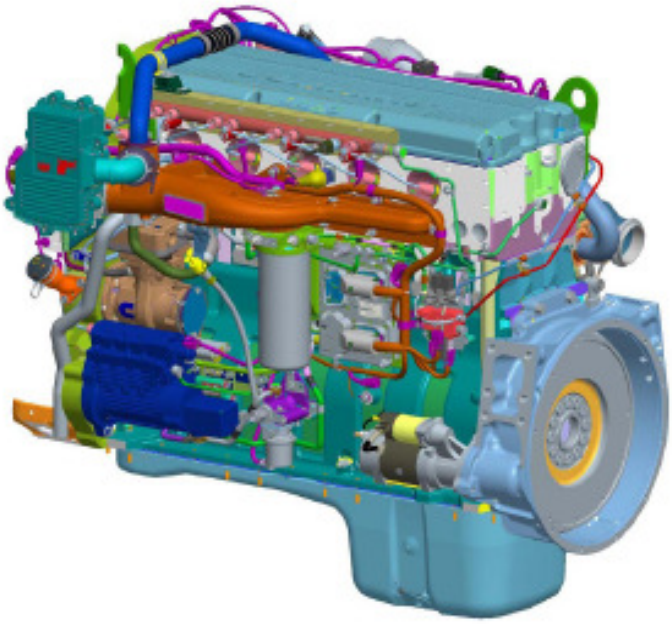
2010 COMMON APPROACH TO CONTROL SYSTEM DIAGNOSTICS Update

Monarch 2010



Phase 7.40.0.xx (CM2250) ECM Software

HD 2010 COMMON APPROACH TO CONTROL SYSTEM DIAGNOSTICS

HD 2010 Common Approach To Control System Diagnostics.doc
Full Production Version
02/13/2010
Revision Number 07

Please Forward Suggestions For Improvement To:
Gary Parker

Where To Find This Document:
CTC LAN: H:\Monarch\Cals\Common Approach\

Internet:

Overview: This document is intended to support on-site troubleshooting and diagnostics of customer complaints for **2010 Heavy-Duty engine platforms**. This document can be used along with CalTerm III for investigation, troubleshooting, and diagnosis of engine performance and electronic controls related issues.

Purpose: The information contained in this document is based on information from Simulink Diagrams and Code Files. The 2010 HD control system includes new control strategies for Air Handling and emissions to meet the 2010 requirements. Information on troubleshooting and diagnostics for these systems is included here. The intent for this document is to provide information and support to those in the field as well as those based in Cummins engineering facilities. This document along with Calterm III will provide more detailed definition of engine conditions associated with specific issues. This information, along with driver comments and concerns, will help in achieving a better responsiveness to customer needs and allow us to develop products which meet or exceed customer expectations.

Tools Required: Calterm III Software installation web address → http://etools.ctg.cummins.com/products/caltermiii/

ECFG File Web address of supported ECFG files → not available yet

Inline V Web address for ordering the Datalink Adapter, driver download, and driver installation instructions → http://inline.cummins.com/

Document Contents:

THIS DOCUMENT SUPPORTS THE FOLLOWING SOFTWARE VERSION:
HD10 ISX10 PHASE 7.40.0.08 SOFTWARE CM2250

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Acknowledgement

Thank you CAD Blitz team for your contributions to the Common Approach. The following are the members of the CAD Blitz team that helped build this document for the 2010 Heavy Duty Platforms:

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Revision History

Rev 00: 2/13/2009
Rev 02: 7/29/2009
Rev 03: 2/13/2010
Rev 04: 5/28/2010
Rev 05: 6/1/2010
Rev 06 6/14/2010

Table of Contents:

Datalogging Using Calterm III

Data Logging

The following four methods can be used to collect data using Calterm III:

1. Request/Receive
2. IDL (Internal Data logger)
3. BAM (Broadcast Announce Message)
4. EDM (Engineering Data Monitor)

In this document, only the EDM data logging method will be discussed. EDM data collection mode has sufficient capability to collect data listed in this document. Also, unlike BAM data collection mode, EDM will not stop broadcast on other devices connected to the datalink.

Instructions for using the EDM Data logger

1. Lauch Calterm III
2. The monitor screen should be displayed. If Calterm does not automatically display the Select Module Screen, go to File and select Open Module.
3. On the monitor screen, select Module Type and ECFG file. ECFG files for each software phase can be downloaded at the following link: http://www.jep.cummins.com/teams/pde/index_org.html
4. Click Automatic to connect to the module. Once connected, the default monitor screen will be displayed
5. If unable to connect, go to Tools, select Options and click datalink type - Verify the settings on the Datalink tab are configured to work with an Inline 5 adapter.
6. Once connected, add parameters to the monitor screen or open an existing screen file.
    - To add parameters to the monitor screen, change the data collection mode to EDM. Type the parameter name or use F1 to search for parameters.
    - To open an existing screen file, go to Monitor and select open screen file.
7. Depending on the desired data collection rate, add parameters to achieve a maximum data rate of 4000 bytes/second.

-To determine the number of bytes for a given parameter, open the ecfg file using word pad. Search for the the parameter name. Under the parameter name, data_length will be listed.

-The majority of parameters are 2 bytes. For example, the data length of FSS_Total_Fueling is 2 bytes.

-To determine the data rate, add the bytes from all parameter on the screen file and divide by the desired data collection rate.

-For example, at a rate of 4000 bytes/second, 40 two byte parameters can be collected every 20ms.

8. Change the data collection mode to EDM. Select the desired data monitor rate.
9. If parameter values are not displayed on the screen after switching to EDM mode, you may have too many parameters for the data collection rate. Two options for correcting this are
    a. Decrease number of parameters (Use only recommended parameters from this document).
    b. Decrease the data collection rate

-The data rate of 4000 bytes/min is only possible under ideal conditions. Increased datalink traffic will decrease the allowable data rate.

10. To start data collection click on start
11. To stop data collection click stop
12. Save datafile to desired location

Critical Parameters List:

1. Mission Data Critical Parameters List

Comment [BJO1]: Review by CPE, ATI and OBD

Standard Engine Investigation List:

Engine_Speed	RPM	Vehicle_Speed	km/hr
Accelerator_Pedal_Position	%	Net_Engine_Torque	N_m
CBM_FdbkTorqueFuel	MG/STROKE	EGR_Position	%
Combustion_Control_Path_Owner	---	EAC_EGR_Valve_Cmd	%
Final_Timing	deg_BTDC	Compressor_Inlet_Density	kg/m^3
Boost_Pressure	kPa_G	CHL_Derate_State	HEX
Effective_Gear_Ratio	---	Filtered_Turbo_Speed	KRPM
Alpha	---	PrcntLoadAtCurSpd	%
H_CBR_Chi_Value	---	TGC_VT_Cmd	%
EMM_AECD_State	HEX	J39_VGT_Actuator_Position	%
EMM_Protection_State	HEX	Charge_Tmptr	DEG_C
Exhaust_Press	KPA	Exhaust_Metal_Tmptr	DEG_C
EGR_Orifice_Tmptr	DEG_C		

Standard Aftertreatment Investigation List:

Engine_Speed	rpm	H_SFP_gpl_Soot_Load	g/L
Net_Engine_Torque	Nm	V_SFP_mg_Soot_Load_DP	g
Accelerator_Pedal_Position	%	V_SFP_mg_Soot_Load_Comb	g
Total_Fueling	Mg/stroke	V_ATD_bs_PFS_SysIO_Errs	HEX
Combustion_Control_Path_Owner	None	V_ATD_bs_PFS_SysPerf1_Errs	HEX
Final_Timing	deg_BTDC	V_ATD_bs_PFS_SysPerf2_Errs	HEX
CHL_MCF_Cmd	kg/min	CBM_PM_Out_Rate	g/hr
Charge_Flow	kg/min	H_SFP_gph_Noxid_Rate	g/hr
CHL_EGR_Frac_Cmd	None	H_SFP_gph_Oxid_Rate	g/hr
EGR_Fraction	None	V_SFP_gph_NetSootAccumRate	g/hr
EGR_Flow	Kg/min	V_ATP_fg_Turbo_Out_O2	g/sec
TGC_VT_Cmd	%	V_ATP_fg_Turbo_Out_NOx	g/sec
J39_VGT_Actuator_Position	%	V_ATP_fg_Turbo_Out_NO2	g/sec
EAC_EGR_Valve_Cmd	%	V_ATP_fg_Turbo_Out	g/sec
EGR_Position	%	V_ATP_gph_Turbo_Out_PM	g/hr
CBR_Alpha	None	CBM_O2_Out_Frac	none
H_CBR_Chi_Value	None	CBM_PM_Out_Frac	none
CBP_Air_Fuel_Ratio	None	CBR_NOx_Out_Frac	none
Ambient_Air_Tmptr	Deg_C	V_HIM_DFSOV_Cmd	None
Compressor_Inlet_Tmptr	Deg_C	V_HIM_DFSOV2_Cmd	None
Compressor_Outlet_Tmptr	Deg_C	V_AIM_pr_HC_DoserP	kPa
Charge_Tmptr	Deg_C	V_OCR_fg_HC_Cmd	g/sec
Exhaust_Metal_Tmptr	Deg_C	V_OCL_fg_HC_Slip_Limit	g/sec
Turbine_Out_Tmptr	Deg_C	V_OCR_fg_HC_Int_Cntrl	g/sec
Coolant_Temperature	Deg_C	V_OCR_fg_HC_Nominal	g/sec
Oil_Temperature	Deg_C	V_OCR_fg_HC_Corr	g/sec
EGR_Orifice_Tmptr	Deg_C	V_OCR_fg_HC_TransComp	None
Filtered_Turbo_Speed	KRPM	V_OCR_fg_HC_Prp_Cntrl	g/sec
Charge_Press	kPa	H_HIM_fg_Dosing_Cmd	g/sec
Compressor_Inlet_Press	kPa	H_OCL_bs_HC_CtrlLimits	HEX
Exhaust_Press	kPa	V_HIM_bs_DiagStatus	HEX
EGR_Orifice_Delta_Press	kPa	H_SFR_Regen_Tactic	None
Ambient_Air_Press	kPa	V_ATM_Oper_Mode	None
V_AIM_pr_Turbo_Out	kPa	V_ATM_Soot_Stage	None
V_SFP_pr_Max_At_High_Flow	kPa	V_SFR_Regen_Stage	None
EMM_AECD_State	HEX	EXM_ATM_Oper_Mode_Rqst	None
EMM_Protection_State	HEX	P_SFR_Regen_Trigger_State	None
V_ATP_trc_CCC_In	Deg_C	V_ATD_RqstProtMode	None
V_ATP_trc_CCC_Out	Deg_C	V_OCL_HC_Desorb_Request	None
V_ATP_trc_DOC_In	Deg_C	V_OCL_H2O_Desorb_Request	None
V_ATP_trc_DOC_Out	Deg_C	V_ATD_DPF_Lamp_State	None
V_ATP_trc_DPF_Out	Deg_C	V_ATD_HET_Lamp_State	None
V_SFR_trc_Regen_Trgt	Deg_C	P_OCL_tm_FacePlug_Count	None
V_SFR_trc_Cmd	Deg_C	C_OCL_tm_FacePlug_LoThd	None
V_ATP_fg_Turbo_Out	g/sec	C_OCL_tm_FacePlug_HiThd	None
V_SFP_fv_DPF	m3/s	P_SFP_gpl_DPSLE_Adj	g
V_SFP_pr_Delta	kPa	P_SFR_tm_Ineff_Dosing	S
V_ATP_prg_DPF_OutP	kPa	V_OCL_Eff_Comp	None
H_SFP_DPTrust_Fctr_Adjusted	None	Vehicle_Speed	km/hr

Basic Unit Conversions:

