**Delphi**

**Chery E1.0**

**MT22.3 4Cylinder HWIO**

**Diagnoses Specification**

| Revision Level | Revision Date | | Author | Change Description and Section(s) affected by the change | Event |
| --- | --- | --- | --- | --- | --- |
|  | | | | | |
| 01 | 28-May-2014 | Fandaowei | | Initial release for MT22.3 Chery ECM |  |
| 02 | 04-Jun-2014 | Fandaowei | | Add COND part |  |
| 03 | 22-July-2014 | Fandaowei | | Add ETCD and CAND |  |
| 04 | 05-Feb-2015 | Zhangjianbo | | Update ESTD |  |
|  |  |  | |  |  |

Contents

[1. Crank Sensor Circuit No Signal 9](#_Toc389643325)

[ Descriptor 9](#_Toc389643326)

[ Enable Conditions 9](#_Toc389643327)

[ Malfunction Fail Criteria 10](#_Toc389643328)

[ Malfunction Reports 10](#_Toc389643329)

[ Calibration Variable and Table Descriptions 10](#_Toc389643330)

[2. Crank Sensor Circuit Noisy Signal 10](#_Toc389643331)

[ Descriptor 10](#_Toc389643332)

[ Enable Conditions 11](#_Toc389643333)

[ Malfunction Fail Criteria 11](#_Toc389643334)

[ Malfunction Reports 11](#_Toc389643335)

[ Calibration Variable and Table Descriptions 11](#_Toc389643336)

[3. CAM1 Sensor Circuit No Signal 11](#_Toc389643337)

[ Descriptor 11](#_Toc389643338)

[ Enable Conditions 12](#_Toc389643339)

[ Malfunction Fail Criteria 12](#_Toc389643340)

[ Malfunction Reports 12](#_Toc389643341)

[ Calibration Variable and Table Descriptions 12](#_Toc389643342)

[4. CAM1 Sensor Rationality Error 13](#_Toc389643343)

[ Descriptor 13](#_Toc389643344)

[ Enable Conditions 13](#_Toc389643345)

[ Malfunction Fail Criteria 13](#_Toc389643346)

[ Malfunction Reports 14](#_Toc389643347)

[ Calibration Variable and Table Descriptions 14](#_Toc389643348)

[5. CAM2 Sensor Circuit No Signal 14](#_Toc389643349)

[ Descriptor 14](#_Toc389643350)

[ Enable Conditions 14](#_Toc389643351)

[ Malfunction Fail Criteria 15](#_Toc389643352)

[ Malfunction Reports 15](#_Toc389643353)

[ Calibration Variable and Table Descriptions 15](#_Toc389643354)

[6. CAM2 Sensor Rationality Error 15](#_Toc389643355)

[7. O2 11 Heater Fault 15](#_Toc389643356)

[ Descriptor 15](#_Toc389643357)

[ Enable Conditions 16](#_Toc389643358)

[ Malfunction Fail Criteria 16](#_Toc389643359)

[ Malfunction Reports 16](#_Toc389643360)

[ Calibration Variable and Table Descriptions 16](#_Toc389643361)

[8. O2 12 Heater Fault 17](#_Toc389643362)

[ Descriptor 17](#_Toc389643363)

[ Enable Conditions 17](#_Toc389643364)

[ Malfunction Fail Criteria 17](#_Toc389643365)

[ Malfunction Reports 18](#_Toc389643366)

[ Calibration Variable and Table Descriptions 18](#_Toc389643367)

[9. Fan A Fault 18](#_Toc389643368)

[ Descriptor 18](#_Toc389643369)

[ Enable Conditions 19](#_Toc389643370)

[ Malfunction Fail Criteria 19](#_Toc389643371)

[ Malfunction Reports 20](#_Toc389643372)

[ Calibration Variable and Table Descriptions 20](#_Toc389643373)

[10. Fan B Fault 20](#_Toc389643374)

[ Descriptor 20](#_Toc389643375)

[ Enable Conditions 21](#_Toc389643376)

[ Malfunction Fail Criteria 21](#_Toc389643377)

[ Malfunction Reports 22](#_Toc389643378)

[ Calibration Variable and Table Descriptions 22](#_Toc389643379)

[11. Main Power Relay Fault 22](#_Toc389643380)

[ Descriptor 22](#_Toc389643381)

[ Enable Conditions 23](#_Toc389643382)

[ Malfunction Fail Criteria 23](#_Toc389643383)

[ Malfunction Reports 24](#_Toc389643384)

[ Calibration Variable and Table Descriptions 24](#_Toc389643385)

[12. Fuel Pump Relay Fault 24](#_Toc389643386)

[ Descriptor 24](#_Toc389643387)

[ Enable Conditions 25](#_Toc389643388)

[ Malfunction Fail Criteria 25](#_Toc389643389)

[ Malfunction Reports 26](#_Toc389643390)

[ Calibration Variable and Table Descriptions 26](#_Toc389643391)

[13. ACC Clutch Fault 26](#_Toc389643392)

[ Descriptor 26](#_Toc389643393)

[ Enable Conditions 27](#_Toc389643394)

[ Malfunction Fail Criteria 27](#_Toc389643395)

[ Malfunction Reports 28](#_Toc389643396)

[ Calibration Variable and Table Descriptions 28](#_Toc389643397)

[14. Purge Solenoid Diagnostic Fault 28](#_Toc389643398)

[ Descriptor 28](#_Toc389643399)

[ Enable Conditions 29](#_Toc389643400)

[ Malfunction Fail Criteria 29](#_Toc389643401)

[ Malfunction Reports 30](#_Toc389643402)

[ Calibration Variable and Table Descriptions 30](#_Toc389643403)

[15. VVT1(intake valve driver solenoid) Diagnostic Fault 31](#_Toc389643404)

[ Descriptor 31](#_Toc389643405)

[ Enable Conditions 31](#_Toc389643406)

[ Malfunction Fail Criteria 32](#_Toc389643407)

[ Malfunction Reports 32](#_Toc389643408)

[ Calibration Variable and Table Descriptions 32](#_Toc389643409)

[16. VVT2(intake valve driver solenoid) Diagnostic Fault 33](#_Toc389643410)

[ Descriptor 33](#_Toc389643411)

[ Enable Conditions 33](#_Toc389643412)

[ Malfunction Fail Criteria 34](#_Toc389643413)

[ Malfunction Reports 34](#_Toc389643414)

[ Calibration Variable and Table Descriptions 34](#_Toc389643415)

[17. Malfunction Indicator Lamp Fault 35](#_Toc389643416)

[ Descriptor 35](#_Toc389643417)

[ Enable Conditions 35](#_Toc389643418)

[ Malfunction Fail Criteria 35](#_Toc389643419)

[ Malfunction Reports 36](#_Toc389643420)

[ Calibration Variable and Table Descriptions 36](#_Toc389643421)

[18. SVS Lamp Fault 36](#_Toc389643422)

[ Descriptor 36](#_Toc389643423)

[ Enable Conditions 37](#_Toc389643424)

[ Malfunction Fail Criteria 37](#_Toc389643425)

[ Malfunction Reports 38](#_Toc389643426)

[ Calibration Variable and Table Descriptions 38](#_Toc389643427)

[19. VGIS Fault 38](#_Toc389643428)

[ Descriptor 38](#_Toc389643429)

[ Enable Conditions 39](#_Toc389643430)

[ Malfunction Fail Criteria 39](#_Toc389643431)

[ Malfunction Reports 39](#_Toc389643432)

[ Calibration Variable and Table Descriptions 40](#_Toc389643433)

[20. Injector Diagnostic 40](#_Toc389643434)

[ Descriptor 40](#_Toc389643435)

[ Enable Conditions 41](#_Toc389643436)

[ Malfunction Fail Criteria 41](#_Toc389643437)

[ Calibration Variables and Table 41](#_Toc389643438)

[21. EST Output 41](#_Toc389643439)

[ Descriptor 41](#_Toc389643440)

[ Enable Conditions 42](#_Toc389643441)

[ Malfunction Fail Criteria 42](#_Toc389643442)

[ Calibration Variables and Table 42](#_Toc389643443)

[22. Knock Sensor Fault 42](#_Toc389643444)

[ Descriptor 42](#_Toc389643445)

[ Enable Conditions 42](#_Toc389643446)

[ List of inhibiting fail criteria 43](#_Toc389643447)

[ Malfunction Fail Criteria 43](#_Toc389643448)

[ Malfunction Reports 43](#_Toc389643449)

[ Calibration Variable and Table Descriptions 44](#_Toc389643450)

[23. Knock System Fault 44](#_Toc389643451)

[ Descriptor 44](#_Toc389643452)

[ Enable Conditions 44](#_Toc389643453)

[ List of inhibiting fail criteria 45](#_Toc389643454)

[ Malfunction Fail Criteria 45](#_Toc389643455)

[ Malfunction Reports 45](#_Toc389643456)

[ Calibration Variable and Table Descriptions 46](#_Toc389643457)

[24. COND SOH Main CPU Fault 46](#_Toc389643458)

[ Descriptor 46](#_Toc389643459)

[ Enable Conditions 47](#_Toc389643460)

[ Malfunction Fail Criteria 47](#_Toc389643461)

[ Malfunction Reports 47](#_Toc389643462)

[25. COND SOH Common Fault 47](#_Toc389643463)

[ Descriptor 47](#_Toc389643464)

[ Enable Conditions 48](#_Toc389643465)

[ Malfunction Fail Criteria 48](#_Toc389643466)

[ Malfunction Reports 48](#_Toc389643467)

[26. COND SOH Common Fault 48](#_Toc389643468)

[ Descriptor 48](#_Toc389643469)

[ Enable Conditions 49](#_Toc389643470)

[ Malfunction Fail Criteria 49](#_Toc389643471)

[ Malfunction Reports 49](#_Toc389643472)

[27. COND Main CPU Clock Fault 49](#_Toc389643473)

[ Descriptor 49](#_Toc389643474)

[ Enable Conditions 50](#_Toc389643475)

[ Malfunction Reports 50](#_Toc389643476)

[ Calibration Variable and Table Descriptions 50](#_Toc389643477)

[28. COND ADC0 Fault 50](#_Toc389643478)

[ Descriptor 50](#_Toc389643479)

[ Enable Conditions 51](#_Toc389643480)

[ Malfunction Reports 51](#_Toc389643481)

[ Calibration Variable and Table Descriptions 51](#_Toc389643482)

[29. COND AD Input Response 51](#_Toc389643483)

[ Descriptor 51](#_Toc389643484)

[ Enable Conditions 52](#_Toc389643485)

[ Malfunction Fail Criteria 52](#_Toc389643486)

[ Malfunction Reports 52](#_Toc389643487)

