# Water in Fuel RTT & Warning Messages – Diesel Applications - CGEA 1.3

## Functional Description

The purpose of the Water\_In\_Fuel\_RTT and warning message is to inform the driver that there is water in the fuel system. Unlike straight gasoline engines water in fuel can cause expensive damage to a diesel engine so is generally implemented for diesel applications.

The Water\_In\_Fuel\_RTT and warning message coorelates the WaterInFuel, WaterInFuel\_B\_Falt signals from the ECM and the Operational\_Mode to illuminate or extinguish the Water\_In\_Fuel\_RTT and to display or not display the warning message.

Version 5.0 of this STSS adds a water in fuel monitor fault warning message primarily intended to support the Vehicle Maintenance Monitor feature which is implemented on 2019.5 V36x program and the upcoming 2020 P558 program. **This STSS is backward compatible**, however, if a particular program need not support the water in fuel fault warning message prior v4.0 may be used.

The Water\_In\_Fuel\_RTT shall provide an iconic representation that will illuminate or extinguish to inform the driver that there is water in the fuel system.

This section describes the RTT function and sets a flag that is used by the Message Center display (See Message Center Section for details of Message Display Algorithm).

## Interfaces

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

Figure 1 Water in Fuel RTT Context Diagram

### Inputs

* + - * INTERNAL:

~~DIAG\_SESSION\_TIMER~~

Operational\_Mode

~~DIAG\_PID\_6308,4,6 (Water in Diesel Fuel)~~

###### MUX message on the HS\_CAN Bus from the HS\_PCM

1. WaterInFuel Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size (bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min** | **Max** |
| WaterInFuel | 1 |  | SED | 1 | 0 |  | 0 (0x0) | 1 (0x1) |
|  |  | Off |  |  |  | 0x0 |  |  |
|  |  | On |  |  |  | 0x1 |  |  |

1. WaterInFuel\_B\_Falt Signal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size (bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min** | **Max** |
| WaterInFuel\_B\_Falt | 1 |  | SED | 1 | 0 |  | 0 (0x0) | 1 (0x1) |
|  |  | No fault |  |  |  | 0x0 |  |  |
|  |  | Fault |  |  |  | 0x1 |  |  |

### Outputs

* Water\_In\_Fuel\_RTT, which is used to control the state of the Reconfigurable Telltale and

water in fuel warning message.

* Water\_In\_Fuel\_Fault\_sMC\_Status\_Flag which is used to control the state of the water in fuel monitor fault warning message.

## Function/Performance

### Operational Modes

| **Mode** | **Differentiating Vehicle Conditions** |
| --- | --- |
| Sleep Mode | Water\_In\_Fuel\_RTT OFF |
| Limited Mode | Water\_In\_Fuel\_RTT OFF |
| Normal Mode | Water\_In\_Fuel\_RTT OFF/ON |
| Crank Mode | Water\_In\_Fuel\_RTT OFF/ON |

The above table references the setting of the RTT flag as per this section. However, the actual RTT display operational modes are displayed in the Message Center section of this SPSS.

### Voltage Levels

Refer to the Cluster Features table located in the Operational Modes and Voltage Range Stategies section in this SPSS

### Human-Machine Interface

#### Visual

#### Indicator Graphics / Display Format

G.10

For actual symbol definition see pixel definition section in the message center section. The pixel representation is based upon the symbol definition database # G.10 of the 03-0685 ARL requirement

##### Indicator Color Coordinates

Amber - Reference SDS IL-0017/IS-0379

##### Indicator Characteristics

Pixel Display in Message Center Display - Water in Fuel RTT

#### Audio

None

#### Switch Control Logic

Not Applicable

### System Accuracy

The state of the Water\_In\_Fuel\_RTT shall change within 100 msec of a state change as indicated in the state matrix reference 1.3.5.1 Subsystem Algorithm Flowchart/ State Diagram