2. Deg_F to Deg_C
Deg_C = (Deg_F – 32) * 5/9

3. InHg to kPa
kPa = 3.3863880 * InHg

4. MPH to Km/Hr
Km/Hr = 1.6093440 * MPH

5. Psi to bar
bar = 0.06894757 * Psi

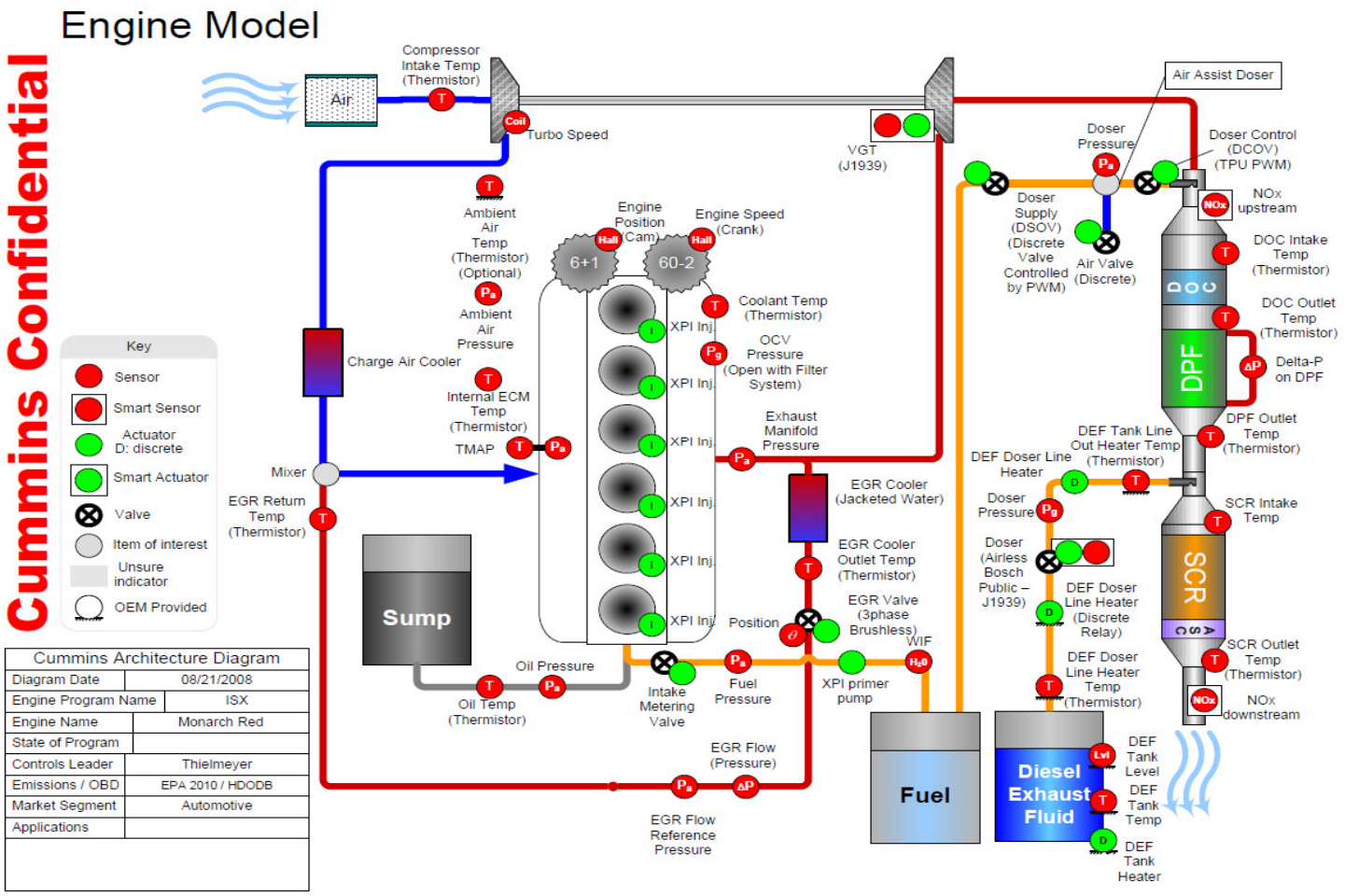
6. Psi to kPa
kPa = 6.8947570 * Psi

7. Voltage to Raw Counts
Raw Counts = (Sensor Signal Volts) / (5.175) * 1023

Control System Overview

8. Air Handling and Aftertreatment Schematic

Comment [BJO2]: Updated

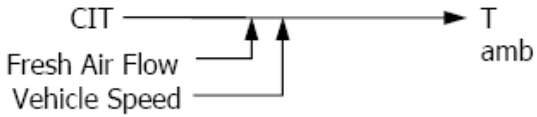


9. Engine Virtual Sensors

Comment [i3]: CPE

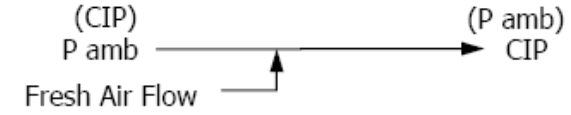
Base Virtual Sensors

Ambient_Air_Tmptr



Uses compressor inlet temperature and an estimate of temperature rise across the air filter and inlet system

Compressor_Inlet_Press

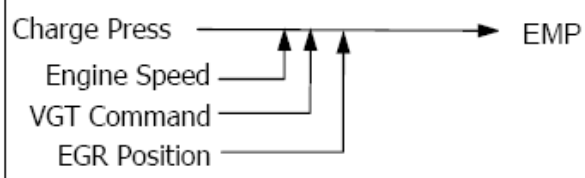


Uses ambient pressure and an estimate of pressure drop across the air filter and inlet system (NOTE: For systems with a compressor inlet pressure sensor, the same process is used to back calculate ambient pressure)

Altitude

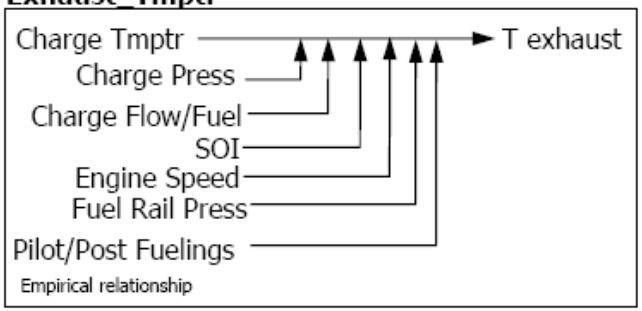
Uses direct calculation from ambient pressure

Exhaust_Press_Est



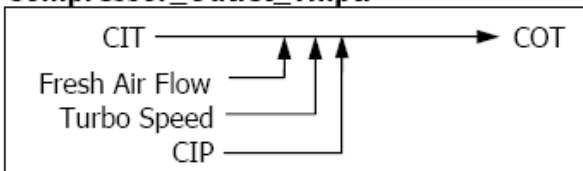
Empirical relationship

Exhaust_Tmptr



Empirical relationship

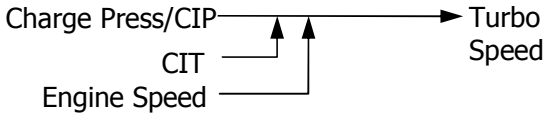
Compressor_Outlet_Tmptr



Uses compressor inlet temperature and an estimate of temperature rise across compressor based on compressor map and corrected turbo speed, corrected air flow

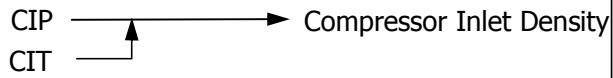
Base Virtual Sensors

Turbo_Speed_Est



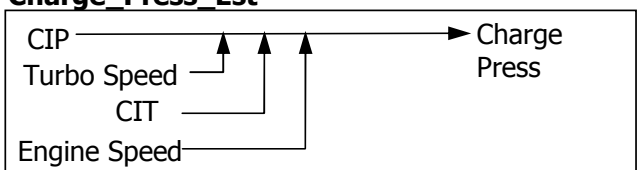
Uses compressor map to get corrected turbo speed as function of pressure ratio with a correction factor based on engine speed to account for air flow effects

Compressor_Inlet_Density



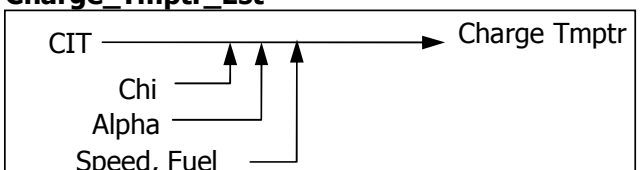
Use direct calculation from compressor inlet temperature and pressure

Charge_Press_Est



Uses compressor map to get pressure ratio as function of corrected turbo speed with a correction factor based on engine speed to account for air flow effects

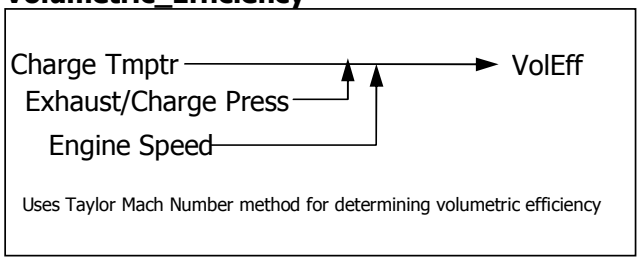
Charge_Tmptr_Est



Uses charge temperature reference from combustion manager with offset based on difference between current CIT and the CIT present during calibration

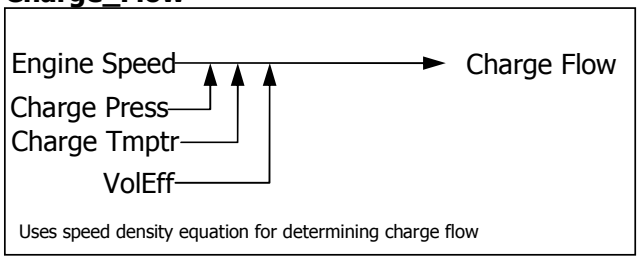
Charge Parameter Virtual Sensors

Volumetric_Efficiency



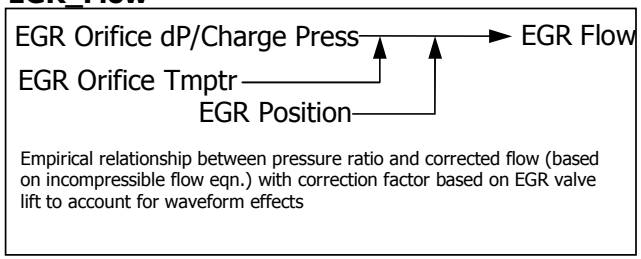
Uses Taylor Mach Number method for determining volumetric efficiency

Charge_Flow



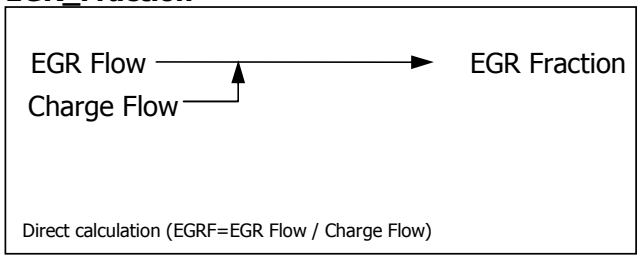
Uses speed density equation for determining charge flow

EGR_Flow



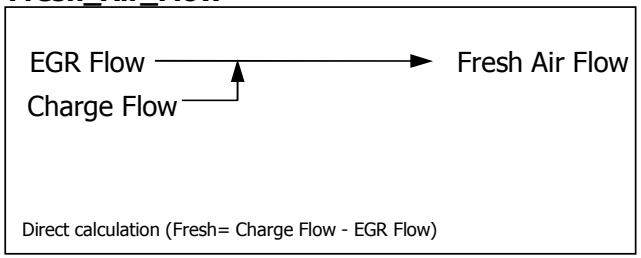
Empirical relationship between pressure ratio and corrected flow (based on incompressible flow eqn.) with correction factor based on EGR valve lift to account for waveform effects

EGR_Fraction



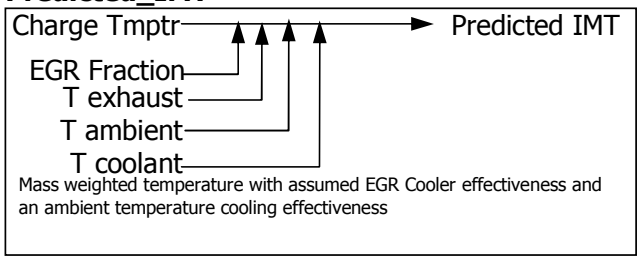
Direct calculation (EGRF=EGR Flow / Charge Flow)

Fresh_Air_Flow



Direct calculation (Fresh= Charge Flow - EGR Flow)

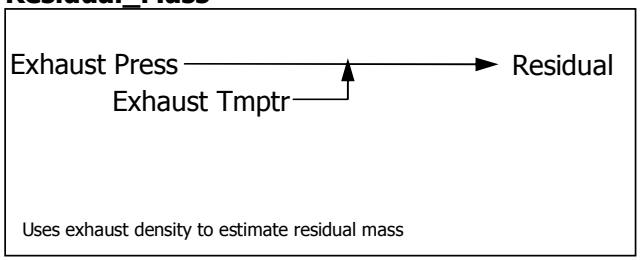
Predicted_IMT



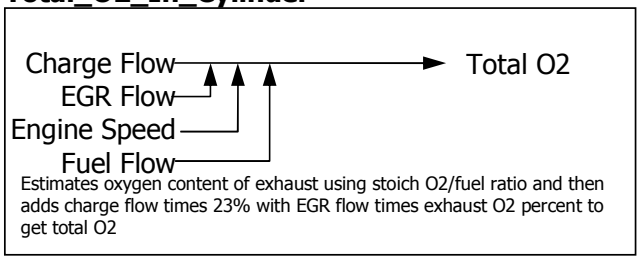
Mass weighted temperature with assumed EGR Cooler effectiveness and an ambient temperature cooling effectiveness