[ Calibration Variable and Table Descriptions 52](#_Toc389643488)

# Crank Sensor Circuit No Signal

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **Variable** | **A2L Label** |
| Complete Flag | SbEPSD\_CrankNoSigTestComplete | CRKNOTC |
| Fail Flag | SbEPSD\_CrankNoSigTestFailed | CRKNOTF |
| Enable Criterial Met | SbEPSD\_CrankNoSigEnblCriteriaMet | CRKNOECM |
| Fail Criterial Met | VbEPSD\_CrankNoSigFailCriteriaMet | CRKNOFCM |

## Enable Conditions

**SbEPSD\_CrankNoSigEnblCriteriaMet** will be set

if

i). Engine in one of the following states: engine key on, engine stall or engine crank; (i.e. **EOBD\_Engine\_State** = CeENG\_KEYON, CeENG\_STALL or CeENG\_CRANK)

-and-

ii). No cam faults present;(i.e. **SbEPSD\_CamBNDLActFaultPresent** = FALSE)

-and-

iii). No cam crank backup active;(i.e. **GetVIOS\_CAM\_CrankBackupActive()**= FALSE)

-and-

iv). Cam input is different from the previous state; (i.e. **GetIO\_DiscreteInputStateImmediate** (DISCRETE\_IN\_CAM1) != SeEPSD\_CamPrevState )

-or -

i). Engine in one of the two states: engine key on, or engine crank; (i.e. **EOBD\_Engine\_State** = CeENG\_KEYON,or CeENG\_CRANK)

-and-

ii). No crank no signal fault reported so far; (i.e. **SeEPSD\_CrankNoSigTestStatReported** == CeSINGLE\_NULL)

-and-

iii). Cam crank backup is not active;(i.e. **GetVIOS\_CAM\_CrankBackupActive()**= FALSE)

-and-

iv). The difference between current MAP and the MAP at key on is great than a threshold; (i.e. **SfEPSD\_MnfdPresAtKeyOn** - **EOBD\_UndefFiltdMnfdPres** > ***KfEPSD\_p\_CrankDeltaMAP\_Thrsh*** )

-and-

v). The difference between current ignition voltage and the ignition voltage at key on is great than a threshold; (i.e. **SfEPSD\_MnfdPresAtKeyOn** - **EOBD\_IgnVoltageAtKeyOn** > ***KfEPSD\_p\_CrankDeltaMAP\_Thrsh*** )

## Malfunction Fail Criteria

**VbEPSD\_CrankNoSigFailCriteriaMet** will be set if engine speed equals to zero. (i.e **EOBD\_EngSpd** = 0 )

## Malfunction Reports

A failure will be reported when the fault active timer counter

**“CrankNoSigTimer “** >= **KfEPSD\_t\_CrankNoSignalTmr**.

A pass will be reported when the fault not active timer counter

**“CrankNoSigResetTimer”** >= **KfEPSD\_t\_CrankNoSignalResetThrsh**.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEPSD\_p\_CrankDeltaMAP\_Thrsh*** | Delta MAP threshold to detect that you are cranking.This is used as an enabling criteria for the Crank\_No\_Signal test for appls without a CAM sensor | kpa | 0 to 255.9961 | 10 | 0.00390625 kpa/ Count |
| ***KfEPSD\_U\_CrankDeltaIgnThrsh*** | Number of Fails from noisy crank diagnostic before failure is reported | v | 0 to 31.99951172 | 2 | 0.000488281 v / Count |
| ***KfEPSD\_t\_CrankNoSignalTmr*** | A Crank\_No\_Signal fault will be active for this amount of time before reporting a failure to the Data Manager | s | 0 to 511.99218750 | 0.0625 | 0.0078125 s / Count |
| ***KfEPSD\_t\_CrankNoSignalResetThrsh*** | Threshold for prevention of noise being detected as a crank sensor fault during a long key-on without engine being started. | s | 0 to 511.99218750 | 2 | 0.007812500 s / Count |

# Crank Sensor Circuit Noisy Signal

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **Variable** | **A2L Label** |
| Complete Flag | SbEPSD\_CrankNoisySigTestComplete | CRKNSTC |
| Fail Flag | SbEPSD\_CrankNoisySigTestFailed | CRKNSTF |
| Enable Criterial Met | SbEPSD\_CrankNoisySigEnblCriteriaMet | CRKNSECM |
| Fail Criterial Met | VbEPSD\_CrankNoisySigFailCriteriaMet | CRKNSFCM |

## Enable Conditions

**SbEPSD\_CrankNoisySigEnblCriteriaMet** will be set if all of the following conditions are met

1). Engine in running state; (i.e. **EOBD\_Engine\_State** = CeENG\_RUN)

-and-

2). Cam crank backup is not active;(i.e. **GetVIOS\_CAM\_CrankBackupActive()** = FALSE)

-and-

3). Crank cylinder event enable counter equals to 2 times of the cylinder number. (i.e**. ScEPSD\_CrankCylEventEnblCntr** = CcSYST\_NUM\_OF\_CYLINDERS / 2)

## Malfunction Fail Criteria

**VbEPSD\_CrankNoisySigFailCriteriaMet** will be set if crank tooth error counter **SfEPSD\_CrankRefToothErrCnt** >= ***KcEPSD\_CrankToothErrFailThrsh***.

## Malfunction Reports

A failure will be reported if the failure counter **ScEPSD\_CrankNoisySigFailCntr** >= ***KcEPSD\_CrankNoisySigFailThrsh.***

A pass will only be reported if the sample counter **ScEPSD\_CrankNoisySigSampleCntr** >= ***KcEPSD\_CrankNoisySigSampleThrsh***

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KcEPSD\_CrankToothErrFailThrsh*** | Number of missing or more teeth accepted without setting an error flag | count | 0 to 65535 | 10 | 1 count / Count |
| ***KcEPSD\_CrankNoisySigFailThrsh*** | Number of Fails from noisy crank diagnostic before failure is reported | count | 0 to 65535 | 10 | 1 count / Count |
| ***KcEPSD\_CrankNoisySigSampleThrsh*** | Number of total revolutions for diagnostic | count | 0 to 65535 | 10 | 1 count / Count |

# CAM1 Sensor Circuit No Signal

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **Cam1NoSignal Variable** | **A2L Label** |
| Complete Flag | SbEPSD\_Cam1NoSigTestComplete | CAM1NSTC |
| Fail Flag | SbEPSD\_Cam1NoSigTestFailed | CAM1NFAIL |
| Enable Criterial Met | SbEPSD\_CamNoSigEnblCriteriaMet | CAMNSECM |
| Fail Criterial Met | VbEPSD\_Cam1NoSigFailCriteriaMet | CAM1NSFCM |

## Enable Conditions

**SbEPSD\_CamNoSigEnblCriteriaMet** will be set if all of the following conditions are met

1). Engine is running. (i.e. **EOBD\_Engine\_State** = CeENG\_RUN)

-and-

2). Currently at the cylinder 1.(i.e. **GetVIOS\_CylNum()** = 1 )

## Malfunction Fail Criteria

**VbEPSD\_Cam1NoSigFailCriteriaMet** will be set

if

i). The malfunction detection enable criteria are met (i.e. **SbEPSD\_CamNoSigEnblCriteriaMet** = TRUE);

-and-

ii) Cam is stucked. (i.e. **GetVIOS\_Cam1Stuck()** = TRUE )

## Malfunction Reports

A failure will be reported when failure counter **ScEPSD\_Cam1NoSigCylEventCntr** >= ***KcEPSD\_CamNoSignalCylEvent.***

A pass will be reported when the enable conditions are met. (i.e. **SbEPSD\_CamNoSigEnblCriteriaMet** = TRUE ) but the malfunction fail criteria are not met. (i.e. **VbEPSD\_Cam1NoSigFailCriteriaMet** = FALSE)

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KcEPSD\_CamNoSignalCylEvent*** | Threshold for the number of cylinder events  without a Cam signal before reporting a failure to the Data Manager | count | 0 to 65535 | 10 | 1 count / Count |

# CAM1 Sensor Rationality Error

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **Cam1Rationality Variable** | **A2L Label** |
| Complete Flag | SbEPSD\_Cam1RatnlyTestComplete | CAM1RYTC |
| Fail Flag | SbEPSD\_Cam1RatnlyTestFailed | CAM1RFAIL |
| Enable Criterial Met | SbEPSD\_Cam1RatnlyEnblCriteriaMet | CAM1RYECM |
| Fail Criterial Met | VbEPSD\_Cam1RatnlyFailCriteriaMet | CAM1RFCM |

## Enable Conditions

**SbEPSD\_Cam1RatnlyEnblCriteriaMet** will be set if the following conditions are met

1). Engine in running state. (i.e. **EOBD\_Engine\_State** = CeENG\_RUN)

-and-

2). Cam no signal test passed..(i.e. **SbEPSD\_Cam1NoSigTestFailed** = False )

## Malfunction Fail Criteria

**VbEPSD\_Cam1RatnlyFailCriteriaMet** will be set

if

i). Cam is occurred. (i.e. **GetVIOS\_Cam1Occurred()** = TRUE);

-and-

The cam cylinder event counter is not equal to the number of cylinders.. (i.e. **VcEPSD\_Cam1CylEventCntr** != CcSYST\_NUM\_OF\_CYLINDERS )

or

i). Cam is not occurred. (i.e. **GetVIOS\_Cam1Occurred()** = FALSE);

-and-

The cam cylinder event counter equals to the number of cylinders.. (i.e. **VcEPSD\_Cam1CylEventCntr** == CcSYST\_NUM\_OF\_CYLINDERS )

## Malfunction Reports

A failure will be reported when the failure counter **ScEPSD\_Cam1RatnlyFailCntr** >= ***KcEPSD\_CamRationalityFailThrsh.***

A pass will be reported when the sample counter **ScEPSD\_Cam1RatnlyPassCntr** >= ***KcEPSD\_CamRationalityPassThrsh.***

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KcEPSD\_CamRationalityFailThrsh*** | The number of cylinder events threshold equal to or above which the Cam Rationality test will report  failure to the Data Manager | count | 0 to 65535 | 10 | 1 count / Count |
| ***KcEPSD\_CamRationalityFailThrsh*** | The number of cylinder events threshold equal to or above which the Cam Rationality test will report a pass to the Data Manager | count | 0 to 65535 | 10 | 1 count / Count |

# CAM2 Sensor Circuit No Signal

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **Cam2NoSignal Variable** | **A2L Label** |
| Complete Flag | SbEPSD\_Cam2NoSigTestComplete | CAM2NSTC |
| Fail Flag | SbEPSD\_Cam2NoSigTestFailed | CAM2NFAIL |
| Enable Criterial Met | SbEPSD\_CamNoSigEnblCriteriaMet | CAMNSECM |
| Fail Criterial Met | VbEPSD\_Cam2NoSigFailCriteriaMet | CAM2NSFCM |

