***insReFogOnEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **3** | **0~15** |

### Functional Description

The **LIGHTS ON LAMP** is used to indicate to the driver that the sidelights are ON. The **LIGHTS ON LAMP** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **LIGHTS ON LAMP** | if | **(Cluster KL15 status && LightS on LAMP ENABLE && sidelights status == 3) OR**  **(CLUSTER KL15 STATUS && LightS on LAMP ENABLE && LightS on LAMP CHECK ENABLE && LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **sidelights on echo Message** | if | **(Cluster KL15 status && sidelights status == 3 && sidelights on echo message enable)** |

The **FRONT FOG LAMP** is used to indicate to the driver that the Front Fog lamps are ON. The **FRONT FOG LAMP** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **FRONT FOG LAMP** | if | **(CLUSTER KL15 STATUS && FRONT FOG LAMP ENABLE && FRONT FOG STATUS ) OR**  **(CLUSTER KL15 STATUS && FRONT FOG LAMP ENABLE && FRONT FOG LAMP CHECK ENABLE && LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **front fog on echo message** | if | **(Cluster KL15 status && front fog status && front fog on echo message enable)** |

The **REAR FOG LAMP** is used to indicate to the driver that the Rear Fog lamps are ON. The **REAR FOG LAMP** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **REAR FOG LAMP** | if | **(CLUSTER KL15 STATUS && REAR FOG LAMP ENABLE && REAR FOG STATUS ) OR**  **(CLUSTER KL15 STATUS && REAR FOG LAMP ENABLE & REAR FOG LAMP CHECK ENABLE && LAMP CHECK STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **rear fog on echo message** | if | **(Cluster KL15 status && rear fog status && rear fog on echo message enable)** |

### Functional Behaviour

KL.30

The outputs are off.

KL.R

The outputs are off.

KL.15 (Cluster KL15 status)

The inputs are monitored and the statuses of the outputs are determined.

KL.50

The inputs are monitored and the statuses of the outputs are determined.

### Tell-tale Symbol

The Light on lamp symbol to be illuminated on the dial face is as follows:



The front fog lamp symbol to be illuminated on the dial face is as follows:



The rear fog symbol to be illuminated on the dial face is as follows:



### Message

For detail refer to UE

## Auto Mainbeam On Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | x | √ | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **cluster power mode status**  **(KL.R)** | Internal signal to indicate the vehicle in ‘Acc’ status. | **1** | **0~1** |
| **Auto Main Beam Lght Request** | ***AutoMainBeamLghtReq*** CAN signal from SMU that the Auto Main Beam lamps are ON when ‘TRUE’.  0x0 = No request  0x1 = request ON from camera  0x2 = request OFF from camera  0x3 =cannot detected the environment | **2** | **0 ~ 3** |
| **~~Auto Main Beam system fail~~** | ***~~Xxx TBD~~*** |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **auto main beam lamp** | Illuminate the Auto Main Beam Warning Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **AUTO main beam echo Message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **auto main beam lamp enable** | ***insAutoMBeamLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **AUTO main beam echo message enable** | ***insAutoMBeamEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **AUTO main beam Lamp** is used to indicate to the driver that the Auto Main Beam headlamps are ON. The **AUTO main beam Lamp** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**. In order to avoid nuisance displays for example when the symbol are shortly flashed as a warning signal to other drivers, the CAN status has to be on for 2 seconds before getting the popup && gong (avoid nuisance displays)

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **auto main beam lamp** | if | **( (Cluster KL15 status or cluster power mode status==!off) && auto main beam lamp enable && Auto Main beam status ==1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AUTO main beam echo Message** | if | **(Cluster KL15 status && AUTO main beam Status TRUE>=2 SECOND && AUTO main beam echo message enable)** |

### Functional Behaviour

**KL.30**

The outputs **AUTO main beam Lamp** and the **AUTO main beam echo message** are off.

**KL.R**

The inputs are monitored and the status of the outputs **AUTO main beam Lamp** is determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **AUTO main beam Lamp** and the **AUTO main beam echo message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **AUTO main beam Lamp** and the **AUTO main beam echo message** are determined.

### Tell-Tale Symbol

Please refer to HMI Specification(UE)

### Message

Please refer to HMI Specification(UE).

## SOC Management Indication

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **SOC Mode Switch Status** | ***EPTSOCMdSwSts*** CAN message from HCU to indicate the SOC management mode:  0x0=default;  0x1=SOC Hold;  0x2=SOC Charge;  0x3~0x7=Reserved. | **3** | **0 ~ 7** |
| **EPT Info Display** | ***EPTInfoDsp*** CAN signal from HCU for some message display: see below 5.44.3 | **5** | **0 ~ 31** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **SOC mode display** | SOC management mode to be displayed in dot-matrix display. |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **soc mode ENABLE** | ***insSOCMdEnPrm*** regen level display enabled when true | **1** | **1** | **0 ~ 1** |
| **soc mode message enable** | ***insSOCMdMesEnPrm*** regen level display enabled when true | **1** | **1** | **0 ~ 1** |

### Functional Description

SOC management mode is used to display the mode of SOC management.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **soc auto echo message** | if | **( Cluster KL15 status && soc mode message enable && SOC Mode Switch Status ==1/20 && EPT Info Display!=5)** |
| **SOC Hold echo message** | if | **( Cluster KL15 status && soc mode message enable && SOC Mode Switch Status ==0/21 && EPT Info Display!=6)** |
| **soc charge echo message** | if | **( Cluster KL15 status && soc mode message enable && SOC Mode Switch Status ==0/12 && EPT Info Display!=7)** |

// 避免每次上电都提醒message，故采用跳变触发；

## Direct TPMS

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| **iTPMS** | **dTPMS** | | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **front left tyre pressure** | ***FLTirePrs*** CAN signal from TPMS, scale 4, unit kpa; | **7** | **0 ~ 127** |
| **front left tyre pressure valid** | ***FLTirePrsV*** CAN signal from TPMS,  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **front left tyre pressure status** | ***FLTireSts*** CAN signal from TPMS  0=Normal;  1=Unknown;  2=Presuure Low;  3=Quick Leak;  4=Pressure High;  5=Temperature High;  6=Axie Pressure imbalance;  7=Battery low; | **3** | **0 ~ 7** |
| **front left tyre temperature** | ***FLTireTem*** CAN signal from TPMS, scale 2, offset -60, unit ℃; | **7** | **0~ 127** |
| **front left tyre temperature valid** | ***FLTireTemV*** CAN signal from TPMS  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **front right tyre pressure** | ***FRTirePrs*** CAN signal from TPMS, scale 4, unit kpa; | **7** | **0 ~ 127** |
| **front right tyre pressure valid** | ***FRTirePrsV*** CAN signal from TPMS,  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **front right tyre pressure status** | ***FRTireSts*** CAN signal from TPMS  0=Normal;  1=Unknown;  2=Presuure Low;  3=Quick Leak;  4=Pressure High;  5=Temperature High;  6=Axie Pressure imbalance;  7=Battery low; | **3** | **0 ~ 7** |
| **front right tyre temperature** | ***FRTireTem*** CAN signal from TPMS, scale 2, offset -60, unit ℃; | **7** | **0~ 127** |
| **front right tyre temperature valid** | ***FRTireTemV*** CAN signal from TPMS  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **rear left tyre pressure** | ***RLTirePrs*** CAN signal from TPMS, scale 4, unit kpa; | **7** | **0 ~ 127** |
| **rear left tyre pressure valid** | ***RLTirePrsV*** CAN signal from TPMS,  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **rear left tyre pressure status** | ***RLTireSts*** CAN signal from TPMS  0=Normal;  1=Unknown;  2=Presuure Low;  3=Quick Leak;  4=Pressure High;  5=Temperature High;  6=Axie Pressure imbalance;  7=Battery low; | **3** | **0 ~ 7** |
| **rear left tyre temperature** | ***RLTireTem*** CAN signal from TPMS, scale 2, offset -60, unit ℃; | **7** | **0~ 127** |
| **rear left tyre temperature valid** | ***RLTireTemV*** CAN signal from TPMS  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **rear right tyre pressure** | ***RRTirePrs*** CAN signal from TPMS, scale 4, unit kpa; | **7** | **0 ~ 127** |
| **rear right tyre pressure valid** | ***RRTirePrsV*** CAN signal from TPMS,  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **rear right tyre pressure status** | ***RRTireSts*** CAN signal from TPMS  0=Normal;  1=Unknown;  2=Presuure Low;  3=Quick Leak;  4=Pressure High;  5=Temperature High;  6=Axie Pressure imbalance;  7=Battery low; | **3** | **0 ~ 7** |
| **rear right tyre temperature** | ***RRTireTem*** CAN signal from TPMS, scale 2, offset -60, unit ℃; | **7** | **0~ 127** |
| **rear right tyre temperature valid** | ***RRTireTemV*** CAN signal from TPMS  0=valid; 1=invalid | **1** | **0 ~ 1** |
| **TPMS Tire Pressure Low Indication On** | ***TPMSTirePrsLowIO*** CAN signal from TPMS,  0=false, 1=true; | **1** | **0 ~ 1** |
| **TPMS winter mode active** | ***TPMSWntrMdA*** CAN signal from TPMS,  0=false, 1=true; | **1** | **0 ~ 1** |
| **TPMS Identification Learn Complete** | ***TPMSIdficnLrnCm*** CAN signal from TPMS,  0=false, 1=true; | **1** | **0 ~ 1** |
| **TPMS failed** | ***TPMSF*** CAN signal from TPMS,  0=false, 1=true; | **1** | **0 ~ 1** |
| **TPMS Auto Location Complete** | ***TPMSAutoLoctnCm*** CAN signal from TPMS,  0=false, 1=true; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **tpms Lamp** | Illuminate the yellow TPMS lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **tpms warn echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **tpms system Fail echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **front left tyre pressure** | Tyre Pressure in LCD |  |  |
| **front left tyre temperature** | Tyre temperature in LCD |  |  |
| **front left tyre pressure status** | Tyre pressure status in LCD |  |  |
| **front right tyre pressure** | Tyre Pressure in LCD |  |  |
| **front right tyre temperature** | Tyre temperature in LCD |  |  |
| **front right tyre pressure status** | Tyre Pressure status in LCD |  |  |
| **rear left tyre pressure** | Tyre Pressure in LCD |  |  |
| **rear left tyre temperature** | Tyre temperature in LCD |  |  |
| **rear left tyre pressure status** | Tyre Pressure status in LCD |  |  |
| **rear right tyre pressure** | Tyre Pressure in LCD |  |  |
| **rear right tyre temperature** | Tyre temperature in LCD |  |  |
| **rear right tyre pressure status** | Tyre Pressure status in LCD |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **tpms Lamp enable** | ***insTPMSFailEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **TPMS echo message enable** | ***insTPMSEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **TPMS gong enable** | ***insTPMSGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **tpms type** | ***insTPMSTypePrm***  0=no TPMS  1= indirect TPMS  2=direct TPMS | **2** | AS24/EP21=2, IP34=1 | **0 ~ 3** |
| **Vehicle PROJECT** | ***insProjectsPrm*** the Vehicle platform:  0x0=IP3X;  0x1=AS2X;  0x2=IS12 Major;  0x3=EP21;  0x4--0x7= Reserved; | **3** | IP34=0  AS24=1  EP21=3 | **0 ~ 7** |
| **tpms Identification Learn message enable** | ***insTPMSIdLearnMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **TPMS winter mode active message enable** | ***insTPMSWinModeAMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tpms auto location message enable** | ***insTPMSAutoLocaMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tpms temperature display enable** | ***insTPMSTempDisEnPrm*** temperature display enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tyre pressure low message enable** | ***insTyrePresLowMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tyre quick leak message enable** | ***insTyreQuickLeakMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tyre pressure high message enable** | ***insTyrePresHighMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **tyre temperature high message enable** | ***insTyreTempHighMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **sensor battery low message enable** | ***insSenBatLowMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |
| **axie pressure unbalance message enable** | ***insAxiePresUnbalMesPrm*** Message enabled when ‘TRUE’. | **1** | AS24/EP21=1,IP34=0 | **0 ~ 1** |

### Functional Description

The TPMS lampis used to indicate to the driver the status of the Tyre Pressure Monitoring System. The **tpms echo message** is used to emphasise the status to the driver. The message is displayed in the LCD for **echo message period**.

As this is a safety related system, the default value of **TPMS failed** is 1 i.e. should the CAN signal be missing the yellow lamp is illuminated.

**1, Telltale:**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms Lamp**  **(ON)** | if | **CLUSTER KL15 STATUS && TPMS LAMP ENABLE &&**  **(TPMS Tire Pressure Low Indication On OR (TPMS FAILED for TIME > 90 SEC)) && tpms type=2** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms Lamp**  **(flash at 0.5 hz)** | if | **CLUSTER KL15 STATUS && TPMS LAMP ENABLE && (TPMS FAILED for TIME <= 90 SEC) && tpms type=2** |

**2, Pop Message:**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms system fail echo message** | if | **CLUSTER KL15 STATUS && TPMS failed && TPMS echo message enable && tpms type=2** |

“胎压监测系统故障，请检修” with TPMS symbol;

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tpms Identification Learn message** | if | **CLUSTER KL15 STATUS && TPMS Identification Learn Complete=0 && tpms Identification Learn message enable && tpms type=2** |

“胎压监测系统传感器学习中”

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TPMS winter mode active message** | if | **CLUSTER KL15 STATUS && TPMS winter mode active && TPMS winter mode active message enable && tpms type=2** |

“胎压监测系统进入冬季模式”

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TPMS Auto Location message** | if | **CLUSTER KL15 STATUS && TPMS Auto Location Complete=0 && TPMS Auto Location message enable && tpms type=2** |

“胎压监测系统传感器自学习中”

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **( (message when XX tyre pressure status >=2) // tpms system fail echo message) && tpms gong enable && tpms type=2** |

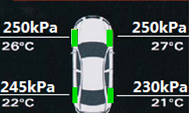
**3, TC Page：**

**Tyre Pressure Display (as a TC page):**

When **tpms type=2,** the tyre pressures will be displayed beside each corresponding tyre position such as the picture below.

**Tyre Temperature Display (as a TC page):**

When **tpms type=2 && tpms temperature display enable =1,** he Tyre temperatures will be displayed beside each corresponding tyre position such as the picture below.



Note:

1, the default unit should be “bar” and “℃”.

2, when the pressure/temperature valid signal is 1(invalid), then it should display “-.- bar” or “---℃”.

3, when WINTER MODE ACTIVE is TRUE then he pressure/temperature should display “-.- bar” or “---℃”.

4, when **tpms type != 2,** the TC page of direct TPMS should not display;

5, the vehicle picture should be in accordance with the parameter **Vehicle PROJECT.**

**4, Tyre Pressure Status Display:**

|  |  |  |
| --- | --- | --- |
| **front left tyre pressure status** | **corresponding EEPROM parameters** | **display** just example, for detail see HMI Spec |
| 0=Normal; | ***insTPMSTypePrm==2*** | 1, TC page: display as below:    2, no pop message |
| 1=Unknown; | ***insTPMSTypePrm==2*** | 1, TC page: pressure display “-.- bar”    2, no pop message; |
| 2=Presuure Low; | ***insTyrePresLowMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: display ”左前轮胎气压低，请增至XXX” with a symbol (see HMI). |
| 3=Quick Leak; | ***insTyreQuickLeakMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: display ”左前轮胎快速漏气，请检修” with a symbol (see HMI). |
| 4=Pressure High; | ***insTyrePresHighMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: display ”左前轮胎压高，请降至XXX” with a symbol (see HMI). |
| 5=Temperature High; | ***insTyreTempHighMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: display ”左前轮胎温高，请进行降温处理” with a symbol (see HMI). |
| 6=Axie Pressure imbalance; | ***insAxiePresUnbalMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: display ”前轴胎压不平衡，请勿高速行驶” with a symbol (see HMI). |
| 7=Battery low; | ***insSenBatLowMesPrm==1 && insTPMSTypePrm==2*** | 1, TC page: the corresponding tyre and pressure display refer to UI.    2, pop message: ”左前传感器电量低，请更换” with a symbol (see HMI). |

For FR/RL/RR tyre status display can refer to the FL tyre status display.

Especially for RF/RR tyre status display, when pressure status=6(axie pressure imbalance), the message should display “后轴胎压不平衡，请勿高速行驶”.

When

### Functional Behaviour

**KL.30**

The outputsare off.

**KL.R**

The outputsare off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputsare determined.

**KL.50**

The inputs are monitored and the status of the outputsare determined.

### Tell-Tale Symbol

The symbol to be illuminated on the dial face is as follows:



The warning is yellow with a dominant wavelength of 590 +/- 4 nm and should deliver a luminance of at least 60cd/m2.

### Message

see HMI Spec.

## Warning Info Lamp

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **warning info lamp request** | Internal signal, true when any warning info exists in Tab “Warning List”. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **warning info lamp** | Illuminate the Warning Info Lamp when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **warning info lamp enable** | ***insWarningInfoLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **warning info lamp** | if | **( Cluster KL15 status && warning info lamp enable && warning info lamp request )** |

### Functional Behaviour

**KL.30**

The output **warning info lamp** is off.

**KL.R**

The output **warning info lamp** is off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the output **warning info lamp** is determined.

**KL.50**

The inputs are monitored and the status of the output **warning info lamp** is determined.

### Tell-Tale Symbol

Please refer to HMI Specification(UE)

## Electric Motor Fail Lamp

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **electricmotor fail** | ***ElecMotFltIO*** CAN signal from HCU  0 = false, 1 = true | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **electric motor fail lamp** | Illuminate the Warning Info Lamp when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **electric motor fail lamp enable** | ***insElecMoFailLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **warning info lamp** | if | **( Cluster KL15 status && electric motor fail lamp enable && electricmotor fail )** |

说明：混动车点亮该报警灯，看的信号是***EPTInfoDsp***=0x18,详见5.44章节***。***

### Tell-Tale Symbol

Please refer to HMI Specification(UE)



## TCCM Active&&Fault Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | √ | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **tccm active indication** | ***TrnsfCaseMdAIO*** CAN signal from HCU  0 = false, 1 = true | **1** | **0 ~ 1** |
| **tccm FAULT INDICATION** | ***TrnsfCaseNonEmsnRltdMA*** CAN signal from HCU 0 = false, 1 = true | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **tccm yellow lamp** | Illuminate the Warning Info Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **tccm green lamp** | Illuminate the Warning Info Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **tccm active message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **tccm fault message** | Warning in LCD when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **tccm yellow lamp enable** | ***InsTCCMYelLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **tccm Green lamp enable** | ***InsTCCMGreLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **tccm active echo message enable** | ***insTCCMActiveEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **tccm fault echo message enable** | ***insTCCMFaultEchoMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **TCCM gong enable** | ***insTCCMGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **tccm yellow lamp** | if | **(Cluster KL15 status && tccm yellow lamp enable && tccm FAULT INDICATION==1 )** |
| **FORMULA** | | |
| **tccm green lamp** | if | **(Cluster KL15 status && tccm green lamp enable && tccm mode FAULT INDICATION==0 && tccm active indication==1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **TCCM active echo message** | if | **(cluster kl15 status && tccm active && tccm active echo message enable)** |
| **FORMULA** | | |
| **TCCM fault echo message** | if | **(cluster kl15 status && TCCM fault status && tccm fault echo message enable &&system ready flag)** |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(TCCM fault echo message && TCCM gong enable)** |

### Tell-Tale Symbol

Please refer to HMI Specification(UE)

## Ibooster Indication----signal interface need confirmed again

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | √ | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **ibooster warning indication** | ***IbstrWrnngIO*** CAN signal from EHBS  0x0=NoIBLamp 0x1=IBLampactive | **1** | **0 ~ 1** |
| **esp warning request** | ***ESPWrnngReq*** CAN signal from SCS  0x0 No request 0x1 yellow request 0x2 red request 0x3 not available | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ibooster yellow lamp** | Illuminate the yellow Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **ibooster red lamp** | Illuminate the red Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **ibooster not available message** | Illuminate the message when TRUE | **1** | **0 ~ 1** |
| **ibooster fault message** | Illuminate the message when TRUE | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ibooster yellow lamp enable** | ***InsIBYelLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ibooster red lamp enable** | ***InsIBRedLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ibooster not available message enable** | ***InsIBYelLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ibooster fault message enable** | ***InsIBRedLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ibooster gong enable** | ***insIBGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ibooster yellow lamp** | if | **(Cluster KL15 status && ibooster yellow lamp enable &&**  **(ibooster warning indication==0 && esp warning request==1)**  **or**  **(ibooster warning indication==1 && esp warning request==0)**  **)** |
| **FORMULA** | | |
| **ibooster red lamp** | if | **(Cluster KL15 status && ibooster red lamp enable**  **&&**  **(esp warning request==2/3)**  **or**  **(ibooster warning indication==1 && esp warning request==1)**  **)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ibooster not available echo Message** | if | **Cluster KL15 status && READY SYSTEM FLAG && ibooster not available message enable &&** |

//智能电子真空系统不可用；——tbd？

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ibooster fault echo Message** | if | **Cluster KL15 status && ((Brake Fluid STATUS && brake fluid status validity = 0) or EBD STATUS) && READY SYSTEM FLAG && brake System echo message enable** |

//智能电子真空系统故障，请维修！——tbd？

### Tell-Tale Symbol

Please refer to HMI Specification (UE).



## Second Row Seatbelt Reminder

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | √ | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Fasten Second Row Left Seatbelt Indication** | ***FasnSecRowLSbltIndCmd*** CAN signal from SDM  0x0=Off Indication; 0x1=On Indication; 0x2=Flashing Indication; | **2** | **0 ~ 3** |
| **Fasten Second Row Middle Seatbelt Indication** | ***FasnSecRowMidSbltIndC*** CAN signal from SDM  0x0 No request 0x1 yellow request 0x2 red request 0x3 not available | **2** | **0 ~ 3** |
| **Fasten Second Row Right Seatbelt Indication** | ***FasnSecRowMidSbltIndC*** CAN signal from SDM  0x0 No request 0x1 yellow request 0x2 red request 0x3 not available | **2** | **0 ~ 3** |
| **Fasten Seatbelt Audible Reminder** | ***FasnSbltAudRmndr*** CAN signal from SDM  0x0=False; 0x1=True; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Second Row Left Seatbelt lamp** | Illuminate Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Second Row middle Seatbelt lamp** | Illuminate Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Second Row right Seatbelt lamp** | Illuminate Lamp when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **fasten second row seatbelt message** | Illuminate the message when TRUE | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **second row seatbelt lamp enable** | ***InsSecRowSeatbeltLampEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **second row seatbelt message enable** | ***InsSecRowSeatbeltMesEnPrm*** Lamp enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **second row seatbelt gong enable** | ***insSecRowSeatbeltGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **Seat belt reminder period** | ***insSBeltRemPeriodPrm*** The duration, in seconds, for which the seat belt reminder gong is given.  0 ~ FE = 0 ~ 254 seconds.  FF = no limit. | **8** | **5A** | **0~255** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Second Row Left Seatbelt lamp**  **on** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row Left Seatbelt Indication ==1)** |
| **Second Row middle Seatbelt lamp**  **on** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row middle Seatbelt Indication ==1)** |
| **Second Row right Seatbelt lamp**  **on** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row right Seatbelt Indication ==1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Second Row Left Seatbelt lamp**  **flash** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row Left Seatbelt Indication ==2)** |
| **Second Row middle Seatbelt lamp**  **flash** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row middle Seatbelt Indication ==2)** |
| **Second Row right Seatbelt lamp**  **flash** | if | **(Cluster KL15 status && second row seatbelt lamp enable &&**  **Fasten Second Row right Seatbelt Indication ==2)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **second row seatblet echo Message** | if | **Cluster KL15 status && Fasten Second Row Left /middle/right Seatbelt Indication ==2** |

//text“请后排系好安全带！”，配图根据实际信号显示哪几个未系；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1**  **(repeated)** | if | **(second row left/middle/right seat belt LAMP (flash) && (time < Seat belt reminder period) && second row seatbelt gong enable)** |

### Tell-Tale Symbol

Please refer to HMI Specification (UE).

# Warnings without Telltales/Symbols

Warnings that are NOT supported by tell-tales/symbols shall operate in the following manner:

1. If configured to do so in E2PROM, a pop-up message is displayed in the display for a time also configurable in E2PROM (this duration is the same as that for echo messages).
2. Should multiple warnings exist, their pop-up messages are to be displayed in the order that the events occurred.
3. ~~The pop-up message for each warning fills the ‘Main Zone’ of the display, see section 13.2.~~
4. If the input conditions for a pop-up change so that they are no longer true before the message is displayed then the message is cancelled.
5. ~~The pop-up message for each warning is displayed once only unless it is a ‘repeat-on-shutdown’ message, in which case it is displayed for a second time at~~ **~~Cluster KL15 status~~** ~~off.~~
6. Pop-up messages and telltales are prevented from being displayed until ‘**ECHO MESSAGE INHIBIT PERIOD**’ after KL15 On.
7. ~~Once all pop-ups have been displayed once, all warnings that have static warnings defined shall display the static warning in the order of their assigned priority, the highest priority being 1.~~
8. ~~For static warnings,~~
   1. ~~There are four types: door open (highest priority), red static warnings, Tyre low and yellow static warnings (lowest priority). For example, the four types all exist, the frist static warning page is for door open. Then the following second page is for red until all red static warnings are displayed, if one page is not enough more pages will be used. At last, like red, yellow static warnings are displayed totally.~~
   2. ~~Whenever possible, static warnings are displayed. However, if the same color warning number is more than 3 in each page, then they are displayed.~~
9. If configured to do so in E2PROM, a single audible warning shall accompany the pop-up message. Static messages do not have audible warnings.
10. ~~To reduce the annoyance of repetitive fault events, the number of gongs for each warning shall be limited to 10 during each ignition cycle; however this does not apply to Over-speed Warning.~~
11. the type of pop messages are devided into A, B and C, for detail please refer to UE. Normally Echo messages are displayed for **ECHO MESSAGE DISPLAY TIME**.
12. Ignition Off Messages, their corresponding priority and display period please refer to UE.:

IGN ON: Type A (P0): period depends on signal value;

Type B: period depends on signal value but max is ***insEchoMesPeriodPrm***;

Type C: constant ***insEchoMesPeriodPrm***;

A can interrupt B and C after B/C message has displayed for ***insEchoMesMinPeriodPrm***;

IGN OFF: Type A: period depends on signal value but max is ***InsIgnOffSpelWarnPeriodPrm***;

Type B: constant ***insIgnOffDispPeriodPrm***;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages display maxium period. | **4** | **5** | **0~15** |
| **echo message min period** | ***insEchoMesMinPeriodPrm*** The duration, in seconds, for which all the echo messages display minimum period. | **4** | **2** | **0~15** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |

## Press Clutch or Brake Request(PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **KL 50** | Internal signal to indicate the vechicle in ‘Crank’ status. | **1** | **0~1** |
| **Crank ems message** | ***ECMPressClBrkRmndr*** CAN signal from **EMS** specifying which message is to be displayed in the LCD.  0 = No message  1 = Press the clutch  2 = Press the brake  3 = Reserved | **2** | **0 ~ 3** |
| **~~BCM request Press clutch~~** | ***~~BCMPressClRmndr~~*** ~~CAN signal from BCM to request to remind to press clutch:~~  ~~$0=False,~~  ~~$1=True~~ | **~~1~~** | **~~0 ~ 1~~** |
| **BCM request press brake** | ***BCMPressBrkRmndr*** CAN signal from BCM to request to remind to press brake:  $0=False,  $1=True | **1** | **0 ~ 1** |
| **~~no key detected press clutch~~** | ***~~BCMNoSmtKeyPressClToRR~~*** ~~CAN signal from BCM to request to remind to press clutch:~~  ~~$0=False,~~  ~~$1=True~~ | **~~1~~** | **~~0 ~ 1~~** |
| **no key detected press brake** | ***BCMNoSmtKeyPressBrkTRR*** CAN signal from BCM to request to remind to press brake:  $0=False,  $1=True | **1** | **0 ~ 1** |
| **READY SYSTEM FLAG** | ***EPTRdy*** CAN signal from HCU | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **~~press clutch message~~** | ~~Warning in LCD when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **press brake message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **~~clutch switch fault message~~** | ~~Warning in LCD when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **~~no key detected press clutch message~~** | ~~Warning in LCD when ‘TRUE’.~~ | **~~1~~** | **~~0 ~ 1~~** |
| **no key detected press brake message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~clutch message enable~~** | ***~~insClutchMesEnPrm~~*** ~~The crank inhibit warning message “Press Clutch” is enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **Brake message enable** | ***insBrakeMesEnPrm*** The crank inhibit warning message “Press Brake” is enabled when true. | **1** | **1** | **0 ~ 1** |
| **~~BCM request clutch message enable~~** | ***~~insBCMClutchMesEnPrm~~*** ~~The crank inhibit warning message “Press Clutch” is enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **BCM request Brake message enable** | ***insBCMBrakeMesEnPrm*** The crank inhibit warning message “Press Brake” is enabled when true. | **1** | **1** | **0 ~ 1** |
| **~~clutch switch fault message enable~~** | ***~~insClutchFaultMesEnPrm~~*** ~~The crank inhibit warning message “Clutch Switch Fault” is enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **clutch Brake gong enable** | ***insClutchBrakeGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **~~clutch switch fault gong enable~~** | ***~~insClutchFaultGongEnPrm~~*** ~~Audible warning enabled when true.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **PRND ENABLE** | ***insPrndEnPrm*** Indicates mode of PRND display. 00 = Off (Manual), 01 = Next Gear, 02 = Current gear only. | **2** | **2** | **0 ~ 2** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |

### Functional Description

~~The crank inhibit function is used to prevent the driver of a manual transmission vehicle from starting the engine unless the clutch pedal is pressed. In the case of a fault with the clutch pedal switch, the brake pedal must be pressed instead and a warning given.~~

~~The “Press Clutch” message is displayed when an attempt to crank the engine takes place while the clutch pedal is not pressed. The message is displayed until the input conditions are no longer TRUE or until~~ **~~Cluster KL15 status~~** ~~becomes ‘FALSE’, whichever is the sooner.~~

~~The “Press Brake” message is displayed when an attempt to crank the engine takes place and the clutch pedal switch is faulty. The message is displayed until the input conditions are no longer TRUE or until~~ **~~Cluster KL15 status~~** ~~becomes ‘FALSE’, whichever is the sooner.If the conditions are true for this warning then an internal flag is set which is used to display the clutch switch fault message after the engine running flag is true.~~

Unlike all other warning messages, the Crank Inhibit messages need to be able to interrupt the cluster start-up routine as it is possible to crank the engine immediately after KL15 becomes true, as well as all other warning messages. In the event that the start-up routine is interrupted by a Crank Inhibt message it is not repeated or reverted to. The Crank Inhibit messages are to be displayed for the duration of Echo Message Period. Please note that there should be no effect on telltale lamp status.

After the Crank Inhibit message has been displayed the LCD should continue to display any warning messages that exist but have not yet been displayed.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~press clutch message~~**  **~~(MT)~~** | ~~if~~ | **~~(cluster KL15 status && clutch message enable && (PRND ENABLE == 0) && (crank ems message == 01) ) or~~**  **~~(BCM request clutch message enable&& (BCM request Press clutch) && (PRND ENABLE == 0))~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~press Brake message~~**  **~~(mt)~~** | ~~if~~ | **~~(cluster KL15 status && Brake message enable && (PRND ENABLE == 0) && (crank ems message == 10) ) or~~**  **~~(BCM request Brake message enable && BCM request press brake && (PRND ENABLE == 0))~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **press Brake message**  **(at)** | if | **(BCM request Brake message enable && BCM request press brake && (PRND ENABLE != 0))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~Clutch switch fault flag = 1~~**  **~~(set)~~** | ~~if~~ | **~~(cluster kl15 status && press Brake message && (PRND ENABLE == 0))~~** |

Add the condition of ‘Cluster kl15 status’ in above formula, but the software must guarantee the flag can be set in case of the PRESS BRAKE MESSAGE occurred under KL15 OFF.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~Clutch switch fault flag = 0 (reset)~~** | ~~if~~ | **~~!cluster KL15 status~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~clutch switch fault message~~** | ~~if~~ | **~~cluster KL15 status && clutch switch fault message enable && (Clutch switch fault flag == 1)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~no key detected press clutch message~~**  **~~(MT)~~** | ~~if~~ | **~~(! cluster KL15 status && BCM request clutch message enable && no key detected press clutch)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **no key detected press Brake message**  **(AT)** | if | **(! cluster KL15 status && BCM request Brake message enable&& no key detected press brake)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(clutch Brake gong enable &&**  **(~~press clutch message or~~**  **press Brake message or**  **~~no key detected press clutch message or~~**  **no key detected press Brake message))**  **~~or~~**  **~~(cluster KL15 status && clutch switch fault gong enable && clutch switch fault message )~~** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the Messages and Gong are determined.

**KL.R**

Inputs not monitored and messages not displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the Messages and Gong are determined.

**KL.50**

The inputs are monitored and the status of the Messages and Gong are determined.

### Messages

For detail refer to UE

## Autohold Status Request

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Autohold message request** | ***AutoHoldMsg*** CAN signal from SCS to require display messages::  $0 =Reserved.  $1 =Seatbelt not fastend.  $2 =Press brake pedal.  $3 =Autohold standby.  $4 =Autohold off.  $5 =Autohold release.  $6 ~ 7 =Reserved. | **4** | **0 ~ 15** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Autohold assist1 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold assist2 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold assist3 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold assist4 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **autohold assist5 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **autohold assist1 message enable** | ***insAutoholdAssist1MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **autohold assist2 message enable** | ***insAutoholdAssist2MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **autohold assist3 message enable** | ***insAutoholdAssist3MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **autohold assist4 message enable** | ***insAutoholdAssist4MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **autohold assist5 message enable** | ***insAutoholdAssist5MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **autohold assist audible warning enable** | ***insAutoholdAssistAWarnEnPrm*** The Autohold Assist audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **PRNDL ENABLE** | ***insPrndEnPrm*** Indicates mode of PRND display. 00 = Off, 01 = Next Gear, 02 = Current gear only. | **2** | **2** | **0 ~ 2** |

### Functional Description

The **autohold assist1 message** to **autohold epb assist5 message**are used to indicate to the driver that Autohold has some information need to remind driver. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold assist1 message** | if | **(Cluster KL15 status && autohold assist1 message enable && Autohold message request == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~autohold assist2 message~~**  **~~(for Manual transmision)~~** | ~~if~~ | **~~(Cluster KL15 status && autohold assist2 message enable && Autohold message request == 2 && PRNDL ENABLE == 0)~~** |

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **autohold assist2 message**  **(For automatic transmision)** | if | **(Cluster KL15 status && autohold assist2 message enable && Autohold message request == 2 && PRNDL ENABLE > 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold assist3 message** | if | **(Cluster KL15 status && autohold assist3 message enable && Autohold message request == 3)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold assist4 message** | if | **(Cluster KL15 status && autohold assist4 message enable && Autohold message request == 4)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **autohold assist5 message** | if | **(Cluster KL15 status && autohold assist5 message enable && Autohold message request == 5)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **autohold assist2 message &&** **autohold assist audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **autohold assist message** and **Audible warning gong1** are off.