### Operation: Performance and Functional

#### Subsystem Algorithm Flowchart / State Diagram

1. State Matrix for Water\_In\_Fuel\_RTT Flag

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Operational\_Mode** | **~~DIAG\_SESSION\_TIMER~~** | **~~DIAG\_PID\_6308,4,6~~**  **~~(Water in Diesel Fuel)~~** | **WaterInFuel Signal** | **Water\_In\_Fuel\_RTT** |
| Normal or Crank | ~~Inactive~~ | ~~X~~ | On (0x1) | Active |
| ~~Inactive~~ | ~~X~~ | Missing as per 1.4.1 | Inactive |
| ~~Normal~~ | ~~Active~~ | ~~Not Received~~ | ~~On (0x1)~~ | ~~Active~~ |
| ~~Active~~ | ~~ON (0x1)~~ | ~~X~~ | ~~Active~~ |
| All Other Cases | | | | Inactive |

X = Don’t Care

Not Received = The state when a DIAG\_SESSION\_TIMER is active and the PID has not been received

1. State Matrix for Water\_In\_Fuel\_Fault\_MC\_Status\_Flag Flag

|  |  |  |
| --- | --- | --- |
| **Operational\_Mode** | **WaterInFuel\_B\_Fault Signal** | **Water\_In\_Fuel\_Fault\_MC\_Status\_Flag** |
| Normal or Crank | Fault (0x1) | Active |
| Missing as per 1.4.1 | Inactive |
| All Other Cases | | Inactive |

1. Water In Fuel RTT Flag to MC Warning Message

|  |  |  |
| --- | --- | --- |
| **Water\_In\_Fuel\_RTT** | **MC Message ID** | **Active Chime\_Status\_Flag** |
| **Active** | W770 | None |

1. Water\_In\_Fuel\_Fault\_MC\_Status\_Flag to MC Warning Message

|  |  |  |
| --- | --- | --- |
| **\_Water\_In\_Fuel\_Fault\_MC\_Status\_Flag** | **MC Message ID** | **Active Chime\_Status\_Flag** |
| **Active** | W208 | Message\_Center\_Informational\_  **Chime\_Status\_Flag** |

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

* The actual RTT display operational modes are displayed in the Message Center Section of this SPSS.
* When Water\_In\_Fuel\_RTT flag is active the RTT and associated text warning is active.

See Table 1.2 for W#.

* Important: For applications which do not support RTT but support warning text messages use this STSS. Only the message warning text portion of this STSS is implemented for those applications. In general this is the case for L0/M0 IPC.

#### Function Safety Classification (EMC)

Class B

#### Memory Storage

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter Name** | **Description** | **Value at**  **Battery Connect** | **Value at**  **Module Wake-up** |
| Water\_In\_Fuel\_RTT | Used to control the state of the RTT | Not Active (0x0) | Not Active (0x0) |
| WaterInFuel Signal | CAN signal sent from the ECM | Off (0x0) | Off (0x0) |
| WaterInFuel\_B\_Falt Signal | CAN signal sent from the ECM | No Fault (0x0) | No Fault (0x0) |
| ~~DIAG\_PID\_6308,4,6 (WaterIn Diesel Fuel)~~ | ~~Indicator Lamp Control 1, byte 4, bit 6 (Water in Diesel Fuel)~~ | ~~0 (0x0)~~ | ~~0 (0x0)~~ |
| Operational\_Mode | 4 state indicator for cluster operational mode | Limited | Limited, Normal or Crank |

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter Name** | **Description** | **Value at**  **Battery Connect** | **Value at**  **Module Wake-up** |
| DIAG\_SESSION\_TIMER | Timer used to time-out a diagnostic session | Inactive | Inactive |

#### Prove Out

No

#### Reconfigurable Telltale

Yes

#### Message Center Msg

1. MC Warning ID

|  |
| --- |
| MC Warning Message ID |
| W770 |
| W208 |

## Error Handling

### Missing Message Strategy

The signals will be declared missing as per the Diagnostics section of this SPSS.

DTCs states and history will be determined as per the Diagnostics section of this SPSS.

No DTSc are logged for WaterInFuel\_B\_Falt signal.