## Enable Conditions

**SbEPSD\_CamNoSigEnblCriteriaMet** will be set if all of the following conditions are met

1). Engine is running. (i.e. **EOBD\_Engine\_State** = CeENG\_RUN)

-and-

2). Currently at the cylinder 1.(i.e. **GetVIOS\_CylNum()** = 1 )

## Malfunction Fail Criteria

**VbEPSD\_Cam2NoSigFailCriteriaMet** will be set

if

i). The malfunction detection enable criteria are met (i.e. **SbEPSD\_CamNoSigEnblCriteriaMet** = TRUE);

-and-

ii) Cam is stucked. (i.e. **GetVIOS\_Cam2Stuck()** = TRUE )

## Malfunction Reports

A failure will be reported when failure counter **ScEPSD\_Cam2NoSigCylEventCntr** >= ***KcEPSD\_CamNoSignalCylEvent.***

A pass will be reported when the enable conditions are met. (i.e. **SbEPSD\_CamNoSigEnblCriteriaMet** = TRUE ) but the malfunction fail criteria are not met. (i.e. **VbEPSD\_Cam2NoSigFailCriteriaMet** = FALSE)

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KcEPSD\_CamNoSignalCylEvent*** | Threshold for the number of cylinder events  without a Cam signal before reporting a failure to the Data Manager | count | 0 to 65535 | 10 | 1 count / Count |

# CAM2 Sensor Rationality Error

**There’s no cam2 rationality diagnose in Delphi.**

# O2 11 Heater Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **O2Heater11 Variable** | **A2L Label** |
| Complete Flag | SbEOSD\_O2\_11\_HtrTestComplete | OE11TC |
| Enable Criterial Met | SbEOSD\_O2\_11\_HtrEnblCriteriaMet | OE11ECM |
| Short Hi Fail Flag | SbEOSD\_O2\_11\_HtrShortHiTestFailed | OA11HTFAHI |
| Short Lo Fail Flag | SbEOSD\_O2\_11\_HtrShortLoTestFailed | OA11HTFALO |

## Enable Conditions

the **SbEOSD\_O2\_11\_HtrEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. engine run time is above the threshold.( i.e **GetVIOS\_t\_EngRunTime () >= KfEOSD\_t\_xx\_HtrEngRunThrsh**)

## Malfunction Fail Criteria

As the O2 heater diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When O2 heater is enabled , “O2 sensor short to battery” is detectable.

When O2 heater is disabled, “O2 sensor short to ground” is detectable.

When hardware reports front O2 heater short to high, **SbEOSD\_O2\_11\_HtrShortHiFailCriteriaMet** is set to True.

If Power for front O2 heater is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of front O2 heater, **SbEOSD\_O2\_11\_HtrShortLowFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The heater failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEOSD\_11\_HtrFailThrsh**

The sample counter threshold is : **KcEOSD\_11\_HtrSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEOSD\_t\_11\_HtrEngRunThrsh*** | In normal operation, the heater will decay to a steady value after initial heater power is on and remain there if the heater is functioning properly. This calibration is the engine run time required for the heater to reach a steady state. | second | [0, 65535] | 200 | 1second/count |
| **KcEOSD\_11\_HtrFailThrsh** | O2 Heater PSVI Fault sample determination counter threshhold equal to or above which a failure is reported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| **KcEOSD\_11\_HtrSmplThrsh** | O2 Heater PSVI sample counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# O2 12 Heater Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| **Item Description** | **O2Heater12 Variable** | **A2L Label** |
| Complete Flag | SbEOSD\_O2\_12\_HtrTestComplete | OE12TC |
| Enable Criterial Met | SbEOSD\_O2\_12\_HtrEnblCriteriaMet | OE12ECM |
| Short Hi Fail Flag | SbEOSD\_O2\_12\_HtrShortHiTestFailed | OA12HTFAHI |
| Short Lo Fail Flag | SbEOSD\_O2\_12\_HtrShortLoTestFailed | OA12HTFALO |

## Enable Conditions

the **SbEOSD\_O2\_11\_HtrEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. engine run time is above the threshold.( i.e **GetVIOS\_t\_EngRunTime () >= KfEOSD\_t\_xx\_HtrEngRunThrsh**)

## Malfunction Fail Criteria

As the O2 heater diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When O2 heater is enabled , “O2 sensor short to battery” is detectable.

When O2 heater is disabled, “O2 sensor short to ground” is detectable.

When hardware reports rear O2 heater short to high, **SbEOSD\_O2\_12\_HtrShortHiFailCriteriaMet** is set to True.

If Power for rear O2 heater is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of rear O2 heater, **SbEOSD\_O2\_12\_HtrShortLowFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The heater failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEOSD\_12\_HtrFailThrsh**

The sample counter threshold is : **KcEOSD\_12\_HtrSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEOSD\_t\_12\_HtrEngRunThrsh*** | In normal operation, the heater will decay to a steady value after initial heater power is on and remain there if the heater is functioning properly. This calibration is the engine run time required for the heater to reach a steady state. | second | [0, 65535] | 200 | 1second/count |
| **KcEOSD\_12\_HtrFailThrsh** | O2 Heater PSVI Fault sample determination counter threshhold equal to or above which a failure is reported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| **KcEOSD\_12\_HtrSmplThrsh** | O2 Heater PSVI sample counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# Fan A Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Fan A Variable | DESCRIPTION |
| FANAENCRMT | SbEMSD\_FANAEnblCriteriaMet | FANA Output diag system enable criteria met |
| FANATSCMPL | SbEMSD\_FANATestComplete | FANA Output diag system test complete |
| FANATSFAHI | SbEMSD\_FANAShortHiTestFailed | FANA Output diag system short high test fail |
| FANATSFALO | SbEMSD\_FANAShortLoTestFailed | FANA Output diag system short low test fail |
| FANASHIMET | SbEMSD\_FANAShortHiFailCriteriaMet | FANA Output diag system test High fail condition meet |
| FANASLOMET | SbEMSD\_FANAShortLoFailCriteriaMet | FANA Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_FANAEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_EngRunTime () >= KfEMSD\_t\_IgnitionOnDelay**)

and

3. Fan1 is present.(i.e **FanPresentFlags.bf.Fan1Present=true**)

And

4. No MPR fault present.

and

5. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the fan1 diagnostic is based on TPIC hardware voltage detection, No specific voltage threshold is required.

When fan1 is enabled , “fan1 short to battery” is detectable.

When fan1 is disabled, “fan1 short to ground” is detectable.

Which means:

When hardware reports fan1 short to high, **SbEMSD\_FANAShortHiFailCriteriaMet** is set to True.

If Power for FAN 1 is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of FAN 1, **SbEMSD\_FANAShortLoFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The fan1 failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_FANAShortHiFailThrsh**

**--or--**

**KcEMSD\_FANAShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_FANAShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_FANADShortHiFailThrsh*** | Fan1TPIC ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FANAShortLoFailThrsh*** | Fan1TPIC ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FANAShortSmplThrsh*** | Fan1 pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# Fan B Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| FANBENCRMT | SbEMSD\_FANBEnblCriteriaMet | FANB Output diag system enable criteria met |
| FANBTSCMPL | SbEMSD\_FANBTestComplete | FANB Output diag system test complete |
| FANBTSFAHI | SbEMSD\_FANBShortHiTestFailed | FANB Output diag system short high test fail |
| FANBTSFALO | SbEMSD\_FANBShortLoTestFailed | FANB Output diag system short low test fail |
| FANBSHIMET | SbEMSD\_FANBShortHiFailCriteriaMet | FANB Output diag system test High fail condition meet |
| FANBSLOMET | SbEMSD\_FANBShortLoFailCriteriaMet | FANB Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_FANBEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_EngRunTime () >= KfEMSD\_t\_IgnitionOnDelay**)

and

3. Fan2 is present.(i.e **FanPresentFlags.bf.Fan2Present=true**)

( Fan configuration is “type2” or “type3”(i.e **KfansConfiguration=FanType2** or **FanType3**))

And

4. No MPR fault present.

and

5. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the fan2 diagnostic is based on TPIC hardware voltage detection, No specific voltage threshold is required.

When fan2 is enabled , “fan2 short to battery” is detectable.

When fan2 is disabled, “fan2 short to ground” is detectable.

Which means:

When hardware reports fan2 short to high, **SbEMSD\_FANBShortHiFailCriteriaMet** is set to True.

If Power for FAN 2 is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of Fan 2, **SbEMSD\_FANBShortLoFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The fan2 failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_FANBShortHiFailThrsh**

**--or--**

**KcEMSD\_FANBShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_FANBShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_FANBDShortHiFailThrsh*** | Fan2 TPIC ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FANBShortLoFailThrsh*** | Fan2 TPIC ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FANBShortSmplThrsh*** | Fan2 pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# Main Power Relay Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | MPR Variable | DESCRIPTION |
| MPRENLCRMT | SbEMSD\_MPRDEnblCriteriaMet | MPR Output diag system enable criteria met |
| MPRTSTCMPL | SbEMSD\_MPRDTestComplete | MPR Output diag system test complete |
| MPRTSTFAHI | SbEMSD\_MPRDShortHiTestFailed | MPR Output diag system short high test fail |
| MPRTSTFALO | SbEMSD\_MPRDShortLoTestFailed | MPR Output diag system short low test fail |
| MPRSHHIMET | SbEMSD\_MPRDShortHiFailCriteriaMet | MPR Output diag system test High fail condition meet |
| MPRSHLOMET | SbEMSD\_MPRDShortLoFailCriteriaMet | MPR Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_MPRDEnblCriteriaMet**flag will be set

if

1. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_MPRDIgnitionOnDelay**)

and

2. Main Power Relay is present.( i.e **GetVIOS\_MPRD\_Presnt= CbTRUE**)

and

3. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the Main Power Relay diagnostic is based on TPIC hardware voltage detection, No specific voltage threshold is required.

When Main Power Relay is enabled , “Main Power Relay short to battery” is detectable.

When Main Power Relay is disabled, “Main Power Relay short to ground” is detectable.

Which means:

When hardware reports Main Power Relay short to high, **SbEMSD\_MPRDShortHiFailCriteriaMet** is set to True.

When hardware reports Main Power Relay short to low, **SbEMSD\_MPRDShortLoFailCriteriaMet** is set to True.