**KL.R**

The outputs **autohold assist message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **autohold assist message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **autohold assist message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Hill Holding Unavailable warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **HHC stauts** | ***BrkSysHillStAstAvlbl*** CAN signal from SCS to indicate the hill holding availablility status:  $1=True;  $0=False | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **HHC fail message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **hhc fail message enable** | ***insHHCFailMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **HHc fail audible warning enable** | ***insHHCFailAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **hhc fail message** is used to indicate to the driver that Hill holding function has some problems. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **hhc fail message** | if | **(Cluster KL15 status && hhc fail message enable && !hhc status)** |

Note: **!** = Not.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **hhc fail message && hhc fail audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **hhc fail message** and **Audible warning gong1** are off.

**KL.R**

The outputs **hhc fail message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **hhc fail message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **hhc fail message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Door/Boot/Bonnet Open

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |
| **front passager door open status** | ***FrtPsngDoorOpenSts*** CAN signal from BCM for front passager door status:  $0=Front Passenger Door Closed  $1=Front Passenger Open(For latch switch can not detect door ajar status)  $2=Front Passenger Door Ajar  $3=Front Passenger Door Full Open | **2** | **0 ~ 3** |
| **Rear Left Door Open Status** | ***RLDoorOpenSts*** CAN signal from BCM for left-hand rear door status:  $0=Rear Left Door Closed  $1=Rear Left Door Open(For latch switch can not detect door ajar status)  $2=Rear Left Door Ajar  $3=Rear Left Door Full Open | **2** | **0 ~ 3** |
| **Rear Right Door Open Status** | ***RRDoorOpenSts***CAN signal from BCM for right-hand rear door status:  $0=Rear Right Door Closed  $1=Rear Right Door Open(For latch switch can not detect door ajar status)  $2=Rear Right Door Ajar  $3=Rear Right Door Full Open | **2** | **0 ~ 3** |
| **boot open status** | ***LdspcOpenSts*** CAN signal from BCM for boot status:  $0=Load Space Closed  $1=Load Space Open  $2=Reserved  $3=Reserved | **2** | **0 ~ 3** |
| **bonnet open status** | ***BntOpenSts*** CAN signal from BCM for bonnet status:  $0=Bonnet Closed  $1=Bonnet Open  $2=Bonnet Switch Disconnect  $3=Reserved | **2** | **0 ~ 3** |
| **cORRECTED SPEED** | Internal signal from speedo function of Speed in km/h. | **8** | **0 ~ 255** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Door/Bonnet/boot open message** | Display the warning symbol in the LCD. Use large format whenever possible. | **1** | **0 ~ 1** |
| **repeat Door/Bonnet/ boot open pop-up message** | Display the warning symbol in the LCD. Use large format whenever possible. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Body Type** | ***insBodyTypePrm*** Vehicle body type.  0 = Saloon,  1 = hatchback. | **1** | **0** | **0 ~ 1** |
| **Vehicle Hand of Drive** | ***insHandofDrivePrm***  00 = LHD, 01 = RHD. | **1** | **0** | **0 ~ 1** |
| **Door/Bonnet/boot open pop-up message enable** | ***insDoorOpenMesEnPrm*** Message enabled when true. | **1** | **1** | **0 ~1** |
| **Door/Bonnet/boot open gong enable** | ***insDoorOpenGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |
| **repeat door/Bonnet/boot open pop-up message enable** | ***insDoorOpenRepPopUpMesEnPrm*** If true, enable the repeat popup function for door open or bonnet when speed>5 km/h &&&& (any doors open || boot open) | **1** | **1** | **0 ~1** |
| **repeat pop-up Interval timeout** | ***insRepPopUpIntTimeoutPrm*** Interval of repeat pop-up message, in increment of 1 second/bit. 0 = pop-up off, 1 = 1 sec (min time), default = 5 sec. | **6** | **5**  **(5 sec)** | **0 ~63** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |
| **key off charging image display period** | ***insKeyOffChargDisPeriod*** 0.5min/bit | **4** | **6**  **(3min)** | **0~15** |

### Functional Description

The **Door/Bonnet/boot open pop-up message** is used to indicate to the driver that one or more doors/bonnet/boot is open, when the related six signals’ value is **!0** (not closed)). ~~The driver door and passager door are in left hand or right hand position depeding on~~ **~~Vehicle Hand of Drive~~**~~.~~

The warning is displayed if the appropriate door/bonnet/boot status condition exists and **Door/Bonnet/boot open pop-up message enable** is ‘TRUE’.

This warning is instantaneous and so responds immediately to changes to its inputs.

For simplicity, the term **BOOT** is used throughout this specification, however, this can also mean **TAILGATE**. The warning symbol for these are slightly different and that which should be displayed is dependant upon the parameter **Body Type*.***

~~The pop-up message is displayed in the LCD for~~ **~~echo message period~~**~~.~~

An audible warning is used to emphasise this warning to the driver, if configured to do so by **Door/Bonnet/boot open gong enable** being TRUE.

The **DOOR/Bonnet/boot open pop-up message** display period see UE:

1) When Ignition On, the message display period depends on the signal value;

2) When Ignition Off and vehicle is not charging, the max display period is **IGNITION OFF SPECIAL WARNING PERIOD.**

3) when Ignition Off and vehicle is charging, the message is included in the charging image and the display period is **key off charging image display period.**

The door open warning is shown if any number of doors are open. The boot / bonnet warning is given if either or both boot and/or bonnet are open.

Additionally, the **repeat Door/Bonnet/boot open pop-up message** (and the gong, if enabled) is given for bonnet or doors that are open while the vehicle speed is greater than or equal to 5km/h, if configured to do so by **repeat door/Bonnet/boot open pop-up message enable.**

~~Since it is possible that a repeat pop-up is triggered while the large format static is being displayed, which are visually identical to each other, then, in order for the repeated pop-up (and gong) to be emphasised as linked events, the large format static should be switched off for a period of 0.5 seconds so that it is clearly visible when the repeat pop-up is triggered.~~

The repeat pop-up is only triggered for open doors or bonnet and not for an open boot.

If, however, a boot open condition exists and a repeat pop-up is triggered for a door / bonnet then the displayed message should also include the open symbol for the boot.

~~The repeat interval is configurable by~~ **~~repeat pop-up Interval timeout.~~** ~~This time-out period is defined in increments of 1 second with a minimum time of 1 sec, a maximum time of 63 sec, and a default value of 5 sec. If set to 0, the repeat pop-up function is disabled. The repeat interval begins when the pop-up has been displayed for~~ **~~echo message PERIOD;~~** ~~however, the interval is re-started if any of the trip computer inputs are activated.~~

~~The pop-up will continue the cycle of interval / repeat / interval / repeat… until all doors and the bonnet are closed or until KL15 is off.~~

~~Note: if there are other echo/pop-up messages waiting or being displayed when the repeat pop-up is due to be displayed, then these should be completed before the repeat pop-up is triggered.~~

~~After each repeat pop-up message has been displayed, the screen should revert to that which was interrupted by the repeat pop-up.~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Door/Bonnet/ boot open message** | if | **(~~Cluster KL15 status &&~~ Door/Bonnet/boot open pop-up message enable && ANY DOOR/BONNET/BOOT STATUS)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **repeat Door/Bonnet/ boot open pop-up message** | if | **(~~Cluster KL15 status &&~~repeat door/Bonnet/boot open pop-up message enable && CORRECtED SPEED >/=5 KM/H &&**  **(ANY DOOR open STATUS || bonnet open status))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **Cluster KL15 status && ((Door/Bonnet/boot open pop-up message) OR (repeat door/Bonnet/boot open pop-up message)) && Door/Bonnet/boot open gong enable** |

**~~Graphical Representation of the Repeat Door/Bonnet/Boot Open Pop-up message (and gong) while Trip Computer or other static warning is displayed.~~**

**~~Graphical Representation of the Repeat Door/Bonnet/Boot Open Pop-up message (and gong) while large format Door/Bonnet/Boot static is displayed.~~**

### Functional Behaviour

**KL.30**

The door open inputs are monitored and the status of the door / bonnet / boot open messages and audible warnings are determined.

**KL.R**

The door open inputs are monitored and the status of the door / bonnet / boot open messages and audible warnings are determined.

**KL.15 (CLUSTER KL15 STATUS)**

The door open inputs are monitored and the status of the door / bonnet / boot open messages and audible warnings are determined.

**KL.50**

The door open inputs are monitored and the status of the door / bonnet / boot open messages and audible warnings are determined.

### Messages

For detail refer to UE

## ~~Lock Status Indication~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Lock status** | ***VehLckngSta*** CAN signal from SMU that indicates the status of the locking system:  $0=Unlock  $1=SPE  $2=Interior Lock  $3=Exterior Lock  $4=Super lock  $5=Reserved  $6=Reserved  $7=Unknow | **1** | **0 ~ 1** |
| **Alarm status** | ***ScurtAlrmSts*** CAN signal from BCM that indicates the status of the alarm system.  0x0 = Security system disarmed  0x1 = Security system partially armed with volumetrics disabled.  0x2 = Security system fully armed with volumetrics disabled.  0x3 = Security system disarmed && volumetric sensor fault  0x4 = Unused  0x5 = Security system partially armed with volumetrics enabled.  0x6 = Security system fully armed with volumetrics enabled.  0x7 = Unused | **3** | **0 ~ 7** |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |
| **front passager door open status** | ***FrtPsngDoorOpenSts*** CAN signal from BCM for front passager door status:  $0=Front Passenger Door Closed  $1=Front Passenger Open(For latch switch can not detect door ajar status)  $2=Front Passenger Door Ajar  $3=Front Passenger Door Full Open | **2** | **0 ~ 3** |
| **Rear Left Door Open Status** | ***RLDoorOpenSts*** CAN signal from BCM for left-hand rear door status:  $0=Rear Left Door Closed  $1=Rear Left Door Open(For latch switch can not detect door ajar status)  $2=Rear Left Door Ajar  $3=Rear Left Door Full Open | **2** | **0 ~ 3** |
| **Rear Right Door Open Status** | ***RRDoorOpenSts***CAN signal from BCM for right-hand rear door status:  $0=Rear Right Door Closed  $1=Rear Right Door Open(For latch switch can not detect door ajar status)  $2=Rear Right Door Ajar  $3=Rear Right Door Full Open | **2** | **0 ~ 3** |
| **boot open status** | ***LdspcOpenSts*** CAN signal from BCM for boot status:  $0=Load Space Closed  $1=Load Space Open  $2=Reserved  $3=Reserved | **2** | **0 ~ 3** |
| **bonnet open status** | ***BntOpenSts*** CAN signal from BCM for bonnet status:  $0=Bonnet Closed  $1=Bonnet Open  $2=Bonnet Switch Disconnect  $3=Reserved | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Lock status on message** | Display indication message in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **lock status off message** | Display indication message in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **lock status fail message** | Display indication message in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **lock status On message enable** | ***insLockStatusOnMesPrm*** Message enable when TRUE. | **1** | **0** | **0 ~ 1** |
| **lock status off message enable** | ***insLockStatusOffMesPrm*** Message enable when TRUE. | **1** | **0** | **0 ~ 1** |
| **lock status fail message enable** | ***insLockStatusFailMesPrm*** Message enable when TRUE. | **1** | **0** | **0 ~ 1** |
| **lock status fail gong enable** | ***insLockStatusFailGongPrm*** Audible warning enable when TRUE. | **1** | **0** | **0 ~ 1** |

### Functional Description

The messages of **Lock status on message, Lock status off message, lock status fail message** are used to indicate to driver the current interior Lock system status.

And **Audible warning gong1** is used to emphasize the lock fail status to driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Lock status on message** | if | **(**  **cluster kl15 status && lock status On message enable &&**  **(Lock status == 0** to **2) &&**  **(alarm Status == 000) &&**  **Driver Door open status == 0 &&**  **front passager door open status== 0 &&**  **Rear Left Door Open Status== 0 &&**  **Rear Right Door Open Status == 0 &&**  **boot open status == 0 &&**  **bonnet open status == 0**  **)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Lock status off message** | if | **(**  **cluster kl15 status && lock status off message enable &&**  **(Lock status == 2** to **0) &&**  **(alarm Status == 000) &&**  **Driver Door open status == 0 &&**  **front passager door open status == 0 &&**  **Rear Left Door Open Status == 0 &&**  **Rear Right Door Open Status == 0 &&**  **boot open status == 0 &&**  **bonnet open status == 0**  **)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **lock status fail message** | if | **cluster kl15 status && lock status fail message enable &&**  **(Lock status == 2) &&**  **(alarm Status == 000) &&**  **(Driver Door open status == !0 or**  **front passager door open status == !0 or**  **Rear Left Door Open Status == !0 or**  **Rear Right Door Open Status == !0 or**  **boot open status== !0 or**  **bonnet open status == !0**  **)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **lock status fail message && lock status fail gong enable** |

### Functional Behaviour

**KL.30**

The outputs **Lock status on message, Lock status off message, lock status fail message** and **Audible warning gong1** are off.

**KL.R**

The outputs **Lock status on message, Lock status off message, lock status fail message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **Lock status on message, Lock status off message, lock status fail message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **Lock status on message, Lock status off message, lock status fail message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Inertia Switch Tripped warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Inertia switch status** | ***VehInertiaSwTrigd*** CAN signal from SMU for Inertia Switch status.  $0=False,  $1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **inertia switch tripped message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **inertia switch tripped Warning message enable** | ***insInertiaSwTripMesEnPrm*** The Inertia Switch Tripped warning feature is enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **inertia switch tripped audible Warning enable** | ***insInertiaSwTripAWarnEnPrm*** The Inertia Switch Tripped audible warning feature is enabled when true. | **1** | **0** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The Inertia Switch warning message is used to indicate to the driver that the inertia switch has been tripped and thus the fuel pump relay is isolated. The message is given until **Inertia switch status** is no longer ‘TRUE’ or **Cluster KL15 status** becomes ‘FALSE’.

If configured to do so by **inertia switch tripped audible Warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **inertia switch tripped message** | if | **Cluster KL15 status &&**  **inertia switch tripped Warning message enable &&**  **Inertia switch status** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **inertia switch tripped message &&**  **inertia switch tripped audible Warning enable** |

### Functional Behaviour

**KL.30**

No Inertia Switch warning message is displayed.

**KL.30 / KL.R (Shutdown mode)**

No Inertia Switch warning message is displayed.

**KL.R**

No Inertia Switch warning message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the Inertia Switch warning message is determined.

**KL.50**

The inputs are monitored and the status of the Inertia Switch warning message is determined.

### Messages

For detail refer to UE

## Ignition Key On warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Ignition key on status** | ***TakeKeyOutRmndr*** CAN signal from SMU for Ignition Key On Warning status:  $0=False  $1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ignition key on message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1 (repeated gong)** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ignition key on message enable** | ***insIgnitionKeyOnMesEnPrm*** The Ignition Key On Message warning is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ignition key on Audible warning enable** | ***insIgnitionKeyOnAWarnPrm*** Audible warning enabled when ‘TRUE’ | **1** | **1** | **0~1** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |

### Functional Description

This warning is used to indicate to the driver that the Key is left on the ignition switch when the driver door is opened.

This message only is displayed in the LCD for the duration of **IGNITION OFF SPECIAL WARNING PERIOD** when **Ignition key on status** is from 0 to 1 if ignition key on message warning is enabled.

Audible warning is continued until **Ignition key on status** is False or reaching **ignition key on AUDIBLE PERIOD**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ignition key on message** | if | **! Cluster KL15 status && Ignition key on status && ignition key on Message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1**  **(repeated gong)** | if | **Ignition key on status && ignition key on Audible warning enable** |

### Functional Behaviour

**KL.30**

The input is monitored and the outputs of **ignition key on Warning message** and **Audible warning gong1 (repeated gong)** are determined.

**KL.R**

The input is not monitored and the ignition key on warning message is not displayed.

**KL.15 (Cluster KL15 status)**

The input is not monitored and the ignition key on warning message is not displayed.

**KL.50**

The input is not monitored and the ignition key on warning message is not displayed.

### Messages

For detail refer to UE

## Press Button to Turn Engine Off warning (PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
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### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **press button to turn engine off request** | ***SSBEnOffRmndr*** CAN signal from SMU for Ignition Key On Warning status:  $0 = no warning request.  $1 = press button again to turn engine off warning.  $2 = long press button to turn engine off warning.  $3 = double press button again to turn engine off warning. | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **press button engine off message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **long press button engine off message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **double press button engine off message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **press button engine off message enable** | ***insPressButtonEngineOffMesEnPrm*** The Message warning is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **press button engine off Audible warning enable** | ***insPressButtonEngineOffAWarnPrm*** Audible warning enabled when ‘TRUE’ | **1** | **1** | **0~1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

This warning is used to remind the driver to press the button to turen engine off. Audible warning is used to emphasize this reminding.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **press button engine off message** | if | **Cluster KL15 status && press button to turn engine off request == 1 && press button engine off message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **long press button engine off message** | if | **Cluster KL15 status && press button to turn engine off request == 2 && press button engine off message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **double press button engine off message** | if | **Cluster KL15 status && press button to turn engine off request == 3 && press button engine off message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(press button engine off message or long press button engine off message or double press button engine off message ) &&**  **press button engine off Audible warning enable** |

### Functional Behaviour

**KL.30**

The input is not monitored and the warning message is not displayed.

**KL.R**

The input is not monitored and the warning message is not displayed.

**KL.15 (Cluster KL15 status)**

The input is monitored and the warning message is decided.

**KL.50**

The input is not monitored and the warning message is not displayed.

### Messages

For detail refer to UE

## Press Brake to Shift Request

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **press brake shift request** | ***ShifterLckRlseBrkReqA*** CAN signal from BCM to remind driver to press brake to shift:  0x0=False  0x1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **press brake shift message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **press brake shift message enable** | ***insPressBrakeShiftMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **press brake shift audible warning enable** | ***insPressBrakeShiftAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **press brake shift message** is used to indicate the driver to press brake to shift. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **press brake shift message** | if | **(Cluster KL15 status && press brake shift message enable && press brake shift request)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **press brake shift message &&** **press brake shift audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **press brake shift message** and **Audible warning gong1** are off.

**KL.R**

The outputs **press brake shift message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **press brake shift message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **press brake shift message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Take Smart Key Out Of Slot Request(PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **take smart key request** | ***BCMTakeSmtKeyOutOfSR*** CAN signal from BCM to remind driver to take smart key out of slot:  0x0=False  0x1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **take smart key message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **take smart key message enable** | ***insTakeSmarKeyMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |
| **take smart key audible warning enable** | ***insTakeSmartKeyAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **take smart key message** is used to indicate the driver to take smart key out of slot. The message is displayed in the LCD for **IGNITION OFF SPECIAL WARNING PERIOD.**

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **take smart key message** | if | **( ! Cluster KL15 status && take smart key message enable && take smart key request)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **take smart key message &&** **take smart key audible warning enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs **take smart key message** and **Audible warning gong1** are determined.

**KL.R**

The inputs are monitored and the status of the outputs **take smart key message** and **Audible warning gong1** are determined.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **take smart key message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **take smart key message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Put Gear Shifter to Park Request

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **put shifter to park request** | ***BCMShftParkRmndr*** CAN signal from BCM to remind driver to put shifter to park request:  0x0=False  0x1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **put shifter to park message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **put shifter to park message enable** | ***insPutShifterParkMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |
| **put shifter to park audible warning enable** | ***insPutShifterParkAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **put shifter to park message** is used to indicate the driver to take smart key out of slot. The message is displayed in the LCD for **IGNITION OFF SPECIAL WARNING PERIOD.**

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **put shifter to park message** | if | **(!Cluster KL15 status && put shifter to park message enable && put shifter to park request)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong(repeat)** | if | **put shifter to park message &&** **put shifter to park audible warning enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs **put shifter to park message** and **Audible warning gong1** are determined.

**KL.R**

The inputs are monitored and the status of the outputs **put shifter to park message** and **Audible warning gong1** are determined.

**KL.15 (Cluster KL15 status)**

The outputs **put shifter to park message** and **Audible warning gong1** are off.

**KL.50**

The outputs **put shifter to park message** and **Audible warning gong1** are off.

### Message

For detail refer to UE

## No Smart Key Detected warning(PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **no smart key detected** | ***BCMNoSmtKeyInVehRmndr*** CAN signal from SMU for no smart key detected:  $0=False  $1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **no smart key detected message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **no smart key detected message enable** | ***insNoSmartKeyDMesEnPrm*** The Message warning is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **no smart key detected Audible warning enable** | ***insNoSmartKeyDAWarnPrm*** Audible warning enabled when ‘TRUE’ | **1** | **1** | **0~1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |

### Functional Description

For this feature does not care the vehicle’s power mode,in order to keep the same strategy of the message display period under ignition on or off,if the vehicle’s power mode is KL15 or KL50,the display period of message shall be set as **echo message period** , and if the power mode is KLR or KL30,the display period of message shall be set as **ignition off message displayed period.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **no smart key detected message** | if | **no smart key detected && no smart key detected message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **no smart key detected message && no smart key detected Audible warning enable** |

### Functional Behaviour

**KL.30**

The input is monitored and the outputs are decided.

**KL.R**

The input is monitored and the outputs are decided.

**KL.15 (Cluster KL15 status)**

The input is monitored and the outputs are decided.

**KL.50**

The input is monitored and the outputs are decided.

### Messages

For detail refer to UE

## Put Smart Key into Backup Position warning(PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **put key into backup position request** | ***BCMPutSmtKeyToBkupPosR*** CAN signal from SMU for no smart key detected:  $0=False  $1=True | **1** | **0 ~ 1** |
| **Synchronize Smart Key Reminder status** | ***BCMSyncSmtKeyRmndr*** CAN signal from BCM forSynchronize Smart Key Reminder status:  $0=Flase  $1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **put key into backup position message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **put key into backup position message enable** | ***insPutKeyIntoBkupPMesEnPrm*** The Message warning is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **put key into backup position Audible warning enable** | ***insPutKeyIntoBkupPAWarnPrm*** Audible warning enabled when ‘TRUE’ | **1** | **1** | **0~1** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **put key into backup position message** | if | **! Cluster KL15 status &&**  **(put key into backup position request && put key into backup position message enable) or**  **(Synchronize Smart Key Reminder status && put key into backup position message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **put key into backup position message && put key into backup position Audible warning enable** |

### Functional Behaviour

**KL.30**

The input is monitored and the outputs are decided.

**KL.R**

The input is monitored and the outputs are decided.

**KL.15 (Cluster KL15 status)**

The input is not monitored and the outputs are decided.

**KL.50**

The input is not monitored and the outputs are decided.

### Messages

For detail refer to UE

## Ignition Relay Failed warning(PEPS)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ See Spec | √ See Spec | √ TBC | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **ignition relay failed from peps**  **(AS24)** | ***PEPSRunCrkTrmlOtptF*** CAN signal from PEPS for ignition relay failed status:  $0=False,  $1=True | **1** | **0 ~ 1** |
| **ignition relay failed from peps**  **(IP34)** | ***PEPSRunCrkF*** CAN signal from PEPS for ignition relay failed status:  $0=False,  $1=True | **1** | **0 ~ 1** |
| **ignition relay failed from bcm**  **(AS24)** | ***BCMRunCrkTrmlOtptF*** CAN signal from BCM for ignition relay failed status:  $0=False,  $1=True | **1** | **0 ~ 1** |
| **ignition relay failed from bcm**  **(IP34)** | ***BCMRunCrkF***  CAN signal from BCM for ignition relay failed status:  $0=False,  $1=True | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **ignition relay failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ignition relay failed message enable** | ***insIgnitionRelayFMesEnPrm*** The Ignition Relay failed message is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **ignition relay failed audible Warning enable** | ***insIgnitionRelayFAWarnEnPrm*** The ignition Relay failed audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **ignition relay failed message** is used to indicate to the driver that the ignition relay has some faults for **echo message period**.

If configured to do so by **ignition relay failed audible Warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ignition relay failed message** | if | **Cluster KL15 status &&**  **ignition relay failed message enable &&**  **(ignition relay failed from peps**  **or**  **ignition relay failed from bcm )** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **ignition relay failed message &&**  **ignition relay failed audible Warning enable** |

### Functional Behaviour

**KL.30**

The outputs **ignition relay failed message** and **Audible warning gong1** are off.

**KL.30 / KL.R (Shutdown mode)**

The outputs **ignition relay failed message** and **Audible warning gong1** are off.

**KL.R**

The outputs **ignition relay failed message** and **Audible warning gong1** are off.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the **ignition relay failed message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the **ignition relay failed message** and **Audible warning gong1** are determined.

### Messages

The **ignition system fault****~~ignition relay failed~~ message** shall be yellow in colour with a dominant wavelength of 590 +/- 4 nm.

#### Pop-up Message

For detail refer to UE

## Start Stop Button(One Key Running Button) Failed warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **start stop button error from peps** | ***PEPSDetcSSBFltSts*** CAN signal from PEPS for start stop button status:  $0= No fault.  $1=Short to GND.  $2= Short to Battery.  $3= Stuck.  $4= Open Circuit.  $5= Switch Failed.  $6 ~ 7= Reserved. | **3** | **0 ~ 1** |
| **start stop button error from bcm**  **(AS24)** | ***BCMDetcSSBFltSts*** CAN signal from PEPS for start stop button status:  $0= No fault.  $1=Short to GND.  $2= Short to Battery.  $3= Stuck.  $4= Open Circuit.  $5= Switch Failed.  $6 ~ 7= Reserved. | **3** | **0 ~ 1** |
| **start stop button error from bcm**  **(IP34)** | ***BCMSSBFltSts*** CAN signal from PEPS for start stop button status:  $0= No fault.  $1=Short to GND.  $2= Short to Battery.  $3= Stuck.  $4= Open Circuit.  $5= Switch Failed.  $6 ~ 7= Reserved. |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **start stop button failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **start stop button failed message enable** | ***insStartstopButtonFMesEnPrm*** The start stop button failed message is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **start stop button failed audible Warning enable** | ***insStartstopButtonFAWarnEnPrm*** The start stop failed audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **start stop button failed message** is used to indicate to the driver that the start stop button has some faults for **echo message period**.

If configured to do so by **start stop button failed audible Warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **start stop button failed message** | if | **Cluster KL15 status &&**  **start stop button failed message enable &&**  **(start stop button error from peps == !0**  **or**  **start stop button error from bcm == !0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **start stop button failed message &&**  **start stop button failed audible Warning enable** |

### Functional Behaviour

**KL.30**

The outputs **start stop button failed message** and **Audible warning gong1** are off.

**KL.30 / KL.R (Shutdown mode)**

The outputs **start stop button failed message** and **Audible warning gong1** are off.

**KL.R**

The outputs **start stop button failed message** and **Audible warning gong1** are off.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the **start stop button failed message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the **start stop button failed message** and **Audible warning gong1** are determined.

### Messages

For detail refer to UE

## Lamp Failed warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **left brake lamp failed** | ***LBrkLghtF*** CAN signal from SMU for left brake lamp failure. | **1** | **0 ~ 1** |
| **right brake lamp failed** | ***RBrkLghtF*** CAN signal from SMU for right brake lamp failure. | **1** | **0 ~ 1** |
| **left DI light failed** | ***LDircnIndLghtF*** CAN signal from SMU for left DI light failure. | **1** | **0 ~ 1** |
| **right DI light failed** | ***RDircnIndLghtF*** CAN signal from SMU for right DI light failure. | **1** | **0 ~ 1** |
| **Left Dipped Beam Failed** | ***LDipdBeamLghtF*** CAN signal from SMU for left dipped beam failure. | **1** | **0 ~ 1** |
| **right dipped beam failed** | ***RDipdBeamLghtF*** CAN signal from SMU for right dipped beam failure. | **1** | **0 ~ 1** |
| **Left Side Light Failed**  **(AS24)** | ***LSideLghtF*** CAN signal from SMU for left side light failure. | **1** | **0 ~ 1** |
| **Right Side Light Failed**  **(AS24)** | ***RSideLghtF*** CAN signal from SMU for right side light failure. | **1** | **0 ~ 1** |
| **Front Side Light Failed**  **(IP34)** | ***FrtSideLghtF*** CAN signal from SMU for front side light failure. | **1** | **0 ~ 1** |
| **Rear Side Light Failed**  **(IP34)** | ***RrSideLghtF*** CAN signal from SMU for front side light failure. | **1** | **0 ~ 1** |
| **Rear Fog Light Failed** | ***RrFogLghtF*** CAN signal from SMU for rear fog light failure. | **1** | **0 ~ 1** |
| **Reverse Lamp Failed** | ***RevsLghtF*** CAN signal from SMU for reverse lamp failure. | **1** | **0 ~ 1** |
| **Day Time Running Lamp Failed** | ***DayTimeRunningLghtF*** CAN signal from SMU for day-time running lamp failure. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **left brake lamp failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **right brake lamp failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **left DI light failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **right DI light failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Left Dipped Beam Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **right dipped beam failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Left Side Light Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Right Side Light Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Rear Fog Light Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Reverse Lamp Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Day Time Running Lamp Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Lamp failure message enable** | ***insLampFailMesEnPrm*** The lamp failure warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **lamp failure gong enable** | ***insLampFailGongEnPrm*** Audible warning enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The lamp failure messages are used to indicate to the driver that an exterior lighting lamp failure has occurred. A message giving specific failure information is given for **echo message PERIOD;** following this a general bulb failure symbol is displayed until the failure no longer exists or until **Cluster KL15 status** becomes ‘FALSE’. ~~All of these lamp failure messages are ‘repeat on shutdown’ designated warnings. As such, when~~ **~~Cluster KL15 status~~** ~~becomes ‘FALSE’, any of these designated messages that were ‘TRUE’ immediately prior to~~ **~~Cluster KL15 status~~** ~~becoming ‘FALSE’, are repeated for~~ **~~shutdown message display time.~~**

When a ‘lamp failed’ message is active, an Audible warning will be active also.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **lamp failure message** | if | **(Cluster KL15 status && Lamp failure message enable && any lamp failed STATUS==1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **Cluster KL15 status && lamp failed message && lamp failure gong enable** |

### Functional Behaviour

**KL.30 && KLR**

No bulb failure messages are displayed.

**KL.30 / KL.R (Shutdown mode)**

No bulb failure messages are displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the statuses of the bulb failure messages are determined.

**KL.50**

The inputs are monitored and the statuses of the bulb failure messages are determined.

### Messages

For detail refer to UE

## ~~Light On Indication~~

## Lights On Key Out warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **KL.R** | Internal signal to indicate the vehicle in ‘Acc’ status. | **1** | **0~1** |
| **KL.50** | Internal signal to indicate the vechicle in ‘Crank’ status. | **1** | **0~1** |
| **Sidelights status** | ***VehSideLghtSts*** CAN signal from SMU for sidelight on status:  0= no side light on.  1= left side light on only.  2= right side light on only.  3= all side light and license plate light on. | **2** | **0 ~ 3** |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Lights on key out warning message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Lights on key out warning message enable** | ***insLightsOnKeyOutMesEnPrm*** The lights on warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **Lights on key out audible Warning enable** | ***insLightsOnKeyOutAWarnEnPrm*** The lights on audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **IGNITION OFF SPECIAL WARNING PERIOD** | ***InsIgnOffSpelWarnPeriodPrm*** The duration,in seconds ,for which the special ignition off warning period is decided, including gong and message display. | **8** | **1E** | **0-255** |
| **Vehicle Hand of Drive** | ***insHandofDrivePrm***  00 = LHD, 01 = RHD. | **1** | **0** | **0 ~ 1** |

### Functional Description

The **Lights on key out warning message** is displayed when the key is removed from the ignition switch when the sidelights are illuminated and the driver’s door is open, if **Lights on key out warning message enable** is ‘TRUE. In order to emphasise this warning to the driver an audible warning is also given for the duration **IGNITION OFF SPECIAL WARNING PERIOD** if **Lights on key out audible Warning enable** is ‘TRUE’.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Lights on key out warning message** | if | **cluster power mode = off &&**  **Lights on key out warning message enable &&**  **Sidelights status == 3 && Driver Door open status == !0** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong (repeat)** | if | **Lights on key out warning message &&**  **Lights on key out audible Warning enable &&**  **t < IGNITION OFF SPECIAL WARNING PERIOD** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the **Lights on key out warning message** and **Audible warning gong1** are determined.

**KL.R**

Inputs not monitored and message not displayed.

**KL.15 (CLUSTER KL15 STATUS)**

Inputs not monitored and message not displayed.

**KL.50**

Inputs not monitored and message not displayed.

### Messages

For detail refer to UE

## ~~Lights Off Delay Active Reminder.~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | X | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN KL15 status and the hardwired KL15 input. | **1** | **0 ~ 1** |
| **LOD status** | ***FMHA*** MSCAN signal from SMU for status of the Lights Off Delay. 1 = LOD Active, 0 = LOD not active. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **LOD ACtive Warning message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **stored LOD duration status** | Stored variable in RAM of status of the Follow Me Home Lights Duration function, in increments of 30 seconds. 0000 = Off, 0001 = 30 sec, 1010 = 5 min, 1011~1111 = n/a. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **LOD Active Warning message enable** | ***insLoDMesEnPrm*** The LoD warning feature is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **LOD ACtive audible Warning enable** | ***insLoDAWarnEnPrm*** The LoD audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |

### Functional Description

The Lights Off Delay warning message is used to indicate to the driver that the Lights Off Delay function is activated and the duration for which it shall remain active (**stored LOD duration status**).

The Lights Off Delay function forms part of the Vehicle Options feature where the user can select either front, rear or both lamps and select the duration for which LoD is active.