Combustion Parameter Virtual Sensors

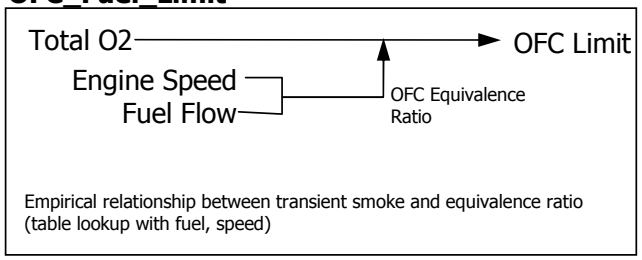
Residual_Mass



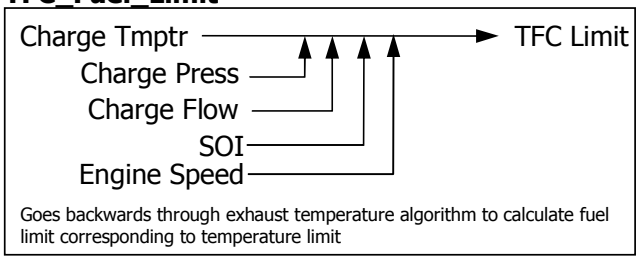
Total_O2_In_Cylinder



OFC_Fuel_Limit



TFC_Fuel_Limit

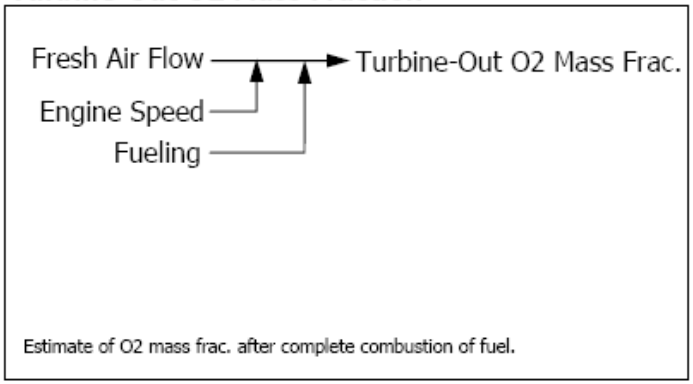


10. Aftertreatment Virtual Sensors

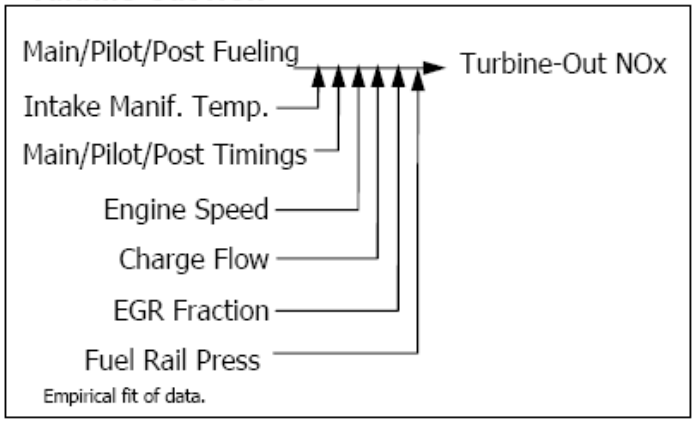
Comment [i4]: UPdated

Engine-Out Virtual Sensors for Aftertreatment

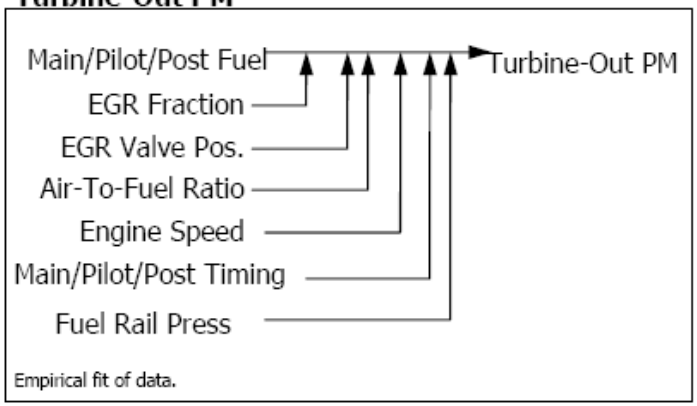
Turbine-Out O2 Mass Fraction



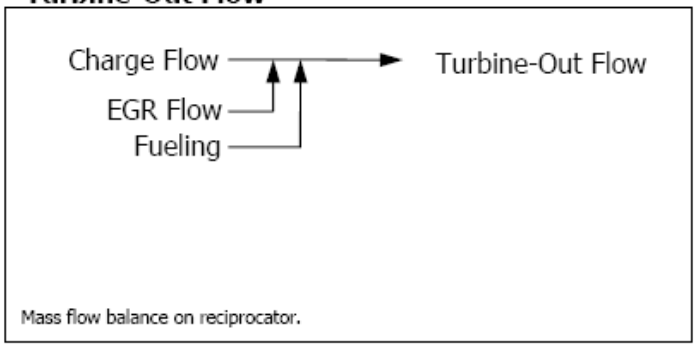
Turbine-Out NOx



Turbine-Out PM

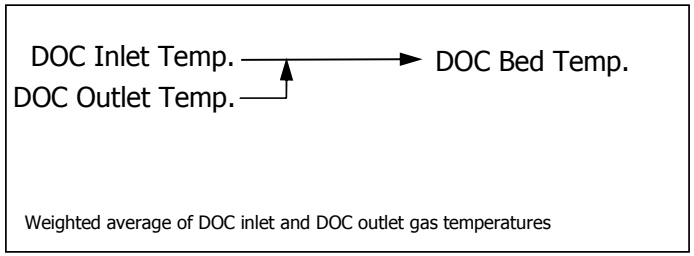


Turbine-Out Flow



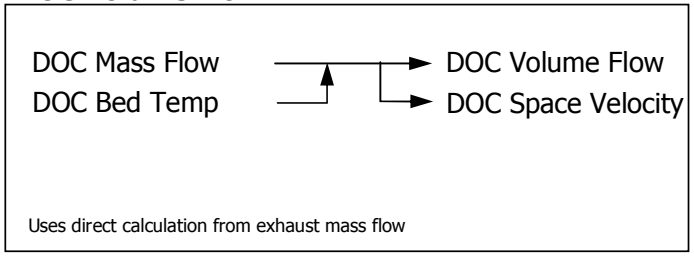
DOC Catalyst Parameters

DOC Bed



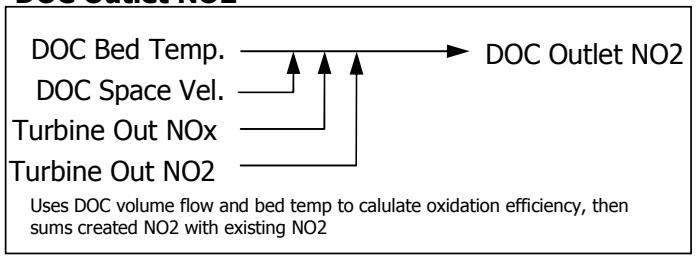
Weighted average of DOC inlet and DOC outlet gas temperatures

DOC Volume Flow



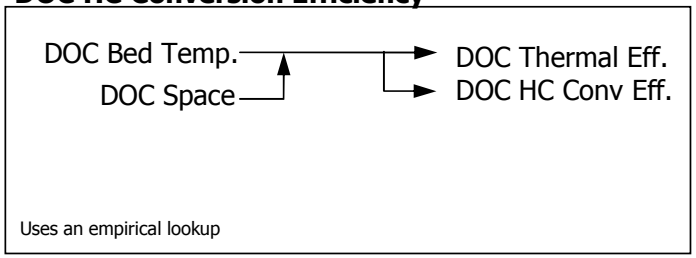
Uses direct calculation from exhaust mass flow

DOC Outlet NO2



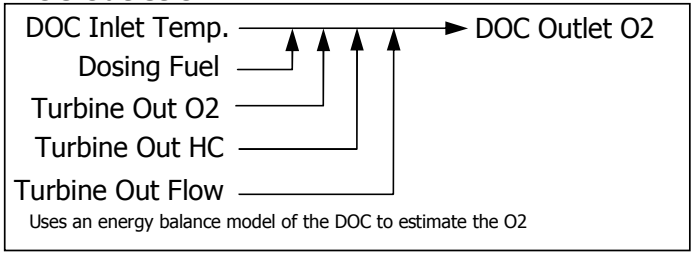
Uses DOC volume flow and bed temp to calulate oxidation efficiency, then sums created NO2 with existing NO2

DOC HC Conversion Efficiency



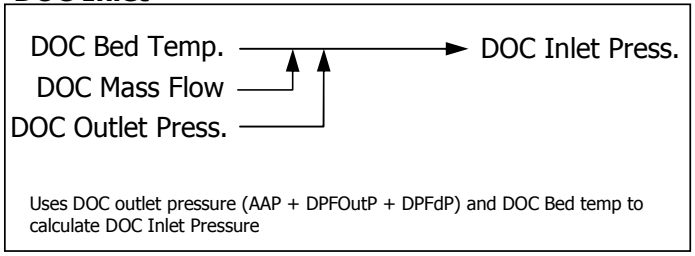
Uses an empirical lookup

DOC Outlet O2



Uses an energy balance model of the DOC to estimate the O2

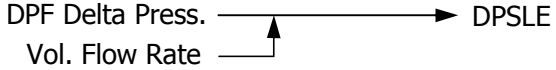
DOC Inlet



Uses DOC outlet pressure (AAP + DPFOutP + DPFdP) and DOC Bed temp to calculate DOC Inlet Pressure

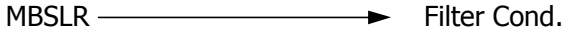
Soot Filter Parameters

Delta Pressure Based Soot Load Estimate



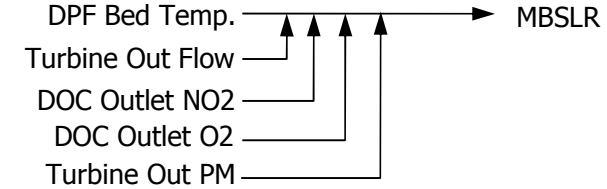
The soot in the DPF is estimated by interpolating in a soot load model based on the volumetric flow rate and comparing these to the DPF delta pressure measurement.

Filter



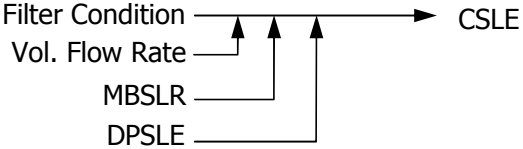
Estimates the degree of soot mal-distribution within the DPF based on soot loading rate

Mass Balance Soot Load Rate



Uses a physics based equation to estimate soot loading compensating for oxidation by NO2 and O2

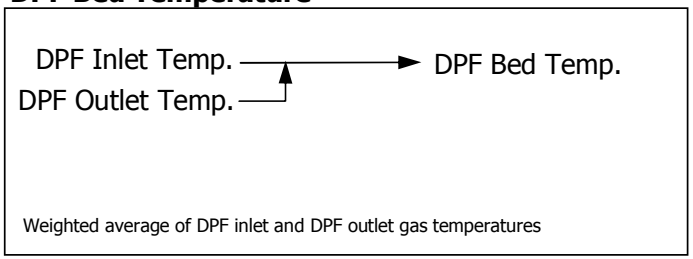
Combined Soot Load Estimate



The CSLE is a weighted average of the MBSLR and the DPSLE. The relative weighting is based on the history and status of the filter provided by the uniform distribution factor and the flow rate.

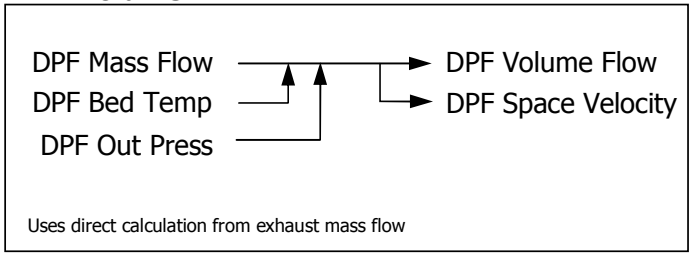
Soot Filter Parameters (continued)

DPF Bed Temperature



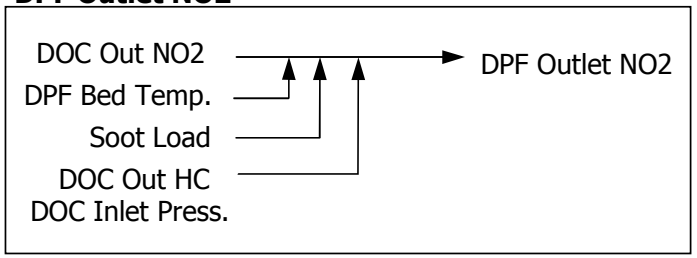
Weighted average of DPF inlet and DPF outlet gas temperatures