## Malfunction Reports

The Main Power Relay failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counters threshold is : **KcEMSD\_MPRDShortHiFailThrsh**

**--**or--

**KcEMSD\_MPRDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_MPRDShortSmplThrsh.**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KcEMSD\_MPRDShortHiFailThrsh*** | Main Power Relay TPIC ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_MPRDShortLoFailThrsh*** | Main Power Relay TPIC ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_MPRDShortSmplThrsh*** | Main Power Relay TPIC pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KfEMSD\_t\_MPRDIgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the main power relay hardware fault detection starts. | seconds | [0, 8191.875] | 10 | 0.125second/count |

# Fuel Pump Relay Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Fuel Pump Variable | DESCRIPTION |
| FPRENLCRMT | SbEMSD\_FPRDEnblCriteriaMet | fprd Output diag system enable criteria met |
| FPRTSTCMPL | SbEMSD\_FPRDTestComplete | fprd Output diag system test complete |
| FPRTSTFAHI | SbEMSD\_FPRDShortHiTestFailed | fprd Output diag system short high test fail |
| FPRTSTFALO | SbEMSD\_FPRDShortLoTestFailed | fprd Output diag system short low test fail |
| FPRSHHIMET | SbEMSD\_FPRDShortHiFailCriteriaMet | fprd Output diag system test High fail condition meet |
| FPRSHLOMET | SbEMSD\_FPRDShortLoFailCriteriaMet | fprd Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_FPRDEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_IgnitionOnDelay**)

And

3. No MPR fault present.

and

4. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the Fuel Pump Relay diagnostic is based on TPIC hardware voltage detection, No specific voltage threshold is required.

When Fuel Pump Relay is enabled , “Fuel Pump Relay short to battery” is detectable.

When Fuel Pump Relay is disabled, “Fuel Pump Relay short to ground” is detectable.

Which means:

When hardware reports Fuel Pump Relay short to high, **SbEMSD\_FPRDShortHiFailCriteriaMet** is set to True.

If Power for FPR is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of Fuel Pump Relay, **SbEMSD\_FPRDShortLoFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The fuel pump relay failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_FPRDShortHiFailThrsh**

**--or--**

**KcEMSD\_FPRDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_FPRDShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_FPRDShortHiFailThrsh*** | Fuel pump Relay TPIC ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FPRDShortLoFailThrsh*** | Fuel pump Relay TPIC ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_FPRDShortSmplThrsh*** | Fuel pump Relay TPIC pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# ACC Clutch Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | ACC Variable | DESCRIPTION |
| ACCENLCRMT | SbEMSD\_ACCDEnblCriteriaMet | ACC Output diag system enable criteria met |
| ACCTSTCMPL | SbEMSD\_ACCDTestComplete | ACC Output diag system test complete |
| ACCTSTFAHI | SbEMSD\_ACCDShortHiTestFailed | ACC Output diag system short high test fail |
| ACCTSTFALO | SbEMSD\_ACCDShortLoTestFailed | ACC Output diag system short low test fail |
| ACCSHHIMET | SbEMSD\_ACCDShortHiFailCriteriaMet | ACC Output diag system test High fail condition meet |
| ACCSHLOMET | SbEMSD\_ACCDShortLoFailCriteriaMet | ACC Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_ACCDEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. Ac clutch is present (i.e **AcFlags.Acpresent**= true)

and

3. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_IgnitionOnDelay**)

And

4. No MPR fault present.

and

5. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the Ac Clutch diagnostic is based on TPIC hardware voltage detection, No specific voltage threshold is required.

When Ac Clutch is enabled , “Ac Clutch short to battery” is detectable.

When Ac Clutch is disabled, “Ac Clutch short to ground” is detectable.

Which means:

When hardware reports A/C Relay short to high, **SbEMSD\_ACCDShortHiFailCriteriaMet** is set to True.

If Power for AC Clutch is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of AC Clutch, **SbEMSD\_ACCDShortLoFailCriteriaMet** is set to True, else this flag will be set to false

## Malfunction Reports

The Ac Clutch failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_ACCDShortHiFailThrsh**

**--or--**

**KcEMSD\_ACCDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_ACCDShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_ACCDShortHiFailThrsh*** | Ac Clutch Relay TPIC ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_ACCDShortLoFailThrsh*** | Ac Clutch Relay TPIC ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_ACCDShortSmplThrsh*** | Ac Clutch Relay TPIC pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# Purge Solenoid Diagnostic Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| PRGENLCRMT | SbPRGD\_Purge\_EnblCritMet | Purge Output diag system enable criteria met |
| PRGTSTCMPL | SbPRGD\_Purge\_TestComplete | Purge Output diag system test complete |
| PRGTSTFAIL | SbPRGD\_Purge\_TestFailed | Purge Output diag system test fail |
| PRGSHLOMET | SbPRGD\_Purge\_ShortLoCritMet | Purge Output diag system test low fail condition meet |
| PRGSHHIMET | SbPRGD\_Purge\_ShortHiCritMet | Purge Output diag system test high fail condition meet |
| PRGSHLOTF | SbPRGD\_Purge\_TestFailedLo | Purge Output diag system short low test fail |
| PRGSHHITF | SbPRGD\_Purge\_TestFailedHi | Purge Output diag system short high test fail |

## Enable Conditions

the **SbPRGD\_Purge\_EnblCritMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition voltage is above the threshold (i.e **GetVIOS\_U\_IgnVolt()>KfPRGD\_U\_SystemThrshLo)**

and

3. Purge solenoid duty cycle is above high limited threshold or below low limited threshold.( i.e **GetEVAP\_CCP\_DutyCycle() >= KfPRGD\_HiBandDCThrsh** or **GetEVAP\_CCP\_DutyCycle() <= KfPRGD\_LoBandDCThrsh)**and  
4. No disable fault present(i.e. **SbPRGD\_Purge\_DisableFltPresent** is false)

## Malfunction Fail Criteria

As the purge solenoid diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When purge solenoid diagnostic is enabled , “purge solenoid short to battery” is detectable.

When purge solenoid diagnostic disabled, “purge solenoid diagnostic short to ground” is detectable.

When hardware reports CCP short to high, **SbPRGD\_Purge\_ShortHiCritMet** is set to True.

If Power for CCP is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of CCP, **SbPRGD\_Purge\_ShortLoCritMet** is set to True, else this flag will be set to false

## Malfunction Reports

The failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcPRGD\_PurgeOutFailThrsh**

The sample counter threshold is : **KcPRGD\_PurgeOutSampleThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfPRGD\_U\_SystemThrshLo*** | This parameter indicates the threshold above which the ignition voltage has to be in order to enable the diagnostic | voltage | [0,32] | 11 | 0.000488v/bit |
| ***KcPRGD\_PurgeOutSampleThrsh*** | Indicates the number of samples taken before a passing result can be reported to the Data Manager | count | [0, 65535] | 20 | 1/count |
| ***KcPRGD\_PurgeOutFailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for the driver output | count | [0, 65535] | 10 | 1/count |
| ***KfPRGD\_HiBandDCThrsh*** | DC below which the diagnostic will be enabled and the State 1 flag gets set | percent | [0,2) | 0 | .003051757812 perecent/bit |
| ***KfPRGD\_LoBandDCThrsh*** | DC above which the diagnostic will be enabled and the State 2 flag gets set | percent | [0,2) | 100 | .003051757812 perecent/bit |

Note:

The diagnostic will report “PASS”(i.e **SbPRGD\_Purge\_TestComplete** **=true**, and **SbPRGD\_Purge\_TestFailed=false) ,** if

a. last diagnostic cycle has reported “PASS”( **FaultActive=False** )

--and---

sample counter is greater than the threshold in this diagnostic cycle.

**--or--**

b. last diagnostic cycle has reported “Failure”( **FaultActive=False** )

---and---

sample counter is greater than the threshold in this diagnostic cycle.

---and---

Whole CCP duty cycle has been diagnosed (when duty cycle is below low threshold And when above high threshold.)

# VVT1(intake valve driver solenoid) Diagnostic Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| VVTENLCRMT | SbVVTD\_EnblCritMet | VVT Output diag system enable criteria met |
| VT1TSTCMPL | SbVVTD\_VVT1\_TestComplete | VVT1 Output diag system test complete |
| VT1TSTFAIL | SbVVTD\_VVT1\_TestFailed | VVT1 Output diag system test fail |
| VT1SHLOMET | SbVVTD\_VVT1\_ShortLoCritMet | VVT1 Output diag system test low fail condition meet |
| VT1SHHIMET | SbVVTD\_VVT1\_ShortHiCritMet | VVT1 Output diag system test high fail condition meet |
| VT1SHLOTF | SbVVTD\_VVT1\_TestFailedLo | Purge Output diag system short low test fail |
| VT1SHHITF | SbVVTD\_VVT1\_TestFailedHi | Purge Output diag system short high test fail |

## Enable Conditions

the **SbVVTD\_EnblCritMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition voltage is above the threshold (i.e **GetVIOS\_U\_IgnVolt()>KfVVTD\_U\_SystemThrshLo)**

and

~~3. Purge solenoid duty cycle is above high limited threshold or below low limited threshold.( i.e~~ **~~GetEVAP\_CCP\_DutyCycle() >= KfPRGD\_HiBandDCThrsh~~** ~~or~~ **~~GetEVAP\_CCP\_DutyCycle() <= KfPRGD\_LoBandDCThrsh)~~**and  
4. No disable fault present(i.e. **SbVVTD\_DisableFltPresent** is false)

## Malfunction Fail Criteria

As the vvt solenoid diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When vv solenoid diagnostic is enabled, “vvt solenoid short to battery” is detectable.

When vvt solenoid diagnostic disabled, “vvt solenoid diagnostic short to ground” is detectable.

When hardware reports vvt short to high, **SbVVTD\_VVT1\_ShortHiCritMet** is set to True.

If Power for VVT is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of VVT, **SbVVTD\_VVT1\_ShortLoCritMet** is set to True, else this flag will be set to false

## Malfunction Reports

The failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold.