The pop-up message is given when KL.15 is switched off. ~~If the cluster is displaying ‘repeat-on-shutdown’ messages then it continues to display the current warning after which it displays the Lights Off Duration warning message for~~ **~~echo message period~~**~~. Once the LoD message has been displayed the cluster continues to display any outstanding ‘repeat-on-shutdown’ messages. The cluster then goes into shutdown.~~

If configured to do so by **lod active Audible Warning** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **LOD ACtive Warning message** | if | **LOD Active Warning message enable &&**  **LOD status &&**  **!cluster kl15 status &&**  **shutdown mode** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **LOD ACtive Warning message &&**  **LOD ACtive audible Warning enable** |

### Functional Behaviour

**KL.30**

The inputs are not monitored and the LoD warning message is not displayed.

**KL.30 / KL.R (Shutdown mode)**

The inputs are monitored and the status of the LoD warning message is determined.

**KL.R**

The inputs are not monitored and the LoD warning message is not displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are not monitored and the LoD warning message is not displayed.

**KL.50**

The inputs are not monitored and the LoD warning message is not displayed.

### Messages

For detail refer to UE

## Washer Fluid Low warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Low washer fluid status**  **（AS24）** | ***LowWiperWshrFludLvlSwA*** CAN signal from SMU for low screen washer fluid status. | **1** | **0 ~ 1** |
| **?IP34?** | ***XXXXXXX???*** |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **low washer fluid message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **low washer fluid message enable** | ***insLowWasherMesEnPrm*** The low washer fluid warning feature is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **low washer fluid audible Warning enable** | ***insLowWasherAudibleWarnEnPrm*** The low washer fluid level audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **low washer fluid message** is used to indicate to the driver that the screen washer reservoir level is low. A message is given for **echo message period** or until **Cluster KL15 status** becomes ‘FALSE’; whichever is the soonest. ~~This warning is ‘repeat on shutdown’ designated; as such, when~~ **~~Cluster KL15 status~~** ~~becomes ‘FALSE’, if the warning/failure status was ‘TRUE’ immediately prior to~~ **~~Cluster KL15 status~~** ~~becoming ‘FALSE’, the warning message is repeated for~~ **~~shutdown message display time.~~**

If configured to do so by **low washer fluid audible Warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **low washer fluid message** | if | **Cluster KL15 status && Low washer fluid status && low washer fluid message enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **low washer fluid message&&** **low washer fluid audible Warning enable** |

### Functional Behaviour

**KL.30**

No low washer fluid message is displayed.

**KL.30 / KL.R (Shutdown mode)**

No low washer fluid message is displayed.

**KL.R**

No low washer fluid message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the low washer fluid message is determined.

**KL.50**

The inputs are monitored and the status of the low washer fluid message is determined.

### Messages

For detail refer to UE

## Window Open Reminder

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Front Left Window Open Reminder**  **(AS24)** | ***FLWndOpenRmndr*** CAN signal from SMU for front left window open status. | **1** | **0 ~ 1** |
| **Front Left Window Open Reminder**  **(IP34)** | ***DrvrWndOpenRmndr*** CAN signal from SMU for front left window open status. | **1** | **0 ~ 1** |
| **Front Right Window Open Reminder**  **(AS24)** | ***FRWndOpenRmndr*** CAN signal from SMU for front right window open status. | **1** | **0 ~ 1** |
| **Front Right Window Open Reminder**  **(IP34)** | ***FrtPsngWndOpenRmndr*** CAN signal from SMU for front right window open status. | **1** | **0 ~ 1** |
| **Rear Left Window Open Reminder** | ***RLWndOpenRmndr*** CAN signal from SMU for rear left window open status. | **1** | **0 ~ 1** |
| **Rear Right Window Open Reminder** | ***RRWndOpenRmndr*** CAN signal from SMU for rear right window open status. | **1** | **0 ~ 1** |
| **Sunroof Open Reminder** | ***SrfOpenRmndr*** CAN signal from SMU for sunroof open status. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **front left window open echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Front Right Window Open echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Rear Left Window Open echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Rear Right Window Open echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Sunroof Open echo message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **windows open audible warning1** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **front left window open echo message enable** | ***insFLWinOpenEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **Front Right Window Open echo message enable** | ***insFRWinOpenEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **Rear Left Window Open echo message enable** | ***insRLWinOpenEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **Rear Right Window Open echo message enable** | ***insRRWinOpenEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **Sunroof Open echo message enable** | ***insSunRoofOpenEchoMesEnPrm*** Message enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **window open AUDIBLE WARNING enable** | ***insWinOpenAudibleWarnEnPrm*** the audible warning enabled when ‘TRUE’ | **1** | **0** | **0 ~ 1** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |
| **Vehicle Hand of Drive** | ***insHandofDrivePrm***  00 = LHD, 01 = RHD. | **1** | **0** | **0 ~ 1** |

### Functional Description

The related ‘window open’ messages are used to indicate some window is OPEN.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **front left window open echo message**  **(Driver)** | if | **( !Cluster KL15 status && Front Left Window Open Reminder && front left window open echo message enable) ~~&&Vehicle Hand of Drive==0~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Front Right Window Open echo message**  **(Front passenger)** | if | **(!Cluster KL15 status && Front Right Window Open Reminder && Front Right Window Open echo message enable) ~~&&Vehicle Hand of Drive==0~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Rear Left Window Open echo message** | if | **(!Cluster KL15 status && Rear Left Window Open Reminder && Rear Left Window Open echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Rear Right Window Open echo message** | if | **(!Cluster KL15 status && Rear Right Window Open Reminder && Rear Right Window Open echo message enable)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Sunroof Open echo message** | if | **(!Cluster KL15 status && Sunroof Open Reminder && Sunroof Open echo message enable)** |

//KL15 ON时，车体图、门开报警图中也需显示，但不作为触发门开报警图的条件；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(ANY WINDOW OR SUNROOF OPEN message) && WINDOW**  **audible Warning enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the statuses of the outputs are determined.

**KL.30 / KL.R (Shutdown mode)**

The inputs are monitored and the statuses of the outputs are determined.

**KL.R**

The inputs are monitored and the statuses of the outputs are determined.

**KL.15 (Cluster KL15 status)**

The outputs are off.

**KL.50**

The outputs are off.

### Message

For detail refer to UE

## ~~Fuel System Fault Warning~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | X | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN KL15 status and the hardwired KL15 input. | **1** | **0 ~ 1** |
| **Fuel relay status** | ***xxxxxx***  MSCAN signal from SMU for a stuck fuel pump relay. 1 = fault, 0 = OK. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Fuel system fault message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Fuel system fault Warning message enable** | ***insFuelSysFaultMesEnPrm*** The Fuel System Fault warning feature is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **Fuel system fault audible Warning enable** | ***insFuelSysFaultAWarnEnPrm*** The Fuel System Fault audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The Fuel System Fault warning message is used to indicate to the driver that the fuel pump relay is stuck closed and thus the fuel pump is constantly energised.

The SMU checks the status of the relay output when KL.R is switched off and sets the signal to fault (1) if the output remains at Vbat.

The pop-up message is initially given when KL.R is switched off. If the cluster is displaying ‘repeat-on-shutdown’ messages then it continues to do so until these have been completed at which point the cluster displays the Fuel System Fault pop-up message for **Echo Message Period**. The cluster then goes into shutdown.

When KL15 is subsequently activated, the input signal shall continue to be true and the message is given following the Welcome and SIA displays. The pop-up warning is displayed for **Echo Message Period** after which the static symbol is displayed.

If configured to do so by **fuel system fault Audible Warning** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Fuel system fault message (pop-up )** | if | **Fuel system fault Warning message enable &&**  **Fuel relay status &&**  **(Cluster kl15 status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Fuel system fault warning (static)** | if | **Fuel system fault Warning message enable &&**  **Fuel relay status &&**  **Cluster kl15 status** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **Fuel system fault po-up message &&**  **Fuel system fault audible Warning enable** |

### Functional Behaviour

**KL.30**

The inputs are not monitored and the Fuel System Fault warning message is not displayed.

**KL.30 / KL.R (Shutdown mode)**

The inputs are not monitored and the Fuel System Fault warning message is not displayed.

**KL.R**

The inputs are not monitored and the Fuel System Fault warning message is not displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the Fuel System Fault warning message is determined.

**KL.50**

The inputs are monitored and the status of the Fuel System Fault warning message is determined.

### Messages

For detail refer to UE

## EPB Assistant warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **EPb message request** | ***EPBSysDspMsgReq*** CAN signal from EPB to require display messages::  0 = No.  1 = Gradient High.  2 = BrakeForce Not Enough.  3 = Please fasten seat belt.  4 = Please open park brake by switch.  5 = Please press the brake pedal.  6 ~ 15= reserved. | **4** | **0 ~ 15** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **epb assist1 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **epb assist2 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **epb assist3 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **epb assist4 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **epb assist5 message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **epb assist1 message enable** | ***insEPBAssist1MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **epb assist2 message enable** | ***insEPBAssist2MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **epb assist3 message enable** | ***insEPBAssist3MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **epb assist4 message enable** | ***insEPBAssist4MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **epb assist5 message enable** | ***insEPBAssist5MesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **epb assist2 audible warning enable** | ***insEPBAssist2AWarnEnPrm*** The EPB Assist2 audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **epb assist1 message** to **epb assist5 message** are used to indicate to the driver that EPB has some problems or how to operate to make EPB work normally. The message is displayed in the LCD for **echo message period**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb assist1 message** | if | **(Cluster KL15 status && epb assist1 message enable && EPB MESSAGE REQUEST == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb assist2 message** | if | **(Cluster KL15 status && epb assist2 message enable && EPB MESSAGE REQUEST == 2)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb assist3 message** | if | **(Cluster KL15 status && epb assist3 message enable && EPB MESSAGE REQUEST == 3)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb assist4 message** | if | **(Cluster KL15 status && epb assist4 message enable && EPB MESSAGE REQUEST == 4)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~epb assist5 message~~**  **~~(manual gearbox)~~** | ~~if~~ | **~~(Cluster KL15 status && epb assist5 message enable && EPB MESSAGE REQUEST == 5 && PRNDL ENABLE = 0)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **epb assist5 message**  **(automatix gearbox)** | if | **(Cluster KL15 status && epb assist5 message enable && EPB MESSAGE REQUEST == 5 && PRNDL ENABLE > 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **epb assist2 message &&** **epb assist2 audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **epb assist message** are off.

**KL.R**

The outputs **epb assist message** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **epb assist message** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **epb assist message** are determined.

### Message

For detail refer to UE

## AFS Failed warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **AFS status** | ***AdvFrtLghtngSysIndReq*** CAN signal from AFS via BCM gateway to indicate whether AFS system has a fault:  $0=No Indication  $1=Indication 1 Dynamic Headlamp Leveling Failed  $2=Indication 2  $3=Indication 3  $4=Indication 4  $5=Indication 5  $6=Indication 6  $7=Indication 7 | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **afs fault message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **AFS fault message enable** | ***insAFSFaultMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **AFS fault audible warning enable** | ***insAFSFaultAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **AFS FAULT message** is used to indicate to the driver that AFS system has some problems. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **AFS fault message** | if | **(Cluster KL15 status && AFS fault message enable && AFS status == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **AFS fault message && AFS fault audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **AFS fault message** and **Audible warning gong1** are off.

**KL.R**

The outputs **AFS fault message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **AFS fault message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **AFS fault message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Battery Failed warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **battery aging stauts** | ***BatAgngSta*** CAN signal from PMDC to indicate the battery aging status:  $0=Good  $1=Little Aging  $2=Middle Aging  $3=Replace reminding  $4=reserved  $5=reserved  $6=reserved  $7=reserved | **3** | **0 ~ 7** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **battery fail message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **battery fail message enable** | ***insBattFailMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **battery fail audible warning enable** | ***insBattFailAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **Battery fail message** is used to indicate to the driver that +12 v battery system has some problems. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **battery fail message** | if | **(Cluster KL15 status && battery fail message enable && battery aging stauts == 3)** |

Text更新：“请维护12V电池！””Please Maintain 12V Battery”

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **battery fail message && battery fail audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **battery fail message** and **Audible warning gong1** are off.

**KL.R**

The outputs **battery fail message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **battery fail message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **battery fail message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Over Speed warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **displayed speed** | Internal signal from speedometer | **8** | **0 ~ 255** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **over speed threshold ficm** | ***ClstrOvrSpdThrshld*** CAN signal form FICM as the over speed warning threshold. | **6** | **0~63** |
| **over speed threshold internal** | Internal signal set in the IPK setting menu |  |  |
| **FICM OVER SPEED function current status** | ***FICMOverSpdFnCrntSts*** CAN signal from FICM, indicates that the overspeed function current status is on or off. $0=Off; $1=On; | **1** | **0 ~ 1** |
| **cluster over speed status** | ***ClstrOverSpdFnHstrSts*** CAN signal IPK send to FICM, indicates that the overspeed function IPK learned from status is on or off:  $0=Off;  $1=On; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **overspeed warning lamp** | Lamp in LCD when true | **1** | **0 ~ 1** |
| **Overspeed warning message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning GONG1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **over speed threshold** | ***insOSThreshPrm*** The speed threshold above which the warning is activated.  Notes:  1, the threshold can be adjusted by Trip computer switch.  2, the threshold can be setted via diagnostic.  3, if the value is ‘0’ means the function is disabled. In this condition, the display value is ‘OFF’. | **8** | **0x78 (120 km/h)** | **30 ~ 240**  **and 0** |
| **over speed hysteresis** | ***insOSHysPrm*** the speed value,1 kmh/bit, minus which based on over speed threshold the warning will be stopped. | **4** | **0x5**  **(5 km/h)** | **0 ~ 15** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **Overspeed warning message enable** | ***insOSWarnMesEnPrm*** The Overspeed warning feature is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **Overspeed audible Warning enable** | ***insOSAudibleWarnEnPrm*** The Overspeed audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

This warning is used to indicate to the driver when the ‘**Display Speed**’ is over the **over speed threshold.**

And the warning will be stopped only when the ‘**Display Speed**’ is less **(over speed threshold - over speed hysteresis).**

Notes: ‘threshold’ will be adjusted between ‘120’, ‘125’…,’220’,’OFF’,’30’...

5/step

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Overspeed warning lamp flash(0.5Hz)** | if | **Cluster KL15 status &&**  **Overspeed warning lamp enable &&**  **(displayed speed > Overspeed warning threshold)**  **&& cluster over speed status==1** |

The telltale is the same with SAS speed lamp.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Overspeed warning message** | if | **Cluster KL15 status &&**  **Overspeed warning message enable &&**  **(displayed speed > Overspeed warning threshold)**  **&& cluster over speed status==1** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **Cluster KL15 status &&**  **Overspeed audible Warning enable &&**  **Overspeed warning message** |

### Functional Behaviour

**KL.30**

The inputs are not monitored, the message is not displayed and the audible warning is not given.

**KL.30 / KL.R (Shutdown mode)**

The inputs are not monitored, the message is not displayed and the audible warning is not given.

**KL.R**

The inputs are not monitored, the message is not displayed and the audible warning is not given.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of **Overspeed warning message, Overspeed warning reset** and **Audible warning gong1**are determined.

**KL.50**

The inputs are monitored and the status of **Overspeed warning message, Overspeed warning reset** and **Audible warning gong1**are determined.

### Messages

The Overspeed message shall be red in colour with a dominant wavelength of 630 +/- 7 nm.

#### Pop-up Message

For detail refer to UE

## PDC Status warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **pdc status** | ***PDCSysSts*** Request from the PDC for indicating the system status:  0x0: System OK  0x1: System initialization sucessful  0x2: System Failed  0X3: System Disabled  0X4: Front PDC Disabled  0X5: Front PDC Failed  0X6: Rear PDC Failed  0X7: Rear PDC Disabled | **4** | **0 ~ 15** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **pdc disabled message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **front pdc disabled message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **PDC failed gong** | Audible warning request when ‘TRUE’.  Notes: This PDC’s GONG characteristic is the same with **pdc permanent tone.** | **1** | **0 ~ 1** |
| **System Failed message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Front PDC Failed** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Rear PDC Failed** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **pdc initial success gong** | Audible warning request when ‘TRUE’.  Notes: This PDC’s GONG characteristic is the same with **pdc permanent tone.** | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **pdc failed message enable** | ***insPDCFMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **front pdc failed message enable** | ***insFrontPDCFMesEnPrm*** Message enabled when True. | **1** | **0** | **0 ~ 1** |
| **rear pdc failed message enable** | ***insRearPDCFMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **pdc disabled message enable** | ***insPDCDisaMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **front pdc disabled message enable** | ***insFPDCDisaMesEnPrm*** Message enabled when True. | **1** | **0** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **3** | **0~15** |
| **PDC failed GONG time** | ***insPDCFailGongTotalTimePrm*** Duration of **PDC failed gong** period in 0.1 seconds/bit | **8** | **1C**  **(2.8 sec)** | **1~255** |
| **pdc initial success gong time** | ***insPDCInitSucGongTotalTimePrm*** Duration of **PDC failed gong** period in 0.1 seconds/bit | **4** | **3** | **1 ~ 15** |
| **Pdc status audible warning enable** | ***insPDCStaAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The related PDC messages are used to indicate to the driver that PDC system has some problems. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **pdc system failed message** | if | **(Cluster KL15 status && pdc failed message enable && pdc status == 2)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **FRONT pdc FAILED message** | if | **(Cluster KL15 status && front pdc failed message enable && pdc status == 5)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **REAR pdc FAILED message** | if | **(Cluster KL15 status && REAR pdc failed message enable && pdc status == 6)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~pdc disabled message~~** | ~~if~~ | **~~(Cluster KL15 status && pdc disabled message enable && pdc status == 3)~~** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **front pdc disabled message** | if | **(Cluster KL15 status && front pdc disabled message enable && pdc status == 4)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **PDC failed gong** | if | **Cluster KL15 status && (pdc status == 2 or 5 or 6) &&**  **Pdc status audible warning enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **pdc initial success gong** | if | **Cluster KL15 status && pdc status == 1 &&**  **Pdc status audible warning enable** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **~~Audible warning gong1~~** | ~~if~~ | **~~(pdc disabled message~~**  **~~or front pdc disabled message or REAR pdc disabled message ) && Pdc status audible warning enable~~** |

### Functional Behaviour

**KL.30**

The outputs **pdc failed message**, **front pdc failed message, rear pdc failed message, pdc disabled message, PDC failed gong, pdc initial success gong** and **Audible warning gong1** are off.

**KL.R**

The outputs **pdc failed message**, **front pdc failed message, rear pdc failed message, pdc disabled message, PDC failed gong, pdc initial success gong** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **pdc failed message**, **front pdc failed message, rear pdc failed message, pdc disabled message, PDC failed gong, pdc initial success gong** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **pdc failed message**, **front pdc failed message, rear pdc failed message, pdc disabled message, PDC failed gong, pdc initial success gong** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## ~~Tyre Low warning~~

## Please Engage Park or Neutral Gear to start

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **please Engage park or neutral to start status**  **(AS24)** | ***BCMGearShftParkNtrlEn***  CAN signal from BCM to indicate whether the driver need engage park or neutral to start.  0x0=False  0x1=True | **1** | **0 - 1** |
| **please Engage park or neutral to start status**  **(IP34)** | ***BCMGearShftParkNtrlESR*** CAN signal from BCM to indicate whether the driver need engage park or neutral to start.  0x0=False  0x1=True | **1** | **0 - 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **please Engage park or neutral to start message** | Warning in LCD when ‘TRUE’ | 1 | **0 - 1** |
| **audible warning gong1** | Audible warning gong1 request when ‘TRUE’ | **1** | **0 - 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **please Engage park or neutral to start message enable** | ***inPlsEnPkOrNtlToStartMesEnPrm*** Message enabled when True. | **1** | **1** | **0 - 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **please Engage park or neutral to start audible enable** | ***inPlsEnPkOrNtlToStartAWarnEnPrm***The please initialize driver window audible warning feature is enabled when true. | **1** | **1** | **0 - 1** |

### Functional Description

The **please Engage park or neutral to start message** is used to indicate to the driver that he/she need engage park or neutral to start. The message is displayed in the LCD for **echo message period**.

This warning is instantaneous and so responds immediately to changes to its inputs

If configured to do so by **please Engage park or neutral to start audible warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **please Engage park or neutral to start message** | if | **(Cluster KL15 status && please Engage park or neutral to start message enable && please Engage park or neutral to start message status)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **please Engage park or neutral to start message && please Engage park or neutral to start audible warning enable** |

### Functional Behaviour

**KL.30**

No related message or audible warnings are given.

**KL.30 / KL.R (Shutdown mode)**

No related message or audible warnings are given.

**KL.R**

No related message or audible warnings are given.

**KL.15 (CLUSTER KL15 STATUS)**

The related inputs are monitored and the status of the tyre low messages and audible warnings are determined.

**KL.50**

The related inputs are monitored and the status of the tyre low messages and audible warnings are determined.

### Messages

For detail refer to UE

## Please Initialize Driver Window

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **please initialize driver window status** | ***DrvrPWLInitnRmndr***  CAN signal from BCM to indicate whether the driver need initialize driver window.  0x0=False.  0x1=True. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **please initialize driver window message** | Warning message in LCD when ‘TRUE’ | 1 | 0 ~ 1 |
| **Audible warning gong1** | Audible warning gong1 request when ‘TRUE’ | 1 | 0 ~ 1 |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **please initialize driver window message enable** | ***insPlsInitDrvrWndMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **please initialize driver window audible warning enable** | ***insPlsInitDrvrWndAWarnEnPrm*** The please initialize driver window audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **please initialize driver window message** is used to indicate to the driver that he/she need press related button to initialize the driver’s window. The message is displayed in the LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **please initialize driver window message** | if | **(Cluster KL15 status && initialize driver window message enable && please initialize driver window)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **initialize driver window message && please** **initialize driver window audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **initialize driver window message** and **Audible warning gong1** are off.

**KL.R**

The outputs **initialize driver window message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **initialize driver window message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **initialize driver window message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## PEPS Antenna Fault

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **PEPS Antenna status** | ***PEPSAntFlt*** CAN signal from PEPS to indicate whether the PEPS antenna has a fault:  $0=false  $1=true | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **peps ANTENNA fault message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **peps ANTENNA fault message enable** | ***insPEPSAntFltMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **peps ANTENNA fault audible warning enable** | ***insPEPSAntFltAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **ignition off message displayed period** | ***insIgnOffDispPeriodPrm*** The duration, in seconds, for which all the ignition off messages are displayed in the LCD. | **8** | **05** | **0~255** |

### Functional Description

The **peps ANTENNA fault message** is used to indicate to the driver that the PEPS antenna exist fault.

~~This warning is a ‘repeat on shutdown’ designated warning. That’s mean, the message would be displayed if the related signal’s status is ‘TRUE’ at the time of ignition on and when CLUSTER KL15 STATUS becomes ‘FALSE’, any of these designated messages that were ‘TRUE’ immediately prior to CLUSTER KL15 STATUS becoming ‘FALSE’, are repeated for SHUTDOWN MESSAGE DISPLAY TIME.~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **peps ANTENNA fault message** | if | **(!Cluster KL15 status && peps ANTENNA fault message enable && PEPS Antenna status == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong (repeat)** | if | **peps ANTENNA fault message && peps ANTENNA fault audible warning enable** |

### Functional Behaviour

**KL.30**

The inputs are monitored and the status of the outputs **peps ANTENNA fault message** and **Audible warning gong1** are determined.

**KL.R**

The inputs are monitored and the status of the outputs **peps ANTENNA fault message** and **Audible warning gong1** are determined.

**KL.15 (Cluster KL15 status)**

The input is not monitored and the ignition key on warning message is not displayed.

**KL.50**

The input is not monitored and the ignition key on warning message is not displayed.

### Messages

The **peps ANTENNA fault message** shall be yellow in colour with a dominant wavelength of 590 +/- 4 nm.

#### Pop-up Message

For detail refer to UE

## EVP Fault Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **BrakeVacuumPumpInfo** | ***BrkVacuumPumpSts***CAN signal from ESP via BCM gateway to indicate the EVP status:  0 = EVP ok.  1 = EVP overload, no lamp on, request combustion engine run  2 = Vacuum sensor failure  3 = Booster, EVP, ECU fault | **4** | **0 ~ 15** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **EVP faUlT message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **EVP faULT message enable** | ***insEVPFaultMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **EVP fAULT audible warning enable** | ***insEVPFaultAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **EVP faULT message** is used to indicate to the driver that the electronic vacuum pump has some problems. The message is displayed in the dot-matrix LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

Should signal **BrakeVacuumPumpInfo** be missing, this message is illuminated.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **EVP faUlT message** | if | **(Cluster KL15 status & EVP faULT message enable & (BrakeVacuumPumpInfo= 2 or 3 ))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **EVP faUlT message & EVP faULT audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **EVP fAULTl message** and **Audible warning gong1** are off.

**KL.R**

The outputs **EVP faUlT message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **EVP faUlT message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **EVP faUlT message** and **Audible warning gong1** are determined.

### Messages

For detail refer to UE

## ~~RBS Fault Warning~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | X | X |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **RBSStatus** | ***RBSStatus***CAN signal from ESP via BCM gateway to indicate the RBS status:  0 = ok.  1 = RBS fault | **4** | **0 ~ 15** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **RBS faUlT message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **RBS faULT message enable** | ***insRBSFaultMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **3** | **0~15** |
| **RBS fAULT audible warning enable** | ***insRBSFaultAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **RBS faULT message** is used to indicate to the driver that the RBS has some problems. The message is displayed in the dot-matrix LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

~~Should signal~~ **~~RBSSTATUS~~** ~~be missing, this message is illuminated.~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **RBS faULT message** | if | **(Cluster KL15 status & rbs faULT message enable & RBSSTATUES)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **RBS faUlT message & RBS faULT audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **RBS faUlT message** and **Audible warning gong1** are off.

**KL.R**

The outputs **RBS faUlT message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **RBS faUlT message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **RBS faUlT message** and **Audible warning gong1** are determined.

### Dot Matrix Messages

For detail refer to UE

## BMS Balance Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **BMS Balance request** | ***BMSBalcRmndngReq*** signal from HCU, 0 = false, 1 = true. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **BMS Balance message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **BMS balance message enable** | ***insBMSBalanceMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **bms balance audible warning enable** | ***insBMSBalanceAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **Bms balance message** is used to indicate to the driver that the HV battery pack need to balance operation. In this case, the driver should slow charge 31 the car and stop alone for at least 8 hours. The message is displayed in the dot-matrix LCD for **echo message period**.

The **Audible warning gong1** are used to emphasise the indication to the driver, if configurated so.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **BMS Balance message** | if | **Cluster KL15 status & bms balance request** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **bms balance message & bms balance audible warning enable** |

### Functional behaviour

**KL.30**

The outputs **BMS Balance message** and **Audible warning gong1** are off.

**KL.R**

The outputs **BMS Balance message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **BMS Balance message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **BMS Balance message** and **Audible warning gong1** are determined.

### Dot Matrix Message

For detail refer to UE

## Power Limitation Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **SYSTEM POWER LIMIT** | ***EPTSysPwrLmtA*** CAN signal from HCU  0 = false, 1 = true | **1** | **0 ~ 1** |
| **SYSTEM READY STATUS** | ***EPTRdy*** CAN signal from HCU  0 = FALSE, 1 = TRUE. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **system power limit echo message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **system power limit echo message enaBle** | ***InsSysPwrLmtEhcoMesEnPrm*** Message enabled when TRUE | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **system power limit audible warning enable** | ***insSysPwrLmtAWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

The **SYSTEM POWER LIMIT ECHO MESSAGE** is used to indicate the driver that the system power is limited. The **AUDIBLE WARNING GONG1** is used to emphasise the fault to the driver. The message is displayed in the dot-matrix LCD for **ECHO MESSAGE PERIOD**.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **system power limit ehco message** | if | **cluster kl15 status & system READY & system power limit ehco message enaBle & SYSTEM POWER LIMIT** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **SYSTEM POWER LIMIT ECHO message & SYSTEM POWER LIMIT audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **system power limit echo message** and **Audible warning gong1** are off.

**KL.R**

The outputs **system power limit echo message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **system power limit echo message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **system power limit echo message** and **Audible warning gong1** are determined.

### Dot Matrix Messages

For detail refer to UE

## ~~Engine Oil change Reminder~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| × | × | × | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Engine Oil Change Indication On** | ***EnOilChngIO*** CAN signal use to indicate that the engine oil need be changed when TRUE | **1** | **0 ~ 1** |
| **Engine Oil Life Reset Performed** | ***EnOilLifeRstPerfd*** CAN signal from ECM to indicate Reset being performed when TRUE | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **oil change reminder message** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **Engine Oil Life Reset request** | ***EnOilLifeRstReq*** CAN signal IPK send to ECM to request ECM perform oil reset when TRUE | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **oil change reminder message enable** | ***insOilChReminderMesEnPrm*** The oil change reminder is enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **oil life reset fail message enable** | ***insOilLifeRstFailMesEnPrm*** The oil reset fail message is enabled when ‘TRUE’. | **1** | **0** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **oil change reminder audible Warning enable** | ***insOilChReminderAWarnEnPrm*** audible warning feature is enabled when true. | **1** | **0** | **0 ~ 1** |
| **oil life reset fail audible Warning enable** | ***insOilLifeRstFailAWarnEnPrm***  audible warning feature is enabled when true. | **1** | **0** | **0 ~ 1** |
| **EOL reset period** | ***insEOLRstPeriodPrm*** The duration, in seconds, for which the reset OK feedback is not received, then the reset fail message will display. | **4** | **3** | **0 ~ 15** |

### Functional Description

The Oil change reminder warning message is used to indicate to the driver that the engine oil need change.

If configured to do so by **oil change reminder audible Warning enable** being TRUE; an audible warning is used to emphasise this warning to the driver.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **oil change reminder message** | if | **Cluster KL15 status & Engine Oil Change Indication On** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **oil change reminder message &**  **oil change reminder audible Warning enable** |

#### EOL reset

EOL Reset shall be afforded when a **eol reset** is received just like other TC function.

When a reset takes place, IPK should send signal **Engine Oil Life Reset request** =1 to ECM. Then ECM received the request and will feedback to IPK signal **Engine Oil Life Reset Performed** =1**.**

Following any EOL reset command the new EOL display will turn to 100%.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **EOL reset**  **(Engine Oil Life Reset request=1)** | if | **Cluster KL15 status &[ (eol reset via menu) or (long press TC switch enter button in oil life TC page)]** |

After reset request is sent to ECM, if signal **Engine Oil Life Reset Performed** does not update to 1 in **EOL reset period**, then IPK will display the EOL reset fail message:

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **EOL reset fail message** | if | **Cluster KL15 status & (Engine Oil Life Reset Performed !=1 for T > EOL reset period after ↑Engine Oil Life Reset request)** |

**↑** means signal value changes from 0 to 1.

### Functional Behaviour

**KL.30**

No Oil Change Reminder message is displayed.

**KL.30 / KL.R (Shutdown mode)**

The inputs are monitored and the status of the Oil Change Reminder message is determined.

**KL.R**

No Oil Change Reminder message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the Oil Change Reminder message is determined.

**KL.50**

The inputs are monitored and the status of the Oil Change Reminder message is determined.

### Dot Matrix Messages

For detail refer to UE

## Power Liftgate Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **power liftgate status** | ***PwrLftgtSts***CAN signal from PLCM to indicate the power liftgate status.  0x0= system fault；  0x1= system Limit；  0x2= full open；  0x3= full Close；  0x4= opening；  0x5= closing；  0x6= middle Stop；  0x7= Transition trough striker； | **3** | **0 ~ 7** |
| **Power Liftgate Put In Park Request** | ***PwrLftgtPutInParkReq***CAN signal from PLCM to remind driver to put in park:  $1=True;  $0=False | **1** | **0 ~ 1** |
| **Power Liftgate Manual Close Request** | ***PwrLftgtManuClsReq***CAN signal from PLCM to remind driver to close liftgate manual.  $1=True;  $0=False | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **power liftgate system fault message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **power liftgate system limit message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Power Liftgate Put In Park Request message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Power Liftgate Manual Close Request message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **power liftgate system message enable** | ***insPowLifGatSysMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **Power Liftgate audible warning enable** | ***insPowLifGatAudibWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |

### Functional Description

The **power liftgate system fault message** and **power liftgate system limit message** is used to indicate to the driver that the system has some problems. The message is displayed in the LCD for **echo message period** .

An audible warning is used to emphasise this warning to the driver, a single gong.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **power liftgate system fault message** | if | **(Cluster KL15 status && power liftgate system message enable && power liftgate status == 0)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **power liftgate system limit message** | if | **(Cluster KL15 status && power liftgate system message enable && power liftgate status == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Power Liftgate Put In Park Request message** | if | **(Cluster KL15 status && power liftgate system message enable && Power Liftgate Put In Park Request == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Power Liftgate manual close Request message** | if | **(Cluster KL15 status && power liftgate system message enable && Power Liftgate Manual Close Request == 1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(power liftgate system fault message / power liftgate system limit message / Power Liftgate Put In Park Request message / Power Liftgate Put In Park Request message ) && Power Liftgate audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **power liftgate system message** and **Audible warning gong1** are off.

**KL.30 / KL.R (Shutdown mode)**

The outputs **power liftgate system message** and **Audible warning gong1** are off.

**KL.R**

The outputs **power liftgate system message** and **Audible warning gong1** are off.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the **power liftgate system message**  and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the **power liftgate system message** and **Audible warning gong1** are determined.