DPF Volume

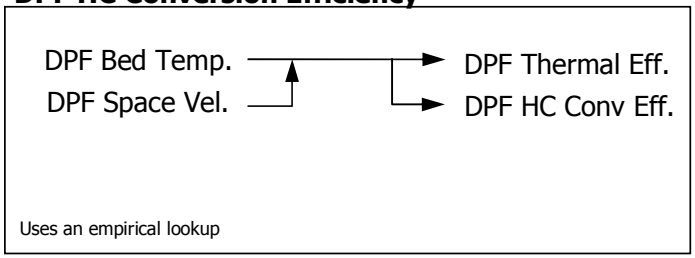


Uses direct calculation from exhaust mass flow

DPF Outlet NO2



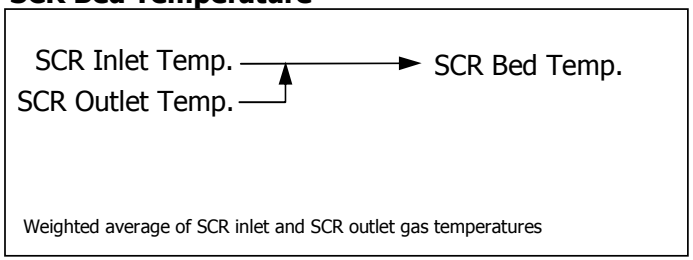
DPF HC Conversion Efficiency



Uses an empirical lookup

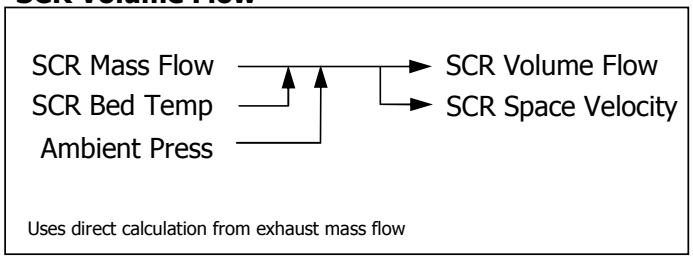
SCR System Parameters

SCR Bed Temperature



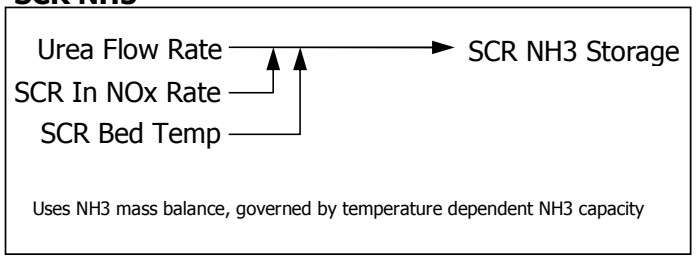
Weighted average of SCR inlet and SCR outlet gas temperatures

SCR Volume Flow



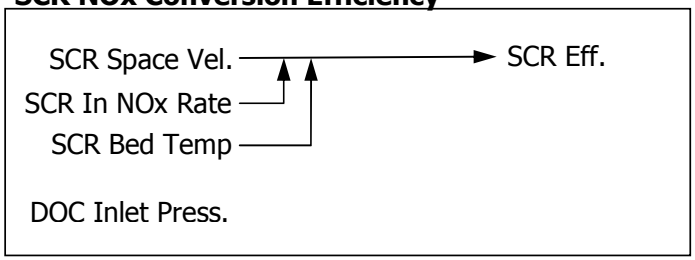
Uses direct calculation from exhaust mass flow

SCR NH3



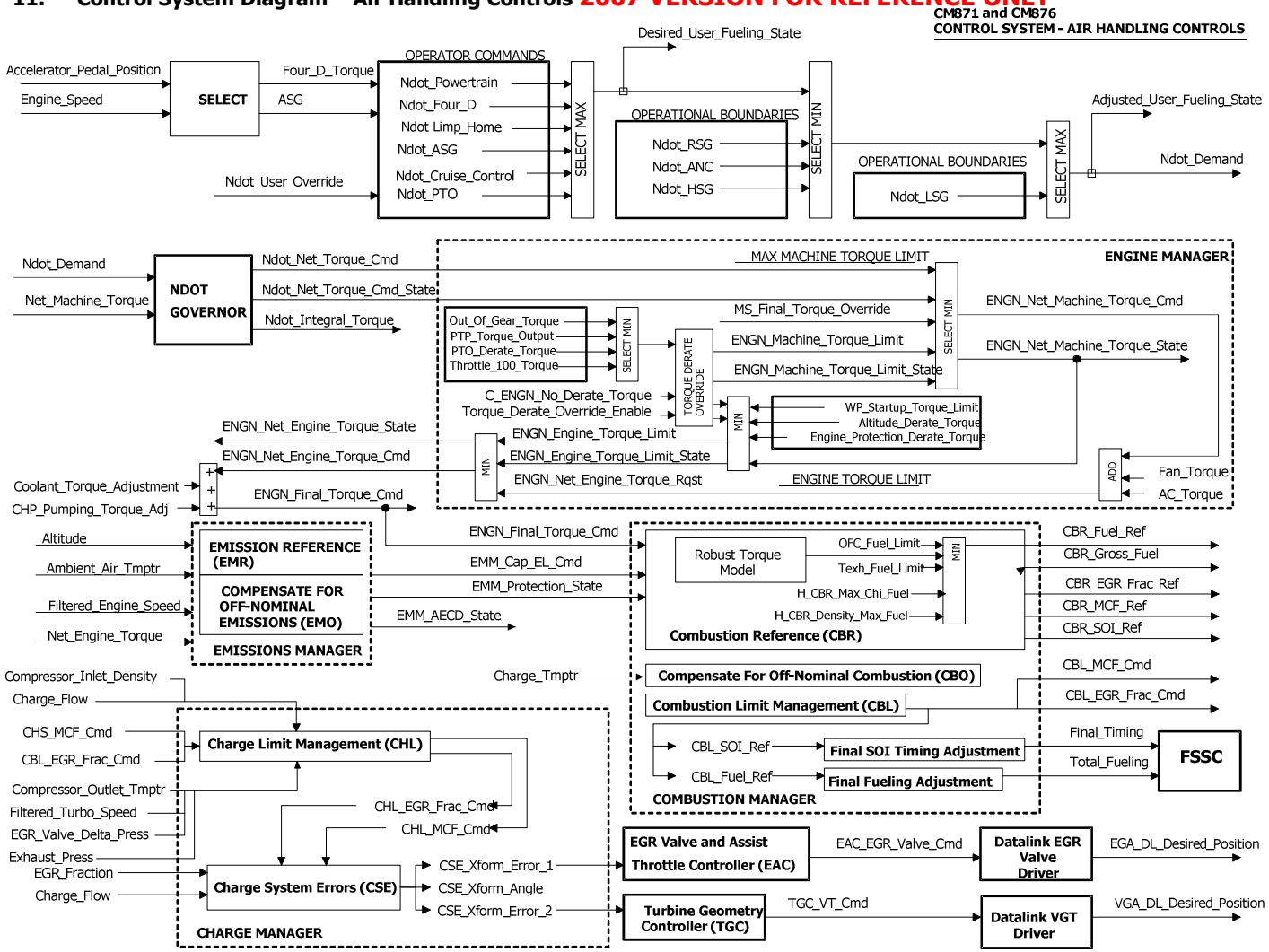
Uses NH3 mass balance, governed by temperature dependent NH3 capacity

SCR NOx Conversion Efficiency

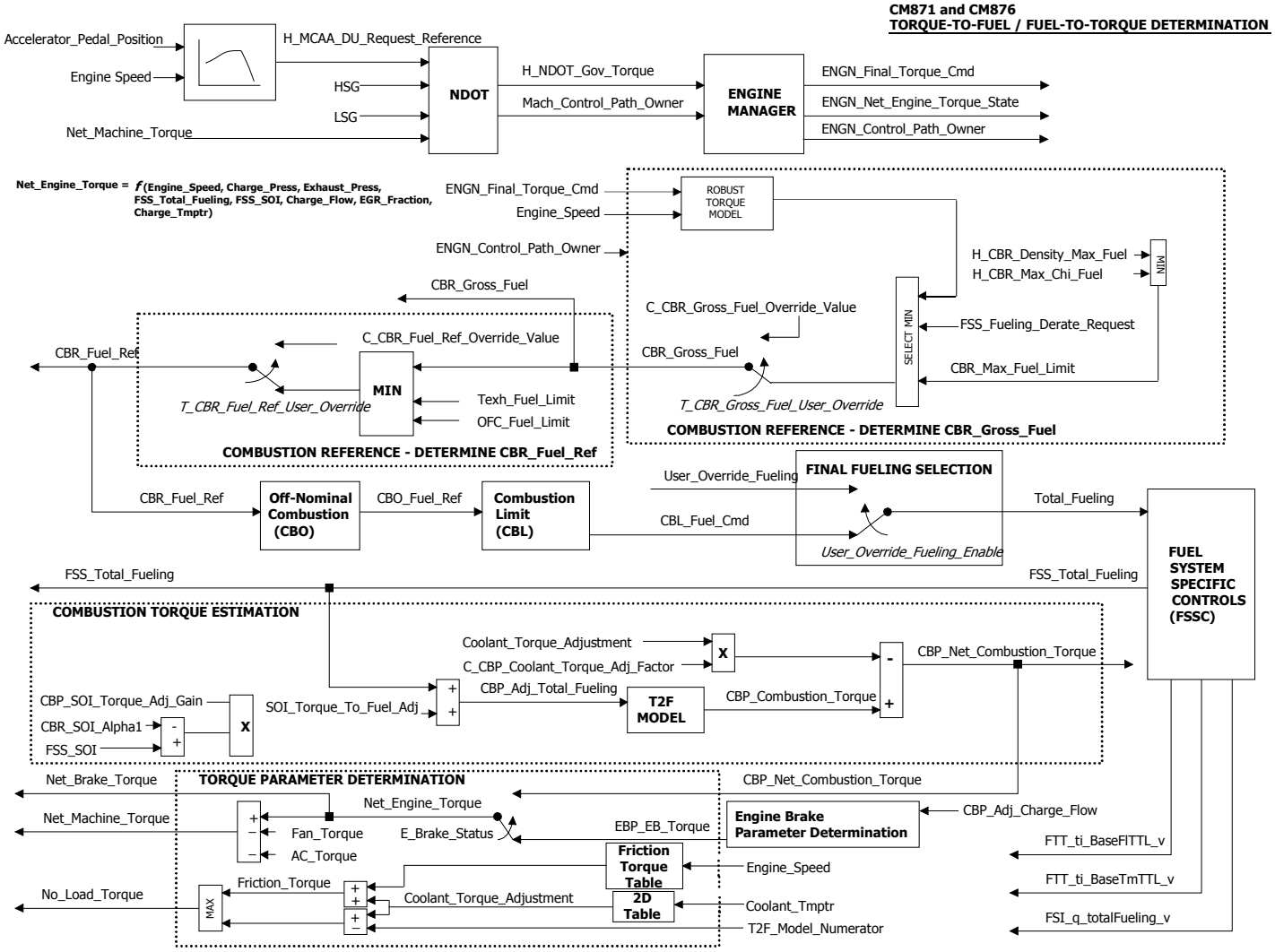


DOC Inlet Press.

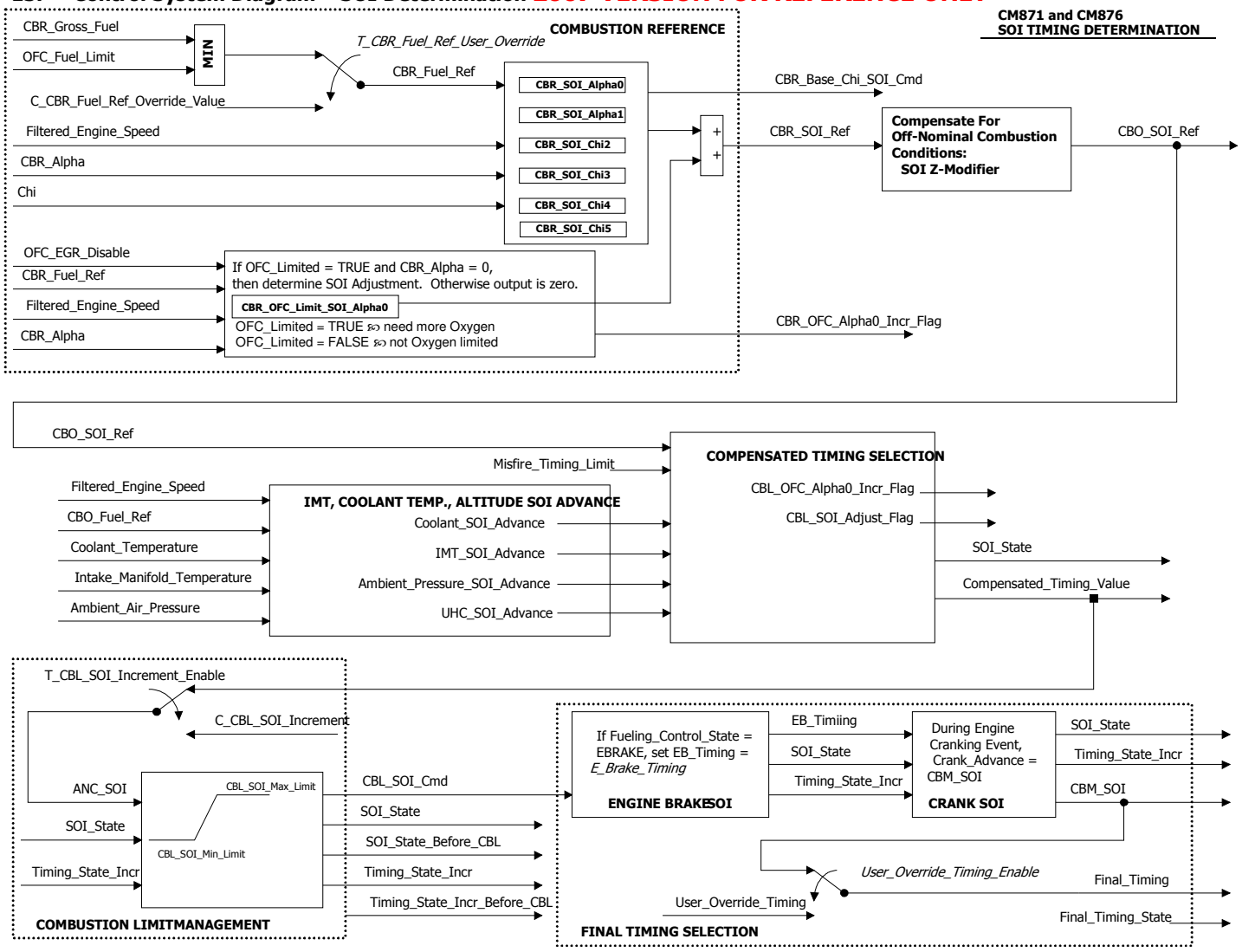
11. Control System Diagram – Air Handling Controls 2007 VERSION FOR REFERENCE ONLY