The failure counter threshold is: **KcVVTD\_VVT1OutFailThrsh**

The sample counter threshold is: **KcVVTD\_VVT1OutSampleThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold, the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfVVTD\_U\_SystemThrshLo*** | This parameter indicates the threshold above which the ignition voltage has to be in order to enable the diagnostic | voltage | [0,32] | 11 | 0.000488v/bit |
| ***KcVVTD\_VVT1OutSampleThrsh*** | Indicates the number of samples taken before a passing result can be reported to the Data Manager | count | [0, 65535] | 20 | 1/count |
| ***KcVVTD\_VVT1OutFailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for the driver output | count | [0, 65535] | 10 | 1/count |
| ***KfVVTD\_HiBandDCThrsh*** | DC below which the diagnostic will be enabled and the State 1 flag gets set | percent | [0,2) | 0 | .003051757812 perecent/bit |
| ***KfVVTD\_LoBandDCThrsh*** | DC above which the diagnostic will be enabled and the State 2 flag gets set | percent | [0,2) | 100 | .003051757812 perecent/bit |

# VVT2(intake valve driver solenoid) Diagnostic Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| VVTENLCRMT | SbVVTD\_EnblCritMet | VVT Output diag system enable criteria met |
| VT2TSTCMPL | SbVVTD\_VVT2\_TestComplete | VVT2 Output diag system test complete |
| VT2TSTFAIL | SbVVTD\_VVT2\_TestFailed | VVT2 Output diag system test fail |
| VT2SHLOMET | SbVVTD\_VVT2\_ShortLoCritMet | VVT2 Output diag system test low fail condition meet |
| VT2SHHIMET | SbVVTD\_VVT2\_ShortHiCritMet | VVT2 Output diag system test high fail condition meet |
| VT2SHLOTF | SbVVTD\_VVT2\_TestFailedLo | Purge Output diag system short low test fail |
| VT2SHHITF | SbVVTD\_VVT2\_TestFailedHi | Purge Output diag system short high test fail |

## Enable Conditions

the **SbVVTD\_EnblCritMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition voltage is above the threshold (i.e **GetVIOS\_U\_IgnVolt()>KfVVTD\_U\_SystemThrshLo)**

and

~~3. Purge solenoid duty cycle is above high limited threshold or below low limited threshold.( i.e~~ **~~GetEVAP\_CCP\_DutyCycle() >= KfPRGD\_HiBandDCThrsh~~** ~~or~~ **~~GetEVAP\_CCP\_DutyCycle() <= KfPRGD\_LoBandDCThrsh)~~**and  
4. No disable fault present(i.e. **SbVVTD\_DisableFltPresent** is false)

## Malfunction Fail Criteria

As the vvt solenoid diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When vv solenoid diagnostic is enabled, “vvt solenoid short to battery” is detectable.

When vvt solenoid diagnostic disabled, “vvt solenoid diagnostic short to ground” is detectable.

When hardware reports vvt short to high, **SbVVTD\_VVT2\_ShortHiCritMet** is set to True.

If Power for VVT is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of VVT, **SbVVTD\_VVT2\_ShortLoCritMet** is set to True, else this flag will be set to false

## Malfunction Reports

The failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold.

The failure counter threshold is: **KcVVTD\_VVT2OutFailThrsh**

The sample counter threshold is: **KcVVTD\_VVT2OutSampleThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold, the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfVVTD\_U\_SystemThrshLo*** | This parameter indicates the threshold above which the ignition voltage has to be in order to enable the diagnostic | voltage | [0,32] | 11 | 0.000488v/bit |
| ***KcVVTD\_VVT2OutSampleThrsh*** | Indicates the number of samples taken before a passing result can be reported to the Data Manager | count | [0, 65535] | 20 | 1/count |
| ***KcVVTD\_VVT2OutFailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for the driver output | count | [0, 65535] | 10 | 1/count |
| ***KfVVTD\_HiBandDCThrsh*** | DC below which the diagnostic will be enabled and the State 1 flag gets set | percent | [0,2) | 0 | .003051757812 perecent/bit |
| ***KfVVTD\_LoBandDCThrsh*** | DC above which the diagnostic will be enabled and the State 2 flag gets set | percent | [0,2) | 100 | .003051757812 perecent/bit |

# ETC(Electronic Throttle Control) Diagnostic Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| ETCENLCRMT | SbETCD\_EnblCritMet | ETC Output diag system enable criteria met |
| ETCTSTCMPL | SbETCD\_TestComplete | ETC Output diag system test complete |
| ETCTSTFAIL | SbETCD\_TestFailed | ETC Output diag system test fail |
| ETCSHLOMET | SbETCD\_ShortLoCritMet | ETC Output diag system test low fail condition meet |
| ETCSHHIMET | SbETCD\_ShortHiCritMet | ETC Output diag system test high fail condition meet |
| ETCSHLOTF | SbETCD\_TestFailedLo | Purge Output diag system short low test fail |
| ETCSHHITF | SbETCD\_TestFailedHi | Purge Output diag system short high test fail |

## Enable Conditions

the **SbETCD\_EnblCritMet** flag will be set

if

1. ignition status is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition voltage is above the threshold (i.e **GetVIOS\_U\_IgnVolt()>KfETCD\_U\_SystemThrshLo)**and  
3. No disable fault present(i.e. **SbETCD\_DisableFltPresent** is false)

## Malfunction Fail Criteria

As the etc diagnostic is based on L9958 hardware voltage detection, No specific voltage threshold is required.

When etc diagnostic is enabled, “etc short to battery” is detectable.

When etc diagnostic disabled, “etc diagnostic short to ground” is detectable.

When hardware reports etc short to high, **SbETCD\_ShortHiCritMet** is set to True.

If Power for ETC is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of ETC, **SbETCD\_ShortLoCritMet** is set to True, else this flag will be set to false

## Malfunction Reports

The failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold.

The failure counter threshold is: **KcETCD\_OutFailThrsh**

The sample counter threshold is: **KcETCD\_OutSampleThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold, the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfETCD\_U\_SystemThrshLo*** | This parameter indicates the threshold above which the ignition voltage has to be in order to enable the diagnostic | voltage | [0,32] | 11 | 0.000488v/bit |
| ***KcETCD\_OutSampleThrsh*** | Indicates the number of samples taken before a passing result can be reported to the Data Manager | count | [0, 65535] | 20 | 1/count |
| ***KcETCD\_OutFailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for the driver output | count | [0, 65535] | 10 | 1/count |
| ***KfETCD\_HiBandDCThrsh*** | DC below which the diagnostic will be enabled and the State 1 flag gets set | percent | [0,2) | 10 | .003051757812 perecent/bit |
| ***KfETCD\_LoBandDCThrsh*** | DC above which the diagnostic will be enabled and the State 2 flag gets set | percent | [0,2) | 100 | .003051757812 perecent/bit |

# CAN Network Diagnostic Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | DISPLAY\_IDENTIFIER | DESCRIPTION |
| CANENLCRMT | SbCAND\_GCU\_CommEnblCritMet | CAN diag enable criteria met |
| CANTSTCMPL | SbCAND\_GCU\_CommTestComplete | CAN diag test complete |
| CANTSTFAIL | SbCAND\_GCU\_CommTestFailed | CAN diag test fail |
| CANTSTFMET | SbCAND\_GCU\_CommFailCritMet | CAN diag test fail condition meet |
| CANFAILCNT | ScCAND\_GCU\_CommFailCntr | CAN diag fail counter |
| CANSMPLCNT | ScCAND\_GCU\_CommSampleCntr | CAN diag sample counter |

## Enable Conditions

the **SbCAND\_GCU\_CommEnblCritMet** flag will be set

if

1. ignition status is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition voltage is above the threshold (i.e **GetVIOS\_U\_IgnVolt()>KfCAND\_U\_CommSystemThrshLo)**and  
3. Engine state is **CeENG\_RUN**

## Malfunction Fail Criteria

When ECM can’t receive the special can messages,  **SbCAND\_GCU\_CommFailCritMet** is set to True.

## Malfunction Reports

The failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold.

The failure counter threshold is: **KcCAND\_FailThrsh**

The sample counter threshold is: **KcCAND\_SampleThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold, the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfCAND\_U\_CommSystemThrshLo*** | This parameter indicates the threshold above which the ignition voltage has to be in order to enable the ECM TCM diagnostic | voltage | [0,32] | 11 | 0.000488v/bit |
| ***KcCAND\_SampleThrsh*** | Indicates the number of samples taken before a passing result can be reported to the Data Manager | count | [0, 65535] | 20 | 1/count |
| ***KcCAND\_FailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for the driver output | count | [0, 65535] | 10 | 1/count |
| ***KfCAND\_t\_CommEngRunThrsh*** | Engine run time must be equal or greater than this calibration to enable the ECM TCM communication diagnostic | seconds | [0, 65535] | 2 | 1 |

# Malfunction Indicator Lamp Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Mil Variable | DESCRIPTION |
| MILENLCRMT | SbEMSD\_MILDEnblCriteriaMet | Mil Output diag system enable criteria met |
| MILTSTCMPL | SbEMSD\_MILDTestComplete | Mil Output diag system test complete |
| MILTSTFAHI | SbEMSD\_MILDShortHiTestFailed | Mil Output diag system short high test fail |
| MILTSTFALO | SbEMSD\_MILDShortLoTestFailed | Mil Output diag system short low test fail |
| MILSHHIMET | SbEMSD\_MILDShortHiFailCriteriaMet | Mil Output diag system test High fail condition meet |
| MILSHLOMET | SbEMSD\_MILDShortLoFailCriteriaMet | Mil Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_MILDEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_IgnitionOnDelay**)

and

3. Main Power Relay is on, if Main Power Relay is present

and

4. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the MIL lamp diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When MIL lamp is enabled , “MIL lamp short to battery” is detectable.

When MIL lamp is disabled, “MIL lamp short to ground” is detectable.

Which means:

When hardware reports MIL lamp short to high, **SbEMSD\_MILDShortHiFailCriteriaMet** is set to True.

When hardware reports MIL lamp short to low, **SbEMSD\_MILDShortLoFailCriteriaMet** is set to True.

## Malfunction Reports

The MIL lamp failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_MILDShortHiFailThrsh**

**--or--**

**KcEMSD\_MILDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_MILDShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_MILDShortHiFailThrsh*** | MIL lamp PSVI ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_MILDShortLoFailThrsh*** | MIL lamp PSVI ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_MILDShortSmplThrsh*** | MIL lamp pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# SVS Lamp Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | SVS Variable | DESCRIPTION |
| SVSENLCRMT | SbEMSD\_SVSDEnblCriteriaMet | SVS Output diag system enable criteria met |
| SVSTSTCMPL | SbEMSD\_SVSDTestComplete | SVS Output diag system test complete |
| SVSTSTFAHI | SbEMSD\_SVSDShortHiTestFailed | SVS Output diag system short high test fail |
| SVSTSTFALO | SbEMSD\_SVSDShortLoTestFailed | SVS Output diag system short low test fail |
| SVSSHHIMET | SbEMSD\_SVSDShortHiFailCriteriaMet | SVS Output diag system test High fail condition meet |
| SVSSHLOMET | SbEMSD\_SVSDShortLoFailCriteriaMet | SVS Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_SVSDEnblCriteriaMet** flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_IgnitionOnDelay**)

and

3. Main Power Relay is on, if Main Power Relay is present

and

4. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the SVS lamp diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When SVS lamp is enabled, “SVS lamp short to battery” is detectable.

When SVS lamp is disabled, “SVS lamp short to ground” is detectable.