### Messages

For detail refer to UE

## SIA Reminder

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Remaining distance** | Internal signal calculated by subtracting the difference between **odo** and **SIA odo**, from **SIA distance**. |  |  |
| **Remianing SIA peroid** | Internal signal calculated by displayed SIA date minus current date. |  |  |
| **FICM VEHICLE MAINTAINANCE REQUREST** | ***FICMVehMntnceSts*** CAN signal from FICM to indicate to the driver that the vehicle need maintainance.  0=status OK  1=suggest to maintain  2=maintain immediately  3=reserved. | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **sia reminder message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **sia reminder critical message** | Warning in LCD when ‘TRUE’. | **1** | **0 ~ 1** |
| **sia audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **sia reminder messAge enable** | ***insSIARmdMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **sia reminder critical messAge enable** | ***insSIARmdCriMesEnPrm*** Message enabled when True. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the LCD. | **4** | **5** | **0~15** |
| **SIA audible wanring enable** | ***InsSIAAudWarnEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **SIA reminder distance threshold** | ***InsSIARmdDistThresPrm***  in km | **16** | **1F4**  **(500)** | **0~65535** |
| **SIA reminder period threshold** | ***insSIARmdPeriodThresPrm*** in crement of 2 days | **5** | **0F** | **0~31** |
| **FICM ENABLE** | ***InsFICMEnPrm*** The vehicle has configuration with different FICM type:  0 = no setting CAN signals, no LVDS (color radio);  1 = with setting CAN signals, without LVDS (8’’);  2 = with setting CAN signals, with LVDS (10.4’’);  3 = reserved; | **1** | **2** | **0 ~ 3** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **sia reminder message** | if | **Cluster KL15 status && sia reminder message enable &&**  **(**  **(FICM ENABLE =0 && remaining distance <= SIA reminder distance threshold)**  **or**  **(FICM ENABLE =1 && ((remaining distance <= SIA reminder distance threshold) or (remaining SIA period <= sia reminder period threshold)) )**  **or**  **(FICM ENABLE =2 && FICM VEHICLE MAINTAINANCE REQUREST ==1)**  **)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **sia reminder critical message** | if | **Cluster KL15 status && sia reminder critical messAge enable &&**  **(**  **(FICM ENABLE =0 && remaining distance == 0)**  **or**  **(FICM ENABLE =1 && (remaining distance == 0 ) or (remaining SIA period == 0))**  **or**  **(FICM ENABLE =2 && FICM VEHICLE MAINTAINANCE REQUREST ==2)**  **)** |

// note：配阿里屏，无SIA菜单；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(sia reminder message or sia reminder critical message) &&** **sia reminder audible warning enable** |

### Functional Behaviour

**KL.30**

The outputs **sia reminder message** and **Audible warning gong1** are off.

**KL.R**

The outputs **sia reminder message** and **Audible warning gong1** are off.

**KL.15 (Cluster KL15 status)**

The inputs are monitored and the status of the outputs **sia reminder message** and **Audible warning gong1** are determined.

**KL.50**

The inputs are monitored and the status of the outputs **sia reminder message** and **Audible warning gong1** are determined.

### Message

For detail refer to UE

## Pedestrian Alert Control Module Fault

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | × | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **PACM fault status**  **(IP34)** | ***PedtrnAlrtCtlSysFlt*** CAN signal use to indicate that the pedestrian alert system is fault when TRUE | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **PACM fault message** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **PACM fault message enable** | ***insPedAlertSysFltMesEnPrm*** The oil change reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **PACM fault audible Warning enable** | ***insPedAlertSysFltAWarnEnPrm*** audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **PACM fault message** | if | **Cluster KL15 status & PACM fault status** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **PACM fault message & PACM fault audible Warning enable** |

### Functional Behaviour

**KL.30**

No pedestrian alert system fault message is displayed.

**KL.R**

No pedestrian alert system fault message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the pedestrian alert system fault message is determined.

**KL.50**

The inputs are monitored and the status of the pedestrian alert system fault message is determined.

### Dot Matrix Messages

For detail refer to UE

## IPK Overheating Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **IPK lcd temperture** | Internal signal use to indicate the IPK LCD temperature; offset – 500, scale=0.1℃/bit. | **12** | **0~24096** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **IPK overheating messge** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ipk overheating message enable** | ***insIPKOverheatMesEnPrm*** The reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **ipk overheating audible Warning enable** | ***insIPKOverheatAWarnEnPrm*** audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **IPk overheating threshold** | ***insIPKOverheatThrsPrm*** 1℃/bit | **8** | **46**  **(70℃)** | **0~255** |
| **IPk LCD shutdown threshold** | ***insIPKLCDShutdownThrsPrm*** 1℃/bit | **8** | **55**  **(85℃)** | **0~255** |
| **ipk overheating hystesis** | ***insIPKOverheatHysPrm*** 1℃/bit message disappear below the threshold. | **3** | **1**  **(1℃)** | **0~7** |

### Functional Description

When temperature rises to 70℃, IPK stores the current illuminance, and with temperature rising, the illuminance will decrease by 5% per ℃ until arriving 85℃. The min illuminance is 25cd/m2.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **ipk overheating message** | if | **Cluster KL15 status & (IPK lcd temperture >= IPk overheating threshold)** |

Key On Type C: ”仪表过温，请降温” / “IPK Overheating”

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~ipk lcd shutdown warning~~** | ~~if~~ | **~~Cluster KL15 status & (IPK lcd temperture >= IPk LCD shutdown threshold)~~** |

~~Key On Type A(P0): “仪表显示屏将在xx秒内关闭”（xx指10倒数到1）/”IPK Screen Will Shut Down in xx s”~~

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **(ipk overheating message or ipk lcd shutdown warning) & ipk overheating audible Warning enable** |

### Functional Behaviour

**KL.30**

No message is displayed.

**KL.R**

No message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the message is determined.

**KL.50**

The inputs are monitored and the status of the message is determined.

### Dot Matrix Messages

For detail refer to UE

## Near Range Control Drive Status // singal not in DBC

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | x | tbd | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **nRcd Status** | ***NRCDSts*** Near Field Control Drive Status, ~~1=ON, 0=OFF;~~  0 = inactive;  1 = NRCD active;  2 = semiautomatic parking assistant active;  3 = fully APA active; | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **nfcd Status message** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **nfcd Status message enable** | ***insNFCDStsMesEnPrm*** The reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **nRcd on message** | if | **Cluster KL15 status & nfcd Status message enable & nRcd Status =1** |

Key On Type **B**: ”**按点火按钮同时踩制动 可退出遥控驾驶模式**” / “Press Brake and push SSB to quit NRCD state”

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~nRcd off message~~** | ~~if~~ | **~~Cluster KL15 status & nfcd Status message enable & nRcd Status =0~~** |

~~Key On Type C: ” 遥控泊车功能关闭” / “Near Field Control Drive Function OFF”~~

### Functional Behaviour

**KL.30**

No message is displayed.

**KL.R**

No message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the message is determined.

**KL.50**

The inputs are monitored and the status of the message is determined.

### Dot Matrix Messages

For detail refer to UE

## Auto Parking Status

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √全自动APA | x | √全自动APA | √半自动APA |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **apa mode** | ***APAMd***  0x0 = off  0x1 = parallel parking  0x2 = perpendicular parking  0x3 = park out  0x4 ~ 0x7 = reserved | **3** | **0 ~ 7** |
| **apa hmi** | ***APAInfoDispReq***  See *“20161206-zh6-自动泊车HMI提醒信息网络信号Code V1 6（遗留问题 + 添加英文）.xlsx”* | **6** | **0~63** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **auto parking Status message** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **auto parking Status message enable** | ***insAPAMesEnPrm*** The reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |

### Functional Description

APA message是特殊的KL15 ON时的message：

（1） 在***APAInfoDispReq***从0变为其他值时开始显示，~~到APA完成或APA中断或APA退出时到~~***APAInfoDispReq***从其他值变为0时结束显示；

（2） 每一个message的显示周期都依据于***APAInfoDispReq***的信号值状态；中间插入其他报警信息都不能打断APA的相关显示；

（3） 停车位图片依据于：

***APAMd***：***APAMd***=1（parallel parking）侧放停车，***APAMd***=2（perpendicular parking）垂直停车；

***APAMd***=3（park out）泊出（仅针对侧方停车泊出）；

***APAInfoDispReq***：***APAInfoDispReq***=0x08 表示左右两侧都有车位；***APAInfoDispReq***=0x09 表示只有左侧车位；***APAInfoDispReq***=0x0A 表示只有右侧车位；

当***APAMd***=0x3且***APADspReq***=0x31时（还未收到转向灯信号）显示文字“请打转向灯，选择泊出方向”，然后当若到左/右转向灯信号，则切换到具体对应侧的泊出停车位的示意图；然后 ***APADspReq***会变成0x32，保持泊出停车位的示意图显示并显示文字“如要将车泊出，请双手离开方向盘，并按住APA键！”，泊出过程中如果驾驶员干预方向盘，则***APADspReq***会变成0x33，保持泊出停车位的示意图并显示文字“如要继续泊出，请双手离开方向盘，并重新按住APA键！”。

1、车位搜索：

2、安全条件检测：

3、自动泊车过程：

// see *“20161206-zh6-自动泊车HMI提醒信息网络信号Code V1 6（遗留问题 + 添加英文）.xlsx”*

**

4、停车位图片

|  |  |  |  |
| --- | --- | --- | --- |
| ***APAMd*** | ***APAInfoDispReq*** | | 停车位图（详见UI） |
| 1（parallel parking）侧放停车 | 0x08 | Please turn on direction indicator if you want to parking in 如要将车泊入，请打转向灯！ | 左右两侧都显示侧方停车位 |
| 0x09 | Please turn on left direction indicator if you want to parking in 如要将车泊入，请打左转向灯！ | 仅左侧显示侧方停车位 |
| 0x0A | Please turn on direction indicator if you want to parking in 如要将车泊入，请打右转向灯！ | 仅右侧显示侧方停车位 |
| 2（perpendicular parking）垂直停车 | 0x08 | Please turn on direction indicator if you want to parking in 如要将车泊入，请打转向灯！ | 左右两侧都显示垂直停车位  （UE暂无示意图） |
| 0x09 | Please turn on left direction indicator if you want to parking in 如要将车泊入，请打左转向灯！ | 仅左侧显示垂直停车位  （UE暂无示意图） |
| 0x0A | Please turn on direction indicator if you want to parking in 如要将车泊入，请打右转向灯！ | 仅右侧显示垂直停车位  （UE暂无示意图） |
| 3 （park out）泊出（仅针对侧方停车位泊出） | 0x31 | Please turn on direction indicator to select park out direction 请打转向灯，选择泊出方向！ | 无图，仅文字 |
| ***APAInfoDispReq*** =0x31/0x32/0x33 && ***RDircnIO*** | |  |
| ***APAInfoDispReq*** =0x31/0x32/0x33 && ***LDircnIO*** | | cid:image004.png@01D2135A.8BD0B160 |

补充1、以下message弹出时伴随GONG提示音；

a.  0x07---提示用户找到车位！

b.  0x2C---提示用户，解除制动，开始自动泊车！

c.  0x2E---提示用户，自动泊车已完成，用户需要接管车辆！

d.  0x39---提示用户，挂前进挡，向前行驶！

e.  0x3B---提示用户，挂倒车档，向后行驶！

补充2、

IP34 ：全自动泊车，仅支持右侧侧方停车；

AS26：半自动泊车，支持右侧侧方停车、右侧垂直泊车；

### Functional Behaviour

**KL.30**

No message is displayed.

**KL.R**

No message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the message is determined.

**KL.50**

The inputs are monitored and the status of the message is determined.

### Dot Matrix Messages

For detail refer to UE

## Door Open Vehicle still Running Reminder

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Driver Door open status** | ***DrvrDoorOpenSts*** CAN signal from BCM for driver door status:  $0=Driver Door Closed  $1=Driver Door Open(For latch switch can not detect door ajar status)  $2=Driver Door Ajar  $3=Driver Door Full Open | **2** | **0 ~ 3** |
| **seat belt driver status** | ***FasnDrvrSbltIndCmd*** CAN signal from SDM that the Seat Belt warning is required:  0x00: drive lamp OFF  0x01: drive lamp ON  0x02: drive lamp Flashing  0x03: reserved | **2** | **0 ~ 3** |
| **Vehicle speed** | ***VehSpdAvgDrvn*** CAN signal of road speed data from ABS/DSC ECU, 0.015625 km/h/bit. | **15** | **0 ~ 511.984 km/h** |
| **Vehicle speed validity** | ***VehSpdAvgDrvnV*** CAN signal to indicate the validity of **Vehicle speed**.  $0=Valid;  $1=Invalid. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Door Open Vehicle still Running reminder message** | Message Warning request when ‘TRUE’ | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Door Open Vehicle Running message enable** | ***insDoorOpenVehRunMesEnPrm*** The reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **Door open vehicle running gong enable** | ***insDoorOpenVehRunGongEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Door Open Vehicle still Running reminder message** | if | **Cluster KL15 status && Door Open Vehicle Running message enable &&**  **READY SYSTEM FLAG &&**  **Driver Door open status !=0 &&**  **seat belt driver status ==1 &&**  **Vehicle speed < 1kmh** |

Key On Type A: ”注意！车辆仍处于可行驶状态” / “Caution! Vehicle is still in Running Status”，优先级高于Door Open，低于Door Open with Speed；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **Door Open Vehicle still Running reminder message & Door open vehicle running gong enable** |

### Functional Behaviour

**KL.30**

No message is displayed.

**KL.R**

No message is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the status of the message is determined.

**KL.50**

The inputs are monitored and the status of the message is determined.

### Dot Matrix Messages

For detail refer to UE

## HCU/VCU display request

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| See Spec | | | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | Description | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **EPT Info Display** | ***EPTInfoDsp*** CAN signal from HCU for some message display: see below 5.44.3 | **5** | **0 ~ 31** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **EPT info display message** | Message Warning request when ‘TRUE’ | **5** | **0 ~ 31** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **ept info display Message enable** | ***insEPTInfoDspMesEnPrm*** The reminder is enabled when ‘TRUE’. | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |

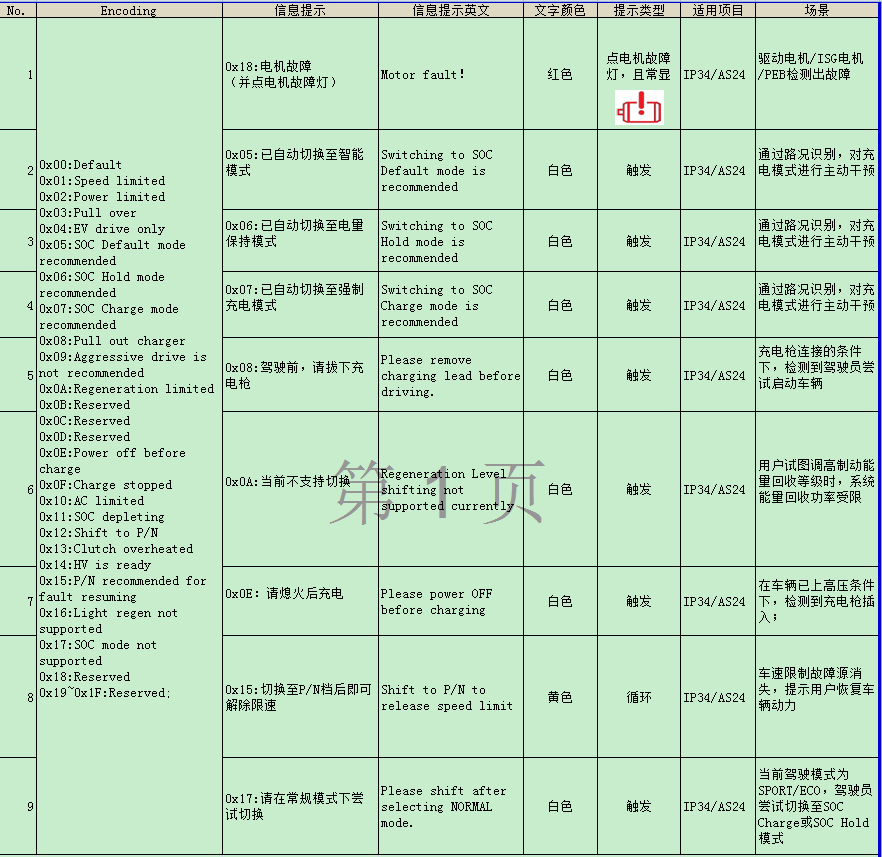
### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **EPT info display message xx** | if | **Cluster KL15 status && EPT Info Display == xx** |

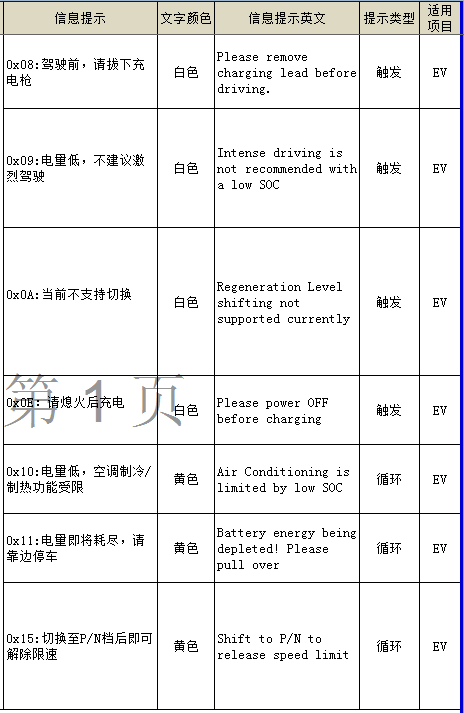
|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Motor Fault lamp** | **if** | **Cluster KL15 status &&Motor fault  lamp enable && ( EPT Info Display == 0x18)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | **if** | **(EPT info display  message==(0x18) && Motor fault gong enable)** |

AS24/IP34：



AS26：



## HVBattery Fault/Airbag Deplosion Leave Car Warning

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **HVBATTERY FAULT** | ***BMSFltIndReq*** CAN signal from HCU  0x0= off  0x1= continuous  0x2= flash  0x3= Reserved | **2** | **0 ~ 3** |
| **AIRBAG DEPLOSION** | ***AirbagDpl*** CAN signal from SDM  0x0= false  0x1= true | **1** | **0~1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **BMS fault leave car warning message** | Display in LCD when TRUE | **1** | **0 ~ 1** |
| **Audible warning gong1** | Audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **hvbattery fault leave car message enaBle** | ***InsHVBatFltLeaCarMesEnPrm*** Message enabled when TRUE | **1** | **1** | **0 ~ 1** |
| **echo message period** | ***insEchoMesPeriodPrm*** The duration, in seconds, for which all the echo messages are displayed in the dot matrix LCD. | **4** | **5** | **0~15** |
| **HVBATTERY fAULT leave car gong enable** | ***insHVBatFltLeaCarFGongEnPrm*** The audible warning feature is enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **HVBATTERY FAULT leave car message** | if | **cluster kl15 status & HVBATTERY FAULT ehco message enaBle && (HVBATTERY FAULT == 2 OR AIRBAG DEPLOSION ==1).** |

// 文字提醒“请赶紧离开车辆！”/ ”Escape from the vehicle immediately!” 配三角警告图标；

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Audible warning gong1** | if | **HVBATTERY FAULT leave car message & HVBATTERY fAULT leave car gong enable** |

### Messages

For detail refer to UE

# ADAS

See *“ADAS Display Spec Vxx.docx”.*

# 12.3 inch TFT Display

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

## Display System Control

**This Section please refer to HMI design specification.**

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN MS key status and the hardwired input. | **1** | **0 ~ 1** |
| **CLUSTER WARNING**  **INFO CENTRE FLAG** | internal signal,to indicate whether there are warnings that  need be displayed under the tab of ‘system warning’.  $0=False;  $1=True; | **1** | **0 ~ 1** |
| **FICM READY STATUS** | ***FICAvlblSts*** CAN signal from FICM to indicate FICM is available.  0x0=False  0x1=True | **1** | **0 ~ 1** |
| **Ldw system status** | ***LDWSysSts*** CAN signal from FVCM ECU to indicate LDW’s status:  0x0=Off  0x1=Stand by  0x2=Active  0x3=Override  0x4=Fault  0x5-0x7=reserved | **3** | **0-7** |
| **ACC SYSTEM STATUS** | ***ACCSysSts*** CAN signal from FVCM to indicate the ACC system status:  0--Off  1--Stand By  2--Active  3--Override  4--Brake Only  5--Reserved  6--Reserved  7--Reserved | **3** | **0 ~ 7** |
| **trip Computer switch input** | Hardwire input from exterior ‘trip computer switch’.  There are 5 buttons, and support 10 switch statuses:  Up---   * Up\_S: short press ‘Up’ button. * Up\_L: long press ‘Up’ button.   Ent---   * Ent\_S: short-press ‘enter’ button. * Ent\_L: long-press ‘enter’ button > button Press time 1.   Dw---   * Dw\_S: short press ‘Down’ button. * Dw\_L: long press ‘Down’ button.   Lf---   * Lf\_S: short press ‘Left’ button. * Lf\_L: long press ‘Left’ button.   Rgt---   * Rgt\_S: short press ‘Right’ button. * Rgt\_L: long press ‘Right’ button. | **3** | **0 ~ 7** |
| **MODE SWITCH STATUS** | ***EPTDrvngMdSwSts*** CAN signal  0x0=E-Economy;  0x1=N-Normal;  0x2=S-Sport(M-Mountain);  0x3=H-SOC Hold;  0x4=C-Charge;  0x5~0x7=Reserved. | **3** | **0 ~8** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **CLUSTER TAB REQUEST** | ***ClusterTabReq*** CAN signal, to deliver the current TAB  status of instrument cluster.  $0=Trip-computer;  $1=Navigation;  $2=Media;  $3=Call;  $4=Warning Information Centre;  $5=Setting;  $6=Active Safety;  $7~$15=Reserved; | **4** | **0-15** |
| **CLUSTER UP BUTTON**  **STATUS** | ***ClusterUpButtonSts*** CAN signal, to deliver the UP button  press status of instrument cluster.  &0=No Press;  $1=Short Press;  $2=Long press;  $3=Reserved;  Note: when tab is **not** Phone/Media/Voice, IPK should **not** send up button and down button status to FICM. | **2** | **0-3** |
| **CLUSTER DOWN**  **BUTTON STATUS** | ***ClusterDwButtonSts*** CAN signal, to deliver the DOWN  button press status of instrument cluster.  &0=No Press;  $1=Short Press;  $2=Long press;  $3=Reserved;  Note: when tab is **not** Phone/Media/Voice, IPK should **not** send up button and down button status to FICM. | **2** | **0-3** |
| **CLUSTER LEFT BUTTON**  **STATUS** | ***ClusterLftButtonSts*** CAN signal, to deliver the LEFT  button press status of instrument cluster.  &0=No Press;  $1=Short Press;  $2=Long press;  $3=Reserved; | **2** | **0-3** |
| **CLUSTER RIGHT BUTTON**  **STATUS** | ***ClusterRgtButtonSts*** CAN signal, to deliver the RIGHT  button press status of instrument cluster.  &0=No Press;  $1=Short Press;  $2=Long press;  $3=Reserved; | **2** | **0-3** |
| **CLUSTER ENTER BUTTON**  **STATUS** | ***ClusterEntButtonSts*** CAN signal, to deliver the ENTER  button press status of instrument cluster.  &0=No Press;  $1=Short Press;  $2=Long press;  $3=Reserved; | **2** | **0-3** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **default level parameter** | | | | |
| **CLUSTER MENU TRIP COMPUTER ENABLE** | ***insClusterMenuTCEnPrm*** When TRUE indicates that the item ‘Trip Computer’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU WARNING ENABLE** | ***insClusterMenuWarnEnPrm*** When TRUE indicates that the item ‘Warning’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU Media ENABLE** | ***insClusterMenuMediaEnPrm*** When TRUE indicates that the item ‘Media’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU NAVI ENABLE** | ***insClusterMenuNaviEnPrm*** When TRUE indicates that the item ‘Navi’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU call ENABLE** | ***insClusterMenuCallEnPrm*** When TRUE indicates that the item ‘Phone’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENUSetting ENABLE** | ***insClusterMenuSettEnPrm*** When TRUE indicates that the item ‘Setting’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU Adas ENABLE** | ***insClusterMenuADASEnPrm*** When TRUE indicates that the item ‘ADAS’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **Level 1 parameter: sub menu under menu ADAS** | | | | |
| **MENU ACC ENABLE** | ***insMenuACCEnPrm*** When TRUE indicates that the item ‘ACC’ in menu level 1 is enabled. | **1** | **1** | **0 ~ 1** |
| **MENU LDW ENABLE** | ***insMenuLDWEnPrm*** When TRUE indicates that the item ‘LDW’ in menu level1 is enabled. | **1** | **1** | **0 ~ 1** |
| **MENU BSD ENABLE** | ***insMenuBSDEnPrm*** When TRUE indicates that the item ‘BSD’ in menu level1 is enabled.. | **1** | **1** | **0 ~ 1** |
| **Level 1 parameter: sub menu under menu setting** | | | | |
| **MENU tHEME ENABLE** | ***insMenuTHEEnPrm*** When TRUE indicates that the item ‘Theme’ in menu level1 is enabled.. | **1** | **1** | **0 ~ 1** |
| **menu style enable** | ***insMenuStyleEnPrm*** When TRUE indicates that the item ‘Style’ in menu level1 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU UNITS ENABLE** | ***insMenuUnitEnPrm*** When TRUE indicates that the item ‘Units’ in menu level1 is enabled.. | **1** | **0** | **0 ~ 1** |
| **MENU illumination luminance ENABLE** | ***insMenuIllumiLumiEnPrm*** When TRUE indicates that the item ‘Illumination Luminance’ in menu level1 is enabled.. | **1** | **1** | **0 ~ 1** |
| **menu digital clock enable** | ***insMenuDigCEnPrm*** When TRUE indicates that the menu of ‘Digital Clock’ is enabled. | **1** | **0** | **0 ~ 1** |
| **menu SIA enable** | ***insMenuSIAEnPrm*** When TRUE indicates that the menu of ‘SIA’ is enabled. | **1** | **0** | **0 ~ 1** |
| **menu Overspeed enable** | ***insMenuOSEnPrm*** | **1** | **0** | **0 ~ 1** |
| **Menu language enable** | ***insMenuLangEnPrm*** | **1** | **0** | **0 ~ 1** |
| **level2 parameter** | | | | |
| **MENU Theme A ENABLE** | ***insMenuTHEAEnPrm*** When TRUE indicates that the item ‘ThemeA’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU Theme B ENABLE** | ***insMenuTHEBEnPrm*** When TRUE indicates that the item ‘ThemeB’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU UNITS DISTAnCE ENABLE** | ***insMenuUnitDistEnPrm*** When TRUE indicates that the item ‘ Unit Distance’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU UNIT FUEL CONSUMPTION ENABLE** | ***insMenuUnitFuelConsEnPrm*** When TRUE indicates that the item ‘Unit Fuel Consumption’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU UNITS tepmerature ENABLE** | ***insMenuUnitTempEnPrm*** When TRUE indicates that the item ‘ Unit temperature’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **MENU UNITS tyre pressure ENABLE** | ***insMenuUnitTyrePresEnPrm*** When TRUE indicates that the item ‘ Unit tyre pressure’ in menu level 2 is enabled.. | **1** | **1** | **0 ~ 1** |
| **parameter for option** | | | | |
| **Consumption Units** | ***insTCConUnitsPrm*** 0 = litres / 100km, 1 = UK mpg, 2 = US mpg, 3 = km / litre. | **2** | **0** | **0 ~ 3** |
| **distance Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **Language** | ***insLangPrm*** The language to be used for display text.0 = English, 1 = Chinese, 2 to 7 = reserved. | **3** | **1** | **0 ~ 7** |
| **theme** | ***insThemePrm*** The theme to be used for display.0 = theme A, 1 = theme B, 2 = theme C, 3 to 7 = tba. | **3** | **0** | **0 ~ 7** |
| **style** | ***insThemePrm*** The style to be used for display.0 = 动感, 1 = 舒适, 2 = 清新, 3=联动模式，4 to 7 = tba. | **3** | **0** | **0 ~ 7** |
| **over speed threshold** | ***insOSThreshPrm*** The speed threshold above which the warning is activated.  Notes:  1, the threshold can be adjusted by Trip computer switch.  2, the threshold can be setted via diagnostic.  3, if the value is ‘0’ means the function is disabled. In this condition, the display value is ‘OFF’. | **8** | **0x78 (120 km/h)** | **30 ~ 240**  **and 0** |
| **illumination level** | ***InsClusterIlluLvPrm***  0=low; 1= normal; 2=high; 3=reserved . | **2** | **1** | **0~3** |
| **tyre pressure unit** | ***InsTyrePresUnitsPrm***  0=bar; 1= kpa; | **1** | **1** | **0~1** |
| **temperature unit** | ***insTempUnitsPrm***  0=℃；1=℉；2=not available; 3=reserved. | **2** | **0** | **0~3** |
| **~~PRNDL ENABLE~~** | ***~~insPrndEnPrm~~*** ~~Indicates mode of PRND display. 00 = Off, 01 = Next Gear, 02 = Current gear only.~~ | **~~2~~** | **~~2~~** | **~~0 ~ 2~~** |
| **related parameter for menu Trip Computer** | | | | |
| **~~TC history mode enable~~** | ***~~insTCHistoryEnPrm~~*** ~~The display mode used for tab of default page of main zone of LCD:~~  ~~0=TC tab/car status;~~  ~~1= history memory mode.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **~~digital speed enable~~** | ***~~insDigiSpeedEnPrm~~*** ~~When TRUE indicates that the function is enabled and is displayed as the Trip Computer function.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **~~rte enable~~** | ***~~insRTEEnPrm~~*** ~~When TRUE indicates that the function is enabled and is displayed as the Trip Computer function(including Electric RTE and Fuel RTE)~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **current journey enable** | ***insCurJourUserEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function (including”average energy consumption, trip, driving time, average speed”) | **1** | **1** | **0 ~ 1** |
| **accumulative journey enable** | ***insAccJourUserEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function (including”average energy consumption, trip, driving time, average speed”) | **1** | **1** | **0 ~ 1** |
| **FC trend display enable** | ***InsFCTrendrEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function. | **1** | **1** | **0 ~ 1** |
| **EC trend display enable** | ***InsECTrendrEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function. | **1** | **1** | **0 ~ 1** |
| **hybrid info enable** | ***insHybridInfoEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function (including”tachometer, motor speed, voltage and current”) | **1** | **1** | **0 ~ 1** |
| **car status enable** | ***insCarStsEnPrm*** When TRUE indicate car status page. | **1** | **1** | **0 ~ 1** |
| **tpms type** | ***insTPMSTypePrm***  0=no TPMS  1= indirect TPMS  2=direct TPMS(display TC page) | **2** | AS24/EP21=2, IP34=1 | **0 ~ 3** |
| **enable parameter for accumulate &current memory** | | | | |
| **Average fuel consump enable** | ***insAFCEnPrm*** If TRUE the AFC TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **IP34/ AS24=1**  **EP21=0** | **0 ~ 1** |
| **average electric consump enable** | ***insAECEnPrm*** If TRUE theAEC TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **LAP TIME ENABLE** | ***insLapTimeEnPrm*** If TRUE the driving Time TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **average speed enable** | ***insAverageSpeedEnPrm*** If TRUE the average speed TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **trip enable** | ***insTripEnPrm***  0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **parameter for switch** | | | | |
| **button Press time 1** | ***insPresstime1Prm*** The time in 0.25 second increments indicates the button press time | **4** | **6**  **(1.5 sec)** | **0 ~ 15** |
| **button Press time 2** | ***insPresstime2Prm*** The time in 50ms per bit to indicate the button press time | **4** | **2**  **(100 ms)** | **0 ~ 15** |
| **~~CLUSTER SETTING TAB~~**  **~~INHIBIT PERIOD~~** | ***~~insClusterSetngTabInhibPeriodPrm~~*** ~~The tab of ‘Setting’~~  ~~should be prevented from being displayed until~~  ~~CLUSTER SETTING TAB INHIBIT PERIOD after KL.15~~  ~~ON and all other conditions are satisfied.~~  ~~5 second/bit.~~ | **~~4~~** | **~~6~~**  ~~(30s)~~ | **~~0 ~ 15~~** |
| **FICM ENABLE** | ***InsFICMEnPrm*** The vehicle has configuration with different FICM type:  0 = no setting CAN signals, no LVDS;  1 = with setting CAN signals, without LVDS;  2 = with setting CAN signals, with LVDS;  3 = reserved; | **1** | **2** | **0 ~ 3** |
| **CLUSTER TAB**  **DISAPPEARED DELAY**  **PERIOD** | ***InsClusterTabDisappearDelayPeriodPrm*** The duration  in seconds, once the instrument cluster detect that  one or more Tab need be disappeared,it should be  keep display for CLUSTER TAB DISAPPEARED DELAY  PERIOD , and then disappeared.  0.5second /bit. | **3** | **3** | **0 ~ 7** |
| **over speed threshold setting entrance** | ***InsOVSThreshSetEntrPrm***  0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved | **2** | **2** | **0~3** |
| **unit setting entrance** | ***insUnitSetEntrPrm***  0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved | **2** | **2** | **0~3** |
| **SIA reset enable** | ***insSIARstEnPrm*** SIA reset by driver enabled when true | **1** | **1** | **0~1** |
| **time display format** | ***insTimeDspFmtPrm***  0=12 hour time; 1=24 hour time | **1** | **1** | **0~1** |
| **time display setting entrance** | ***insTimeDspSetEntrPrm***  0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved | **2** | **2** | **0~3** |
| **language setting entrance** | ***insLangSetEntrPrm***  0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved | **2** | **2** | **0~3** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **long enter** | Internal signal that is ‘TRUE’ if **Enter input** is ‘TRUE’ for > **Trip computer switch time threshold**. | **1** | **0 ~ 1** |
| **history** | Internal signal indicate which TC function is selected of previous ignition cycle:  0= digital speed,  1= average fuel trend,  2=RTE,  3= Accumulate Memory  4= Current Memory,  5=reserved.  6=reserved.  >7 = blank. | **4** | **0 ~ 15** |

### Functional Description

~~According to the interaction principle between Cluster and Infotainment, the user can change cluster related setting through cluster setting menu that under the column of ‘setting’ tab,also it can be changed from infotainment. And here,the ‘setting’ tab in cluster is as a backup, so only when the infotainment can not work over~~ **~~CLUSTER SETTING TAB INHIBIT PERIOD~~** ~~or the vehicle does not own an infotainment(~~**~~FICM ENABLE==0~~**~~),the ‘setting’ tab will be displayed on cluster.~~

The tab that can be disappeared under some circumstance, in order to provide a good user experience, once the cluster detect the corresponding tab need be disappeared,the tab should keep display for **CLUSTER TAB DISAPPEARED DELAY PERIOD**,in case that if during the **CLUSTER TAB DISAPPEARED DELAY PERIOD** the cluster detect that the tab displayed conditions are satisfied again, the tab should keep display.