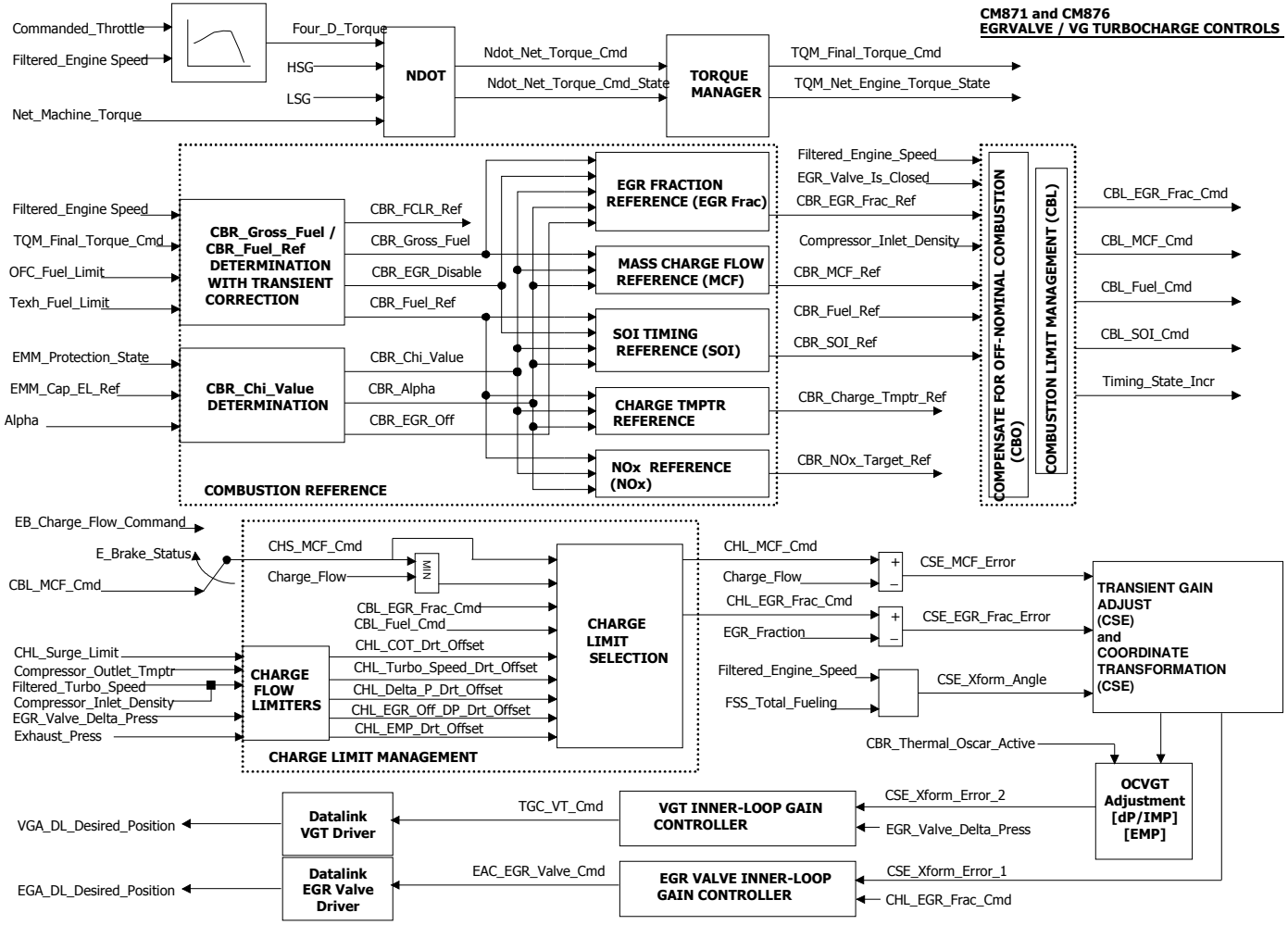
12. Control System Diagram – Torque To Fuel Determination 2007 VERSION FOR REFERENCE ONLY



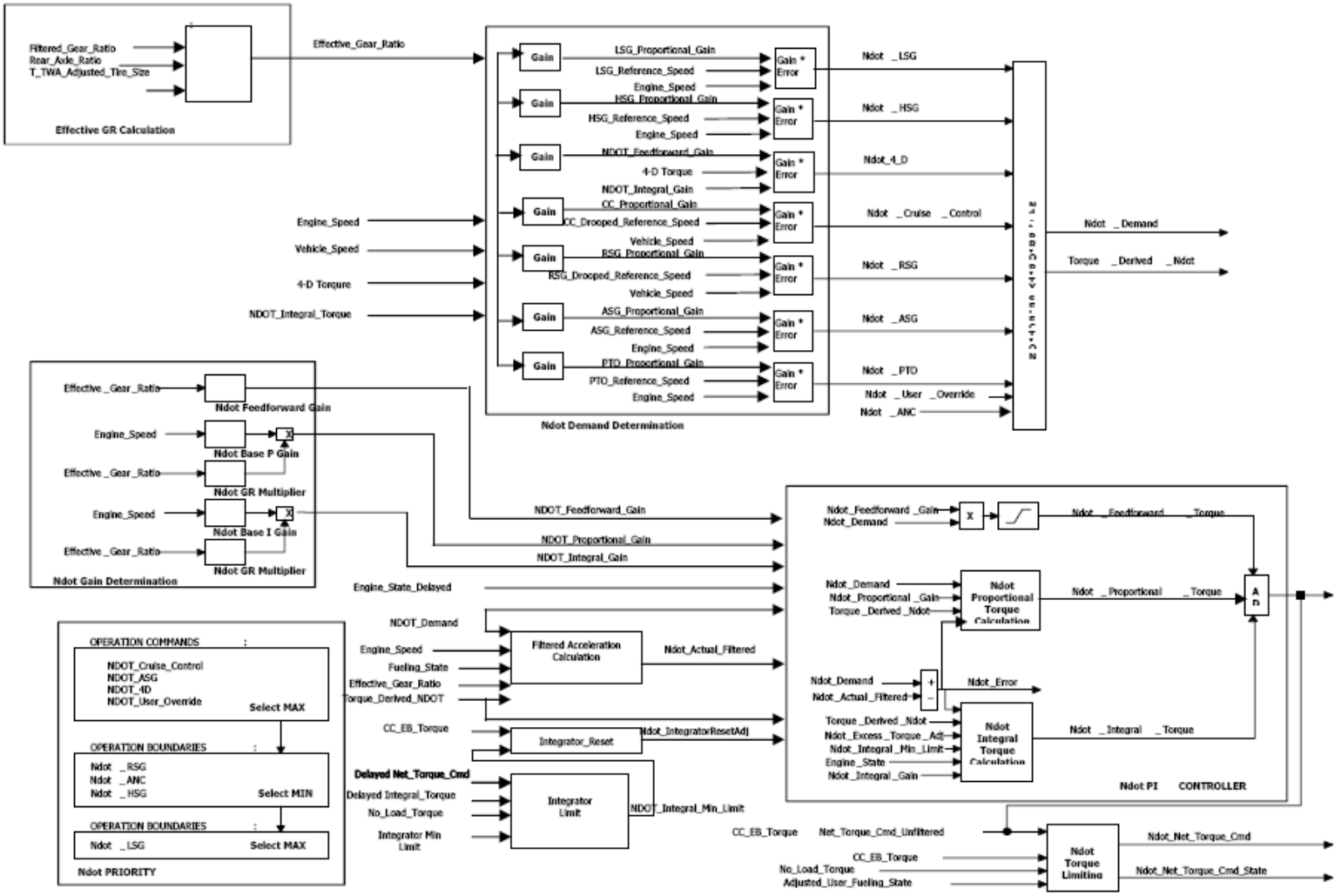
13. Control System Diagram – SOI Determination 2007 VERSION FOR REFERENCE ONLY