## Diagnostics

### Self Test

None

### Engineering Test Mode

Reference section “Dealer / Engineering Test Mode (ETM)”

### Part II Performance

**Supported Diagnostic PIDs (Service $22 and $2F)**

|  |  |  |
| --- | --- | --- |
| **Number** | **PID / CommonID Name** | **PID Type** |
| ~~6308~~ | ~~Indicator Lamp Control 1, byte 4, bit 6 (Water in Diesel Fuel)~~ | ~~Bit Mapped~~ |

**Supported Diagnostic Trouble Codes (DTCs)**

|  |  |  |
| --- | --- | --- |
| **DTC** | **Description** | **When Logged** |
| C10000 | Lost Communication with ECM/PCM | Message missing for more than 5 seconds |

## Reference Specification

FU-1125 DIESEL FUEL WATER SEPARATOR REQUIREMENTS

IS-0001 WARNINGS/INDICATORS/DISPLAYS PROVEOUT

IS-0046 INSTRUMENTATION MATERIAL RESISTANCE TO CLEANING

IS-0052 OPERATING VOLTAGES - FUNCTIONAL/PERFORMANCE

IS-0069 FUNCTIONAL IMPORTANCE CLASS

IS-0324 WINDSHIELD & OTHER REFLECTIONS

IS-0327 WARNING INDICATOR EVALUATION

IS-0329 FLICKERING OF LAMPS

IS-0379 NORTH AMERICAN WARNINGS AND INDICATORS STRATEGY

03-0661  PLACEMENT: CONTROL AND DISPLAY LOCATIONS

03-0662  PLACEMENT: LOGICAL GROUPING FUNCTION AND USAGE

03-0664  PLACEMENT: DOWN VISION TO COMPONENTS WITH HIGH VISUAL DEMAND

03-0665  PLACEMENT: EXPECTED LOCATIONS OF CONTROLS AND DISPLAYS VDS

03-0670  INTERIOR VISIBILITY

03-0671  INTERIOR VISIBILITY: REFLECTIONS FROM COMPONENTS & SURFACES

03-0672  INTERIOR VISIBILITY: REFLECTIONS IN DISPLAYS

03-0673  INTERIOR VISIBILITY: VISUAL OBSCURATIONS

03-0674  INTERIOR VISIBILITY: ILLUMINATION CONTROLS / DISPLAYS

03-0675  INTERIOR VISIBILITY: VEILING GLARE

03-0677  INTERIOR VISIBILITY: SUNLIGHT WASHOUT

03-0681  IDENTIFICATION: CHARACTER AND SYMBOL SIZE

03-0682  IDENTIFICATION: LEGIBILITY

03-0685  IDENTIFICATION: SYMBOLS,  ABBREV FOR CONTROL

03-0721  LOGIC OF OPERATION: OPERATIONAL STEREOTYPES

03-0722  LOGIC OF OPERATION: INTERPRETATION

03-0723  LOGIC OF OPERATION: USE OF SYSTEMS WITH VISUAL DISPLAYS

## Revision History

**SPSS Module Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision Level** | **Name** | **Change Description** | **Date** |
| Draft | TC | SENT OUT FOR APPROVAL | 8/29/03 |
| 1.0 | Jfodera4 | Changed all Telltales to RTT  Deleted Bulb\_Proveout\_Timer and Self\_Test\_Entry\_Bulb\_Check\_Timer  throughout whole document  1.1 Added content to Functional Description   * + 1. Changed LED to "Reconfigurable Telltale   1.3.1 Added Content to Operational Modes   * + - 1. Added Pixel Definition   1.3.3.2.2 Changed LED to "Pixel Display in Message Center Display"   * + 1. Reworded System Accuracy        1. Changed ON to Active and OFF to Not Active   1.3.5.4 Changed RTT value at battery connect and value at module wake up from OFF to Not Active   * + - 1. No Proveout       2. Added "Yes"       3. Added content | 2/2/05 |
| 2.0 | Jfodera4  TCwik | Added new footer  Changed Limiting Mode to Limited Mode  1.3.2 Changed "Master Document" to " Operational Modes and Voltage Range Stategies "  1.3.3.2.1 Added IS-0379   * + - 1. added row to table when PIDs are "not received"   1.3.5.4 Changed CAN Signal Wake-up value to “Do Not Init”  1.4.1 Reworded new missing message strategy  1.6 Added reference IS-0379 | 6/13/05 |