Which means:

When hardware reports SVS lamp short to high, **SbEMSD\_SVSDShortHiFailCriteriaMet** is set to True.

When hardware reports SVS lamp short to low, **SbEMSD\_SVSDShortLoFailCriteriaMet** is set to True.

## Malfunction Reports

The SVS lamp failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_SVSDShortHiFailThrsh**

**--or--**

**KcEMSD\_SVSDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_SVSDShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold , the test is “complete” and will be reported immediately .

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_SVSDShortHiFailThrsh*** | SVS lamp PSVI ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_SVSDShortLoFailThrsh*** | SVS lamp PSVI ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_SVSDShortSmplThrsh*** | SVS lamp pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# VGIS Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Mil Variable | DESCRIPTION |
| GISENLCRMT | SbEMSD\_GISDEnblCriteriaMet | GIS Output diag system enable criteria met |
| GISTSTCMPL | SbEMSD\_GISDTestComplete | GIS Output diag system test complete |
| GISTSTFAHI | SbEMSD\_GISDShortHiTestFailed | GIS Output diag system short high test fail |
| GISTSTFALO | SbEMSD\_GISDShortLoTestFailed | GIS Output diag system short low test fail |
| GISSHHIMET | SbEMSD\_GISDShortHiFailCriteriaMet | GIS Output diag system test High fail condition meet |
| GISSHLOMET | SbEMSD\_GISDShortLoFailCriteriaMet | GIS Output diag system test low fail condition meet |

## Enable Conditions

the **SbEMSD\_GISDEnblCriteriaMet**flag will be set

if

1. engine state is ignition on.(i.e **GetVIOS\_IgnSt ()** == CeIGN\_ON)

and

2. ignition on time is above the threshold.( i.e **GetVIOS\_t\_IgnOnTime() >= KfEMSD\_t\_IgnitionOnDelay**)

and

3. Main Power Relay is on, if Main Power Relay is present

and

4. Diagnostic Fault Code Type Enablement Criteria is met.

## Malfunction Fail Criteria

As the VGIS diagnostic is based on PSVI hardware voltage detection, No specific voltage threshold is required.

When VGIS is enabled, “VGIS short to battery” is detectable.

When VGIS is disabled, “VGIS short to ground” is detectable.

Which means:

When hardware reports VGIS short to high, **SbEMSD\_GISDShortHiFailCriteriaMet** is set to True.

When hardware reports VGIS short to low, **SbEMSD\_GISDShortLoFailCriteriaMet** is set to True.

## Malfunction Reports

The VGIS failure will be reported when the failure counter reaches the threshold before the sample counter reaches its threshold .

The failure counter threshold is : **KcEMSD\_GISDShortHiFailThrsh**

**--or--**

**KcEMSD\_GISDShortLoFailThrsh**

The sample counter threshold is : **KcEMSD\_GISDShortSmplThrsh**

If the sample counter reaches the threshold before the failure reaches its threshold, the test is “complete” and will be reported immediately.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfEMSD\_t\_IgnitionOnDelay*** | In normal operation, This calibration is the ignition on time required for the ems side I/O hardware fault detection starts. | second | [0,8191.875] | 10 | 0.125second/count |
| ***KcEMSD\_GISDShortHiFailThrsh*** | VGIS PSVI ShortHi Fault determination counter threshhold equal to or above which a ShortHi failure isreported to the Data Manager. | Count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_GISDShortLoFailThrsh*** | VGIS PSVI ShortLo Fault determination counter threshhold equal to or below which a ShortLo failure is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |
| ***KcEMSD\_GISDShortSmplThrsh*** | VGIS pass counter threshold equal to or above which a pass is reported to the Data Manager. | count | [0, 65535] | 10 | 1/count |

# Injector Diagnostic

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Injd Variable | DESCRIPTION |
| INJENCRM | SbINJD\_InjCktEnblCriteriaMet | Inj Output diag system enable criteria met |
| INJATSCP INJBTSCP INJCTSCP | SaINJD\_CktTestComplete[] | Inj Output diag system test complete |
| INJATSFL INJBTSFL INJCTSFL | SaINJD\_CktTestFailed[] | Inj Output diag system short high test fail |
| INJAFCRM INJBFCRM INJCFCRM | VaINJD\_FailCriteriaMet[] | Inj Output diag system test High fail condition meet |

## Enable Conditions

Ignition is on (IgnitionOnStatus.IgnitionIsOn)

- AND –

Engine Speed (EOBD\_EngSpd) > ***KfINJD\_n\_EngSpdThrshLo***

## Malfunction Fail Criteria

When hardware reports Injector Coil 1 short to high, **VaINJD\_FailCriteriaMet[1]**is set to True.

If Power for Injector Coil 1 is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short Low fail logic: When hardware reports a Short Low fault of Injector Coil 1, **VaINJD\_FailCriteriaMet[1]** is set to True, else this flag will be set to false

## Calibration Variables and Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINTION** | **UNIT** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfINJD\_n\_EngSpdThrshLo*** | Indicates minimum RPM required to enable the injector diagnostic | RPM | 0 to 8000 | 2000 | 1 count per RPM |

# EST Output

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | ESTD Variable | DESCRIPTION |
| ESTDSHECM | SbESTD\_ShortFaultEnblCriteriaMet | ESTD Output diag system enable criteria met for short to high |
| ESTDOECM | SbESTD\_OpenFaultEnblCriteriaMet | ESTD Output diag system enable criteria met for short to low & open |
| ESTDTCx | SaESTD\_FaultTestComplete[x] | ESTD Output diag system test complete |
| ESTDSHTFx | SaESTD\_ShortFaultTestFailed[x] | ESTD Output diag system short to high test fail |
| ESTDOTFx | SaESTD\_OpenFaultTestFailed[x] | ESTD Output diag system short to low & open test fail |
| ESTDSHFCMx | VaESTD\_ShortFailCriteriaMet[x] | ESTD Output diag system test high fail condition meet |
| ESTDOFCMx | VaESTD\_OpenFailCriteriaMet[x] | ESTD Output diag system test low & open fail condition meet |
| ESTDSHSCx | SaESTD\_ShortFaultSampleCounter[x] | ESTD Output diag system test high sample counter |
| ESTDOSCx | SaESTD\_OpenFaultSampleCounter[x] | ESTD Output diag system test low & open sample counter |
| ESTDSHFCx | SaESTD\_ShortFaultFailureCounter[x] | ESTD Output diag system short high fail counter |
| ESTDOFCx | SaESTD\_OpenFaultFailureCounter[x] | ESTD Output diag system short low & open fail counter |

## Enable Conditions

1) Ignition On and First Valid Crank tooth;

- and -

2) Ignition input Voltage > ***KfESTD\_U\_ShortIgnVoltResetThrsh or KfESTD\_U\_OpenIgnVoltResetThrsh***- and -

3) ***KfESTD\_t\_EnableDelayTime*** time should be elapsed after ignition ON

## Malfunction Fail Criteria

When hardware reports Spark Coil 1 short to high, **VaESTD\_ShortFailCriteriaMet[ScESTD\_EST\_OutputNumber]** is set to True.

If Power for Spark Coil 1 is OK(refer to Power Logic), Short Low fail logic will run, else the logic will be bypassed.

Short to low & open fail logic: When hardware reports a short to low or open fault of Spark Coil 1, **VaESTD\_OpenFailCriteriaMet[ScESTD\_EST\_OutputNumber]** is set to True, else this flag will be set to false

## Calibration Variables and Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINTION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfESTD\_U\_ShortIgnVoltResetThrsh*** | Short to high voltage threshold used to prevent false failure  indication when the ignition is cycled quickly as the engine is  turning. Due to hardware characteristics, the EST failure register bits may set during an ignition transistion (key\_0n to Key\_off) with RPM > 0 | VOLT | 0 to 31.999 | 11 |  |
| ***KfESTD\_U\_OpenIgnVoltResetThrsh*** | Short to low & open voltage threshold used to prevent false failure indication when the ignition is cycled quickly as the engine is  turning. Due to hardware characteristics, the EST failure register bits may set during an ignition transistion (key\_0n to Key\_off) with RPM > 0 | VOLT | 0 to 31.999 | 11 |  |
| ***KcESTD\_FailThrsh*** | Indicates the number of samples that can register a failure before a fault is set for that EST output. | count | 0-255 | 5 |  |
| ***KcESTD\_SampleThrsh*** | Voltage threshold used to prevent false failure indication when the ignition is cycled quickly as the engine is turning. Due to hardware characteristics, the EST failure register bits may set during an ignition transistion (key\_0n to Key\_off) with RPM > 0 | count | 0-255 | 11 |  |
| ***KfESTD\_t\_EnableDelayTime*** | Timer threshold used to indicate sufficient time has elapsed since an engine at OFVC diagnostic clear has occurred to enable the diagnostic. Due to hardware characteristics, the EST failure register bits may set during an ignition transition (Key\_off to Key\_on) with RPM >0 | 7p8125ms |  |  |  |

# Knock Sensor Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Knock Variable | DESCRIPTION |
| KNKSENCM | SbKNKD\_SensorEnableCriteriaMet | Knock sensor diag enable criteria met |
| KNKSTSCP | SbKNKD\_SensorTestComplete | Knock sensor diag test complete |
| KNKSTSFA | SbKNKD\_SensorTestFailed | Knock sensor diag test fail |
| KNKFACNT | ScKNKD\_SensorFailCounter | Knock sensor failed counter |
| KNKSMCNT | VcKNKD\_SensorSampleCounter | Knock sensor sample counter |

## Enable Conditions

**Knock Sensor Diagnostic Enable Conditions:**

The Knock Sensor Fault diagnostic will be enabled (i.e **SbKNKD\_SensorEnableCriteriaMet** set to true) if all of the following conditions are met:

1) No disabling faults present (i.e. **SbKNKD\_DsblgKeyOnFaultPresent =** FALSE);

2) Manifold Vacuum is no greater than the high limit(GetVIOS\_p\_MnfdVac() <= ***KtKNKD\_p\_EngVacThrsh***);

3) ESC logic has been enabled (i.e. GetVIOS\_CCESC\_Enabled(), which has been hooked up to **EscFlag. EscEnabled**, must be true to enable Knock Sensor Diagnostic);

4) Iginition On = True;

5) Engine Speed should be no less than the low limit (i.e. **EOBD\_EngSpd** >= ***KfKNKD\_n\_EngSpdSystemEnblThrsh***).

## List of inhibiting fail criteria

1). MAP Sensor Short to High/Low Fault (i.e. **CeDGDM\_MAP\_Sho**rtHigh,

**CeDGDM\_MAP\_ShortLow**);

2). MAP/TPS Rationality Fault (i.e. **CeDGDM\_MAP\_TPS\_Rationality**).