14. Control System Diagram – EGR Valve / VG Turbocharger Controls 2007 VERSION FOR REFERENCE ONLY

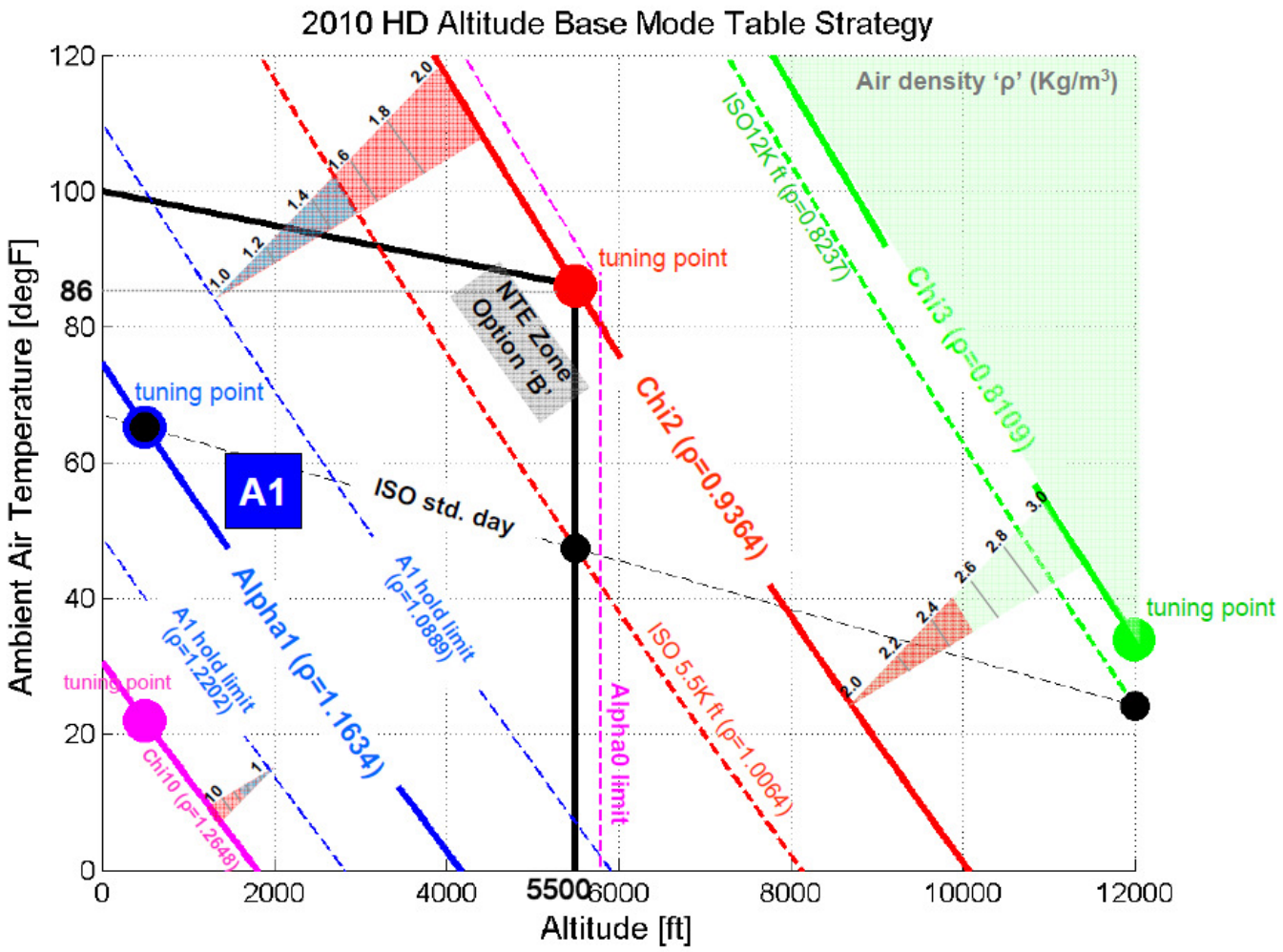


15. Control System Diagram – Ndot Governor Controls



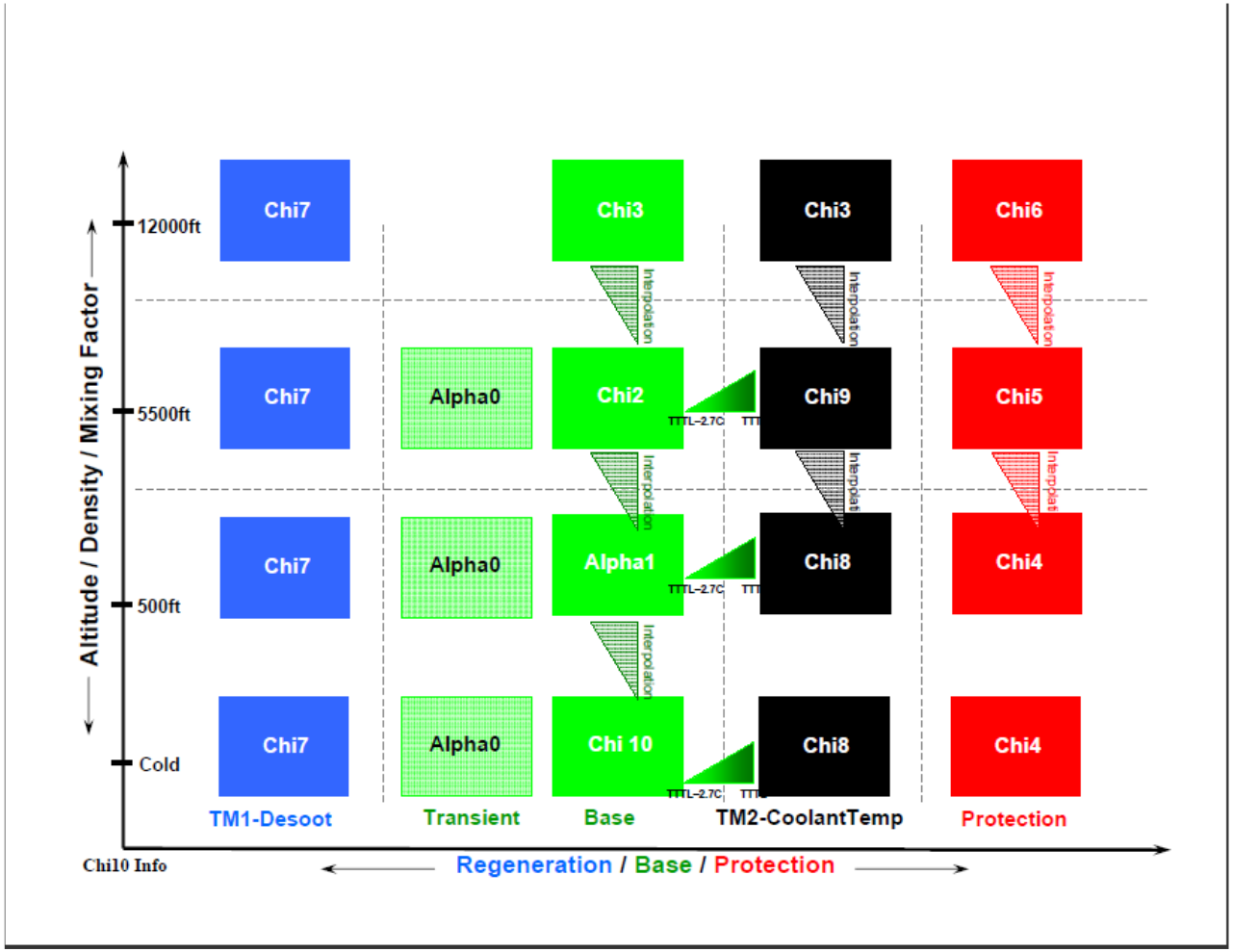
16. Control System Diagram – Chi Determination Strategy

Comment [BJO5]: Not updated



17. Interpreting Chi

Comment [BJO6]: t updated



18. Chi Table Mask

HD

CBR_Chi_Table_Mask — Single = Single Level — Comb = Combination of Levels

Alpha / Chi-Level

Value	0	1	2	3	4	5	6	7	8	9	10
1	Single										
2		Single									
3	Comb	Comb									
4			Single								
5	Comb		Comb								
6		Comb	Comb								
7	Comb	Comb	Comb								
8				Single							
12			Comb	Comb							
13	Comb		Comb	Comb							
16					Single						
32						Single					
48					Comb	Comb					
64							Single				
96						Comb	Comb				
128								Single			
256									Single		
257	Comb								Comb		
258		Comb							Comb		
259	Comb	Comb							Comb		
512										Single	
513	Comb									Comb	
516			Comb							Comb	
768									Comb	Comb	
769	Comb								Comb	Comb	
774		Comb	Comb						Comb	Comb	
1024											Single
1025	Comb										Comb
1026		Comb									Comb
1027	Comb	Comb									Comb
1280									Comb		Comb
1281	Comb								Comb		Comb
1282		Comb							Comb		Comb
1283	Comb	Comb							Comb		Comb

Chi Determination parameters

Engine_Speed	RPM	CBR_Base_Chi_High_Index	None
Net_Engine_Torque	N_m	CBR_Prot_Chi_High_Index	None
Total_Fueling	mg/stroke	CBR_SCRTM_Chi_High_Index	None
H_CBR_Compressor_Inlet_Density	kg/m3	CBR_TM1_Chi_High_Index	None
Ambient_Air_Press	kPa	CBR_TM2_Chi_High_Index	None
Compressor_Inlet_Tmptr	Deg_C		
Combustion_Control_Path_Owner	None	CBR_Base_Chi_Mixing_Factor	None
		CBR_Protection_Mixing_Factor	None
CBR_Protection_Chi_Flag	None	CBR_SCRTM_Mixing_Factor	None
EMM_Protection_state	None	CBR_Thermal_Mgt_Mixing_Factor	None
CBR_Alpha	None	CBR_Thermal_Mgt2_Mixing_Factor	None
CBR_Base_Chi_Low_Index	None	CBR_Base_Chi_WT_Factor	None
CBR_Prot_Chi_Low_Index	None	CBR_Prot_WT_Factor	None
CBR_SCRTM_Chi_Low_Index	None	CBR_TM1_WT_Factor	None
CBR_TM1_Chi_Low_Index	None	CBR_TM2_WT_Factor	None
CBR_TM2_Chi_Low_Index	None	CBR_SCRTM_WT_Factor	None
		CBR_Alpha_WT_Factor	None

19. Common Approach Parameter Lists

Engine Sensors and Actuators

Comment [BJO7]: Not Updated

20. Ambient Air Pressure / Compressor Inlet Pressure Sensor

(inm_inp_airp_lib, csdd_emissions_manager)

Air_Press_Sensor	kPa	Air_Press	kPa
Air_Press_Sensor_Volts	V	Air_Press_Source	---
Ambient_Air_Press	kPa	Ambient_Air_Press_Source	---
Ambient_Air_Press_Status	---	T_AMB_AirPressRLOC	---
C_AMB_AirPressSupplyID	---	T_AIP_AMB_User_Override_En	---
AIP_AMB_User_Override_Value	kPa	C_AMB_AirPressGlobalDefault	kPa
Compressor_Inlet_Press	kPa	Compressor_Inlet_Press_Source	---
Compressor_Inlet_Press_Status	---		

21. Charge Pressure Sensor/Boost Pressure Sensor

(inm_inp_icp_lib, csdd_charge_manager)

Charge_Press	kPa	Charge_Press_Sensor	kPa
Charge_Press_Sensor_Volts	V	Charge_Press_Status	---
C_AIP_ChargePressDefault	kPa	C_AIP_ChargePressSupplyID	---
C_ChargePressEnable	---	H_Charge_Press_Raw	counts
T_AIP_ChargePressRLOC	---	C_AIP_ChargePressOverride_En	---
C_AIP_ChargePressOverride_Raw	kPa	Boost_Pressure	kPa_G
Boost_Pressure_Status	---		

22. Charge Temperature Sensor / Intake Manifold Temperature

(inm_inp_ict _lib, csdd_charge_manager)

Charge_Tmptr	Deg_C	Charge_Tmptr_Status	---
Charge_Tmptr_Sensor_Volts	V	C_ChargeTmptrEnable	---
C_AIP_ChargeTmptrDefault	Deg_C	T_AIP_ChargeTmptrRLOC	---
H_Charge_Tmptr_Raw	counts	AIP_Charge_Tmptr_Override_Value	Deg_C
T_AIP_CHT_User_Override_En	---		
Intake_Manifold_Temperature	Deg_C		

23. Compressor Inlet Temperature / Ambient Air Temperature Sensor

(inm_inp_cit_lib, csdd_charge_manager, inm_amb_lib, csdd_emissions_manager)

Compressor_Inlet_Tmptr	Deg_C	Compressor_Inlet_Tmptr_Sensor	Deg_C
Compressor_Inlet_Tmptr_Raw	counts	Compressor_Inlet_Tmptr_Status	---
Compressor_Inlet_Tmptr_State	HEX	C_CompInletTmptrEnable	---
C_AIP_CompInTmptrDefault	Deg_C	Compressor_Inlet_Tmptr_Raw	counts
T_AIP_CompInTmptrRLOC	---	AIP_CompInTmptr_Override_Value	Deg_C
T_AIP_CompInTmptr_Ovrd_En	---	Ambient_Air_Tmptr_Status	---
Ambient_Air_Tmptr	Deg_C		

24. Coolant Level Sensor

(csdd_lube_cool)

Coolant_Level	---	T_AIP_Cool_Lev_User_Override_En	---
T_AIP_Coolant_Level_RLOC	---	AIP_Cool_Lev_Override_Value	---
C_AIP_Clvl_SensorSupply_ID	---		
C_Coolant_Level_Type_Select	---	**Diagnostics :**	
C_Coolant_Level_Sensor_Type	---	C_AIP_Clvl_OOR_Upper_Limit	---
Coolant_Level_Sensor_Voltage	V	C_AIP_Clvl_OOR_Lower_Limit	---

25. Coolant Temperature Sensor

(csdd_lube_cool)

T_Coolant_Temperature_Sensor_Enable	---	T_AIP_CT_User_Override	---
Coolant_Temperature	Deg_C	AIP_Cool_Tmptr_Override_Value	Deg_C
Coolant_Tmptr_Sensor_Volts	V	**Diagnostics:**	
T_AIP_Coolant_Temperature_RLOC	---	C_AIP_CT_Count_OOR_High_Limit	---
		C_AIP_CT_Count_OOR_Low_Limit	---

26. EGR Delta Pressure Sensor

(inm_inp_egrp_lib, csdd_charge_manager)

EGR_Delta_P_Autozero_Offset	kPa	**Autozero:**	
EGR_DeltaP_Sensor_Volts	V	T_EGR_Delta_P_Autozero_Offset	kPa
EGR_Delta_Press	kPa	C_EGR_AZ_EGR_Flow_Thd	Kg
H_EGR_Delta_Press_Raw	Counts	C_EGR_Delta_P_AZ_Tolerance	kPa
EGR_Delta_Press_Sensor	kPa	C_EGR_AZ_IMT_Thd	Deg_C
EGR_Delta_Press_AP	kPa	C_EGR_AZ_Coolant_Tmptr_Thd	Deg_C
EGR_Orifice_Delta_Press	kPa	C_EGR_AZ_ECM_Tmptr_Offset	Deg_C
		C_EGR_AZ_ECM_Tmptr_Thd	Deg_C
Diganostics:			
C_AIP_EGRDeltaPressULim	Counts		
C_AIP_EGRDeltaPressLLim	Counts		
Override:			
T_EGR_Delta_P_AZ_User_Override	---		
C_EGR_Delta_P_AZ_Override_Value	kPa		
T_AIP_EGRDeltaPress_Ovrd_En	---		
C_AIP_EGRDeltaPress_Ovrd_Val	kPa		

27. EGR Orifice Pressure Sensor

EGR_Orifice_Press_Status	---	EGR_Orifice_Press_Est	kPa
EGR_Orifice_Press	kPa	EGR_Orifice_Press_EStat	---
EGR_Orifice_Press_Sensor_Volts	V	EGR_Orifice_Press_IR_Low_Error	---
H_EGR_Orifice_Press_Raw	counts	**Diagnostics:**	
C_AIP_EGROrifPressDefault	kPa	C_AIP_EGROrificeTmptrULim	counts
		C_AIP_EGROrificeTmptrLLim	counts

28. EGR Orifice Temperature Sensor

(inm_inp_egrt_lib)

EGR_Orifice_Tmptr_Status	---	**Override:**	
EGR_Orifice_Tmptr	Deg_C	T_AIP_EGROrificeTmptr_Ovrd_En	---
EGR_Orifice_Tmptr_Sensor_Volts	V	C_AIP_EGROrificeTmptr_Ovrd_Val	Deg_C
H_EGR_Orifice_Tmptr_Raw	counts		
C_AIP_EGROrificeTmptrDefault	Deg_C	**Diagnostics:**	
EGR_Orifice_Tmptr_Source	---	C_AIP_EGROrificeTmptrULim	---
EGR_Orifice_Tmptr_State	---	C_AIP_EGROrificeTmptrLLim	---

29. EGR Valve Actuator

(csdd_charge_manager, csdd_dd_egr_blm, inm_egr_mon_lib)