| 3.0 | Tsodiya | 1.2.1 -Deleted the DIAG\_PID\_6308,1,3 (all warning lamps)  -Deleleted the ETM\_Bulb\_Check\_State  1.2.2 Deleted the last two bullets all warning lamps and ETM\_Blb\_Chk\_State  1.3.5.1 -Deleted ETM\_Bulb\_Check \_State column  -Deleted DIAG\_PID\_6308,1,3 (all warning lamps) column  -Deleted the 2nd row in Normal or Crank Section  -Deleted the 2nd and 4th row in Normal section   * + - 1. Deleted the all warning lamps and ETM\_Bulb\_Check\_State row   1.5.3 Deleted the 2nd row in the Supported Diagnostic PIDs | 11/29/05 |
| 3.1 | Jblatchf | 1.3.3.2.1: Changed color from Red to Amber to reflect as manufactured. | 2/28/13 |
| 4.0 | Jblatchf | This update adds Warning # as has always been functional intent and implementation, corrects signal to current GSDB, updates missing message strategy to CGEA 1.3 standard implementation, adds clarification that for L0/M0 IPC this STSS is implemented without RTT (implement text message only), and adds new W# table to assist modelling efforts. This STSS appears to have been moved to CGEA 1.3 library from CGEA without appropriate changes several years ago.   * 1.1: Added text indicating warning message is also associated with this warning text. Corrected signal. * Figure 1: Corrected signal in context diagram. * Table 1.0: Updated to correct signal. * 1.2.3: Added reference to warning message. * Table 1.1: Corrected signal, added missing message function. * Table 1.2: Added table. * 1.5.3.2: Added 2 notes. * 1.3.5.7: Added Table 1.3 to support modelling effort. * 1.5.3: Corrected DTC to CGEA 1.3 | 05/30/17 |
| 5.0 | J.Blatchford | Version 5.0 of this STSS adds a water in fuel monitor fault warning message primarily intended to support the 2019.5 V36x program and the upcoming 2020 P558 program. **This STSS is backward compatible**, however, if a particular program need not support the water in fuel fault warning message v4.0 may be used. Changes highlighted in green.   * 1.1: Added paragraph relative to v5.0 change. * Figure 1: Added input signal and output MC\_Status\_Flag. * Table 1.1: Added table. * 1.2.3: Added MC\_Status\_Flag * Table 1.3: Added Table. * Table 1.5: Added Table. * 1.3.5.4: Updated with new signal, corrected WaterInFuel signal to GSGB which was intended in v4.0 release. * Table 1.6: Added W208 to support modelling effort. * 1.4.1: Added statement that no DTCs are logged for WaterInFuel\_B\_Falt signal. | 6/23/2017 |
| 5.1 | J.Blatchford | Clarified that v5.0 of this STSS was intended to support the Vehicle Maintenance Monitor. 2019.5 V36x and 2020 P558 are the first programs supporting Vehicle Maintenance Monitor. Change so minor not highlighted.   * 1.1 Functional Description: Added reference to the paragraph updated in v5.0 to reference Vehicle Maintenance Monitor. | 6/24/2017 |
| 5.2 | J.Blatchford | This update addresses Denso 2019 UP375 Q&A #78 where it was noted the wrong DID is referenced in the logic although the correct is also called out in the STSS. Since direction has been to remove the specific telltale DID for RTTs unless there is a specific reason to keep it this update removes both the correct and incorrect DID from the document. This action concurred by Scott Watkins in 5/15/2018 email to myself and Denso. Changes highlighted in light blue. | 5/17/2018 |