## Malfunction Fail Criteria

**Fail Criteria will be met when all of the following conditions are met** (**ScKNKD\_SensorFailCounter** will be increased)**:**

1). Diagnostic enable conditions are met (i.e. **SbKNKD\_SensorEnableCriteriaMet** has been set to true);

2). The most difference of sensor inputs from all the cylinders is less than the low limit ( i.e. (MAX(**EOBD\_ADESC**[num\_cyl]) - MIN(**EOBD\_ADESC**[num\_cyl])) < ***KfKNKD\_Pct\_SensorIntnsDeltThrsh*** ).

## Malfunction Reports

**A failure will be reported if both of the following two sets of conditions are met:**

1). **SbKNKD\_SensorTestComplete** is true;

2). **SbKNKD\_SensorTestFailed** is true.

i.e. **ScKNKD\_SensorFailCounter** >= ***KcKNKD\_SensorFailThrsh*** .

**A pass will be reported if both of the following two sets of conditions are met:**

1). **SbKNKD\_SensorTestComplete** is true;

2). **SbKNKD\_SensorTestFailed** is flase.

i.e. **VcKNKD\_SensorSampleCounter** >= ***KcKNKD\_SensorSampleThrsh*** and **ScKNKD\_SensorFailCounter** < ***KcKNKD\_SensorFailThrsh***.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KtKNKD\_p\_EngVacThrsh*** | Indicates maximum engine vacuum allowable for enabling both Knock Sensor Circuit faults and Knock Sensor DSNEF | kpa | [0, 105] | - | 1/256 |
| ***KfKNKD\_n\_EngSpdSensorEnblThrsh*** | Minimum rpm to run the knock sensor diagnostic test | rpm | [0, 8192] | 1600 | 1/8 |
| ***KfKNKD\_Pct\_SensorIntnsDeltThrsh*** | Minimum acceptable difference between maximum minimum instantaneous readings for all cylinders | Percent | [0, 200] | 0.3 | 1/327.68 |
| ***KcKNKD\_SensorFailThrsh*** | Number of knock sensor fault determinations that cause a failure to be reported to the Data Manager | count | [0, 255] | 26 | 1 |
| ***KcKNKD\_SensorSampleThrsh*** | Number of knock sensor fault determinations that cause a failure to be reported to the Data Manager | count | [0, 255] | 64 | 1 |

# Knock System Fault

## Descriptor

|  |  |  |
| --- | --- | --- |
| Label | Knock Variable | DESCRIPTION |
| KNKENCRM | SbKNKD\_SystemEnableCriteriaMet | Knock diag system enable criteria met |
| KNKFACRM | SbKNKD\_SystemFailCriteriaMet | Knock diag system fail criteria met |
| KNKTSTCP | SbKNKD\_SystemTestComplete | Knock diag system test complete |
| KNKTSTFA | SbKNKD\_SystemTestFailed | Knock diag system test fail |
| KNKTSTLF | SbKNKD\_SystemTestLoFailed | Knock diag system test low fail |
| KNKTSTHF | SbKNKD\_SystemTestHiFailed | Knock diag system test high fail |

## Enable Conditions

**Knock system Diagnostic Enable Conditions:**

The Knock System Fault diagnostic will be enabled (i.e **SbKNKD\_SystemEnableCriteriaMet** set to true) if all of the following conditions are met:

1) No disabling faults present (i.e. **SbKNKD\_DsblgKeyOnFaultPresent =** FALSE);

2) Manifold Vacuum is no greater than the high limit(GetVIOS\_p\_MnfdVac() <= ***KtKNKD\_p\_EngVacThrsh***);

3) ESC logic has been enabled (i.e. GetVIOS\_CCESC\_Enabled(), which has been hooked up to **EscFlag. EscEnabled**, must be true to enable Knock Sensor Diagnostic);

4) Engine Speed should be no less than the low limit (i.e. **EOBD\_EngSpd** >= ***KfKNKD\_n\_EngSpdSystemEnblThrsh***).

## List of inhibiting fail criteria

1). MAP Sensor Short to High/Low Fault (i.e. **CeDGDM\_MAP\_Sho**rtHigh,

**CeDGDM\_MAP\_ShortLow**);

2). MAP/TPS Rationality Fault (i.e. **CeDGDM\_MAP\_TPS\_Rationality**).

## Malfunction Fail Criteria

**Short Low Fail Criteria will be met when all of the following conditions are met**(**VcKNKD\_SystemFailLoCounter** will be increased by one count each time)**:**

1) Diagnostic enable conditions are met (i.e. **SbKNKD\_SystemEnableCriteriaMet** has been set to true);

2) The maximum value of sensor inputs from any of the cylinders is less than the low limit ( i.e. MAX(**EOBD\_ADESC**[num\_cyl] < ***KfKNKD\_Pct\_SystemIntensThrshLo***).

**Short High Fail Criteria will be met when all of the following conditions are met** (**VcKNKD\_SystemFailHiCounter** will be increased by one count each time)**:**

1) Diagnostic enable conditions are met (i.e. **SbKNKD\_SystemEnableCriteriaMet** has been set to true);

2) The minimum Integrator Average of sensor inputs from the cylinders is greater than the high limit ( i.e. MIN(**EOBD\_IntegratorAverage**[num\_cyl] > ***KfKNKD\_Pct\_SystemIntnsAvThrshHi***).

## Malfunction Reports

A failure will be reported if both of the following two sets of conditions are met:

1). **SbKNKD\_SystemTestComplete** is true;

2). Any one of **SbKNKD\_SystemTestLoFailed** and **SbKNKD\_SystemTestHiFailed** is true.

i.e. **VcKNKD\_SystemFailLoCounter** >= ***KcKNKD\_SystemFailLoThrsh*** or ***VcKNKD\_SystemFailHiCounter*** >= ***KcKNKD\_SystemFailHiThrsh***.

A pass will be reported if both of the following two sets of conditions are met:

1). **SbKNKD\_SystemTestComplete** is true;

2). Both of **SbKNKD\_SystemTestLoFailed** or **SbKNKD\_SystemTestHiFailed** are false.

i.e. **VcKNKD\_SystemSampleCounter** >= ***KcKNKD\_SystemSampleThrsh*** and **VcKNKD\_SystemFailLoCounter** < ***KcKNKD\_SystemFailLoThrsh*** and ***VcKNKD\_SystemFailHiCounter*** < ***KcKNKD\_SystemFailHiThrsh***.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| ***KfKNKD\_Pct\_SystemIntensThrshLo*** | Indicates threshold for the short to ground test. If all instantaneous readings for all cylinders are below this value, the knock control system is determined to be shorted to ground | Percent | [0, 200] | 3.9 | 1/327.68 |
| ***KfKNKD\_Pct\_SystemIntnsAvThrshHi*** | Indicates threshold for the short to supply (vcc). If knock cylinder average is above this value, the knock control system is determined to be shorted high | Percent | [0, 200] | 80 | 1/327.68 |
| ***KcKNKD\_SystemFailLoThrsh*** | Number of knock sensor fault determinations that cause a failure to be reported to the Data Manager | count | [0, 255] | 26 | 1 |
| ***KcKNKD\_SystemFailHiThrsh*** | Number of knock sensor fault determinations that cause a failure to be reported to the Data Manager | count | [0, 255] | 64 | 1 |
| ***KcKNKD\_SystemSampleThrsh*** | Number of knock sensor fault determinations that cause a failure to be reported to the Data Manager | count | [0, 255] | 26 | 1 |

# COND SOH Main CPU Fault

## Descriptor

SOH Main CPU fault is collection of soh sub fault, details like this:

CwHWIO\_ETC\_SOH\_MAIN\_CPU\_FLTS\_MASK =

CwHWIO\_ETC\_SOH\_SYS\_CLK\_FREQ\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_INTRT\_SRC\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_SYS\_TMR\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_TST\_SEQN\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_RTI\_FREQ\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_CPU\_LOOP\_SEQN\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_SHUTOFF\_TMR\_EXPRD\_FLT\_MASK,

|  |  |  |
| --- | --- | --- |
| **COND SOH Main CPU Fault Diagnostic A2L Info** | |  |
| Label | Main CPU Fault Variable | DESCRIPTION |
| CDMAINTC | SbCOND\_SOH\_MainCPU\_TstCmp | SOH Main CPU Fault Diagnose Complete Flag |
| CDMAINF | SbCOND\_SOH\_MainCPU\_Flt | SOH Main CPU Fault Flag |

## Enable Conditions

There is no enable condition for The SOH diagnostic, for the soh diagnostic program is going on as soon as ECU is power on.

## Malfunction Fail Criteria

**Fail Criteria will be met when one of the following conditions are met:**

1. Soh\_FaultLogNVM. SysClkFail == true;
2. Soh\_FaultLogNVM. SohIrqSrcFail == true
3. Soh\_FaultLogNVM. SysTmrFail == true
4. Soh\_FaultLogNVM. SohSeqFail == true
5. Soh\_FaultLogNVM. RtiFreqFail == true
6. Soh\_FaultLogNVM. LoopSeqFail == true
7. Soh\_FaultLogNVM. ShutOffTimeExpire == true

## Malfunction Reports

A failure will be reported if both of the following two sets of conditions are met:

1). **SbCOND\_SOH\_MainCPU\_TstCmp** is true;

2). **SbCOND\_SOH\_MainCPU\_Flt** is true.

A pass will be reported if both of the following two sets of conditions are met:

1). **SbCOND\_SOH\_MainCPU\_TstCmp** is true;

2). **SbCOND\_SOH\_MainCPU\_Flt** are false.

# COND SOH Common Fault

## Descriptor

SOH Common fault is collection of soh sub fault, details like this:

CwHWIO\_ETC\_SOH\_COMM\_FLTS\_MASK =

CwHWIO\_ETC\_SOH\_SPI\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_SPI\_COMM\_FLT\_MASK,

|  |  |  |
| --- | --- | --- |
| **COND SOH Common Fault Diagnostic A2L Info** | |  |
| Label | Common Fault Variable | DESCRIPTION |
| CDCOMMTC | SbCOND\_SOH\_CommTstCmp | SOH Common Fault Diagnose Complete Flag |
| CDCOMMF | SbCOND\_SOH\_CommFlt | SOH Common Flag |

## Enable Conditions

There is no enable condition for The SOH diagnostic, for the soh diagnostic program is going on as soon as ECU is power on.

## Malfunction Fail Criteria

**Fail Criteria will be met when one of the following conditions are met:**

* + - 1. Soh\_FaultLogNVM. SPIFail == true;
      2. Soh\_FaultLogNVM. SPICommFail == true

## Malfunction Reports

A failure will be reported if both of the following two sets of conditions are met:

1).SbCOND\_SOH\_CommTstCmpis true;

2). SbCOND\_SOH\_CommFlt is true.