EGR_Position	%	**Override:**	
EAC_EGR_Valve_Cmd	%	T_EGA_Cmd_User_Override	---
EGA_Position_Cmd	%	C_EGA_Cmd_Override_Value	%
EGA_Position_Ref_Filtered	%	T_EAC_User_Override	---
EGA_PWM_Abs_Duty_Cycle	%	C_EAC_Override_Value	%
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V	**Diagnostics:**	
EGA_Control_State	---	EGR_Driver_Failure	---
T_EGA_Cycle_Counter	Counts		

30. Exhaust Pressure Sensor

(inm_inp_emp_lib, csdd_charge_manager, inm_tpe_exhp_lib,

Exhaust_Press_Sensor_Volts	V	**In-Range:**	
Exhaust_Press	kPa	Exhaust_Press_IR_Low_Enable	---
Exhaust_Press_Sensor	kPa	C_Exhaust_Press_Torque_Thd	N_m
C_AIP_ExhaustPressDefault	kPa	C_Exhaust_Press_Speed_Thd	RPM
H_Exhaust_Press_Raw	Counts	C_Exhaust_Press_IR_Low_Thd	kPa
C_AIP_ExhaustPressULim	---	C_Exhaust_Press_Charge_Thd	kPa
C_AIP_ExhaustPressLLim	---		
		Estimate:	
Diagnostics:		T_TPE_Exhaust_Press_Est_Enable	---
C_AIP_ExhaustPressULim	---	Exhaust_Press_Est	kPa
C_AIP_ExhaustPressULim	---	Exhaust_Press_EStat	---
Exhaust_Pressure_Keyon_Error	---		
		Override:	
		T_AIP_ExhaustPress_Ovrd_En	---

		AIP_ExhaustPress_Ovrd_Val	kPa

31. Oil Pressure Sensor

(csdd_lube_cool)

Oil_Pressure_Absolute	kPa	**Override:**	
Oil_Pressure_Sensor_Volts	V	T_AIP_OP_User_Override	---
Oil_Pressure	kPa_G	AIP_Oil_Press_Override_Value	kPa
Diagnostics:			
C_AIP_OP_Count_OOR_Low_Limit	---		
C_AIP_OP_Count_OOR_High_Limit	---		

32. Oil Temperature Sensor

(csdd_lube_cool)

Oil_Tmptr_Sensor_Volts	V	C_AIP_OT_Count_OOR_High_Limit	---
Oil_Temperature	Deg_C	C_AIP_OT_Count_OOR_Low_Limit	---
Override:		**Diagnostics:**	
T_AIP_OT_User_Override	---	C_AIP_OT_Count_OOR_High_Limit	---
AIP_Oil_Tmptr_Override_Value	Deg_C	C_AIP_OT_Count_OOR_Low_Limit	---

33. Turbocharger Speed Sensor

(inm_inp_tsp_lib, csdd_charge_manager)

Filtered_Turbo_Speed	KRPM	**Diagnostics:**	
C_Turbo_Speed_Default	KRPM	Turbo_Speed_In_Range_Error	---
Turbo_Speed_Source	---	CHL_Turbo_Speed_Drt_Active	---
Turbo_Speed_State	HEX	CHL_Turbo_Drt_Fuel_Active	---
Turbo_Speed_Status	---	C_TSD_OverSpdThd	KRPM
		Turbo_Speed_High_Error	---
Estimate:		C_Turbo_Speed_Eng_Spd_Thd	RPM
Turbo_Speed_EStat	HEX		
Turbo_Speed_Est	KRPM	**Override:**	
		T_Turbo_Speed_Override_Enable	---
		T_Turbo_Speed_Override	KRPM

34. Turbocharger VG Actuator

(csdd_charge_manager)

TGC_VT_Cmd	%	**Diagnostics:**	
J39_VGT_Motor_Effort	None	H_VGT_Fault_Actuation	
J39_VGT_Actuator_Status	HEX	H_VGT_Fault_Command_Source	
J39_VGT_Actuator_State	None	H_VGT_Fault_Communication	
TAHR_VGT_LLim	%	H_VGT_Fault_Config_Mess_Timeout	
TAHR_VGT_ULim	%	H_VGT_Fault_Cust_ID_Mismatch	
VGA_DL_Mode_Command	HEX	H_VGT_Fault_Driver_Circuit	
VGA_DL_Desired_Position	%	H_VGT_Fault_Learned_Calibration	
J39_VGT_Temperature	Deg_C	H_VGT_Fault_Over_Temperature	
J39_VGT_Actuator_Position	%	H_VGT_Fault_Software_ID_Receive	
J39_VGT_Commanded_State	None	H_VGT_Fault_Software_Release	
J39_VGT_Position_Requested	%	H_VGT_Fault_Voltage_Low	
VGT_Actuator_Error_Status	None	H_VGT_Fault_Voltage_Mismatch	
		VGT_Driver_Failure	None
Override:		C_VGA_DL_StatusLB_Fault_Enable	
T_TGC_User_Override	None	C_VGA_DL_StatusUB_Fault_Enable	
C_TGC_Override_Value	%	C_J39_VGT_Status_Timeout	mSec
C_VGA_DL_Cmd_User_Override	None		
C_VGA_DL_Cmd_Override_Value	%		

35. Open Crankcase Ventilation

Crankcase_Press_Auto_Zero	kPa_G	Net_Engine_Torque	N_m
Crankcase_Press	kPa_G	Engine_Speed	RPM
T_CCP_Zero_Adjustment	kPa_G	OCV_Pressure_Relief_Active	None
H_CCP_Mod_High_Thd	kPa_G	Prev_emx_CCP_Trq_Drt_Idx	None
H_CCP_Sev_High_Thd	kPa_G	Boost_Pressure	kPa_G

XPI Fuel System Sensors:

Comment [BJO8]: Updated

36. EPS (Engine Position/Engine Speed) Sensors

Engine_Speed		RPM	EPS_s_Status		
EPS Main Sensor (Crank):			**EPS Backup Sensor (Cam):**		
H_EPS_s_MainLevel	(See Note 1)	---	H_EPS_s_BkupLevel	(See Note 1)	---
EPS_s_MainSync		---	EPS_s_BkupSync		---
H_EPS_s_MainSupplyStatus		---	H_EPS_s_BkupSupplyStatus		---
Sensor_Supply_3_Voltage		V	Sensor_Supply_2_Voltage		V

Note 1: The engine must be stopped. This parameter will toggle from 1 to 0 as a ferrous metal is passed in front of the sensor.

37. Fuel Rail Pressure Sensor FC451, FC452, FC516

APC_hp_Cmd	Bar	**Diagnostics:**	
FSI_hp_Cmd	Bar	C_APC_ct_DslPrsOORLLim	Counts
APC_hp_Fdbk	Bar	C_APC_ct_DslPrsOORULim	Counts
H_APC_hp_SyncFdbk	Bar	H_APC_ct_DslPrsRaw	Counts
H_APC_hp_FxdFdbk	Bar	H_APC_ct_DslPrsSupRaw	Counts
H_APC_s_DslPrsA2DError	---	APC_v_DslPrsSensor	v
Sensor_Supply_6_Voltage	v		

XPI Fuel System:

Comment [BJO9]: Updated

38. Boost Voltage Control (BVC) FC351

Engine_Speed	RPM	H_BVC_p_AdjustPWM	%
BVC_ct_MaxInjPulses	Counts	H_BVC_p_SlopeAdjustPWM	%
BVC_s_LowBoostVoltage	Noine	H_BVC_ti_LowBoostVoltage	Sec
BVC_vb_DriverVoltage	V	H_BVC_vb_IntegError	V
C_BVC_vb_BoostThreshold	V	C_BVC_vb_DesiredBoost	V
H_FDH_x_ErrorState	HEX		

39. Inlet Metering Actuator Driver Diagnostics (IMA) FC2311, FC271, FC272

Engine_Speed	RPM	H_ADD_s_PwmOnClearDiag	None
FSI_q_TotalFueling	Mg/str	H_ADD_s_PwmHSFault	None
APC_qr_cmd	gram/sec	H_ADD_ti_InmtPwmOffError	Sec
ADD_s_PWMDriverError	None	H_ADD_ti_InmtPwmOnError	Sec
H_ADD_ct_PwmFaultClear	Counts	P_ADD_s_PwmOffFault	None
H_ADD_ct_PwmOffNoFault	Counts	P_ADD_s_PwmOnFault	None
H_ADD_ct_PwmOnFault	Counts	APC_hp_Cmd	Bar
H_ADD_ct_PwmOnNoFault	Counts	APC_hp_Fdbk	Bar
H_ADD_s_InmtPwmOffError	None	APC_i_ImaCmd	A
H_ADD_s_InmtPwmOnError	None	H_IMA_i_Fltr	A
H_ADD_s_PwmOffClearDiag	None	H_IMA_p_Fdbk	%

40. Engine Speed Processing (EPS) FC731, FC689, FC115, FC778, FC2321, FC2322

Engine_Speed	RPM	H_EPS_ca_BkupPhase	Deg BTDC
EPS_s_SensorSelect	None	EPS_s_Error	HEX
EPS_s_Status	None	H_EPS_ct_HalfCycleToggle	None
EPS_s_MainSync	None	H_EPS_ct_MainStartInterrupt	None
EPS_s_BkupSync	None	H_EPS_s_BkupSupplyStatus	None
H_EPS_n_MainRPM	RPM	H_EPS_s_MainSupplyStatus	None
H_EPS_n_BkupRPM	RPM	P_EPS_ti_BkupGlitch	S
H_EPS_ct_MainAtBkupTooth	counts	P_EPS_ti_MainGlitch	S
H_EPS_th_ActMainAtBkupSync	counts	H_FDH_x_ErrorState	HEX
H_EPS_ct_MainAtBkupSync	counts	EPS_ca_Offset	Deg BTDC
EPS_ct_MainInterrupt	counts	Sensor_Supply_3_Voltage	V
EPS_ct_BkupInterrupt	counts	Sensor_Supply_2_Voltage	V
EPS_s_CamHalfCycle	None		

41. Injection Fuel Control & IFC

Engine_Speed	RPM	H_IFC_ca_FirstCylSOTTL_T[0-10]	Deg_BTDC
FSI_q_totalFueling_v	MG/STROKE	H_IFC_ca_SecondCylSOTTL_T[0-10]	Deg_BTDC
H_IFC_q_TotalFueling	MG/STROKE	H_IFC_ca_ThirdCylSOTTL_T[0-10]	Deg_BTDC
APC_hp_Fdbk	MG/STROKE	H_IFC_q_Quantity	MG/STROKE
H_FSI_ct_DisplayCylinder (See Note 1)	Counts	H_IFC_s_PulseActionMask	Hex
H_FSI_ca_DisplaySOI[0-10]	Deg_BTDC	H_IFC_ti_FirstCylOntime_T	MSec
H_FSI_q_DisplayQuantity[0-10]	MG/STROKE	H_IFC_ti_SecondCylOntime_T	MSec
H_FSI_s_DisplayPulseAction[0-10]	None	H_IFC_ti_ThirdCylOntime_T	MSec
H_FSI_ti_DisplayOnTime[0-10]	MSec	H_IFC_ti_MinSeparation	MSec
H_FSI_ti_DisplaySeparation[0-10]	Msec	H_IFC_ti_Separation	Msec

Note: H_FSI_ct_DisplayCylinder must not be zero (1-6 for Monarch)

42. Accumulator Pressure Control (APC) FC449, 553, 559, 1911

Engine_Speed	RPM	P_APC_i_ImaTrim	A
APC_hp_Cmd	Bar	P_APC_r_ImaTrimGain	None
FSI_hp_Cmd	Bar	H_APC_ct_DslPrsRaw	Counts
APC_hp_Fdbk	Bar	H_APC_ct_DslPrsSupRaw	Counts
APC_qr_Cmd	g/sec	APC_v_DslPrsSensor	V
H_APC_hp_SyncFdbk	Bar	H_APC_s_FdbkConfidence	None
H_APC_hp_FxdFdbk	Bar	H_APC_ti_ImaPWM	mSec
H_APC_hp_MdvPeak	Bar	H_APC_s_AdptStatus	None
P_APC_hp_MdvDrivePeak	Bar	H_APC_s_Error	None
H_IMA_i_Fltr	A	H_APC_ct_DriveMdvResets	Counts
H_IMA_p_Fdbk	%	P_APC_ct_TotalMdvResets	Counts
APC_i_ImaCmd	A	P_APC_ct_TotalMdvPeakCounts	Counts
H_APC_hp_Deviation	Bar	H_APC_s_MdvStatus	None
H_APC_qr_Fueling	g/sec	H_APC_qr_WindupError	g/sec
H_APC_qr_KdTerm	g/sec	H_APC_s_Crank	None
H_APC_qr_KffTerm	g/sec	H_APC_s_LimpHome	None
H_APC_qr_KiTerm	g/sec	H_APC_s_PRDEnable	None
H_APC_qr_KpTerm	g/sec	H_APC_s_Crank	None
H_APC_qr_Limit	g/sec	H_FDH_x_ErrorState	HEX
H_APC_qr_DslFueling	g/sec	Sensor_Supply_6_Voltage	v

Note: 20 to 40 msec rate EDM data log preferred.