Every button here has three status, like No press,Short press and Long press. Once the status of a button is

changed,the new status should be delivered to FICM by CAN Bus as soon as possible.Furthermore, during the tab transferred from one to another, a transformation animation will be occurred, here the cluster must assure that the new button status be published through CAN Bus once the animation start.

The period for short press is defined as parameter **button Press time 2;**

The period for long press is defined as parameter **button Press time 1;**

Navi Tab:

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **CLUSTER Navi TAB**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && FICM ENABLE ==2 && CLUSTER MENU NAVI ENABLE && MODE SWITCH STATUS=0/1)** |

Phone Tab:

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **CLUSTER Phone TAB**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && FICM ENABLE ==2 && CLUSTER MENU call ENABLE)** |

Media Tab:

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **CLUSTER Media TAB**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && FICM ENABLE ==2 && CLUSTER MENU media ENABLE)** |

Cluster Setting tab: **always display.**

|  |  |  |
| --- | --- | --- |
| **~~FORMULA~~** | | |
| **~~CLUSTER SETTING TAB~~**  **~~DISPLAYED~~** | ~~=~~ | **~~((CLUSTER KL.15 STATUS FOR TIME > CLUSTER SETTING TAB INHIBIT PERIOD) && (! FICM READY STATUS) && FICM ENABLE >1~~**  **~~OR ((CLUSTER KL.15 STATUS && (! FICM ENABLE))~~** |

ADAS Tab:

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **CLUSTER ADAS TAB**  **DISPLAYED** | = | **KL.15 STATUS && CLUSTER MENU Adas ENABLE && (Ldw system status !=0 || ACC system STATUS !=0)** |

Warning Tab:

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **CLUSTER WARNING INFO.**  **CENTRE TAB DISPLAYED** | = | **KL.15 STATUS &&**  **(FICM ENABLE==2 && CLUSTER WARNING INFO CENTRE FLAG) or (FICM ENABLE !=2 )** |

**About Car Status display:**

Car Status TC page will display if **car status enable** is true. Especially in Sport mode and **FICM ENABLE** !=2, then it should display on the left side to substitute the Navi image and the TC page will not display.

### Functional Behaviour

KL.30 and KL.R

The input are not monitored and the outputs are not determined.

KL.15 and KL.50

The inputs are monitored and the outputs are determined.

## Nav & Media & Call & VR

### Signals (I/O)

**km/h**

**km/h**

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **NAV LVDS DATA READY**  **STATUS** | ***LVDSNavReady*** CAN signal from FICM, to decide  whether the NAV data ready or not.  $0=Not Ready;  $1=Ready; | **1** | **0 ~ 1** |
| **MEDIA LVDS DATA**  **READY STATUS** | ***LVDSMediaReady*** CAN signal from FICM, to  decide whether the Media data ready or not.  $0=Not Ready;  $1=Ready; | **1** | **0 ~ 1** |
| **CALL LVDS DATA READY**  **STATUS** | ***LVDSPhoneReady*** CAN signal from FICM, to decide  whether the Call data ready or not.  $0=Not Ready;  $1=Ready; | **1** | **0 ~ 1** |
| **CALL STATUS** | ***CallSts*** CAN signal from FICM, to decide whether the call  is running.  $0=No Call;  $1=Calling(means incoming call);  $2~$3=reserve； | **2** | **0 ~ 3** |
| **FICM READY STATUS** | ***FICAvlblSts*** CAN signal from FICM to indicate FICM is available.  0x0=False; 0x1=True | **1** | **0 ~ 1** |
| **NAVI GUIDANCE STATUS** | ***NavGudcSts*** CAN signal from FICM to indicate Navi mode is map only or Navi guiding mode.  0x0= not in guidance ; 0x1= in guidance | **1** | **0 ~ 1** |
| **VRC STATUS** | ***FICMVcRcgtnSts*** CAN signal from FICM to indicate Voice Recognition Status.  0x0=VRC not runnig; 0x1= VRC running | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **NAV ABNORMAL IMAGE**  **DISPLAYED** | The Nav abnormal image will be displayed on NAV area  when ‘TURE’. | **1** | **0 ~ 1** |
| **MEDIA ABNORMAL**  **IMAGE DISPLAYED** | The Media abnormal image will be displayed on Media area  when ‘TURE’. | **2** | **0 ~ 3** |
| **CALL ABNORMAL IMAGE**  **DISPLAYED** | The Call abnormal image will be displayed on Call area  when ‘TURE’. | **6** | **0 ~ 64** |
| **call remind image** |  |  |  |
| **FICM not launch image** |  |  |  |
| **turn by turn navi image** | It is only available in Npormal/Eco mode/Classical theme) |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **CLUSTER MENU Media ENABLE** | ***insClusterMenuMediaEnPrm*** When TRUE indicates that the item ‘Media’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU NAVI ENABLE** | ***insClusterMenuNaviEnPrm*** When TRUE indicates that the item ‘Navi’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **CLUSTER MENU CALL ENABLE** | ***insClusterMenuCallEnPrm*** When TRUE indicates that the item ‘Phone’ in menu default level is enabled. | **1** | **1** | **0 ~ 1** |
| **voice request enable** | ***insVoiceReqEnPrm*** display enabled when true. | **1** | **1** | **0 ~ 1** |
| **turn by turn enable** | ***insTBTEnPrm*** display enabled when true. | **1** | **1** | **0 ~ 1** |

### Functional Description

When the vehicle cold start, the FICM may take a long time to reach the point that can provide LVDS data, or under some abnormal circumstances that the LVDS data can not provide correctly even it has been started. To avoid a bad user experience happened in case the tab is stay at NAV,Media or Call,under this condition a corresponding permanent image(数据暂时无法提供 请等待…) that stored in cluster flash shall be displayed on there.

LVDS not Ready image including Navi/Media/Call abnormal image has higher priority than FICM not Launch image.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **NAV ABNORMAL IMAGE**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && CLUSTER MENU NAvi ENABLE && (NAV LVDS DATA READY STATUS==0))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **MEDIA ABNORMAL IMAGE**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && CLUSTER MENU Media ENABLE &&**  **(MEDIA LVDS DATA READY STATUS==0))** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **CALL ABNORMAL IMAGE**  **DISPLAYED** | = | **(CLUSTER KL.15 STATUS && CLUSTER MENU CALL ENABLE && (CALL LVDS DATA READY STATUS==0))** |

When phone call is coming, the tab will turn to Phone Tab except when ADAS warning exists.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **CALL REMIND image** | = | **(CLUSTER KL.15 STATUS && CLUSTER MENU CALL ENABLE && CALL LVDS DATA READY STATUS==1 && call status==1)** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **FICM not launch image** | = | **(CLUSTER KL.15 STATUS && FICM READY STATUS==0)** |

When IPK is in normal/Eco mode, and FICM is under Navi guiding mode, and IPK Tab is not Navi, then IPK should display turn by turn Navi image(from LVDS) in the digital PWR area(see HMI).

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **turn by turn navi imAge** | = | **(CLUSTER KL.15 STATUS && CLUSTER MENU NAvi ENABLE && turn by turn enable && MODE SWITCH STATUS ==0/1 && NAVI GUIDANCE STATUS ==1 && IPK Tab != Navi)** |

When VR is request, then IPK tab area will jump to display VR image (from LVDS).

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **vr imAge** | = | **见“FICM-IPK交互文档”；** |

**Note: 以上策略详见“FICM-IPK交互文档”，且以“FICM-IPK交互文档”为准。**

### Functional Behaviour

KL.30 and KL.R

The input are not monitored and the outputs are not determined.

KL.15 and KL.50

The inputs are monitored and the outputs are determined.

## Welcome Display

The welcome animation refers to HMI design specification.

## Display Layout

Refer to HMI design specification.

## Display State Flowchart

Refer to UE specification

## Default Level&& Menu Structure

Refer to HMI design specification.

## Gear Display

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **gear Position status** | ***TrShftLvrPos***  $0=Between Ranges  $1=Park Range  $2=Reverse Range  $3=Neutral Range  $4=Forward Range A  $5=Forward Range B  $6=Forward Range C  $7=Forward Range D  $8=Forward Range E  $9=Forward Range F  $A=Forward Range G  $B=Forward Range H  $F=Lever Position Unknown | **4** | **0 ~ 10** |
| **gear Position status validity** | ***TrShftLvrPosV*** validity for CAN signalTrShftLvrPos.  $0 = Valid;  $1 = Invalid; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **prnd display** | PRND Data to be displayed in dot-matrix display. |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **PRNDL ENABLE** | ***insPrndEnPrm*** Indicates mode of PRND display.  00 = Off,  01 = Next Gear(reserved),  02 = Current gear only. | **2** | **02** | **0 ~ 2** |
| **~~prnd tip enable~~** | ***~~insPrndTipEnPrm~~*** ~~When ‘TRUE’ indicates that an automatic gearbox with tip-tronic is fitted to the vehicle.~~ | **~~1~~** | **~~0~~** | **~~0 ~ 1~~** |
| **~~Prnd number of gears~~** | ***~~insPrndMaxGearPrm~~*** ~~The number of manual gears available.~~ | **~~3~~** | **~~6~~** | **~~0 ~ 7~~** |

### Functional Description

The PRND is displayed within the PRND zone of the dot-matrix display, (see section 10).

The PRND display is enabled if **PRND ENABLE > 0** and **Cluster KL15 status** is ‘TRUE’,

If **PRND ENABLE = 2** the display shows the selected gear only where the selected gear letter or number fill the PRND zone.

|  |  |  |
| --- | --- | --- |
| ***TrShftLvrPosV*** | ***TrShftLvrPos*** | IPK Display |
| ***TrShftLvrPosV*** =0 | P (1) | P |
| R (2) | R |
| N (3) | N |
| D (4) | D |
| Else | Display blank |
| ***TrShftLvrPosV*** =1 | x | EP |

## Outside Air Temperature

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Outside air temperature** | ***OtsdAirTemCrVal*** CAN signals from GW for the temperature in ºC of the outside air temperature transmitted.  0.5 deg / bit with -40 deg offset. | **8** | **- 40 to +87 ºC** |
| **Outside air temperature valid** | ***OtsdAirTemCrValV*** CAN signals from GW to indicate **OUTSIDE AIR TEMPERATURE** signal validity.  0= valid;  1= invalid. | **1** | **0 ~ 1** |
| **FICM TEMPERATURE UNITS ADJUST** | ***FICMTempUnitsAdj*** CAN signal from FICM,indicates what the temperature units user set through FICM is.  $0=Celsius Degree(℃)  $1=Fahrenheit Degree(℉)  &2=Not Available;  $3=Reserved; | **2** | **0 ~ 3** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **outside airTemperature display** | Indicates the outside air Temperature status for user in LCD area. | **8** | **- 40 to +87 ºC** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **outside airTemperature display enable** | ***insOtsAirTemDisEnPrm*** Outside air temperature display enabled when true. | **1** | **1** | **0 ~ 1** |
| **outside airTemperature display UNIT** | ***InsTempUnitsPrm*** Outside air temperature display unit.  0= Celsius Degree(℃)  1= Fahrenheit Degree(℉)  2-3= Reserved. | **2** | **0** | **0 ~ 3** |

### Functional Description

The cluster display the Outside air temperature in LCD outside air temperature area, the unit depend on **FICM TEMPERATURE UNITS ADJUST,** When cluster get the **FICM TEMPERATURE UNITS ADJUST,** Cluster should write the **outside airTemperature display UNIT** and display the correct value.

When the **FICM TEMPERATURE UNITS ADJUST** is not available, cluster should keep as before the last valid status.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Celsius Degree display(℃)** | = | **CLUSTER KL.15 STATUS && outside airTemperature display enable && Outside air temperature&& outside airTemperature display UNIT=0** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Fahrenheit Degree value (℉)** | = | **32 + Outside air temperature (℃) X1.8** |

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Fahrenheit Degree displayed (℉)** | = | **CLUSTER KL.15 STATUS && outside airTemperature display enable && Fahrenheit Degree value (℉)&& outside airTemperature display UNIT=1** |

### Functional Behaviour

KL.30 and KL.R

The input are not monitored and the outputs are not determined.

KL.15 and KL.50

The inputs are monitored and the outputs are determined.

## Menu setting - OS, UNIT, ILLUMINATION, SIA,Theme

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **CLUSTER KL15 STATUS** | Internal cluster signal used by the cluster from a combination of the CAN key status and the HW input. | **1** | **0 ~ 1** |
| **~~FICM setting data validity~~** | ***~~FICMSettingDataV~~*** ~~CAN signal from FICM to indicate an adjusting occurred when true.~~  ~~0=valid; 1=invalid~~ | **~~1~~** | **~~0 ~ 1~~** |
| **ficm restore fctory defults request** | ***RstrFctryDeftsReq*** CAN signal from FICM to indicate FICM have finished restore factory defaults just now.  0=false; 1=true | **1** | **0 ~ 1** |
| **FICM DIMMING LIGHT LEVEL** | ***FICMDimLghtLvl*** CAN signal from FICM, indicates that the driver adjust dimming level.  E=N \*0.4% | **8** | **0 ~ 100** |
| **FICM DIMMING LIGHT LEVEL request** | ***FICMDimLghtLvlV*** CAN signal from FICM, indicates that the driver adjust dimming level Request.  $0=False;  $1=True; | **1** | **0 ~ 1** |
| **ficm over speed threshold adjust** | ***FICMOvrSpdThrshldAdj*** 0 means OFF; | **6** | **0~64** |
| **ficm over speed threshold adjust request** | ***FICMOverSpdThldAdjtRA*** 0=false; 1=true | **1** | **0 ~ 1** |
| **FICM OVER SPEED function current status** | ***FICMOverSpdFnCrntSts*** CAN signal from FICM, indicates that the overspeed function current status is on or off  $0=Off;  $1=On; | **1** | **0 ~ 1** |
| **ficm distance units adjust** | ***FICMDistUntAdj***  0=km; 1=mils | **1** | **0 ~ 1** |
| **ficm distance units adjust request** | ***FICMDistUntAdjA***  0=false; 1=true | **1** | **0 ~ 1** |
| **ficm Fuel cosumption units adjust** | ***FICMFuelCsumpUntAdj***  0=L/100km; 1=mpg(UK); 2=mpg(US),3=L/km | **2** | **0 ~ 3** |
| **ficm Fuel cosumption units adjust request** | ***FICMFuelCsumpUntAdjRA***  0=false; 1=true | **1** | **0 ~ 1** |
| **ficm temperture units adjust** | ***FICMTempUntAdj***  0=℃；1=℉；2=not available; 3=reserved. | **2** | **0 ~ 3** |
| **ficm temperature units adjust request** | ***FICMTempUntAdjReqA***  0=false; 1=true | **1** | **0 ~ 1** |
| **ficm tyre pressure unit adjust** | ***FICMTyrePressureUntAdj***  0=bar, 1=kpa, 2=PSI, 3=reserved // not in DBC | **2** | **0~3** |
| **ficm tyre pressure unit adjust request** | ***FICMTyrePressureUntAdjReqA*** 0=false; 1=true // not in DBC. | **1** | **0 ~ 1** |
| **ficm tab request** | ***FICMTabReq*** CAN signal from FICM which send out Tab switch request to notify IPK to switch Tab | **2** | **0~3** |
| **theme adjust** | ***ClstrThemeSetngAdjFI***  0=default 1=classical, 2=reserved, 3=reserved. | **2** | **0 ~ 3** |
| **theme adjust request** | ***ClstrThemeSetngAdjReqA***  0=false; 1=true | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **output** | **Description** | **No of bits** | **Value** |
| **cluster setting data validity** | ***ClstrSetngDataV*** to inform FICM the setting related data sent by IPC is validity.  0=valid; 1=invalid; | **1** | **0 ~ 1** |
| **cluster ilumintion level** | ***ClstrIllumLvl***  0=low; 1= normal; 2=high; 3=reserved | **2** | **0~3** |
| **cluster over speed threshold** | ***ClstrOvrSpdThrsHld***  5kmh/bit, ~~0= OFF~~ | **6** | **0~64** |
| **cluster over speed status** | ***ClstrOverSpdFnHstrSts***  When KL15. From 0 to 1, Cluster should send the OS function status in last ignition.  If the OS function is on in last ignition,cluster should send “on” to FICM  If the OS function is off in last ignition,cluster should send “off” to FICM.  1 =ON, 0=OFF | **1** | **0 ~ 1** |
| **cluster distance unit** | ***ClstrDistUnt***  0=km;1=miles | **1** | **0 ~ 1** |
| **cluster fuel consumption unit** | ***ClstrFuelCsumpUnt***  0=L/100km; 1=mpg(UK); 2=mpg(US),3=L/km | **2** | **0~3** |
| **Cluster Temperature unit** | ***ClstrTemUnt***  0=℃；1=℉；2=not available; 3=reserved. | **2** | **0~3** |
| **cluster tyre pressure unit** | ***ClstrTyrePreUnt***  //not in DBC  0=bar, 1=kpa, 2=psi, 3=reserved | **2** | **0~3** |
| **cluster SIA date** | ***ClstrSIASDate*** IPK sends to FICM to display SIA. | **24**  **(year 8bit, Month 8bit, Day 8bit.)** |  |
| **cluster sia distance** | ***ClstrSIASDist*** the distance to do next SIA | **??** |  |
| **cluster theme** | ***ClstrThemeSetng***  0=default Normal;  1=default Eco;  2=default Sport;  3=classical Normal;  4=classical Eco;  5=classical Sport;  6~15 =reserved; | **4** | **0~15** |

### Valus in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **output** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **illumination level** | ***InsClusterIlluLvPrm***  0=low; 1= normal; 2=high; 3=reserved . | **2** | **1** | **0~3** |
| **tyre pressure unit** | ***InsTyrePresUnitsPrm***  0=bar, 1=kpa, 2=psi, 3=reserved | **2** | **0** | **0~3** |
| **Consumption Units** | ***insTCConUnitsPrm*** 0 = litres / 100km, 1 = UK mpg, 2 = US mpg, 3 = km / litre. | **2** | **0** | **0 ~ 3** |
| **distance Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **temperature unit** | ***insTempUnitsPrm***  0=℃；1=℉；2=not available; 3=reserved. | **2** | **0** | **0~3** |
| **Language** | ***insLangPrm*** The language to be used for display text.0 = English, 1 = Chinese, 2 to 7 = tba. | **3** | **1** | **0 ~ 7** |
| **theme** | ***insThemePrm*** The theme to be used for display.0 = theme A, 1 = theme B, 2 = theme C, 3 to 7 = tba. | **3** | **0** | **0 ~ 7** |
| **over speed threshold** | ***insOSThreshPrm*** The speed threshold above which the warning is activated.  Notes:  1, the threshold can be adjusted by Trip computer switch.  2, the threshold can be setted via diagnostic.  3, if the value is ‘0’ means the function is disabled. In this condition, the display value is ‘OFF’. | **8** | **0x78 (120 km/h)** | **30 ~ 240**  **and 0** |
| **FICM ENABLE** | ***InsFICMEnPrm*** The vehicle has configuration with different FICM type:  0 = no setting CAN signals, no LVDS;  1 = with setting CAN signals, without LVDS;  2 = with setting CAN signals, with LVDS;  3 = reserved; | **1** | **2** | **0 ~ 3** |
| **~~over speed threshold setting entrance~~** | ***~~InsOVSThreshSetEntrPrm~~***  ~~0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved~~ | **~~2~~** | **~~2~~** | **~~0~3~~** |
| **~~unit setting entrance~~** | ***~~insUnitSetEntrPrm~~***  ~~0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved~~ | **~~2~~** | **~~2~~** | **~~0~3~~** |
| **SIA reset enable** | ***insSIARstEnPrm*** SIA reset by driver enabled when true | **1** | **1** | **0~1** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MENU tHEME ENABLE** | ***insMenuTHEEnPrm*** When TRUE indicates that the item ‘Theme’ in menu level1 is enabled.. | **1** | | **1** | | **0 ~ 1** | |
| **MENU UNITS ENABLE** | ***insMenuUnitEnPrm*** When TRUE indicates that the item ‘Units’ in menu level1 is enabled.. | | **1** | | **0** | | **0 ~ 1** |
| **MENU illumination luminance ENABLE** | ***insMenuIllumiLumiEnPrm*** When TRUE indicates that the item ‘Illumination Luminance’ in menu level1 is enabled.. | | **1** | | **1** | | **0 ~ 1** |
| **menu SIA enable** | ***insMenuSIAEnPrm*** When TRUE indicates that the menu of ‘SIA’ is enabled. | | **1** | | **0** | | **0 ~ 1** |
| **menu Overspeed enable** | ***insMenuOSEnPrm*** | | **1** | | **0** | | **0 ~ 1** |

### Functional Description

About ***InsFICMEnPrm:***

The parameter is to indicate whether the vehicle has FICM or not.

if ***InsFICMEnPrm*** ***=***0,that means the vehicle do not own FICM, so all related features strategy should follow below:

1. No need to record the node missing DTC(it has been added in the condition of the formula);
2. The Language should display as Chinese(it also is the default value in Part4) unless people change it by Menu;
3. The format of Clock should always keep as 24th(it also is the default value in Part4);

if ***InsFICMEnPrm*** =1 or 2,that means the vehicle own FICM,so all related features strategy should follow below:

1. The node missing DTC should be detected and recorded;
2. The format of Language should up to the communicate signals between Instrument cluster and FICM, more details can refer to follow chapter;
3. The format of Clock should up to the communicate signals between Instrument cluster and FICM, and attention, the default format also should keep as 24th before communicate with FICM(to avoid the case like: even the value of ***InsFICMEnPrm*** ***=***1or 2,but the node of FICM never be connected ), more details can refer to follow chapter;

#### Over speed threshold

1. When ***~~insOVSThreshSetEntrPrm~~*** ~~=0~~, ***insMenuOSEnPrm***=1

Cluster itself menu to set over speed threshold. Tx signals will be synchronous with current status.

1. When ***~~insOVSThreshSetEntrPrm~~*** ~~=1,~~ ***insMenuOSEnPrm***=0
2. **If (*FICMOverSpdFnCrntSts* ==1)&& (*FICMOvrSpdThrsHldAdjtRA* is true) && (*FICMOvrSpdThrsHldAdjt* is not time-out and valid ~~=!0~~) && (*RstrFctryDeftsReq* is false):**

Cluster will learn FICM’s threshold. ***insOSThreshPrm*** will set to new value and Tx signals will be synchronous with current status(***ClstrOverSpdFnHstrSts*** set to 1)

1. **If (*FICMOverSpdFnCrntSts* ==0) &&(*RstrFctryDeftsReq* is False):**

Ignore ***FICMOvrSpdThrshldAdjtRA, FICMOvrSpdThrshldAdj***. ~~Cluster will learn FICM’s info.~~ The Overspeed warning function should be off. As the driver turn off the OS function in FICM. Tx signals will be synchronous with current status(***ClstrOverSpdFnHstrSts*** set to 0).

1. **If *RstrFctryDeftsReq* is true:**

Cluster ignores ***FICMOvrSpdThrsHldAdjtRA*** and ***FICMOvrSpdThrsHldAdjt*** and set ***insOSThreshPrm*** to 120kmh and Tx signals will be synchronous with current status (***ClstrOverSpdFnHstrSts*** set to 1).

1. ~~When~~ ***~~insOVSThreshSetEntrPrm~~*** ~~=2,~~

~~The threshold can be set through the above two ways.~~

#### Unit

1. When ***~~insUnitSetEntrPrm~~*** ~~=0~~ ***insMenuUnitEnPrm=1***

Cluster itself menu to set unit. Tx signals will be synchronous with current status.

1. When ***~~insUnitSetEntrPrm~~*** ~~=1,~~ ***insMenuUnitEnPrm=0***

**If (*FICMDistUntAdjA* or *FICMFuelCsumpUntAdjRA* or *FICMTempUntAdjA* or *FICMTyrePressureUntAdjReqA* is true) and (*FICMDistUntAdj or FICMFuelCsumpUntAdj or FICMTempUntAdj or FICMTyrePressureUntAdj* is not time-out and valid):**

Cluster will learn from FICM’s unit and related parameters should set to current status value. Tx signals will be synchronous with current status.

1. ~~When~~ ***~~insUnitSetEntrPrm~~*** ~~=2,~~

~~The unit can be set through the above two ways.~~

#### Illumination level

See illumination section.

#### SIA Menu

Cluster itself menu SIA information can be seen by driver if ***insMenuSIAEnPrm*** is true.

SIA can also be reset (either in menu or in TC page) by driver if ***insSIARstEnPrm*** is true.

Tx signals will be synchronous with current status.

#### Theme

1. When ***insMenuTHEEnPrm =1***

Cluster itself menu to set theme. Tx signals will be synchronous with current status.

1. When ***insMenuTHEEnPrm =0***

**If (*ClstrThemeSetngAdjReqA* is true) and (*ClstrThemeSetngAdjFI* is not time-out and valid):**

Cluster will learn from FICM’s theme setting and related parameters should set to current status value. Tx signals will be synchronous with current status.

## Clock && Calendar && Language

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **time adjust request** | ***TimeAdjReqA*** CAN signal from ICE for current clock display. | **1** | **0 ~ 1** |
| **Time Display Format adjust** | ***TimeDspFmtAdj*** CAN signal from ICE for current clock display. | **1** | **0 ~ 1** |
| **hour adjust** | ***HourOfDayAdj*** CAN signal from ICE for current clock display. | **5** |  |
| **Minute adjust** | ***MinuteOfHourAdj*** CAN signal from ICE for current clock display. | **6** |  |
| **second adjust** | ***SecsOfMinuteAdj*** CAN signal from ICE for current clock display. | **6** |  |
| **calendar adjust request** | ***CalendarAdjReqA*** CAN signal from ICE for calendar. | **1** | **0 ~ 1** |
| **year adjust** | ***CalendarYearAdj*** CAN signal from ICE for calendar. |  |  |
| **month adjust** | ***CalendarMonthAdj*** CAN signal from ICE for calendar. |  |  |
| **day adjust** | ***CalendarDayAdj*** CAN signal from ICE for calendar. |  |  |
| **LANGUAGE ADJUST REQUEST** | ***LanggSetngAdjReqA*** CAN signal from ICE for language adjusting request. | **1** | **0 ~ 1** |
| **LANGUAGE ADJUST** | ***LanggSetngAdj*** CAN signal from ICE for language adjusting. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **display time** | The current time.  Notes: only **HH: MM** is for display in LCD. | **16** | **00:00 ~ 23:59** |
| **hour** | ***HourOfDay*** CAN signal for time. |  |  |
| **minute** | ***MinuteOfHour*** CAN signal for time. |  |  |
| **second** | ***SecsOfMinute*** CAN signal for time. |  |  |
| **time format** | ***TimeDspFmt*** CAN signal for time. |  |  |
| **year** | ***CalendarYear*** CAN signal for calendar. |  |  |
| **month** | ***CalendarMonth*** CAN signal for calendar. |  |  |
| **day** | ***CalendarDay*** CAN signal for calendar. |  |  |
| **Language setting** | ***LanggSetng*** CAN signal for language setting. | **7** | **0~7F** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **~~digital clock enable~~** | ***~~insDigiClockEnPrm~~*** ~~The function is displayed when ‘TRUE’. The clock will Not be displayed when ‘Flase’.~~ | **~~1~~** | **~~1~~** | **~~0 ~ 1~~** |
| **Language setting** | ***insLangPrm*** The language to be used for display text. 0 = English, 1 = Chinese, 2 to 7 = reserved. | **3** | **1** | **0~7** |
| **FICM ENABLE** | ***InsFICMEnPrm*** The vehicle has configuration with different FICM type:  0 = no setting CAN signals, no LVDS;  1 = with setting CAN signals, without LVDS;  2 = with setting CAN signals, with LVDS;  3 = reserved; | **1** | **2** | **0 ~ 3** |
| **~~time display format~~** | ***~~insTimeDspFmtPrm~~***  ~~0=12 hour time; 1=24 hour time~~ | **~~1~~** | **~~1~~** | **~~0~1~~** |
| **~~time display setting entrance~~** | ***~~insTimeDspSetEntrPrm~~***  ~~0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved~~ | **~~2~~** | **~~2~~** | **~~0~3~~** |
| **~~language setting entrance~~** | ***~~insLangSetEntrPrm~~***  ~~0=IPK; 1=FICM; 2=IPK or FICM; 3=reserved~~ | **~~2~~** | **~~2~~** | **~~0~3~~** |
| **menu digital clock enable** | ***insMenuDigCEnPrm*** When TRUE indicates that the menu of ‘Digital Clock’ is enabled. | **1** | **0** | **0 ~ 1** |
| **Menu language enable** | ***insMenuLangEnPrm*** | **1** | **0** | **0 ~ 1** |

### Functional Description

#### Digital clock

1. When ***~~insTimeDspSetEntrPrm~~***~~=0~~ ***insMenuDigCEnPrm*==1**

Cluster itself menu to set clock. Tx signals will be synchronous with current status.

1. When ***i~~nsTimeDspSetEntrPrm~~***~~=1~~ ***insMenuDigCEnPrm*==0**

**If (*TimeAdjReqA* is TRUE and *TimeDspFmtAdj, HourOfDayAdj, MinuteOfHourAdj* and *SecsOfMinuteAdj* all are *not* time-out and valid):**

Cluster will learn ICE’s time info: ***TimeDspFmtAdj, HourOfDayAdj, MinuteOfHourAdj*** and ***SecsOfMinuteAdj***.

**Else:**

Cluster will compute ‘time’ itself. And those Tx signals should be synchronous with Cluster’s current status.

The ‘time’ signals (‘hour’, ‘mintue’ and ‘second’) from ICE and Cluster sending-out all are ‘24 hour’ format, so Cluster’s clock display should consider the time format, and if the signal of ***TimeDspFmtAdj*** is missing,the display format of cluster should keep the previous value .

1. ~~When~~ ***~~insTimeDspSetEntrPrm~~***~~=2~~

~~The clock can be set through the above two ways.~~

Notes: Clock function should be active in all power status (KL30, KLR, KL15 and KL50).

#### Calendar

**If (*CalendarAdjReqA* is TRUE and *CalendarYear, CalendarMonth,* and *CalendarDay* all are *not* time-out and valid):**

Cluster will learn ICE’s calendar info: ***CalendarYear, CalendarMonth,*** and ***CalendarDay***.

**Else:**

Cluster will compute ‘calendar’ itself. And those Tx signals should be synchronous with Cluster’s current status.

Notes: Calendar function should be active in all power status (KL30, KLR, KL15 and KL50).

#### Language

1. When ***~~insLangSetEntrPrm~~***~~=0~~ ***insMenuLangEnPrm*=1**

Cluster itself menu to set language. Tx signals will be synchronous with current status.

1. When ***~~insLangSetEntrPrm~~***~~=1~~ ***insMenuLangEnPrm*=0**

**If (*LanggSetngAdjReqA* is TRUE and *LanggSetngAdj* is *not* time-out and valid):**

cluster will learn ICE’s language info: ***LanggSetngAdj***. If ***LanggSetngAdj*** = 0(Chinese), ***insLangPrm*** will set to 1(Chinese). If ***LanggSetngAdj*** = 1 or 2 (English), ***insLangPrm*** will set to 0(English). If other signal values, cluster will ignore them.

Notes: if CAN network is active, this mode will be monitored by cluster.

1. ~~When~~ ***~~insLangSetEntrPrm~~***~~=2,~~

~~The language can be set through the above two ways.~~

# Audible Warnings

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

## Signals (I/O)

/\*need add audible warning related signal sending-out strategy.

When cluster’s speaker is active because of some audible warnings request, the audible CAN signals request should be sent out at the same time.