A pass will be reported if both of the following two sets of conditions are met:

1).SbCOND\_SOH\_CommTstCmp is true;

2). SbCOND\_SOH\_CommFlt are false.

# COND SOH Common Fault

## Descriptor

SOH Common fault is collection of soh sub fault, details like this:

CwHWIO\_ETC\_SOH\_CHKNG\_CPU\_FLTS\_MASK =

CwHWIO\_ETC\_SOH\_C\_AND\_R\_CNTR\_LOW\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_C\_AND\_R\_DISARMD\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_C\_AND\_R\_TMOUT\_FLT\_MASK

| CwHWIO\_ETC\_SOH\_C\_AND\_R\_CNTR\_ZERO\_FLT\_MASK,

|  |  |  |
| --- | --- | --- |
| **COND SOH Checking CPU Fault Diagnostic A2L Info** | |  |
| Label | Common Fault Variable | DESCRIPTION |
| CDCHEKTF | SbCOND\_SOH\_CheckingCPU\_TstCmp | SOH Checking CPU Diagnose Complete Flag |
| CDCHEKF | SbCOND\_SOH\_CheckingCPU\_Flt | SOH Checking CPU Flag |

## Enable Conditions

There is no enable condition for The SOH diagnostic, for the soh diagnostic program is going on as soon as ECU is power on.

## Malfunction Fail Criteria

**Fail Criteria will be met when one of the following conditions are met:**

* + - 1. Soh\_FaultLogNVM. CRCounterLow == true;
      2. Soh\_FaultLogNVM. CRDisarmed == true
      3. Soh\_FaultLogNVM. CRTimeoutFail == true
      4. Soh\_FaultLogNVM. CRCounterFail== true

## Malfunction Reports

A failure will be reported if both of the following two sets of conditions are met:

1).SbCOND\_SOH\_CheckingCPU\_TstCmp is true;

2). SbCOND\_SOH\_CheckingCPU\_Flt is true.

A pass will be reported if both of the following two sets of conditions are met:

1).SbCOND\_SOH\_CheckingCPU\_TstCmp is true;

2). SbCOND\_SOH\_CheckingCPU\_Flt are false.

# COND Main CPU Clock Fault

## Descriptor

This diagnostic will detect the main cpu PLL fault.

|  |  |  |
| --- | --- | --- |
| **COND Main CPU Clock Fault Diagnostic A2L Info** | |  |
| Label | Common Fault Variable | DESCRIPTION |
| MCLKCRMT | VbCOND\_HWIO\_ClockEnblCritMet | Main CPU Clock Diagnose enable condition |
| MCLKCMPL | VbCOND\_HWIO\_ClockTstComplete | Main CPU Clock Diagnose Complete Flag |
| MCLKFAIL | VbCOND\_HWIO\_ClockFailed | Main CPU Clock Flag |

## Enable Conditions

The Fault diagnostic will be enabled if all of the following conditions are met(VbCOND\_HWIO\_ClockEnblCritMet set to true):

1. Iginition On = True;
2. SfCOND\_t\_ClockEnblDlyTmr > KfCOND\_t\_ClockEnblDlyTmrThrsh

## Malfunction Reports

**A failure will be reported if both of the following two sets of conditions are met:**

1). **VbCOND\_HWIO\_ClockTstComplete** is true;

2). **VbCOND\_HWIO\_ClockTested** is true.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| KfCOND\_t\_ClockEnblDlyTmrThrsh | Enable delay timer threshold for Main CPU Clock | sec | [0, 16] | - | 125ms |

# COND ADC0 Fault

## Descriptor

The purpose of this diagnostic is to detect the ADC0 sample fault.

|  |  |  |
| --- | --- | --- |
| **COND ADC0 Fault Diagnostic A2L Info** | |  |
| Label | ADC0 Fault Variable | DESCRIPTION |
| ADC0CRMT | VbCOND\_HWIO\_ADC0EnblCritMet | ADC0 Diagnose enable condition |
| ADC0CMPL | VbCOND\_HWIO\_ADC0TstComplete | ADC0 Diagnose Complete Flag |
| ADC0FAIL | VbCOND\_HWIO\_ADC0Failed | ADC0 Flag |

## Enable Conditions

The Fault diagnostic will be enabled if all of the following conditions are met(VbCOND\_HWIO\_ADC0EnblCritMet set to true):

1. Iginition On = True;
2. SfCOND\_t\_ADC0EnblDlyTmr > KfCOND\_t\_ADC0EnblDlyTmrThrsh

## Malfunction Reports

**A failure will be reported if both of the following two sets of conditions are met:**

1). **VbCOND\_HWIO\_ADC0TstComplete** is true;

2). **VbCOND\_HWIO\_ADC0Failed** is true.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| KfCOND\_t\_ADC0EnblDlyTmrThrsh | Enable delay timer threshold for ADC0. | sec | [0, 16] | - | 125ms |

# COND AD Input Response

## Descriptor

The purpose of this diagnostic is to detect AD input response fault.

|  |  |  |
| --- | --- | --- |
| **COND AD InputResponse diagnostic A2L Info** | |  |
| Label | AD InputResponse Fault Variable | DESCRIPTION |
| CADRFCRM | VbCOND\_AD\_RespFailCritMet | AD Input Response Diagnose Fail condition |
| CADRCRM | VbCOND\_AD\_RespEnblCritMet | AD Input Response Diagnose enable condition |
| CADRTC | VbCOND\_AD\_RespTstComplete | AD Input Response Diagnose Complete Flag |
| CADRTF | VbCOND\_AD\_RespFailed | AD Input Response Flag |
| CADRTITM | SfCOND\_dt\_AD\_RespTstIntervalTime | The A/D input response diagnostic test interval timer |
| CADRA1SH | SfCOND\_Pct\_APS1\_Shorted | Raw APS1 A/D value while short to ground applied. |
| CADRA2SH | SfCOND\_Pct\_APS2\_Shorted | Raw APS2 A/D value while short to ground applied |
| CADRSSTM | SfCOND\_dt\_APS\_ShortSettlingTime | APS1 short to ground settling time. (time of latest A/D read - time short was applied). |

## Enable Conditions

The Fault diagnostic will be enabled if all of the following conditions are met(VbCOND\_AD\_RespEnblCritMetset to true):

1. Iginition On = True;
2. SfCOND\_dt\_AD\_RespTstIntervalTime > KfCOND\_t\_AD\_RespTstInterval
3. GetVIOS\_U\_IgnVolt() > KfCOND\_U\_AD\_RespIgnLoDsbl
4. GetVIOS\_U\_IgnVolt() < KfCOND\_U\_AD\_RespIgnHiDsbl
5. GetETCI\_Pct\_BuffRawAPS\_1() > KfCOND\_Pct\_AD\_RespAPS\_PreShortMin
6. VbCOND\_HWIO\_ClockFailed == False

## Malfunction Fail Criteria

**Fail Criteria will be met when all of the following conditions are met** (**VbCOND\_AD\_RespFailCritMet** will be increased)**:**

1). Diagnostic enable conditions are met (i.e. **VbCOND\_AD\_RespEnblCritMetset** has been set to true);

2). **SfCOND\_Pct\_APS1\_Shorted > KfCOND\_Pct\_AD\_RespAPS\_ShortedMax**

3). **SfCOND\_dt\_APS\_ShortSettlingTime > KfCOND\_t\_AD\_RespShortSettleMin**

## Malfunction Reports

**A failure will be reported if both of the following two sets of conditions are met:**

1). **VbCOND\_AD\_RespTstComplete** is true;

2). **VbCOND\_AD\_RespFailed** is true.

## Calibration Variable and Table Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE/SPEC NAME** | **DEFINITION** | **UNITS** | **RANGE** | **TYPICAL VALUE** | **RESOLUTION** |
| KfCOND\_U\_AD\_RespIgnLoDsbl | Ignition voltage below which the A/D Input Response diagnostic is disabled. | volt | [0, 32] | 4 | 0.00048828125 Volt / Count |
| KfCOND\_U\_AD\_RespIgnHiDsbl | Ignition voltage above which the A/D Input Response diagnostic is disabled. | volt | [0, 32] | 24 | 0.00048828125 Volt / Count |
| KfCOND\_Pct\_AD\_RespAPS\_PreShortMin | Raw APS1 value below which the A/D Input Response diagnostic is disabled (CADRENBL = False). | t\_percenta | [0, 200) | 5 | 0.0030517578125 % / Count |
| KfCOND\_Pct\_AD\_RespAPS\_ShortedMax | APS1 shorted value below which the A/D Input Response diagnostic is OK (CADRFCM = False). | t\_percenta | [0, 200) | 100 | 0.0030517578125 % / Count |
| KfCOND\_Pct\_AD\_RespRecDeltaAPS1\_Max | Change in APS1 pre-short to post-short below which APS1 slow recovery is set False. | t\_percenta | [0, 200) | 100 | 0.0030517578125 % / Count |
| KfCOND\_Pct\_AD\_RespRecDeltaAPS2\_Max | Change in APS2 pre-short to post-short above which APS1 slow recovery is not evaluated. | t\_percenta | [0, 200) | 0 | 0.0030517578125 % / Count |
| KfCOND\_Pct\_AD\_RespDeltaAPS2\_Max | Change in APS2 value when APS1 is shorted above which"APS short together CADRSHRT is set True | t\_percenta | [0, 200) | 100 | 0.0030517578125 % / Count |
| KfCOND\_t\_AD\_RespTstInterval | Minimum Time between the A/D Input Response diagnostic tests. Engineering Range: [0, 16), Resolution: 0.000244140625 s / Count | s | [0, 16) | 3 | 0.000244140625 s / Count |
| KfCOND\_t\_AD\_RespShortSettleMin | A/D settling time CADRSSTM below which the A/D Input Response diagnostic short to ground is not evaluated (CADRFCM = False). | s | [0, 16) | 0.004 | 0.000244140625 s / Count |
| KfCOND\_t\_AD\_RespRecSettleMin | A/D settling time (CADNSST) below which APS1 slow recovery is not evaluated (CADRSLOW = False). | s | [0, 16) | 0.008 | 0.000244140625 s / Count |
| KfETCI\_t\_AD\_NotShortSettleMin | A/D settling time after APS1 short to ground is removed below which APS1 value is not used for control and diagnostics. | s | [0, 16) | 0.008 | 0.000244140625 s / Count |
| KfETCI\_t\_APS\_MinLrnDsblDly | Time APS Min Learn is disabled after APS1 short to ground is removed. | s | [0, 16) | 0.5 | 0.000244140625 s / Count |