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Audible warning gong1** | Internal audible warning GONG 1 request when ‘TRUE’. | **1** | **0 ~ 1** |
| **front pdc** | ***FrtPDCAudWrnng*** Request from the PDC for a audible warning:  0x0: No Obstacle  0x1: Zone 1 (permanent tone)  0x2: Zone 2 (shortest interval)  0x3: Zone 3  0x4: Zone 4  0x5: Zone 5  0x6: Zone 6  0x7: Zone 7  0x8: Zone 8  0x9: Zone 9 (Longest interval)  0xA ~ F: reserved | **4** | **0 ~ 15** |
| **rear PDC** | ***RrPDCAudWrnng*** Request from the PDC for a audible warning:  0x0: No Obstacle  0x1: Zone 1 (permanent tone)  0x2: Zone 2 (shortest interval)  0x3: Zone 3  0x4: Zone 4  0x5: Zone 5  0x6: Zone 6  0x7: Zone 7  0x8: Zone 8  0x9: Zone 9 (Longest interval)  0xA ~ F: reserved | **4** | **0 ~ 15** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **GOnG 1** | Audible output from instrument cluster for Internal and External SMU Requests | **1** | **0 ~ 1** |
| **PDC GONG** | Audible output from instrument pack for External PDC request. | **1** | **0 ~ 1** |
| **TICK** | Audible output from instrument pack for DI. | **1** | **0 ~ 1** |
| **TOCK** | Audible output from instrument pack for DI. | **1** | **0 ~ 1** |
| **Chime Location Front Left status** | ***ChmCmdSndLoctnFL*** CAN signal from IPK to ICE to indicate whether front left speaker of ICE need to active:  $1=True; $0=False | **1** | **0 ~ 1** |
| **Chime Location Front right status** | ***ChmCmdSndLoctnFR*** CAN signal from IPK to ICE to indicate whether front right speaker of ICE need to active:  $1=True; $0=False | **1** | **0 ~ 1** |
| **Chime Location rear Left status** | ***ChmCmdSndLoctnRL*** CAN signal from IPK to ICE to indicate whether rear left speaker of ICE need to active:  $1=True; $0=False | **1** | **0 ~ 1** |
| **Chime Location rear right status** | ***ChmCmdSndLoctnRR*** CAN signal from IPK to ICE to indicate whether rear right speaker of ICE need to active:  $1=True; $0=False | **1** | **0 ~ 1** |
| **Chime Command Sound Tone** | ***ChmCmdSndTone*** CAN signal from IPK to ICE to indicate sound tone:  $0=Clack  $1=Click  $2=Beep (750 Hz)  $3=Beep (2000 Hz)  $4=Gong (750 Hz)  $5=Gong (2000 Hz)  $6-$F=Reserved | **4** | **0 ~ 15** |
| **Chime Command Sound Cadence Period** | ***ChmCmdSndCndcPrd*** CAN signal from IPK to ICE to indicate sound cadence period:  ***xxxxxx*** ***E = N \* 10*** | **8** | **0 ~ 255** |
| **Chime Command Sound Duty Cycle** | ***ChmCmdSndDutyCyc*** CAN signal from IPK to ICE to indicate sound duty:  xxxxxxx E = N \* 0.392157 | **8** | **0 ~ 255** |

## Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **PDC ENABLE** | ***insPDCEnablePrm*** indicate which type PDC system fitted in vehicle:  00= no PDC.  01= 4 channel PDC.  02= 8 channel PDC.  03= reserved. | **2** | **1** | **0~3** |
| **GONG 1 FREQUeNCY** | ***insGong1FreqPrm*** Frequency of Gong 1 in 10Hz/bit | **9** | **1E** | **0 ~ 5110HZ** |
| **GONG 1 DURATION** | ***insGong1DurationPrm*** Duration of Gong 1 in 0.01 seconds/bit | **4** | **8** | **0 ~ 16** |
| **GONG 1 VOLUME** | ***insGong1VolumePrm*** Volume of Gong 1 in % from 0 to 100%. | **7** | **4B** | **0 ~ 127** |
| **gong 1 fade off time** | ***insGong1FadeOffPrm*** Duration of Gong 1 fade off period in 0.01 seconds/bit | **8** | **64** | **0 ~ 255** |
| **gong 1 total time** | ***insGong1TotalTimePrm*** Duration of Gong 1 period in 0.01 seconds/bit | **8** | **6C** | **0 ~ 255** |
| **tick tock VOLUME** | ***insTickTockVolumePrm*** Volume of DI Tick Tock in % from 0 to 100%. | **7** | **64** | **0 ~ 127** |
| **PDC Gong 9 frequency** | ***insPDCGong9FreqPrm*** Frequency of PDC Gong 1 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 9 duration** | ***insPDCGong9DurationPrm*** Duration of PDC Gong 1 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 9 VOLUME** | ***insPDCGong9VolumePrm*** Volume of PDC Gong 1 in % from 0 to 100%. | **7** | **3E** | **0 ~ 127** |
| **PDC gong 9 fade off time** | ***insPDCGong9FadeOffPrm*** Duration of PDC Gong 1 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 9total time** | ***insPDCGong9TotalTimePrm*** Duration of PDC Gong 1 period in 0.01 seconds/bit | **8** | **64** | **1~255** |
| **PDC Gong 8 frequency** | ***insPDCGong8FreqPrm*** Frequency of PDC Gong 2 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 8 duration** | ***insPDCGong8DurationPrm*** Duration of PDC Gong 2 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 8 VOLUME** | ***insPDCGong8VolumePrm*** Volume of PDC Gong 2 in % from 0 to 100%. | **7** | **40** | **0 ~ 127** |
| **PDC gong 8 fade off time** | ***insPDCGong8FadeOffPrm*** Duration of PDC Gong 2 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 8 total time** | ***insPDCGong8TotalTimePrm*** Duration of PDC Gong 2 period in 0.01 seconds/bit | **8** | **58** | **1~255** |
| **PDC Gong 7 frequency** | ***insPDCGong7FreqPrm*** Frequency of PDC Gong 3 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 7 duration** | ***insPDCGong7DurationPrm*** Duration of PDC Gong 3 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 7 VOLUME** | ***insPDCGong7VolumePrm*** Volume of PDC Gong 3 in % from 0 to 100%. | **7** | **42** | **0 ~ 127** |
| **PDC gong 7 fade off time** | ***insPDCGong7FadeOffPrm*** Duration of PDC Gong 3 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 7 total time** | ***insPDCGong7TotalTimePrm*** Duration of PDC Gong 3 period in 0.01 seconds/bit | **8** | **4B** | **1~255** |
| **PDC Gong 6 frequency** | ***insPDCGong6FreqPrm*** Frequency of PDC Gong 4 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 6 duration** | ***insPDCGong6DurationPrm*** Duration of PDC Gong 4 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 6 VOLUME** | ***insPDCGong6VolumePrm*** Volume of PDC Gong 4 in % from 0 to 100%. | **7** | **44** | **0 ~ 127** |
| **PDC gong 6 fade off time** | ***insPDCGong6FadeOffPrm*** Duration of PDC Gong 4 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 6 total time** | ***insPDCGong6TotalTimePrm*** Duration of PDC Gong 4 period in 0.01 seconds/bit | **8** | **3F** | **1~255** |
| **PDC Gong 5 frequency** | ***insPDCGong5FreqPrm*** Frequency of PDC Gong 5 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 5 duration** | ***insPDCGong5DurationPrm*** Duration of PDC Gong 5 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 5 VOLUME** | ***insPDCGong5VolumePrm*** Volume of PDC Gong 5 in % from 0 to 100%. | **7** | **46** | **0 ~ 127** |
| **PDC gong 5 fade off time** | ***insPDCGong5FadeOffPrm*** Duration of PDC Gong 5 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 5 total time** | ***insPDCGong5TotalTimePrm*** Duration of PDC Gong 5 period in 0.01 seconds/bit | **8** | **32** | **1~255** |
| **PDC Gong 4 frequency** | ***insPDCGong4FreqPrm*** Frequency of PDC Gong 6 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 4 duration** | ***insPDCGong4DurationPrm*** Duration of PDC Gong 6 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 4 VOLUME** | ***insPDCGong4VolumePrm*** Volume of PDC Gong 6 in % from 0 to 100%. | **7** | **48** | **0 ~ 127** |
| **PDC gong 4 fade off time** | ***insPDCGong4FadeOffPrm*** Duration of PDC Gong 6 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 4 total time** | ***insPDCGong4TotalTimePrm*** Duration of PDC Gong 6 period in 0.01 seconds/bit | **8** | **28** | **1~255** |
| **PDC Gong 3 frequency** | ***insPDCGong3FreqPrm*** Frequency of PDC Gong 7 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 3 duration** | ***insPDCGong3DurationPrm*** Duration of PDC Gong 7 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 3 VOLUME** | ***insPDCGong3VolumePrm*** Volume of PDC Gong 7 in % from 0 to 100%. | **7** | **4A** | **0 ~ 127** |
| **PDC gong 3 fade off time** | ***insPDCGong3FadeOffPrm*** Duration of PDC Gong 7 fade off period in 0.01 seconds/bit | **8** | **A** | **0 ~ 255** |
| **PDC gong 3 total time** | ***insPDCGong3TotalTimePrm*** Duration of PDC Gong 7 period in 0.01 seconds/bit | **8** | **1E** | **1~255** |
| **PDC Gong 2 frequency** | ***insPDCGong2FreqPrm*** Frequency of PDC Gong 8 in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **PDC Gong 2 duration** | ***insPDCGong2DurationPrm*** Duration of PDC Gong 8 in 0.01 seconds/bit | **4** | **A** | **0 ~ 16** |
| **PDC GONG 2 VOLUME** | ***insPDCGong2VolumePrm*** Volume of PDC Gong 8 in % from 0 to 100%. | **7** | **4C** | **0 ~ 127** |
| **PDC gong 2 fade off time** | ***insPDCGong2FadeOffPrm*** Duration of PDC Gong 8 fade off period in 0.01 seconds/bit | **8** | **5** | **0 ~ 255** |
| **PDC gong 2 total time** | ***insPDCGong2TotalTimePrm*** Duration of PDC Gong 8 period in 0.01 seconds/bit | **8** | **14** | **1~255** |
| **pdc permanent tone frequency** | ***insPDCPermFreqPrm*** Frequency of PDC Permanent tone in 10Hz/bit | **9** | **50** | **0 ~ 5110HZ** |
| **pdc permanent vOLUME** | ***insPDCPermVolumePrm***  Volume of PDC Permanent tone in % from 0 to 100%. | **7** | **4C** | **0 ~ 127** |

## Functionality description

1. For the audible warning achieved through chime, IPK should send the related chime signal to FICM according to the file: *“20150402-AS22&IP31 Chime Strategy-v1.0”*
2. For IPK with speaker then the strategy should be follow the following strategy:

There are 3 types of audible warnings produced by the cluster. These are:

* **PDC GONG:** Repeated gong used for Park Distance Control until input conditions are cancelled. And including **PDC failed gong** and **pdc initial success gong.**

(Notes: ‘PDC failed GONG’ and ‘PDC initial success GONG’, the priortity of them is higher than general Rear/Front PDC GONG)

* **GONG 1:** Including single GONG 1 and repeated GONG 1 (the frequency of repeat Gong should be the same with lamp fresh frequency. For repeat Gong without telltale, its frequency should be 0.5Hz.)
* **TICK:** Single sound used for Direction Indicator ON.
* **TOCK:** Single sound used for Direction Indicator OFF.

### GONG 1

When **GONG 1** is active the speaker will sound as defined by **GONG 1 FREQUENCY** and **GONG 1 VOLUME** for a time of **GONG 1 DURATION** and with a fade off time of **gong 1 fade off time.**

**Single GONG1**

**On time = GONG1 DURATION (default 80mS)**

**Fade Off Time = GONG1 FADE OFF TIME (default 1000ms)**

**On**

**Off**

### TICK-TOCK

When **TICK** or **TOCK** is active the speaker will play a series of frequencies for a variable duration and volume. These exact frequency/duration/volume are defined as table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **FREQUENCY** | **VOLUME** | **DURATION** |
| **TICK** | 1000 | 73% | 1ms |
|  | 3000 | 73% | 1ms |
|  | 1000 | 64% | 1ms |
|  | 1000 | 56% | 1ms |
|  | 3000 | 47% | 1ms |
|  | 1000 | 38% | 1ms |
|  | 3000 | 29% | 1ms |
|  | 3000 | 21% | 1ms |
| **TOCK** | 1500 | 73% | 1ms |
|  | 2700 | 73% | 1ms |
|  | 600 | 64% | 1ms |
|  | 600 | 56% | 1ms |
|  | 2700 | 47% | 1ms |
|  | 600 | 38% | 1ms |
|  | 2700 | 29% | 1ms |
|  | 2700 | 21% | 1ms |

### PDC GONG

**PDC GONG#**

**On time = PDC GONG# DURATION. PDC GONG# Fade-Off Time.**

**On**

**Off**

If **PDC ENABLE** =1, the cluster responds to the Rear PDC signal, **rear PDC.**

If **PDC ENABLE** =2, the cluster responds to the Front PDC signal, **front PDC.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **pdc GOnG (intermittent)** | if | **Cluster KL15 status && PDC ENABLE == 1 && (rear PDC==** 0x02 to 0x09 **)**  **or**  **Cluster KL15 status && PDC ENABLE == 2 && (front PDC ==** 0x02 to 0x09 **)** |

The characteristics of the sound for the **PDC gong** is defined by **PDC GONG# DURATION, PDC GONG# fade off time, PDC GONG# FREQUENCY** and **PDC GONG# VOLUME.**

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **pdc GOnG (permanent tone)** | if | **Cluster KL15 status && PDC ENABLE == 1 && (rear PDC ==** 0x01 **)**  **or**  **Cluster KL15 status && PDC ENABLE == 2 && (front PDC ==** 0x01**)** |

### Sounder Priority

The order of priority for sounder outputs is as follows, (highest priority first):

**PDC failed GONG** or **pdc initial success gong,** **PDC gong, GOnG 1**, **TICK -TOCK**.

If the PDC sounder is active (i.e. **EXTERNAL AUDIO REQUEST PDC** > 0x00) it cannot be interrupted by any other sound request even during its OFF time. For example, if the PDC sounder has an OFF time of 2 seconds, the OFF period cannot be used for another sound request.

If a cluster internal warning is active, it cannot be interrupted by another request except from the PDC.

If a sound is active and an audible warning request is received by a higher priority source, the current sound is completed. For example, if the sounder is producing a repeated series of GONG1 outputs for Seat Belt Reminder and a PDC request is received during the ON Time; the ON TIME and the Fade Off period is completed before the PDC request is dealt with.

The priority of GONG1 refers to UE spec.

# Illumination Control

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

## Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **FICM DIMMING LIGHT LEVEL** | ***FICMDimLghtLvl*** CAN signal from FICM, indicates that the driver adjust dimming level.  E=N \*0.4% | **8** | **0 ~ 100** |
| **FICM DIMMING LIGHT LEVEL request** | ***FICMDimLghtLvlV*** CAN signal from FICM, indicates that the driver adjust dimming level Request.  $0=False;  $1=True; | **1** | **0 ~ 1** |
| **Sidelights status** | ***VehSideLghtSts*** CAN signal from SMU for sidelight on status:  0= no side light on.  1= left side light on only.  2= right side light on only.  3= all side light and license plate light on. | **2** | **0 ~ 3** |
| **illumination adjustment level** | Internal parameter decided by illumination adjustment status in LCD and ‘Illumination Luminance’ menu’s status.(IPK local setting)  There are 3 levels:  0=Level 1: 0.8  1=Level 2: 1.0 (default level)  2=Level 3: 1.2  3=reserved; | **2** | **0~3** |
| **Load Shed status** | ***VehLdShedLvl*** CAN signal to indicate the status of Vehicle Load shed:  $0=No Power Risk  $1=Low Power Risk  $2=Middle Power Risk  $3=High Power Risk  $4=PMDC-broken  $5 ~ $7=reserved | **3** | **0 ~ 7** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **LCD illmination** | PWM output for the dot-matrix display red illumination. | **8** | **0 ~ 255** |

## Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **LCD day illuminance base** | ***insLCDDayIllBasePrm*** base value for the illuminace of LCD in day time. Scale =1, unit cd/m2. | **8** | **64**  **(100)** | **0~255** |
| **lcd day illuminace factor** | ***insLCDDayIllFactorPrm*** base value for the illuminace of LCD in day time. Scale =0.02, unit cd/m2. | **8** | **96**  **(3)** | **0~255** |
| **LCD night illuminance base** | ***insLCDNigIllBasePrm*** base value for the illuminace of LCD in night. Scale =1, unit cd/m2. | **8** | **4B**  **(75)** | **0~255** |
| **lcd night illuminace factor** | ***insLCDNigIllFactorPrm*** base value for the illuminace of LCD in day time. Scale =0.02, unit cd/m2. | **8** | **4B**  **(1.5)** | **0~255** |
| **~~LCD illumination day characteristic~~** | ***~~insLCDDayIllCharPrm~~*** ~~Dimming curve for TFT LCD illumination. X~~~~0~~ ~~to X~~~~3,~~ ~~&&~~~~Y~~~~0~~ ~~to Y~~~~3.~~ ~~8 x 1 byte each~~  ~~X: 2cd/m~~~~2~~ ~~per bit~~  ~~Y:0.4% per bit~~ | **~~64~~** | ~~X0~X3:0x32,0x4B,0x64,0x7D, Y0~Y3:0x4B,0x85,0xBF,0xFA~~ | **~~0 ~ 255 (x8)~~** |
| **~~LCD illumination night characteristic~~** | ***~~insLCDNigIllCharPrm~~*** ~~Dimming curve for TFT LCD illumination. X~~~~0~~ ~~to X~~~~3,~~ ~~&&~~~~Y~~~~0~~ ~~to Y~~~~3.~~ ~~8 x 1 byte each~~  ~~X: 2cd/m~~~~2~~ ~~per bit~~  ~~Y:0.4% per bit~~ | **~~64~~** | ~~X0~X3:0x25,0x32,0x3E,0x4B, Y0~Y3:0x4B,0x85,0xBF,0xFA~~ | **~~0 ~ 255 (x8)~~** |
| **illumination default input value** | ***insIllumDefaultPrm*** The default illumination input value to be assumed in case of no valid CAN signal ***FICMDimLghtLvl***. | **8** | **32**  **(50%)** | **0~250** |
| **illumination level** | ***InsClusterIlluLvPrm*** (IPK local setting)  0=low; 1= normal; 2=high; 3=reserved . | **2** | **1** | **0~3** |

## Functional Description

When ***VehSideLghtSts*** == 3, then the illumination enters into night mode and the Illuminance characteristic should follow **LCD night illuminance base, lcd night illuminace factor.**

Else the illuminance should use **LCD day illuminance base, lcd day illuminace factor.**

The cluster’s luminance can be adjusted by FICM menu. IPK calculates its illuminance according to the PWM input ***FICMDimLghtLvl*** from FICM. Besides the IPK luminance can also be adjused by IPK self with three level (**illumination adjustment level**). Default level is level 2.

The calculation is as the following formula:

**Day Illuminance = [*insLCDDayIllBasePrm* + (*insLCDDayIllFactorPrm* × *FICMDimLghtLvl* × 100)] × illumination adjustment level**

**Night Illuminance = [*insLCDNigllBasePrm* + (*insLCDNigIllFactorPrm* × *FICMDimLghtLvl* × 100)] ×illumination adjustment level**

If ***FICMDimLghtLvlV*** is false, IPK should use the last valid memory value, but For First KL30 ON use the default value of ***FICMDimLghtLvl. //见顾伟良3/14邮件说明。***

If ***LdShedLvl*** is 2/3, then the illuminance should change to (**10% × MAX illumination).**

**Note: 10% need confirm whether it is suitable after illumination test.**

### Tacho && Speedo Dial and Unit Illumination

Since all the display functions are in LCD. So the illumination is the same with LCD illumination.

### Tacho && Speedo Pointer Illumination

Since all the display functions are in LCD. So the illumination is the same with LCD illumination.

### Non-Dimmed Warning Telltales Illumination

Since all the display functions are in LCD, So the illumination is the same with LCD illumination..

### Dimmed Warning Telltales Illumination

Since all the display functions are in LCD. So the illumination is the same with LCD illumination.

## Functional Behaviour

**KL.30**

All illumination is ‘OFF’ except door open, charging status, EPB related telltales and messages which can display in KL30 if they are required.

**KL.R**

All illumination is ‘OFF’ except door open, charging status, EPB related telltales and messages which can display in KL30 if they are required.

**KL.15 (CLUSTER KL15 STATUS)**

All illumination is ‘ON’.

**KL.50**

All illumination is ‘ON’.

**Default condition:**

In case an invalid input signal **Illumination PWM** is received or a signal timeout exists, a default value of **illumination default input value** is assumed.

# Trip Computer Functions

The trip computer has the following functions, the sequence reference HMI specification.

* Digital Speed
* Fuel and Electric Consumption trend.
* Range to Empty, including Fuel RTE and Elec RTE.
* Accumulate Memory (Accumulate Journey, Average Fuel Consumption, Average Electic Consumption, Driving Time, Average Speed.)
* Current Memory ( Current Journey, Average Fuel Consumption, Average Electic Consumption, Driving Time，Average Speed.)
* Hybrid information, including tachometer, motor speed, voltage, current.

The other related functions:

* Digital clock.
* Compass

Strategy when the signal is missing:

* Fuel and Elec Consumption trend: If FuelCsump missing, no line display;
* Range to Empty: if fuel sensor error exists in the second ignition, display ---. If FuelCsump missing, display ---
* Accumulate Memory

Accumulate Journey: keep previous value

Average Fuel Consumption: ---

Driving Time: Calculate cluster it self.

Average Speed: ---

* Current Memory

Current Journey: keep previous value

Average Fuel Consumption: ---

Driving Time: Calculate cluster it self.

Average Speed: ---

* Hybrid Information: see 11.9;
* Direct TPMS: see 4.40;
* 12V Battery Status: -- or no display.

## Digital Speed

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

**km/h**

**km/h**

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **displayed speed** | Internal signal considering **cORRECTED SPEED** x **units correction factor** and current selected units based on CAN signal. | **8** | **0 ~ 255** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **digital speed** | Internal variable **Displayed Speed** for the displayed value of digital speed. | **8** | **0 ~ 255** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **digital speed enable** | ***insDigiSpeedEnPrm*** When TRUE indicates that the function is enabled and is displayed as the Trip Computer function. | **1** | **1** | **0 ~ 1** |
| **speed display update rate** | ***insSpeedoDispUpdateRatePrm*** the update period for digital speed display.4ms/bit | **8** | **96** | **0-1020** |
| **speed filter** | ***insSpeedoFilterPrm*** the sample amount ,and their average value shall be used for display. | **8** | **0F** | **0-255** |

### Functional Description

The digital speed display function displays the current vehicle speed as calculated from speedometer function. This is displayed in the main zone of the dot matrix display.

## Fuel and Elec Consumption trend (only for IP34/AS24)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | ×only elec | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **fuel consumption** | ***FuelCsump*** CAN signal from EMS of rolling count of the micro-litre sum of the injector pulse volumes.  E=N\*16 | **12** | **0 ~ 4095** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **displayed AVe fuel consumption** | The value of Average Fuel Consumption displayed in the LCD in the format segment, unit is L/100km or mpg. |  |  |
| **displayed AVe elec consumption** | The value of Average Elec Consumption displayed in the LCD in the format segment, unit is kWh/100km. |  |  |

### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **AVG CONSUMPTION FUEL USED** | The calculated fuel used value for the calculation of the average fuel consumption**.** | **32** | **0 ~ 2^32 - 1** |
| **AVG CONSUMPTION DISTANCE TRAVELED** | The calculated distance travelled for the calculation of the average fuel consumption. | **32** | **0 ~ 2^32 - 1** |
| **limited inSTantaneous fuel consumption** | The calculated value of instantaneous fuel consumption in litre / 100km, limited to between the upper and lower limits. | **16** | **0 ~65535** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Consumption Units** | ***insTCConUnitsPrm***  0 = litres / 100km, 1 = UK mpg, 2 = US mpg, 3 = km / litre. | **2** | **0** | **0 ~ 3** |
| **consumption correction factor** | ***insTCFuelConsCorFactorPrm*** The fuel consumption correction factor in increments of 0.2% from 75% to 125% (Also used for the correction of the instantaneous fuel consumption display. | **8** | **7D**  **(100%)** | **0 ~ 255** |
| **consumption display upper limit** | ***insTCFuelConsUpperLimitPrm*** The maximum value of fuel consumption in increments of 5 l/100km from 19.9 to 49.9 to be dispalyed. 0 = no max limit.  E = (N -1) \*5 + 19.9 | **3** | **1**  **(19.9)** | **0 ~ 7** |
| **consumption display lower limit** | ***insTCFuelConsLowerLimitPrm*** The minimum value of fuel consumption in in increments of 0.5 l/100km from 0.5 to 3.5 to be dispalyed. 0 = no min limit. | **3** | **0** | **0 ~ 7** |
| **Consumption sample internal distance** | ***InsConsSamIntDistPrm*** The distance in increment of 100m for fuel/electric consumption calculation per sample point. The unit km/mile depends on the unit setting. | **8** | **A**  **(1)**  (km/mls) | **0 ~ 255** |
| **AEC display upper limit** | ***insTCAECUpperLimitPrm*** The maximum value of AEC in increments of 10kWh/100km from 19.9 to 79.9 to be dispalyed. 0 = no max limit. 1=19.9, 2=29.9…7=79.9 | **3** | **5**  **(59.9)** | **0 ~ 7** |
| **aec display lower limit** | ***insTCAECLowerLimitPrm*** The minimum value of fuel consumption in in increments of 5 kWh/100km from -34.9 to -4.9 to be dispalyed. 0 = 0; 1=-34.9, 2=-29.9…7=-4.9 | **3** | **4**  **(-19.9)** | **0 ~ 7** |

### Functional Description

The Fuel/Electric Consumption trend is scaled according to ***InsConsSamIntDistPrm,*** the fuel/electric consumption trend display in LCD refer to HMI specification.

The function is active when **Cluster KL15 status** is ‘TRUE’.

Subsequently the first average consumption value appears on the display after a suitable delay time to prevent frequent changes of the displayed value during the initial phase.

The memory for consumption (quantity, distance) become using the available momentary values presented. A value should not be displayed until both counters are > 0.

**Electric Consumption Sample Point Caluculating Method:**

It can refer to section 11.4.3:

“ HVBatEnrg=BMSPackVol\* BMSPackCrnt\*△t

*/*每个***InsConsSamIntDistPrm***内的累计电能消耗即本次驾驶循环实时累计电能消耗，其中△*t*为高压电池母线电压、电流所在帧的周期；此处数值积分仅示意计算方法，详细如何计算准确，请自行考虑。*/*

AEC= HVBatEnrg/( VehOdoThisTrip\* BMSPwrEfncy) */*平均电耗显示值*/ ”*

The displayed value shall be limited to between the values of **AEC display upper limit** and **AEC display lower limit**.

**Fuel Consumption Sample Point Calculating Method:**

There are two 32-bit counters, the distance travelled in meters (from the ODO) and total fuel consumed in milliLitres (from the fuel injector rolling counter CAN signal ***FuelConsumption***).  Both counters are updated every 250ms.

The displayed value shall be limited to between the values of **consumption display upper limit** and **consumption display lower limit** in litres/100km (or the equivalent values in other units).

The display value is scaled according to the EEPROM parameter ***insTCConsUnitsPrm*** (0=litres/100km, 1=UK mpg, 2=US mpg, 3=km/litre) and multiplied by the **consumption correction factor**.

The consumption calculation is simply fuel\_used/distance travelled, calculated and displayed once per second, starting after a delay from KL15, the distance according to the EEPROM parameter ***InsConsSamIntDistPrm***. The value is always expressed by chosen unit.

Forming of an average value:

Byte 1

Byte n-1

Verbrauch

Byte 1

Byte k-1

\* VK\*UF

Weg

With: VK= consumption correction factor **(consum\_c)**

UF = conversion factor for the unit of country [1/100km]

**Characteristics after a low voltage reset**

If the significant variables for the calculation of the average fuel consumption in RAM are found to be unchanged after a low voltage reset, then they should be retained to prevent a loss of the displayed value.

## Elec Consumption trend’’ (only for EP21/AS26)

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| × | × | √only elec | |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Elec Consumption Per Kilometer** | ***ElecCsumpPerKm*** E=N\*0.1-20 kwh/100km | **10** | **0 ~1024** |
| **Elec Consumption Per Kilometer Validity** | ***ElecCsumpPerKmV*** 0x0=Valid;  0x1=Invalid; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **displayed AVe elec consumption** | The value of Average Elec Consumption displayed in the LCD in the format segment, unit is kWh/100km. |  |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Consumption sample internal distance** | ***InsConsSamIntDistPrm*** The distance in increment of 100m for fuel/electric consumption calculation per sample point. The unit km/mile depends on the unit setting. | **8** | **A**  **(1)**  (km/mls) | **0 ~ 255** |
| **AEC display upper limit** | ***insTCAECUpperLimitPrm*** The maximum value of AEC in increments of 10kWh/100km from 19.9 to 79.9 to be dispalyed. 0 = no max limit. 1=19.9, 2=29.9…7=79.9 | **3** | **5**  **(59.9)** | **0 ~ 7** |
| **aec display lower limit** | ***insTCAECLowerLimitPrm*** The minimum value of fuel consumption in in increments of 5 kWh/100km from -34.9 to -4.9 to be dispalyed. 0 = 0; 1=-34.9, 2=-29.9…7=-4.9 | **3** | **4**  **(-19.9)** | **0 ~ 7** |

### Functional Description

The Fuel/Electric Consumption trend is scaled according to ***InsConsSamIntDistPrm,*** the electric consumption trend display in LCD refer to HMI specification.

The function is active when **Cluster KL15 status** is ‘TRUE’.

Each time IPK received a valid value from BMS (it will send one value per kilometer), IPK shall draw it as one sample point on the electric conseumption trend.

If ***ElecCsumpPerKmV*** is invalid, then no point will draw until a valid value is received again.

The sample point shall be limited between ***insTCAECUpperLimitPrm*** and ***insTCAECLowerLimitPrm.***

## Range to Empty

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ see spec  Only Elec RTE | |

### Signals (I/O)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** | |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** | |
| **fuel consumption** | ***FuelCsump*** CAN signal from EMS of rolling count of the micro-litre sum of the injector pulse volumes. **FC** | **16** | | **0 ~ 65535** |
| **hv battery soc** | ***BMSPackSOC*** CAN signal of SOC data from HCU ECU. In 0.1bit without offset. | **10** | | **0 ~ 1024** |
| **hv battery soc Valid** | ***BMSPackSOCV*** validity of CAN signal BMSPackSOC  $0 = Valid;  $1 = Invalid | **1** | | **0 ~ 1** |
| **ODO** | Current odometer distance in 10m increments | **24** | | **0 ~ 16777215** |
| **Electric RTE CAL FACTOR** | ***BMSOdoFct*** the percent of engine power in total output power. factor 0.5, offset 0,unit %. | **8** | | **0 ~ 127.5%** |
| **electric RTE CAL FACTOR valid** | ***BMSOdoFctV*** validity of CAN signal BMSPackSOC  $0 = Valid;  $1 = Invalid | **1** | | **0 ~ 1** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OUTPUTS** | **Description** | | **No of bits** | | **Value** | |
| **displayed Range** | | The value of Range to Empty displayed in the LCD.  **RTE\_Total .** | |  | |  |
| **displayed fuel Range** | | The value of fuel Range to Empty displayed in the LCD. **fRTE\_dsp** | |  | |  |
| **displayed Elec Range** | | The value of electric Range to Empty displayed in the LCD. **eRTE\_dsp** | |  | |  |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **reduction factor** | ***insTCRangeRFPrm*** Fuel tank capacity reduction factor. **RF.** 1%/bit (0-100 -> 100%-200%), with a default value of 0x0a (7%). | **5** | **4**  **(4%)** | **0 ~ 31** |
| **reserve fuel** | ***insTCRangeRESPrm*** Fuel tank reserve capacity. **RES.** | **8** | **03**  **(3L)** | **0 ~ 255** |
| **fuel tank total capacity** | ***insFuelTankTotalCapacity*** Fuel tank max capacity.1 Litre/bit without offset. **RES.** | **8** | **AS24= 25(37L)**  **IP34= 1E(30L)** | **0 ~ 255 L** |
| **default fuel consumption** | ***InsRTEDefFuelConS*** Used to calculate the RTE value when the fuel consumption signal has not received from EMS for a determined time. This signal is scaled 0.1L/100km per bit | **8** | **3A**  **(5.8L /100km)** | **0~255** |

### Functional Description

#### Fuel RTE calculation

Note:

Here can try the strategy MM suggested as below:

y(n)=y(n-1)+(x(n)-x(n-1))\*0.01,

In the formula, x(n)=⊿FC(n) / ∑last 500 km (⊿TRIP(n)), y(n)= AFC\_RTEf. And factor 0.01 should be configurable in EEPROM **(RF)**.

* **2016/10/28更新策略（仅供测试版用）：**

1. 输入信号：不变；
2. EEPROM参数：增加如下

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **upper Fuel consump for Fuel RTE** | ***insUpperFCforFRTE*** unit L/100km, sacle 0.1 | **8** | **AS24=59 (8.9L/100km)**  **IP34=48 (7.2L/100km)** | **0~25.5** |
| **lower Fuel consump for Fuel RTE** | ***insLowerFCforFRTE*** unit L/100km, sacle 0.1 | **8** | **AS24 =37**  **(5.5 L/100km)**  **IP34 =2D**  **(4.5L/100km)** | **0~25.5** |

1. 策略：
2. 计算续航里程用的平均油耗y(n)：

纯电工况的Trip也计算到分母中，每1km计算一个值，即：

x(n)= ∑last1km⊿FC(n) / ∑last 1 km ⊿TRIP(n)

并采用一阶滤波算法向后台值逼进：

y(n)=y(n-1)+(x(n)-x(n-1))\*RF；（RF即**reduction factor**）

初始首次KL30是从默认值向后台真实值逼进，即y(0)=x(0)= ***InsRTEDefFuelConS***；

1. 计算目标续航里程值：

当y(n) >= ***insUpperFCforFRTE***时，则y(n) == ***insUpperFCforFRTE***;

当y(n) <= ***insLowerFCforFRTE***时，则y(n) == ***insLowerFCforFRTE***;

fRTE\_tgt= FuelLevel / y(n)；

//例如：当y(99)=0<***insLowerFCforFRTE*:**

1. 先套入到y(n)=y(n-1)+(x(n)-x(n-1))\*RF 时，y(100)=y(99) +(x(100)-x(99))\*RF=0+(x(100)-x(99))\*RF
2. 再套入到fRTE\_tgt= FuelLevel / y(n)时，则按y(n) = ***insLowerFCforFRTE***计算，即fRTE\_tgt= FuelLevel / y(100)= FuelLevel / ***insLowerFCforFRTE***;

即y(n)=y(n-1)+(x(n)-x(n-1))\*RF的循环内不做上下限判断；只在fRTE\_tgt= FuelLevel / y(n)的计算时才按上述公式判断上下限；

1. 显示续航里程值fRTE\_dsp和逼近速度：
2. 当fRTE\_dsp<50km时，显示---km；
3. fRTE\_dsp逐渐向RTE\_tgt逼进，逼进速度可参考之前算法，如下：

**update frequency(TA)**

Since the **RWmomf** changes rapidly, so **RWmomf** need to be damped to **RWanzf** which is used to be RTE display.

The damping strategy ensures that the **RWanzf** changes only around ±1 [km]. Within a defined time the update frequency depends on the relative error **Fr** between **RWanzf** and **RWmomf**.

The calculation results with:

The display update frequency is calculated as follows:

If **Jm>=(RES+2)L**

{

If **Fr** > 10,

TA = 5;

Else if Fr <= 10,

}

Else if **Jm < (RES+2)L**

TA = 3;

After a system reset (e.g. KL30 OFF) the **RWanzf** is calculated with a **default fuel consumption**.

In the first 30 [s] after the reset, the average value for the tank capacity is calculated.

During the first 10 [s], the calculation of the range with the accumulated values in the average memory, the tracking routine is turned off.

// The maximum update frequency is limited to 5 [s/km], which means that if **Fr** >10, then should **TA** = 5.The **TA** is limited still to 3 [s/km] for a **Jm**< (RES+2) L;

Relationship between **Fr** and **TA**

|  |  |
| --- | --- |
| **Fr [%]** | **TA [s/1km]** |
| 11.3 | 3.0 |
| 10 | 5.0 |
| 9 | 6.5 |
| . | . |
| . | . |
| 6 | 11.0 |
| 3 | 15.5 |
| 2 | 17.0 |
| 1 | 18.5 |
| 0 | 20.0 or ¥ *(infinite)* |

#### Electric RTE calculation:

1. EEPROM参数：增加如下

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Full SOC Electric RTE** | ***insFullElcRTE*** unit km, sacle 0.1; | **12** | **AS24=27A**  **(63.4km)**  **IP34=25C**  **(60.4km)** | **0~4094** |

1. 策略：

**ERTE\_full= *insFullElcRTE*;**

**eRTE\_dsp = ERTE\_full \* HV BATTERY SOC \* electric RTE CAL FACTOR (km);**

**Note：**

1. If signal **electric RTE CAL FACTOR** is timout, it should be set to default value 100%.
2. **计算结果按四舍五入后显示！**

#### Total RTE calculation:

**RTE\_Total = fRTE\_dsp+ eRTE\_dsp (km)**

**Note:**

1. **全虚拟仪表须主页面常显；断码仪表在行车电脑菜单中循环显示；**
2. **当fRTE\_dsp<50km时，fRTE\_dsp和RTE\_Total都显示---km；**

## Accumulate Memory

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ see spec | √ see spec |

The Accumulate memory function is reset by the following:

* Do ‘**Ent**’: a long press on the Enter button of the ***Trip computer switch*** while the function is displayed.

Notes: of course, if KL30 Off, this function data will be reset.

Once the Accumulate memory is reset, the distance should display as 0.0km (Mls), the time display as 00h; the fuel consumption display as --.- L/100km, the electric consumption display as --.-kWh/100km, the average speed display 0.0km/h;

For the calculation of distance is based on the Odo, the distance should display as ----, in case of the odo over the storage space or the software can not execute a right addressing by which the application can get a current odo value from E2PROM. If the display odo has gotten to 999999km(miles) and less than the value E2PROM can storage, the accumulate trip function should be normal.

### Accumulate Trip

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **odo** | Current odometer distance in 10m increments. | **24** | **0 ~ 16777215** |
| **~~Accumulate trip Reset~~** | ~~A reset of the trip counter is required. This occurs via the trip computer menu.~~ | **~~1~~** | **~~0 ~ 1~~** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Accumulate Trip display value** | Accumulate Trip value in 0.1km (or miles) used for the TC display | **18** | **0 ~ 9999.9** |

#### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **Accumulate** **trip odo** | The odometer reading when the Accumulate Trip was last reset | **24** | **0 ~ 16777215** |
| **Accumulate trip** | The calculated value of the Accumulate Trip in 0.1km | **18** | **0 ~ 160930** |

#### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |
| **Display Zeros** | ***insDisplayZerosPrm*** Enable Leading Zeros; 1= Enabled 0 = Disabled | **1** | **0** | **0 ~ 1** |
| **VIN** | ***insVINPrm*** The Vehicle Identity Number. | **136** |  |  |
| **Roll over value** | ***insTripRollOverPrm*** Roll over to zero at trip value of; 1= 9999.9 0 = 999.9. | **1** | **1** | **0 ~ 1** |

#### Functionality Description

The Accumulate Trip is displayed within the main zone of Accumulate Journey display.

Especially, when VIN code does not match with BCM , then “Error” should be displayed in trip zone replace trip.

|  |  |  |
| --- | --- | --- |
| **FORMULA** | | |
| **Accumulate Trip** | = | **odo –Accumulate Trip odo** |

#### Functional Behaviour

**KL30 and KLR**

No Accumulate Trip calculations are made or displayed.

**KL.15 (CLUSTER KL15 STATUS)**

**Trip** and **Trip display value** are calculated and **Trip display value** made available to the display.

**KL.50 (CLUSTER KL15 STATUS)**

**Trip** and **Trip display value** are calculated and **Trip display value** made available to the display.

### Accumulate Average Fuel Consumption

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | × |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **fuel consumption** | ***FuelCsump*** CAN signal from EMS of rolling count of the micro-litre sum of the injector pulse volumes.  E=N\*16 | **12** | **0 ~ 4095** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **displayed AVe consumption** | The value of Average Consumption displayed in the LCD in the format xx.x L/100km or mpg.. |  |  |

#### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **AVG CONSUMPTION FUEL USED** | The calculated fuel used value for the calculation of the aVerage fuel consumption**.** | **32** | **0 ~ 2^32 - 1** |
| **AVG CONSUMPTION DISTANCE TRAVELED** | The calculated distance traveled for the calculation of the average fuel consumption. | **32** | **0 ~ 2^32 - 1** |
| **limited inSTantaneous fuel consumption** | The calculated value of instantaneous fuel consumption in litre / 100km, limited to between the upper and lower limits. | **16** | **0 ~65535** |

#### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Consumption Units** | ***insTCConUnitsPrm***  0 = litres / 100km, 1 = UK mpg, 2 = US mpg, 3 = km / litre. | **2** | **0** | **0 ~ 3** |
| **consumption correction factor** | ***insTCFuelConsCorFactorPrm*** The fuel consumption correction factor in increments of 0.2% from 75% to 125% (Also used for the correction of the instantaneous fuel consumption display. | **8** | **7D**  **(100%)** | **0 ~ 255** |
| **consumption display upper limit** | ***insTCFuelConsUpperLimitPrm*** The maximum value of fuel consumption in in increments of 5 l/100km from 19.9 to 49.9 to be dispalyed. 0 = no max limit. | **3** | **1**  **(19.9)** | **0 ~ 7** |
| **consumption display lower limit** | ***insTCFuelConsLowerLimitPrm*** The minimum value of fuel consumption in in increments of 0.5 l/100km from 0.5 to 3.5 to be dispalyed. 0 = no min limit. | **3** | **0** | **0 ~ 7** |

#### Functional Description

The average fuel consumption is calculated as an arithmetic average.

The driver can reset the average by following the reset procedure, see section 14, Trip Computer Menu.

The displayed value format can be switched between miles per gallon, litres per 100 kilometres and km per litres, this configuration being set in E2PROM. And also can be selected by user via cluster menu.

The function is active when **Cluster KL15 status** is ‘TRUE’.

When the function is reset 3 dashes appear on the display first. --.- L/100km. A numeric value should not be displayed until 300m have been droved,

Subsequently the first average consumption value appears on the display after a suitable delay time to prevent frequent changes of the displayed value during the initial phase.

The memory for consumption (quantity, distance) become using the available momentary values presented. A numeric value should not be displayed until both counters are > 0.

The displayed value shall be limited to between the values of **consumption display upper limit** and **consumption display lower limit** in litres/100km (or the equivalent values in other units).

The display value is scaled according to the EEPROM parameter ***insTCConsUnitsPrm*** (0=litres/100km, 1=UK mpg, 2=US mpg, 3=km/litre) and multiplied by the **consumption correction factor**.

**Calculating method:**

There are two 32-bit counters, the distance travelled in meters (from the ODO) and total fuel consumed in milliLitres (from the fuel injector rolling counter CAN signal ***FuelConsumption***).  Both counters are updated every 250ms (Supplier can adjust this value after discussing with SAIC).

If either counter is in danger of overflowing, both have their values multiplied by 7/8 (Supplier can adjust this value after discussing with SAIC)., maintaining the same ratio with high precision.  The overflow points are approximately 27000 km and 27000 Litres.

Both counters start at 0 after a system reset or a trip computer reset, and in this state will not start incrementing until the vehicle speed first exceeds 5 km/h.

The average consumption calculation is simply fuel\_used/distance travelled, calculated and displayed once per second, starting after a delay from KL15 or when the vehicle speed reaches 5km/h after a trip computer reset. The value is always expressed in tenths of the chosen unit, and displayed with one decimal place.  A value of 0 is displayed as "---.-".

There is no defined reset behaviour for the FuelConsumption CAN signal, so the first value read after a system reset is treated as a starting value and increments are calculated from there.  There is a possibility that this could result in small jumps at reset or KL15-on, but as the average accumulates, these would rapidly become too small to affect the displayed value.

**Forming of an average value**

Byte 1

Byte n-1

Verbrauch

Byte 1

Byte k-1

\* VK\*UF

Weg

With: VK= consumption correction factor **(consum\_c)**

UF = conversion factor for the unit of country [1/100km]

**Characteristics after a low voltage reset**

If the significant variables for the calculation of the average fuel consumption in RAM are found to be unchanged after a low voltage reset, then they should be retained to prevent a loss of the displayed value.

### Average Electric Consumption

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ See spec | |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **BMS PACK CURRENT** | ***BMSPackCrnt*** CAN signal from HCU, HV Battery pack Current. E=0.025N -1000. | **16** | **0 ~ 1638** |
| **BMS PACK CURRENT valid** | ***BMSPackCrntV*** validity for CAN signalBMSPackCrnt  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |
| **BMS PACK VOLTAGE** | ***BMSPackVol*** CAN signal from HCU, HV Battery pack Voltage. Scale 0.25. | **12** | **0 ~ 1024** |
| **BMS PACK VOLTAGE valid** | ***BMSPackVolV*** validity for CAN signalBMSPackVol.  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |
| **BMS Power Efficiency** | ***BMSPwrEfncy*** BMS power efficiency,unit %  If signal missing, it should be keep previous value. E=N\*0.5 % | **8** | **0~255** |
| **BMS energy available** | ***BMSAvlblEnrg*** BMS energy available, unit kWh. E=N\*0.1; | **8** | **0~255** |
| **BMS Energy Validity** | ***BMSAvlblEnrgV***  0x0=Valid;  0x1=Invalid; | **1** | **0 ~ 1** |
| **BMS onboard change energy** | ***BMSOnbdChrgEnrg*** BMS onboard change energy, unit kWh. E=N\*0.1 kwh | **16** | **0~FFFF** |
| **total average Elec consumption**  **(only for AS26/EP21 )** | ***HVBatElecEnrgAvgRate*** BMS calculated average electric consumption, E=N\*0.1-20, unit kWh/100km. | **10** | **0 ~ 1024** |
| **total average Elec consumption Validity**  **(only for AS26/EP21 )** | ***HVBatElecEnrgAvgRateV***  0x0=Valid;  0x1=Invalid; | **1** | **0 ~ 1** |
| ***current* average Elec consumption**  **(only for AS26/EP21 )** | ***CrntAvgElecCsump*** BMS calculated average electric consumption, E=N\*0.1-20, unit kWh/100km. | **10** | **0 ~ 1024** |
| ***current* average Elec consumption Validity**  **(only for AS26/EP21 )** | ***CrntAvgElecCsumpV***  0x0=Valid;  0x1=Invalid; | **1** | **0 ~ 1** |
| **average Elec consumption Reset Performed**  **(only for AS26/EP21 )** | ***ElecEnrgAvgRstPerfd*** when received AEC reset request, BMS will reset AEC and set to TRUE.  0x0=False;  0x1=True; | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **AEC DISPLAY** | Display the AEC in the format: XXXkWh/100km in LCD. | **8** | **0~25.5** |
| **average Elec consumption Reset Request**  **(only for AS26/EP21 )** | ***ElecEnrgAvgRstReq*** when IPK reset AEC, IPK set it to TRUE.  0x0=No Request;  0x1=Reset for Total Elec Consump;  0x2=Reset for Current Elec Consump;  0x3=reserved; | **2** | **0 ~ 3** |

#### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **odo threshold** | ***K\_OdoThrhd\_km*** after AEC reset, trip less than this value, use strategy1; trip over this value, use strategy2.  E=Nx10, unit km. | **8** | **64** | **0 ~ 2550** |
| **AEC display update rate\_Distance** | ***K\_AECDisplayDistanceGap\_m***  AEC display update rate every xxx m.  E=Nx10, unit m. | **8** | **3** | **0 ~ 255** |
| **AEC display update rate\_Time** | ***K\_AECDisplayTimeGap\_s***  AEC display update rates every xxx s.  E=Nx1, unit s. | **8** | **5** | **0 ~ 255** |
| **AEC Default value Move** | ***K\_AECDefMove*** the default value of electric consumption when vehicle is moving.  E=Nx0.1, unit kWh/100km. | **8** | **A0** | **0 ~ 255** |
| **AEC Default value stop** | ***K\_AECDefStop*** the default value of electric consumption when vehicle is stop.  E=Nx0.1, unit kWh | **8** | **14** | **0 ~ 255** |
| **AEC display upper limit** | ***insTCAECUpperLimitPrm*** The maximum value of AEC in increments of 10kWh/100km from 19.9 to 79.9 to be dispalyed. 0 = no max limit. 1=19.9, 2=29.9…7=79.9 | **3** | **5**  **(59.9)** | **0 ~ 7** |
| **aec display lower limit** | ***insTCAECLowerLimitPrm*** The minimum value of fuel consumption in in increments of 5 kWh/100km from -34.9 to -4.9 to be dispalyed. 0 = 0; 1=-34.9, 2=-29.9…7=-4.9 | **3** | **4**  **(-19.9)** | **0 ~ 7** |

#### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Value** |
| --- | --- | --- | --- |
| **/** | ***AECCalculate***  See 13.4.3.4, E=Nx0.1, unit kWh/100km | **8** | **0~25.5** |
| **/** | ***DeltaAEC***  See 13.4.3.4, E=Nx0.1, unit kWh/100km | **8** | **0~25.5** |
| / | ***VehOdoThisTrip***  See 13.4.3.4, E=Nx0.1, Unit km | **24** | **0 ~ 16777215** |
| **/** | ***VehOdoTripBase***  See 13.4.3.4, need store in EEPROM, unit km. | **24** | **0 ~ 16777215** |
| **/** | ***HVBatEnrg***  See 13.4.3.4, need store in EEPROM, unit kWh | **16** | **65535** |
| **/** | ***BMSOnbdChrgEnrgThisTrip***  See 13.4.3.4, E=Nx0.1, Unit kWh | **16** | **65535** |
| **/** | ***BMSOnbdChrgEnrgTripBase***  See 13.4.3.4, need store in EEPROM, E=Nx0.1, unit kWh | **16** | **65535** |
| **/** | ***BMSEnrgAvl***  See 13.4.3.4, need store in EEPROM, unit kWh | **8** | **0~255** |

#### Functional Description

1. **For AS24/IP34 (hybrid vehicle):**

The AEC is used to display the average electric consumption of the vehicle if configured..

When the function is reset 3 dashes appear on the display first --.- kWh/100km and AEC should display value at the same time with AFC.

The strategy pls refer to *“平均电耗算法说明\_20150524.pdf”*;

The displayed value shall be limited to between the values of **AEC display upper limit** and **AEC display lower limit**.

1. **For AS26/EP21**

**display accumulate AEC = total average Elec consumption**

**display current AEC = current average Elec consumption**

When the validity signal is invalid, the correcponding AEC display “---“.

When IPK reset accumulate AEC, IPK will set **average Elec consumption Reset Request** to 1; When IPK reset current AEC (including auto reset after KL15 OFF for ***insCurrMemAutoReseTimePrm***), IPK will set **average Elec consumption Reset Request** to 2;

For auto reset after KL15 OFF for ***insCurrMemAutoReseTimePrm***, IPK shall send reset request(0x02) to BMS when KL15 is ON again.

After BMS receives AEC reset request, BMS will reset AEC and set **average Electric consumption Reset Performed** to TRUE.

The displayed value shall be limited to between the values of **AEC display upper limit** and **AEC display lower limit**.

### Accumulate Driving Time

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Accumulate Driving time display value** | The calculated Accumulate driving time value in the format of XXXX.Xh  0.1h/bit | **18** | **0~9999.9h** |

#### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
|  |  |  |  |  |

#### Functionality Description

The function is active when **Cluster KL15 status** is ‘TRUE’.

The algorithm only runs when **system ready** is true.

The Driving Time is calculated from the time elapsed since the timer start.

After ‘Accumulate memory’ reset, the driving time calculations start from when the vehicle speed exceeds 5km/h (while Cluster KL15 status is TRUE). Once the calculation starts, it will not stop except ‘reset’ occurs.But the duration of Accumulate memory should stop increasing temporary if the vehicle’s power mode status were !KL.15.

#### Functional Behaviour

**KL30 and KLR**

No Accumulate driving time calculations are made or displayed.

**KL.15 (CLUSTER KL15 STATUS)**

Accumulate driving time made available to the display.

**KL.50 (CLUSTER KL15 STATUS)**

Accumulate driving time made available to the display.

### Accumulate Average Speed

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **displayed speed** | Internal signal considering **cORRECTED SPEED** x **units correction factor** and current selected units based on CAN signal. | **8** | **0 ~ 255** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **displayed AVe speed** | The value of Average Speed displayed in the LCD. |  |  |

#### Internal signals

|  |  |  |  |
| --- | --- | --- | --- |
| **variables** | **Description** | **No of bits** | **Value** |
| **Previous ave speed** | The previous value calculated of ave speed**.** |  |  |
| **number of values taken** | The number of values used to calculate the **Previous ave speed** |  |  |

#### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Units** | ***insUnitsPrm*** 0 = km/h 1=mph. | **1** | **0** | **0 ~ 1** |

#### Functional Description

The function is active when **Cluster KL15 status** is ‘TRUE’.

The algorithm only runs when **system ready status** is true.

The average speed calculation is simply speed\_sum/count, calculated and displayed once per second, starting one second after engine-running or when the vehicle speed reaches 3kph after a trip computer reset.

The display value is scaled according to the EEPROM parameter insUnitsPrm (0=kph, 1=mph).  The value is always expressed in tenths of the chosen unit, and displayed with one decimal place.

**Calculating Procedure**

The average speed is calculated as a simple average.  There are two 32-bit counters, the sum of the speed values in kph (from the Speedometer module) and count of the speed values.  Both counters are updated every 250ms.  If either counter is in danger of overflowing, both have their values multiplied by 7/8, maintaining the same ratio with high precision.  The overflow points are approximately 4 hours at 255kph and 2 years of driving respectively.  Both counters start at 0 after a system reset or a trip computer reset, and in this state will not start incrementing until the vehicle speed first exceeds 3 kph.

Averaging:

Byte 1

Byte n-1

Byte n

speed.

all [s]

Byte 1

Byte k-1

Byte k

number

n

**Behavior after System Reset**

After a system reset is the function average speed in the reset condition.

Display : ---.- mph

A value will only be displayed, when both counters have reached a sufficiently large value to allow a stable display.

If no value can be displayed (e.g. after a trip computer reset) or if the value is 0, "---.-" will be shown instead.

**Characteristics after a low voltage reset**

If the significant variables for the calculation of the average speed in RAM are found to be unchanged after a low voltage reset, then they should be retained to prevent a loss of the displayed value.

## Current Memory

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ see spec | |

The current memory strategy is same as accumulate memory in a certain extent. The accumulate memory reset is manual, the current memory reset contain reset automatical and manual.

The function is active when **Cluster KL15 status** is ‘TRUE’.

The algorithm only runs when **SYSTEM READY FLAG** is true.

Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **CURRENT MEMORY AuTOMATIC RESET TIME** | ***insCurrMemAutoReseTimePrm*** The time of current memory automatic reset when KL15 is off, in 1 minute. | **8** | **1E**  **(30min)** | **0 ~ 255** |

The current memory reset by the following:

* When KL15 Status change from 1 to 0 ≥***insCurrMemAutoReseTimePrm,*** the reset is occurred.
* Do ‘**Ent**’: a long press on the Enter button of the ***Trip computer switch*** while the function is displayed.

Notes: if KL30 Off, this function also be reset.

Once the current memory is reset, the distance should display as 0.0km(Mls),the time display as 00h; the fuel consumption display as --.- L/100km, the electric consumption display as --.-kWh/100km, the average speed display 0.0km/h;

### Current trip

### Current Average Fuel Consumption

### Current Average Elec Consumption

### Current Driving Time

### Current Average Speed

## Hybrid Information

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

Hybrid information includes tachometer, motor speed, voltage and current.

### TachoMeter

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | × |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **ENGINE speed for OTS2** | ***EnSpd***  16 bit CAN signal of engine speed data from EMS ECU. (0.25pm / bit) | **16** | **0 ~ 16383.8** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **TACHO DISPLAY** | Display the current TACHO in the format:XXXX RPM in LCD | **16** | **0~8000** |

#### Functional Description

The tachometer is used to display the engine speed of the vehicle in RPM and must cater for different vehicle variants with different maximum engine speeds.

The displayed engine speed will be derived from the **ENGINE SPEED** signal via the CAN network.

The display should consider filter so as not to change rapidly.

When signal **ENGINE speed** is missing, then should display “-.- x1000 RPM” for digital gauge or 0 RPM for analog gauge.

### Motor Speed

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **transinput speed** | ***EPTTrInptShaftSpd*** CAN signal from HCU, input shaft speed, E=N-32767 | 16 | **0 ~ 65535** |
| **TRANSINPUT SPEED VALID** | ***EPTTrInptShaftSpdV*** validity for CAN signal EPTTrInptShaftSpd | 1 | **0 ~ 1** |

**OUTPUTS**

**Description**

**No of bits**

**Value**

**motor speed DISPLAY**

Display the current motor speed in the format:XXXX RPM in LCD

**16**

**0~8000**

#### Values in non-volatile memory

**CONSTANTS**

**Description**

**No of bits**

**Init**

**(Hex)**

**Value**

**~~Motor speed display hysteresis~~**

***~~insMotorSpeedDisplayHysPrm~~*** ~~The quantity of motor speed, in rpm, above any threshold that is required to illuminate red backlight, it has been extinguished.~~

**~~16~~**

**~~012c~~**

**~~(300rpm)~~**

**~~0 ~ 65535~~**

#### Functional Description

The motor speed meter is used to display the motor speed of the vehicle in RPM and must cater for different vehicle variants with different maximum engine speeds.

The displayed engine speed will be derived from the **transinputspeed** signal via the CAN network when the **TRANSINPUTSPEEDVALID** is TRUE.

When signal **transinputspeed** is missing or signal **TRANSINPUTSPEEDVALID** is FALSE, then should display “-.- x1000 RPM” for digital gauge or 0 RPM for analog gauge.

The display should consider filter so as not to change rapidly.

The scale for motor speed is 0~8.0 x1000rpm, **and** the scale or digital value(not including the unit x1000rpm) over 7.0 x1000rpm should display red. And it return to white when lower than 6.8 x1000rpm.

### Current and Voltage

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** |  |
| √ | √ | √ |  |

#### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **BMS PACK CURRENT** | ***BMSPackCrnt*** CAN signal from HCU, HV Battery pack Current. E=0.025N -1000. | **16** | **0 ~ 1638** |
| **BMS PACK CURRENT valid** | ***BMSPackCrntV*** validity for CAN signalBMSPackCrnt  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |
| **BMS PACK VOLTAGE** | ***BMSPackVol*** CAN signal from HCU, HV Battery pack Voltage. Scale 0.25. | **12** | **0 ~ 1024** |
| **BMS PACK VOLTAGE valid** | ***BMSPackVolV*** validity for CAN signalBMSPackVol.  $0 = Valid;  $1 = Invalid | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **current DISPLAY** | Display the current in the format: XXXX A in LCD. | **16** | **-300 ~ 500** |
| **voltage display** | Display the voltage in the format: XXX V in LCD. | **12** | **0 ~ 600** |

#### Functional Description

The current and voltage meter is used to display the current and voltage of the vehicle.

It must cater for different vehicle variants with different maximum current and voltage value.

When signal **bms pack current** is missing or **BMS PACK CURRENT valid** = 1, then should display “**---**A” for digital gauge or ”0A” for anolog gauge

When signal **bms pack voltage** is missing or **BMS PACK VOLTAGE valid** = 1, then should display “**---**V” for digital gauge or ”0V” for anolog gauge.

Both current and voltage display should consider filter so as not to change rapidly.

## Service Interval Announcement (SIA) //confirmed: only in menu, not in TC;

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **SIA reset** | ***To be defined in part 4 spec*** An SIA reset is requested via diagnostic ~~or from FICM~~ or by IPK menu | **1** | **0 ~ 1** |
| **odo** | Current odometer distance in 10m increments. | **24** | **0~9999999** |
| **year** | ***CalendarYearAdj*** Current ‘Year’ information from ICE/NAV unit.  E=N\*1 + 2000 | **8** |  |
| **month** | ***CalendarMonthAdj*** Current ‘Month’ information from ICE/NAV unit.  $0=Unknown  $1=January  $2=February  $3=March  $4=April  $5=May  $6=June  $7=July  $8=August  $9=September  $A=October  $B=November  $C=December  $D-$F=Reserved | **4** |  |
| **day** | ***CalendarDayAdj*** Current ‘Day’ information from ICE/NAV unit. | **5** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **display sia date** | The date when the next service is required (year, month, day). | **3 x 8** | **06,01,01** |
| **display sia Distance** | Displayed, quantized distance in km or miles, until next service. | **24** | **0~9999999** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **SiA mode** | ***insSIAModePrm*** 00 = SIA off, 01 = SIA Linear Mode, ~~10 = Fuel Mode~~ | **2** | **1** | **0 ~ 2** |
| **SIA DISTANCE** | ***insSIADistPrm*** The recommended distance, in km, between services used for SIA calculations. | **16** | **2710**  **(10000)** | **0~65535** |
| **SIA odo** | ***insSIAOdoPrm*** The odometer reading stored when the last service reset took place. | **24** | **00** | **0~9999999** |
| **Units** | ***insUnitsPrm*** 0 = km/h, 1=mph. | **1** | **0** | **0 ~ 1** |
| **SIA date** | ***insSIADatePrm*** The date of the next service stored when the last service reset took place (year,month,day). | **3 x 8** | **0E,01,01**  **(2014,01,01)** |  |
| **sia period** | ***insSIAPeriodPrm*** The maximum time period, in months, between services. | **8** | **0C** | **0~65535** |
| **~~SIA TC page enable~~** | ***~~insTCSIAEnPrm~~*** ~~SIA display as a TC page when TRUE~~ | **~~1~~** | **~~0~~** | **~~0 ~ 1~~** |

### Internal signals

| **VARIABLES** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| --- | --- | --- | --- | --- |
| **units correction factor** | km/h units = 1 Mph units = 1.61 | **8** | **01** | **1 ~ 1.61** |
| **REmaining Distance** | Calculated distance until next service. | **24** | **00** | **0~9999999** |

### Functional Description

The Service Interval display is the means by which the driver is informed of when the next vehicle service is due.

The SIA can support several modes of functionality, being controlled by **SIA mode**. The versions supported are: SIA OFF, SIA Linear Mode ~~and SIA Fuel Mode.~~

**SIA OFF Mode** (**SIA MODE** = 00)

In SIA OFF mode the SIA feature shall be disabled. No SIA calculations shall take place and no SIA data is displayed.

**SIA Linear Mode** (**SIA MODE** = 01)

In SIA Linear mode the SIA is based upon a combination of:

* A fixed number of km (or miles) between each service.
* A fixed number of months between each service.

~~If~~ ***~~insTCSIAEnPrm~~*** ~~is true, the SIA information can be seen in~~ **~~TC page~~**~~, please refer to HMI specification.~~

The **remaining distance** is calculated by subtracting the difference between **odo** and **SIA odo**, from **SIA distance**.

The **remaining distance** is quantized to the nearest 50 km or 25 miles, **display sia Distance**, depending on the selected value of **Units**.

The **SIA date** is calculated by adding the **SIA period** to **(year, month, day)**. It is stored in EEPROM and the data used for the output to the display, **display sia date**.

Notes: if cluster can NOT receive **YEAR**, **MONTH**, **DAY** signal from ICE, cluster will only display **remaining distance** information.

**~~SIA Fuel Mode~~** ~~(~~**~~SIA MODE~~** ~~= 10)~~

~~In SIA Fuel mode, the service interval is based upon the use of a predetermined quantity of fuel within a set period.~~

### Functional Behaviour

**KL.30**

The SIA function is OFF. No calculations are made. No SIA is displayed.

**KL.15 (CLUSTER KL15 STATUS)**

The SIA function is ON. SIA is calculated.

**KL.R / KL.30 (Shutdown Mode)**

The SIA function is OFF. No calculations are made. No SIA is displayed.

### SIA reset

In Linear mode the SIA reset will be possible at any time.

Service Interval Reset shall be afforded when a **SIA reset** is received, via vehicle diagnostics.

When a service reset takes place the current odometer reading is stored as **sia odo** and the date of the next service is calculated and stored as **SIA date**.

Following any SIA reset command the new SIA information will be displayed for twice the **SIA display time**. This will assist the service engineer by confirming that the reset has occurred.

## ~~Compass Indication~~

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | X | X | X |

### Signals (I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN KL15 status and the hardwired KL15 input. | **1** | **0 ~ 1** |
| **Positioning System Heading** | ***PosngSysHdng*** CAN signal from ICE for a compass symbol display.  E=N\*0.1 | **12** | **0 ~ 360°** |
| **Positioning System Heading Validity** | ***PosngSysHdngV*** CAN signal from ICE for a compass symbol display.  $0=Valid;  $1=Invalid | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **compass symbol** | Display in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **compass angle 1 threshold** | ***insComAng1ThresPrm*** the angle value, 0.1°/bit, above which ‘North East’ symbol is illuminated. | **12** | **e1**  **(22.5°)** | **0 ~ 360°** |
| **compass angle 2 threshold** | ***insComAng2ThresPrm*** the angle value, 0.1°/bit, above which ‘East’ symbol is illuminated. | **12** | **2a3**  **(67.5°)** | **0 ~ 360°** |
| **compass angle 3 threshold** | ***insComAng3ThresPrm*** the angle value, 0.1°/bit, above which ‘South East’ symbol is illuminated. | **12** | **465**  **(112.5°)** | **0 ~ 360°** |
| **compass angle 4 threshold** | ***insComAng4ThresPrm*** the angle value, 0.1°/bit, above which ‘South’ symbol is illuminated. | **12** | **627**  **(157.5°)** | **0 ~ 360°** |
| **compass angle 5 threshold** | ***insComAng5ThresPrm*** the angle value, 0.1°/bit, above which ‘North East’ symbol is illuminated, above which ‘South West’ symbol is illuminated. | **12** | **7E9**  **(202.5°)** | **0 ~ 360°** |
| **compass angle 6 threshold** | ***insComAng6ThresPrm*** the angle value, 0.1°/bit, above which ‘West’ symbol is illuminated. | **12** | **9AB**  **(247.5°)** | **0 ~ 360°** |
| **compass angle 7 threshold** | ***insComAng7ThresPrm*** the angle value, 0.1°/bit, above which ‘North West’ symbol is illuminated. | **12** | **B6D**  **(292.5°)** | **0 ~ 360°** |
| **compass angle 8 threshold** | ***insComAng8ThresPrm*** the angle value, 0.1°/bit, above which ‘North’ symbol is illuminated. | **12** | **D2F (337.5°)** | **0 ~ 360°** |
| **compass angle hysteresis** | ***insCompassAngleHysPrm*** the angle value, 1°/bit, below any angle threshold that is required to extinguish a segment after it has been illuminated. | **4** | **3 (3°)** | **0 ~ 15°** |
| **compass enable** | ***insComPassEnPrm*** when TRUE indicates that the function is enabled.  The function is diabled and Not displayed when ‘Flase’. | **1** | **1** | **0 ~ 1** |

### Functional Description

The compass function is used to display the current direction. According to the signal from ICE, cluster will display 8 types symbol according to different angle area.

When***PosngSysHdng*** and ***PosngSysHdngV***, (any signal time-out) or (the two signals are present, and PosngSysHdngV = invalid), Cluster will display '- -'.

### Functional Behaviour

**KL.30**

The inputs are not monitored and the output is not decided.

**KL.30 / KL.R (Shutdown mode)**

The inputs are not monitored and the output is not decided.

**KL.R**

The inputs are not monitored and the output is not decided.

**KL.15 (CLUSTER KL15 STATUS)**

The inputs are monitored and the output is decided.

**KL.50**

The inputs are monitored and the output is decided.

### Symbol

**compass symbol (North):**

北(**angle 8- angle 1**)

**compass symbol (North east):**

东北(**angle 1- angle 2** )

**compass symbol (east):**

东(**angle 2- angle 3**)

**compass symbol (south east):**

东南(**angle 3 angle 4**)

**compass symbol (south):**

南(**angle 4- angle 5**)

**compass symbol (south west):**

西南(**angle 5- angle 6**)

**compass symbol (west):**

西(**angle 6- angle 7**)

**compass symbol (North west):**

西北(**angle 7- angle 8**)

## Hybrid Energy Flow // it is included in Car Status Page(section 11.11).

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Electric Vehicle System Mode** | ***ElecVehSysMd*** signal from HCU  0x0=default;  0x1=Idle charge;  0x2=Smart charge;  0x3=Pure electric drive mode (for EP21: TM单电机驱动);  0x4=Pure engine drive mode;  0x5=Series drive mode;  0x6=Parallel drive mode (for EP21:TM+BM双电机并联驱动);  0x7 =Regen brake mode;  0x8 =PlugIn Charging.  0x9=Pure electric drive mode-4WD (only for EP21:TM+FM四驱模式);  0xA=Parallel drive mode-4WD (only for EP21: TM+BM+FM四驱模式);  0xB=Reserved;  0xC=Reserved;  0xD=Reserved;  0xE=Reserved;  0xF=Reserved;  说明：AS24/IP34 使用0~7；AS26使用0、3、7；EP21使用0、3、6、7、9、A； | **1** | **0 ~ 1** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Electric Vehicle System Mode** | Energy Flow in LCD when ‘TRUE’. | **1** | **0 ~ 1** |

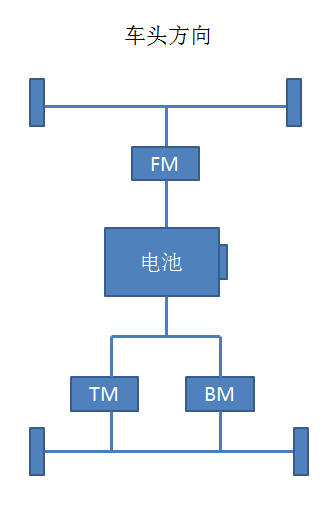
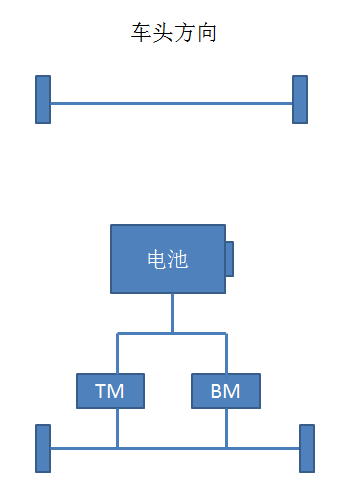
### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **energy flow enable** | ***insEnergyEnPrm***  If TRUE Energy Flow TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **4wd mode type** | ***Ins4WDTypePrm*** 0=2WD, 1=4WD; | **1** | **1** | **0 ~ 1** |

### Functional Description

Each value of the input signal ***ElecVehSysMd*** has one corresponding energy flow picture. For detail see HMI Spec.

1、EP21四驱示意图： 2、EP21两驱示意图：

## Direct TPMS display

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| X | √ | √ | √ |

See section 4.40

## Car Status

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

The car status including Hybrid energy flow, door/bonnet/boot/sunroof open status, main beam/dipped beam/front fog lamp/rear fog lamp status.

It use different color car according to the following parameter:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **car color** | ***InsCarColorPrm***  0=default(white);  1=black;  2=silver;  3=red;  4=brown;  5=gold;  6=blue;  7~15=reserved; | **4** | **0** | **0 ~ 15** |

Detailed pls see HMI Spec.

## 12V Battery Status

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **12V battery voltage** | ***BatVol*** signal from GW  E=N/1024 +3, unit V | **14** | **0 ~ 15362** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **12V battery voltage** | in LCD when ‘TRUE’. Scale 0.1V; | **8** | **0 ~ 255** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **12V battery status enable** | ***Ins12VBatStsEnPrm***  if TRUE 12V battery status TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |

### Functional Description

For detail see HMI Spec.

## Carbon Emission Reduction -— to be modified

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| x | x | √ | √ |

### Signals(I/O)

|  |  |  |  |
| --- | --- | --- | --- |
| **INPUTS** | **Description** | **No of bits** | **Value** |
| **Cluster KL15 status** | Internal cluster signal used by the Cluster from a combination of the CAN key status and the hardwired input. | **1** | **0 ~ 1** |
| **Elec Consumption Per Kilometer** | ***ElecCsumpPerKm*** E=N\*0.1-20 kwh/100km | **10** | **0 ~1024** |
| **Elec Consumption Per Kilometer Validity** | ***ElecCsumpPerKmV*** 0x0=Valid; 0x1=Invalid; | **1** | **0 ~ 1** |
| **displayed speed** | Internal signal considering **cORRECTED SPEED** x **units correction factor** and current selected units based on CAN signal. | **8** | **0 ~ 255** |

|  |  |  |  |
| --- | --- | --- | --- |
| **OUTPUTS** | **Description** | **No of bits** | **Value** |
| **Carbon emission reduction** | When the result <=999g, Scale 1, unit g; when result>999g, then display in scale 0.1 unit kg;  //依据实车测试的结果，可能需要调整； | **16** | **0 ~ 65535** |

### Values in non-volatile memory

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONSTANTS** | **Description** | **No of bits** | **Init**  **(Hex)** | **Value** |
| **Carbon emission reduction enable** | ***InsCaEmiRedEnPrm***  if TRUE carbon emission reduction TC function is enabled and displayed. 0 = disabled 1=enabled. | **1** | **1** | **0 ~ 1** |
| **fuel emission fuel consump 1** | ***InsFuelEmiConsump1Prm*** 发动机油耗特性曲线油耗特征值，**v<= fuel emission speed 1**时的油耗值， scale 0.1 L/100km; | **8** | 11.8L/100km | **0~255** |
| **fuel emission speed 1** | ***InsFuelEmiSpeed1Prm*** 发动机油耗特性曲线车速特征值，scale 1km/h; | **8** | 30kmh | **0~255** |
| **fuel emission fuel consump 2** | ***InsFuelEmiConsump2Prm*** 发动机油耗特性曲线油耗特征值，**fuel emission speed 1 *<* v <= fuel emission speed 2**时的油耗值， scale 0.1 L/100km; | **8** | 8.8L/100km | **0~255** |
| **fuel emission speed 2** | ***InsFuelEmiSpeed2Prm*** 发动机油耗特性曲线车速特征值，scale 1km/h; | **8** | 60kmh | **0~255** |
| **fuel emission fuel consump 3** | ***InsFuelEmiConsump3Prm*** 发动机油耗特性曲线油耗特征值，**fuel emission speed2 *<* v <= fuel emission speed 3**时的油耗值， scale 0.1 L/100km; | **8** | 6.8L/100km | **0~255** |
| **fuel emission speed 3** | ***InsFuelEmiSpeed3Prm*** 发动机油耗特性曲线车速特征值，scale 1km/h; | **8** | 80kmh | **0~255** |
| **fuel emission fuel consump 4** | ***InsFuelEmiConsump4Prm*** 发动机油耗特性曲线油耗特征值，**fuel emission speed 3 *<* v <= fuel emission speed 4**时的油耗值， scale 0.1 L/100km; | **8** | 5.8L/100km | **0~255** |
| **fuel emission speed 4** | ***InsFuelEmiSpeed4Prm*** 发动机油耗特性曲线车速特征值，scale 1km/h; | **8** | 100kmh | **0~255** |
| **fuel emission fuel consump 5** | ***InsFuelEmiConsump5Prm*** 发动机油耗特性曲线油耗特征值，**v > fuel emission speed 4**时的油耗值， scale 0.1 L/100km; | **8** | 7.8L/100km | **0~255** |
| **carbon emission sample internal distance** | ***InsCaEmiSamIntDistPrm*** The distance in increment of 100m for carbon emission calculation per sample point. The unit km/mile depends on the unit setting. | **8** | **A**  1km/mls | **0 ~ 255** |

// 以上特性参数曲线经实车测试标定后可能需要调整!

### Functional Description

//方便理解，本章节均用中文描述;

1. 计算间隔ΔSample：

ΔSample = InsCaEmiSamIntDistPrm；

//默认1km，考虑1km内的工况较复杂，可以考虑适当延长到3km或5km等等，作为配置参数；

1. 平均车速v\_Sample：

v\_Sample = ΔSample内的平均车速；

//算法同平均车速；

1. 平均油耗AFC\_sample：根据特征表判断，

If v\_Sample <=InsFuelEmiSpeed1Prm,

AFC\_sample = InsFuelEmiConsump1Prm;

Else if InsFuelEmiSpeed1Prm < v\_Sample <=InsFuelEmiSpeed2Prm,

AFC\_sample = InsFuelEmiConsump2Prm;

Else if InsFuelEmiSpeed2Prm < v\_Sample <=InsFuelEmiSpeed3Prm,

AFC\_sample = InsFuelEmiConsump3Prm;

Else if InsFuelEmiSpeed3Prm < v\_Sample <=InsFuelEmiSpeed4Prm,

AFC\_sample = InsFuelEmiConsump4Prm;

Else if v\_Sample > InsFuelEmiSpeed4Prm,

AFC\_sample = InsFuelEmiConsump5Prm;

1. 平均电耗 AEC\_sample：借用BMS发送的ElecCsumpPerKm 计算，

If ΔSample = 1km,

AEC\_sample = ElecCsumpPerKm;

Else If ΔSample >= 2km,

AEC\_sample = ∑i ElecCsumpPerKm /ΔSample, //即算数平均法计算；

1. 碳排放节省量 CaEmiRed，

CaEmiRed = (2.7kg/L \* AFC\_sample - 0.997kg/kWh \* AEC\_sample) \* ΔSample； //注意单位换算；

CaEmiRed = CaEmiRed++； //显示值为累加量；

// 2.7kg/L、0.997kg/kWh是常量，建议做成配置字可配；

1. 信号异常策略，

当DistRCAvgDrvn或 VehSpdAvgDrv或ElecCsumpPerKm 信号missing或invalid，CaEmiRed均保持显示missing或invalid前的有效值不变；

1. Reset 操作

暂无，整车生命周期内一直累加。

# TBOX

|  |  |  |  |
| --- | --- | --- | --- |
| **IP34** | **AS24** | **EP21** | **AS26** |
| √ | √ | √ | √ |

Instrument Cluster should transmit the vehicle fault/failure status displayed to TBOX, and the user can know the vehicle’s status by their phone.

The CAN signals generally as below list, when the detailed strategy confirmed, the cluster output signals will be added in the corresponding section.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name**  **(Long Name)** | **Length**  **(bit)** | **Data**  **Type** | **Power-Up Default**  **(Initial Logical Value)** | **Range** | **Signal Encoding**  **(Factor,Offset,Unit)** | **Input Delay**  **or Data Delay(ms)** | **Subscriber**  **Interface Definition** |
| Fuel level segment IPK |  |  |  |  |  |  | TBOX |
| Range to empty IPK |  |  |  |  |  |  | TBOX |
| Vehicle Speed IPK |  |  |  |  |  |  | TBOX |
| Fuel Consumption current IPK |  |  |  |  |  |  | TBOX |
| Fuel Consumption Accumulate IPK |  |  |  |  |  |  | TBOX |
| Alternator Warning IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Tyre Pressure Status IPK | **2** | ENM | 0 | 0-2 | $2=System Failure;$1=Low Tyre;$0=No Warning |  | TBOX |
| Low Oil Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Left Brake Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Right Brake Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Left DI Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Right DI Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Left Dipped Beam Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Right Dipped Beam Light Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Dynamic Headlight Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Stability Control System Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| ABS Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Coolant Temp Warning IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Brake Fluid Low Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Electrical Brake Status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Low Fuel IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Fuel Sensor Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Fuel System Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Stop Starts Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Stop Start Button Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Hill Decent Control Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Electric Power Steering Fault IPK | **2** | ENM | 0 | 0-1 | $2=Hard Warning;$1=Soft Warning;$0=No Warning |  | TBOX |
| Steering Angle Sensor Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Steering Angle Sensor Calibrartion IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Air Bag Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Air Bag Lamp Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Passenger Air Bag Lamp Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Immobiliser Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Security Key Low IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Clutch Switch Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Hill Hold Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Inertia Switch Triggered IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Ignition Relay Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Low Washer Fluid IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Battery Replacement Required IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Clutch Overtemp IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| PDC Status IPK | **3** | ENM | 0 | 0-3 | $3=Total Failure;$2=Rear Failure;$1=Front Failure;$0=No Warning |  | TBOX |
| Transmission Fault IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| IPK Valid Flag 1 | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| IPK Valid Flag 2 | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Engine MIL status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Engine Drive by wire status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |
| Electronic Parking Brake status IPK | **1** | ENM | 0 | 0-1 | $1=Warning;$0=No Warning |  | TBOX |

# Revision History

| **Rev** | **Date** | | **Author** | | **Section** | | **Change Description** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1.0 | 2015-4-7 | | Cheng Fangbing | |  | | Initial release (draft). | |
| All the TBC functions means that the signal interface or strategy is not confirmed. | | | | | | | | |
| 1.2 | | 2015-8-4 | | Cheng Fangbing | | 3.3.3 | | Change function description |
|  | |  | |  | | 3.4.4 | | Formula update, delete speed signal corrector factor. |
|  | |  | |  | | 3.6 | | Change input signal. |
|  | |  | |  | | 4.6 | | Change input signal; change formula |
|  | |  | |  | | 4.22 | | Change input signal: adding EPB HW input; change formula |
|  | |  | |  | | 4.31 | | Change input signal. |
|  | |  | |  | | 11.3 | | Change input signal; change Electric RTE strategy for AS24. |
|  | |  | |  | | 11.4.3 | | Change AEC strategy for AS24. |
|  | |  | |  | | 5.29.1 | | Define the input signal for IP34 |
|  | |  | |  | | 4.2 | | Delete ASL related function |
|  | |  | |  | | 11.8 | | Delete this section |
|  | |  | |  | | 11.2 | | Delete this section |
|  | |  | |  | | 7.1 | | Update the I/O signal, EEPROM parameters and internal signals  Update the function description |
|  | |  | |  | | 7.2 | | Insert 7.2 Nav & Media & Call section. |
|  | |  | |  | | 7.6 | | Add a picture as reference |
|  | |  | |  | | 2.4 | | Modify SMTC standard number. |
|  | |  | |  | | 2.2 | | Delete preview mode |
|  | |  | |  | | 2.3 | | Delete TC button as wanke up condition |
|  | |  | |  | | 2.6 | | Delete some Rx signals |
|  | |  | |  | | 11.4.4 | | Update this section |
|  | |  | |  | | 11.4.2  11.4.4 | | Add “A numeric value should not be displayed until 300m have been droved,” |
|  | |  | |  | | 5.17 | | Delete this section and move to section 4.37. |
|  | |  | |  | | 5.37 | | Add Power Liftgate Warning |
|  | |  | |  | | 7.8 | | Old section 12 outside temp display move to this section. |
|  | |  | |  | | 6 | | Update ADAS functions, including 6.1, 6.2, 6.3, 6.4, SAS TBD. |
|  | |  | |  | | 4.7 | | Delete stop start related function ddescription |
| 1.3 | | 2015-9 | | Cheng Fangbing | | 7.1.2 | | Update the name of some parameter in EEPROM |
|  | |  | |  | | 11.3 &  11.4.3 | | Reunite the strategy of ERTE and AEC for AS24 and IP34 |
|  | |  | |  | | 3.5.4 | | Add AS24 Fuel Sender Characteristics and the related parameter default value redefined in 3.5.4.2 |
|  | |  | |  | | 4.6.3 | | Update DCDC Charge Fault Message;  Add load shed level-2 echo message, load shed level-3 echo message and GONG strategy. |
|  | |  | |  | | 4.3.1 | | Update internal signal high Temp warning status. |
|  | |  | |  | | 4.38 | | Separate Auto Main Beam Indication Function from 4.17 to this section, but the input signals are **TBD**. |
|  | |  | |  | | 4.26 | | Update vehicle speed threshold value to 5km/h |
|  | |  | |  | | 11.4.2 | | Update vehicle speed threshold value to 5km/h |
|  | |  | |  | | 7.8 | | Update the temperature range |
|  | |  | |  | | 7.1 | | Confirm the input sinal **FICM READY STATUS** |
|  | |  | |  | | 9.11 | | Add direct-TPMS (only for EP21), but the function is TBD. |
|  | |  | |  | | 6.1  6.2  6.3  6.4  6.5 | | Update strategys of ADAS functions！please see it in detail. |
|  | |  | |  | | 9.3 | | Add description for the illumance strategy. |
|  | |  | |  | | 5.33 | | Delete this section |
|  | |  | |  | | 4.39 | | Add this section ”SOC management mode” |
|  | |  | |  | | 4.28 | | Input signal changes and the formula update |
|  | |  | |  | | 4.29 | | Input signal changes and the formula update |
|  | |  | |  | | 7.1.2 | | Redefine the parameter TC history mode enable |
|  | |  | |  | | 11.7 | | Delete *insICEType* and it is substituted by *insFICMEnPrm****;***  The parameter *insFICMEnPrm* changes to 2 bits and redefined; |
|  | |  | |  | | 7.1.4 | | Add description for the period of short and long press  The formula with *insFICMEnPrm* is changed |
| 1.4 | | 2015-9 | | Cheng Fangbing | | 3.5.4.2 | | Add fuel Resistance X7 fuel Resistance X8 fuel Litres Y7 fuel Litres Y8, and update related default value. |
|  | |  | |  | | 4.6.3 | | Delete the lamp check formula |
|  | |  | |  | | 4.17.1 | | Update the inpout signal |
|  | |  | |  | | 4.22.3 | | Update formula for Audible Gong. |
|  | |  | |  | | 4.26 | | Change the input signal to VEHICLE SPEED |
|  | |  | |  | | 4.31 | | Formula update. |
|  | |  | |  | | 4.32.3 | | Update the first formula |
|  | |  | |  | | 4.33.3 | | Delete self-check in the fomula |
|  | |  | |  | | 4.34 | | Update the message formula |
|  | |  | |  | | 11.6.1 | | Update input signal’s encoding. |
|  | |  | |  | | 4.25.3 | | Update formula for dipped beam LAMP(yellow) |
|  | |  | |  | | 3.3 | | Update the description; |
| 1.5 | | 2015-10 | | Cheng Fangbing | | 4.21 | | TCCM function is not available for AS24; |
|  | |  | |  | | 4.26.3 | | Delete description “~~Specialy if~~ *~~SteeringWheelAngle~~* ~~= 0xFFFF the message will not display. And signal~~ *~~SteeringWheelAngle~~* ~~is timeout, the SAS Fault Warning will be triggered~~” |
|  | |  | |  | | 4.9 | | Update direct TPMS strategy and AS24 is with direct TPMS. |
|  | |  | |  | | 4.40 | | seperate direct TPMS strategy from 4.9 to 4.40 |
|  | |  | |  | | 3.2 | | Delete this section |
| 1.6 | | 2015-11 | |  | | 4.28.4 | | Add the picture showing the charging status after KL15 OFF |
|  | |  | |  | | 11.7 | | Add SIA as a TC page |
|  | |  | |  | | 7.9 | | This section move form 11.7 to 7.9 for clock display and time setting are not TC functions. |
|  | |  | |  | | 5.36  10 | | Oil remaining life display and oil change reminder function are disabled for IP34 and AS24. |
|  | |  | |  | | 5.32.1 | | Define the input signal |
|  | |  | |  | | 4.9 | | Add TPMS TYPE parameter in the formula. |
|  | |  | |  | | 5.28 | | Delete this section, it is included in 4.40 direct TPMS display. |
|  | |  | |  | | 4.38  5.27 | | Confirm the strategy |
|  | |  | |  | | 4.27 | | Add Power OFF lamp formula. |
|  | |  | |  | | 5.16,  5.20,  5.31 | | Delete shutdown related strategy. |
|  | |  | |  | | 5.18.3 | | Update the audible warning period and formula |
|  | |  | |  | | 5.19 | | Delete this section. |
|  | | 2015-11-18 | |  | | 5.26 | | Update overspeed warning strategy |
|  | |  | |  | | 11.7.3 | | Delete three parameters. |
|  | |  | |  | | 11.4.1.4 | | Add description about VIN dismatch display strategy. |
|  | |  | |  | | 2.2 | | Add door open welcome display description. |
|  | |  | |  | | 5.38 | | Add SIA Reminder. |
|  | |  | |  | | 7.9,  7.10, | | Update these two sections. |
|  | |  | |  | | 7.1.2 | | Add some parameters |
|  | |  | |  | | 9 | | Update illumination strategy |
|  | |  | |  | | 11.2 | | Re-add this function |
|  | |  | |  | | 11.4.3 | | Add the lower and upper display value for AEC |
|  | |  | |  | | 3.4 | | Add speedometer halo effect parameters |
|  | |  | |  | | 2.6 | | Update the TX signal list. |
| 1.6.1 | | 2015-11-25 | |  | | 7.2 | | Input signals update in accordance with NRS.  Add calling request image and FICM not launch image. |
|  | |  | |  | | 7.11 | | Add voice request function |
|  | |  | |  | | 7.2 | | Add call reminder tab jump strategy, FICM not launch strategy, turn by turn navi image. |
|  | |  | |  | | 7.1 | | Update input signals and related formula. |
|  | |  | |  | | 9.4 | | Update function brehaviour |
|  | |  | |  | | 4.6.3 | | DCDC charge fault lamp formul change. |
|  | |  | |  | | 4.8 | | ESCL warning is not for AS24. |
|  | |  | |  | | 4.22 | | Add EPB HW input strategy. |
|  | |  | |  | | 11.1 | | Delete digital speed TC page. |
|  | |  | |  | | 11.3 | | Udpate RTE stretagy. Delete parameter RESERVE FUEL. |
|  | |  | |  | | 11.11 | | Add car status TC page. |
|  | |  | |  | | 7.1.2 | | Add language and overspeed menu enable parameters;  Add FC trend, EC trend, car status and trip enable parameters;  Change some parameters’ default value; |
|  | |  | |  | | 6.1  6.3 | | Add the Tab jump strategy when ACC Take Over Message or LDW Lane3 or LDW Lane4 occur. |
|  | |  | |  | | 4.28 | | Add charging error indication. |
|  | |  | |  | | 7.1.1 | | Add notes for output signal: up button and down button status. |
|  | |  | |  | | 4.39 | | Add description for SOC Hold mode display. |
|  | |  | |  | | 5 | | Define the message display period(refer to UE) |
|  | |  | |  | | 5.4 | | Separate the repeat door open pop message |
|  | |  | |  | | 5.16,  5.18,  5.19,  5.20,  5.22,  5.31 | | Delete repeat-on-shutdown message related description |
|  | |  | |  | | 5.11 | | Update the message display period. |
|  | |  | |  | | 4, 5 | | All the message pictures change to “refer to UE”. |
|  | |  | |  | | 8 | | Separate the audible strategy for IPK with speaker and audible warning achieved through chime |
| 1.6.2 | | 2015-12-02 | |  | | 4.2 | | Re-add ASL function. |
| 1.6.3 | | 2015-12-08 | |  | | 4.2 | | Update some parameters. Updatecruise fault Lamp formula. |
|  | |  | |  | | 5.39 | | Add pedestrian alert system fault section. |
|  | |  | |  | | 6.5 | | Update SAS strategy. |
|  | |  | |  | | 4.2 | | Update the input signal Cruise/ASL Target Speed |
|  | |  | |  | | 6.4.3,  5.1.3  11.4.5.4 | | Delete Engine Running Flag related description.  In 11.4.5.4 it is substituted by SYSTEM READY STATUS. |
|  | |  | |  | | 9.3 | | Update the description of interpolation. |
|  | |  | |  | | 4.29,  6.2,  4.38 | | The projects using the related functions are updated. |
|  | |  | |  | | 6.5 | | Update the strategy. |
| 1.6.4 | | 2015-12-09 | |  | | 6.5 | | Update the strategy. |
|  | |  | |  | | 9 | | Update the strategy and related parameters are redefined. |
|  | |  | |  | | 11.2 | | Add output and update some description. |
| 1.6.5 | | 2015-12-10 | |  | | 6.1  6.3 | | Update the strategy. |
|  | |  | |  | | 5.4  5.10 | | Update the message display period. |
|  | |  | |  | | 5.39 | | Update the input signal. |
|  | |  | |  | | 5 | | Add message display period description |
|  | |  | |  | | 5.40 | | Add IPK overheating warning |
|  | |  | |  | | 4.41 | | Add warning info lamp |
| 1.6.6 | | 2015-12-22 | |  | | 4.2 | | Delete CC active On/Off Message; |
|  | |  | |  | | 4.23 | | Add EPB fault message, update audible warning |
|  | |  | |  | | 5.5 | | Delete this section |
|  | |  | |  | | 5.11 | | Change to repeat Gong |
|  | |  | |  | | 5.18 | | Change to repeat Gong |
|  | |  | |  | | 5.21 | | Add IP34 sunroof open signal |
|  | |  | |  | | 5.31 | | Add IP34 sunroof open signal |
|  | |  | |  | | 5.38 | | Add SIA reminder critical message |
|  | |  | |  | | 8.3 | | Add repeat Gong description. |
|  | |  | |  | | 6.1;  6.3;  6.4 | | Update strategy. |
|  | |  | |  | | 7.1.2 | | Add and delete some parameters. |
|  | |  | |  | | 7.2.3 | | Add description for FICM not launch image and LVDS not ready image. |
|  | |  | |  | | 7.1.4 | | Add Navi, Media, Phone Tab display formula; update warning tab display formula; add Car Status display strategy. |
|  | |  | |  | | 2.6 | | Add some IP34 output signals |
|  | |  | |  | | 5.39 | | Update the input signal. |
|  | |  | |  | | 4.28  4.29 | | Update input signal |
|  | |  | |  | | 4.25 | | Audible warning see section 5.16 |
|  | |  | |  | | 5.14 | | Update input signal for IP34 |
| 1.6.7 | | 2015-12-28 | |  | | 5.4 | | Update formula: delete KL15 condition. |
|  | |  | |  | | 6.4.3 | | Update audible wanring, only one frequency. |
|  | |  | |  | | 7.1.2 | | Add TPMS TYPE parameter to control the direct TPMS TC page display. |
| 1.6.8 | | 2016-01-13 | |  | | 7.7.3 | | Update the formula for gear display |
|  | |  | |  | | 8.2  8.3.3 | | Update the PDC GONG parameter and PDC audible warning formula. |
|  | |  | |  | | 5.40 | | Delete LCD shutdown message |
|  | | 2016-03-16 | |  | | 4.6 | | Update text and add two new message; |
|  | |  | |  | | 5.25 | | Update text; |
|  | |  | |  | | 5.41 | | Add Near Field Control Drive Status |
|  | |  | |  | | 5.42 | | Add Auto Parking Status, strategy not confirmed |
|  | |  | |  | | 11.12 | | Add TC page: 12V Battery Status |
|  | |  | |  | | 7.2 | | Update input signal for Navi Guiding Mode and VC Request (section 7.11 is update into 7.2). |
|  | |  | |  | | 5.38 | | Update strategy |
|  | |  | |  | | 7.9 7.10 | | Update input signals and strategy (follow 7inch) |
|  | |  | |  | | 9 | | Update input signals and strategy (follow 7inch) |
|  | |  | |  | | 5.27 | | Delete PDC disabled message. |
|  | |  | |  | | 2.3 | | Add a wake up input: EPB hardwire input |
|  | |  | |  | | 11.3 | | Update strategy description. |
|  | |  | |  | | 6.4 | | Update strategy，Add FCW SYSTEM OFF LAMP ON, FCW SYSTEM fault LAMP flash,see the **red** text (following 7inch) |
|  | |  | |  | | 4.22 | | The autohold telltale in switch need consider dimming. |
|  | |  | |  | | 2.2 | | Update default value of *insDoorOpenWelTimePrm* to 15s |
|  | |  | |  | | 7.1.2 | | Update the *insPresstime1Prm* and *insPresstime2Prm* default value |
|  | |  | |  | | 11.2  11.4 | | Update the default value of *insTCFuelConsUpperLimitPrm*to 1(19.9L/100km) |
|  | |  | |  | | 6.1 | | Update strategy, delete ACC fault message, see the **blue** text (following 7inch). |
|  | |  | |  | | 6.2 | | Update strategy, delete AEB fault message see the **blue** text (following 7inch). |
|  | |  | |  | | 6.3 | | Update strategy, delete LDW fault message, add crossing lane message, see the **blue** text (following 7inch). |
|  | |  | |  | | 11 | | Add TC display when CAN missing |
|  | |  | |  | | 2 | | Update Tx signal list |
| **1.7** | | **2016-03-16** | |  | |  | | **Release Version.** |
| 1.7.1 | |  | |  | | ALL | | Add AS26 project variant. |
|  | |  | |  | | 4.7 | | Update the strategy |
|  | |  | |  | | 9 | | Add illumination adjust strategy with loadshed level, see **blue** text. |
|  | |  | |  | | 2.6 | | Update some signal description: ***ClstrOvrSpdThrshld*** description & so on, see such text |
|  | |  | |  | | 5.27 | | Delete Audible Warning |
|  | |  | |  | | 5.38 | | Update the description of ***insSIARmdPeriodThresPrm;*** |
|  | |  | |  | | 5.26 | | Update formula; |
| 1.7.2 | |  | |  | | 6.1 | | AddFVCM FAULT Audible warning gong1;  Change ACC Audible warning gong1;  Add FVCM FAULT Audible warning gong1 enable;  ADD Sensor block audible warning;  ADD Sensor block audible warning ENABLE; |
|  | |  | |  | | 6.2 | | UpdateAEB Audible warning gong1; |
|  | |  | |  | | 6.3 | | Delete LDW Audible warning gong1;  Delete LDW Audible warning gong1 enable; |
|  | |  | |  | | 6.4 | | Change FCW Audible warning gong1  delete FCW system fault echo message |
|  | |  | |  | | 2.2 | | udpate the strategy of door open welcome display, see **such** text |
|  | |  | |  | | 2.6 | | Update TX signal strategy, see such text; |
|  | |  | |  | | 11.3 | | Add note for ERTE, see **such** text; |
|  | |  | |  | | 4.6 | | Update text, see such text; delete load shed level-4 echo message; Update REPEAT GONG formula; |
|  | |  | |  | | 4.3,  4.8,  4.27,  4.30,  4.40 | | Update GONG1 strategy; |
|  | |  | |  | | 11.3 | | Update strategy add upper AFC limit |
|  | |  | |  | | 4.36 | | Add message for regen level info. |
|  | |  | |  | | 11.11 | | Add parameter InsCarColorPrm to control the different color of car. |
|  | |  | |  | | 3.6 | | Update function strategy. |
| 1.7.3 | | 2016/5/12 | |  | | 6.4.1 | | Update input signal in accordance with NRS file. |
|  | |  | |  | | 2.6 | | Add ClstrElecRngToEPT and ClstrFuelRngToEPT. |
|  | |  | |  | | 6.1 | | Add FVCM fault tab message and FVCM fault tab message enable parameter; |
|  | |  | |  | | 3.5 | | Update strategy, see red text. |
|  | |  | |  | | 6.4 | | FCW is also available for AS24 and AS26; |
| 1.7.4 | | 2016/6/24 | |  | | 4.22.3 | | Update the formula: autohold status lamp (on) |
|  | |  | |  | | 2.6 | | Delete ClstrDspdEleclBrkDW;  Update strategy for ClstrDspdSysRdyAudW |
|  | |  | |  | | 5.13.3 | | Update the formula: put key into backup position message; |
|  | |  | |  | | 11.4.3.1 | | Update the description of BMSPwrEfncy. |
|  | |  | |  | | 11.6.1  11.6.2  11.6.3 | | Add: The display should consider filter so as not to change rapidly.  Update the motor speed’s changing red strategy. |
|  | |  | |  | | 4 | | Update thedescription of 6). |
|  | |  | |  | | 4.27 | | Update formula POWER OFF LAMP; |
|  | |  | |  | | 5.35 | | Correct the input signal; |
|  | |  | |  | | 4.40.3 | | Update the description in table: the corresponding tyre and pressure display refer to UI. |
|  | |  | |  | | 11.3.3 | | Update the default value of insTCRangeRESPrm, K\_insAFCRTEUpLmtPrm |
|  | |  | |  | | 5.43 | | Add this section |
|  | |  | |  | | 6.3 | | Add LDW Temporary Unavailabe messge |
| 1.8 | | 2016/9/14 | |  | | 6.3  6.4 | | 6.3 LDW仅针对AS24、AS26项目，新增6.4 LDW更新了信号接口，适用于AS24、AS26以外的其他项目； |
|  | |  | |  | | 5.42 | | 更新auto parking的策略 |
| 1.8.1 | | 2016/9/30 | |  | | 7.1.2 | | 增加“风格”菜单的相关配置字； |
|  | |  | |  | | 5.42 | | 增加泊车停车位的描述； |
|  | |  | |  | | 5.41 | | 更新遥控驾驶的信号名、formula、显示文字； |
| 1.8.2 | | 2016/10/12 | |  | | 5.44 | | 增加 HCU/VCU display request； |
| 1.8.3 | | 2016/10/25 | |  | | 11.2’’  11.4.3  11.3 | | AS26： 更新平均电耗、电耗趋势、电续航里程信号接口和策略； |
|  | |  | |  | | 11.13 | | AS26： 增加碳排放量策略； |
|  | |  | |  | | 4.28 | | AS26/IP34/EP21：增加剩余充电时间； |
|  | |  | |  | | 7.2 | | All： 增加简易导航使能配置字，更新公式**turn by turn navi imAge**； |
|  | |  | |  | | 4.2 | | All：更改CC目标车速信号***EPTCCTrgtSpd***定义； |
|  | |  | |  | | 11.3.4 | | All：燃油续航里程计算策略； |
|  | |  | |  | | 6.6.3 | | SAS 目标显示车速需要x1.05 |
|  | |  | |  | | 6.5.3 | | FCW报警信息等级1/2/3对应不同的UI图片； |
|  | |  | |  | | 5.44 | | 补充3条message |
|  | |  | |  | | 4.22 | | 更新epb status LAMP公式 |
|  | |  | |  | | 11.4.3.4 | | 更新AEC策略的引用文档，增加描述AEC有效值须和AFC有效值同时出现； |
|  | |  | |  | | 4.36.3 | | 更新公式，改为跳变时才触发message； |
|  | |  | |  | | 5.21 | | Sunroof Open echo message补充描述：KL15 ON时，车体图、门开报警图中也需显示，但不作为触发门开报警图的条件； |
|  | |  | |  | | 11.3.4.3 | | 增加Total RTE calculation |
|  | |  | |  | | 4.5 | | 更新MIL echo Message策略，增加对READY SYSTEM FLAG的2s延时； |
|  | |  | |  | | 6.4 | | IP34 /AS26/EP21：优化LDW输出信号，更新standby和invalid 组合时的显示输出； |
| 1.8.4 | | 2016/12/27 | |  | | 5.26 | | All：更新超速报警Formula； |
|  | |  | |  | | 3.6  4.33 | | AS26：更新显示和低SOC报警策略 |
|  | |  | |  | | 5.43 | | All：增加声音报警 |
|  | |  | |  | | 11.3 | | 更新油续航里程的油耗上限值，区分IP34和AS24；  更新策略描述； |
|  | |  | |  | | 5.45 | | AS26/EP21：新增message； |
|  | |  | |  | | 6 | | 改成See *“ADAS Display Spec V05.docx”.* |
|  | |  | |  | | 5.42 | | 简化策略描述，详细以 *“20161206-zh6-自动泊车HMI提醒信息网络信号Code V1 6（遗留问题 + 添加英文）.xlsx”*文档为准； |
|  | |  | |  | | 4.38 | | IP34：Auto mainbean指示功能IP34上也实施； |
| 1.8.5 | | 2017/02/21 | |  | | 5.44 | | All：更新coding和策略； |
|  | |  | |  | | 4.8 | | 更新：escl fault level 1/2/3 message enable默认值为1 |
|  | |  | |  | | 5.42 | | 更新：AS26是半自动APA，EP21和IP34是全自动APA； |
|  | |  | |  | | 4.39.3 | | 新增：SOC管理模式的message提醒； |
|  | |  | |  | | 5.44 | | 更新：区分AS26和IP34/AS24 的message需求； |
| 1.8.6 | | 2017/03/30 | |  | | 5.45 | | EP21/AS26：更新airbagdpl==1时也触发该条message； |
|  | |  | |  | | 4.42 | | EP21/AS26：新增electric motor fail 报警灯； |
|  | |  | |  | | 4.31 | | EP21：增加Eco+模式，肤色同Eco； |
|  | |  | |  | | 11.9 | | EP21：针对EP21变更信号定义； |
|  | |  | |  | | 4.43 | | EP21：增加TCCM状态灯（双色）和报警信息； |
|  | |  | |  | | 4.44 | | EP21：增加Ibooster指示灯，符号复用制动灯； |
|  | |  | |  | | 4.45 | | EP21：增加后排安全带未系报警灯和文字提醒； |
|  | |  | |  | | 5.42 | | AS26/IP34：AS26增加垂直泊入（仅右侧），部分message增加声音提示； |
|  | |  | |  | | 6 | | ADAS更新：新增LKA车道保持和BSD盲区检测，详见ADAS Spec附件； |

END