43. Lift Pump Control (LPC) FC2265, 2266

Engine_Speed	RPM	H_LPC_ti_Test	Sec
H_LPC_i_LpcFltr	A	H_LPC_v_Batt	V
H_LPC_p_LiftPumpDuty	%	H_LPC_x_OverrideState	None
H_LPC_s_TestStateReq	None	LPC_s_LiftPumpCmd	None
H_LPC_s_TestStatus	None	LPC_t_InputTmptrSelected	None
H_LPC_ti_CrankingTimer	Sec	LPC_ti_LftPmpKeyOnTime	Sec
H_LPC_ti_KeyOnTimer	Sec	FSI_hp_Cmd	Bar
H_LPC_ti_PrimeModeTimer	Sec	APC_hp_Fdbk	Bar
H_LPC_ti_RuntoStopTimer	Sec	H_FDH_x_ErrorState	HEX

44. Fuel System Injector Actuator Driver Diagnostics (ADD) FC322-325, FC331, FC332

Engine_Speed	RPM	H_ADD_x_DfrCyl6	HEX
FSI_q_TotalFueling	Mg/str	H_ADD_x_FsrLatchOff	HEX
APC_qr_cmd	gram/sec	H_ADD_x_FsrPulseTerm	HEX
ADD_s_Misfire	None	H_ADD_x_LatchOffClearDiag	HEX
ADD_x_DieselInjDriverError	None	H_ADD_x_PulseTermClearDiag	HEX
H_ADD_x_DfrCyl1	HEX	P_ADD_x_LatchOffFault	HEX
H_ADD_x_DfrCyl2	HEX	P_ADD_x_PulseTermFault	HEX
H_ADD_x_DfrCyl3	HEX	H_ADD_ct_FsFaultClear	Counts
H_ADD_x_DfrCyl4	HEX	H_ADD_ti_FsrFaultRetry	Sec
H_ADD_x_DfrCyl5	HEX	H_FDH_x_ErrorState	HEX

45. Fuel System Fault Derate Handler (FDH)

Engine_Speed	RPM	Total_Fueling	MG/STROKE
Combustion_Control_Path_Owner	None	H_FSI_q_TotalFueling	MG/STROKE
H_FDH_ct_DerateWinner	None	Apc_hp_Fdbk	Bar
H_FDH_ct_PumpDemandWinner	None	APC_hp_Cmd	Bar
H_FDH_ct_ShutDownWinner	None	H_APC_s_Error	HEX
H_FDH_q_MustDerate	MG/STROKE	EPS_s_Error	HEX
H_FDH_q_PrsBasedLimit	MG/STROKE	H_APC_s_MdvStatus	None
H_FDH_r_TrqDerate	None		
H_FDH_s_PumpDemand	None		
H_FDH_x_ErrorState	HEX		

H_FDH_x_ErrorState	**Bit**		**Bit**
Mechanical Dump Valve Popped	0		
Accumulator pressure is high	1	ADD OFB/Adler (IMV) error	16
Accumulator pressure is low	2	Accumulator pressure bank-to-bank imbalance	17
Accumulator pressure is very low	3	Accumulator pressure is very high	18
Accumulator pressure signal is electrically out of range (OOR)	4	EPS half cycle is unknown	19
Accumulator pressure signal is not rational (PRD)	5	Shut down from other FSM CEN ECM	20
EPS main sensor problem or running on backup sensor	6	Large derate from other FSM CEN ECM	21
EPS backup sensor problem	7	Moderate derate from other FSM CEN ECM	22
EPS phase error between main and backup sensor	8	CEN failure	23
One or more injectors misfire	9	Pressure command derate from other FSM CEN ECM	24
Injector Boost Voltage is too low	10	Not Used	25
IMV electrical resistance error	11	Not Used	26
Inlet Metering Valve Flow Demand is high	12	Not Used	27
Inlet Metering Valve Flow Demand is low	13	Not Used	28
ADD Injector error	14	Not Used	29
ADD FSPWM0 (Lift Pump) error	15	Not Used	30

46. Fuel Systems Interface (FSI)

Combsution_Control_Path_Owner	None	FSI_x_CylCutOutMask	HEX
Engine_Speed	RPM	FSI_ct_CbmVersion	HEX
H_FSI_q_TotalFueling	MG/STROKE	FSI_ct_ECM	None
FSI_q_TotalFueling	MG/STROKE	H_FSI_ct_DisplayCylinder	Counts
FSI_v_Batt	V	H_FSI_ca_DisplaySOI[0-10]	Deg_BTDC
FSI_s_Key	None	H_FSI_q_DisplayQuantity[0-10]	MG/STROKE
H_FSI_s_Cranking	None	H_FSI_s_DisplayPulseAction[0-10]	None
FSI_t_Coolant	None	H_FSI_ti_DisplayOnTime[0-10]	MSec
APC_hp_Cmd	Bar	H_FSI_ti_DisplaySeparation[0-10]	Msec
APC_hp_Fdbk	Bar	FSI_ca_QTDSOTTL	D_CRK
FSI_hp_Cmd	Bar	FSI_qr_QTDFlow	g/sec
FSI_x_CylCutOutBaseMask	HEX	FSI_s_QTDActive	None

Note: H_FSI_ct_DisplayCylinder must not be zero (1-6 for Monarch)

47. Fuel Rate Limiter (FRL)

Engine_Speed	RPM	H_FRL_r_NegRateLim	BAR/Sec
APC_hp_Cmd	BAR	H_FRL_r_PosRateLim	BAR/Sec
APC_hp_Fdbk	BAR	H_FRL_s_PulseUpdateFlag	None
FSI_q_TotalFueling	MG/STROKE	H_FRL_s_RateLim	HEX
H_FRL_q_TotalFuel	MG/STROKE	H_FRL_ti_ActiveTime	Sec

48. Manufacturer Injector Trim (MIT) FC2765

H_MIT_x_Error	None		
_Injector_Barcode_Cylinder1	None	T_MIT_x_InjectorCode_Cyl1	HEX
_Injector_Barcode_Cylinder2	None	T_MIT_x_InjectorCode_Cyl2	HEX
_Injector_Barcode_Cylinder3	None	T_MIT_x_InjectorCode_Cyl3	HEX
_Injector_Barcode_Cylinder4	None	T_MIT_x_InjectorCode_Cyl4	HEX
_Injector_Barcode_Cylinder5	None	T_MIT_x_InjectorCode_Cyl5	HEX
_Injector_Barcode_Cylinder6	None	T_MIT_x_InjectorCode_Cyl6	HEX

49. Manufacturing Injector Trim Adjustment

Manufacturing Injector Trim Adjustment

Procedure for Changing Injector Barcodes by Operation in Calterm III

Note: This procedure is valid for both 5pt and 6pt trim codes. Each trim code contains information indicating to the MIT algorithm whether 5pt or 6pt trimming is to be utilized.

1. Make sure engine is stopped and key switch is on.
2. Check/Set C_MIT_s_Enable to 3FF.
3. In Calterm III, go to **Monitor/Send Operation**.
4. In the "Send Operation" window, choose "**ExecuteOperation**" in the box under "Select Command".
5. Type "**10BB**" in the box under "OperationID".
6. In the box under "Arguments", type in the cylinder number and the injector barcode. For example, "**1 4A 4B 32 47 33 32 36 32 4E**". The 1st number is the cylinder number for which you want to change the injector barcode. The 2nd to the 10th numbers are the 9 characters of the injector barcode in HEX format. There should be a space between each number as shown above.
   Injector Barcodes are usually provided in a string of ASCII characters, for example: JK2G3262N. These ASCII characters must be converted into HEX format as shown above. See the table below for conversion.
7. Click on "Send".
8. Wait for a few seconds, the middle of the "Send Operation" window will be updated. Monitor "**Response ID**".
   - If it is "SUCCESS", you can close the "Send Operation" window OR repeat step 5 to 8 to change the injector barcode for another cylinder.
   - If it is "INVALID_CYLINDER_NUMBER", double check the cylinder number you put in the box under "Arguments", it should be between 1 and 6.
   - If it is "INVALID_BARCODE", double check the injector barcode you put in.
   - If it is "DUPLICATE_BARCODE", double check whether you have more than 3 duplicate injector barcodes for the engine.
9. After you execute the operation for each cylinder, monitor parameters "_Injector_Barcode_Cylinder1" to "_Injector_Barcode_Cylinder6" (shown in ASCII format). They should match the corresponding 9-character injector barcodes marked on the injector.
10. In Calterm III, go to **Command/Save Changes** to save the injector barcodes. If this step is not executed the barcodes will revert to their original values at the next power cycle.
11. Power down and power up the module.
12. Verify that the injector Barcodes, "_Injector_Barcode_Cylinder1" to "_Injector_Barcode_Cylinder6, remain as set in step 9.

Note: The injector barcodes reside in a portion of ECM memory not written to during download. They will not reset to zero or change during subsequent downloads. They can only be changed per this procedure or using appropriate Cummins Inc., tools.

Manufacturing Injector Trim Adjustment

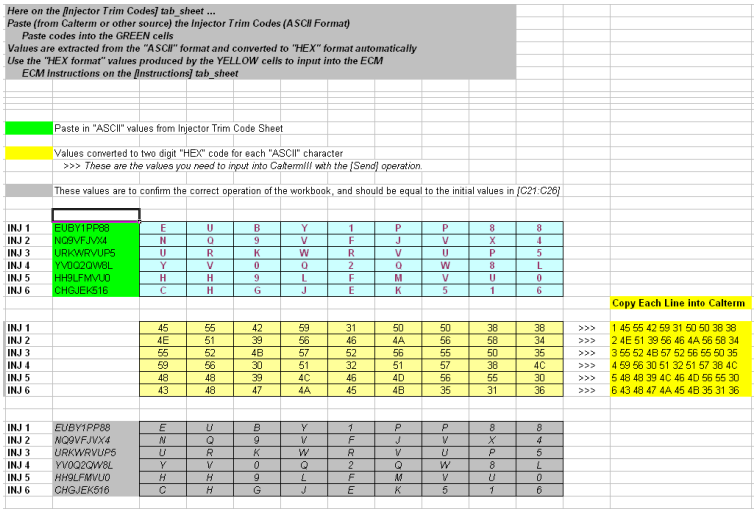
Injector Barcodes are usually provided in as string of ASCII characters, for example: JK2G3262N. The barcodes are typically marked on the individual injectors. These ASCII characters must be converted into HEX format as shown above in order to enter them into the ECM via the "Send Operation".

Table 1 Conversion of MIT ASCII Characters into HEX

ASCII Character	ASCII Char in HEX		ASCII Character	ASCII Char in HEX
0	30		G	47
1	31		H	48
2	32		J	4A
3	33		K	4B
4	34		L	4C
5	35		M	4D
6	36		N	4E
7	37		P	50
8	38		Q	51
9	39		R	52
A	41		T	54
B	42		U	55
C	43		V	56
D	44		W	57
E	45		X	58
F	46		Y	59

50. Injector Trim Decoder .xls

Located on G:\Performance Development\Documents\Common Approach to Diagnostics\CM 2250 Engines



Here on the [Injector Trim Codes] tab_sheet ...
Paste (from Calterm or other source) the Injector Trim Codes (ASCII Format)
Paste codes into the GREEN cells
Values are extracted from the "ASCII" format and converted to "HEX" format automatically
Use the "HEX format" values produced by the YELLOW cells to input into the ECM
ECM Instructions on the [Instructions] tab_sheet

Paste in "ASCII" values from Injector Trim Code Sheet

Values converted to two digit "HEX" code for each "ASCII" character
>>> These are the values you need to input into Calterm!!! with the [Send] operation.

These values are to confirm the correct operation of the workbook, and should be equal to the initial values in *[C21:C26]*

INJ 1	EUBY1PP88	E	U	B	Y	1	P	P	8	8		
INJ 2	NQ9VFJVX4	N	Q	9	V	F	J	V	X	4		
INJ 3	URKWRVUP5	U	R	K	W	R	V	U	P	5		
INJ 4	YV0Q2QW8L	Y	V	0	Q	2	Q	W	8	L		
INJ 5	HH9LFMVU0	H	H	9	L	F	M	V	U	0		
INJ 6	CHGJEK516	C	H	G	J	E	K	5	1	6		
												Copy Each Line into Calterm
INJ 1		45	55	42	59	31	50	50	38	38	>>>	1 45 55 42 59 31 50 50 38 38
INJ 2		4E	51	39	56	46	4A	56	58	34	>>>	2 4E 51 39 56 46 4A 56 58 34
INJ 3		55	52	4B	57	52	56	55	50	35	>>>	3 55 52 4B 57 52 56 55 50 35
INJ 4		59	56	30	51	32	51	57	38	4C	>>>	4 59 56 30 51 32 51 57 38 4C
INJ 5		48	48	39	4C	46	4D	56	55	30	>>>	5 48 48 39 4C 46 4D 56 55 30
INJ 6		43	48	47	4A	45	4B	35	31	36	>>>	6 43 48 47 4A 45 4B 35 31 36
INJ 1	*EUBY1PP88*	*E*	*U*	*B*	*Y*	*1*	*P*	*P*	*8*	*8*		
INJ 2	*NQ9VFJVX4*	*N*	*Q*	*9*	*V*	*F*	*J*	*V*	*X*	*4*		
INJ 3	*URKWRVUP5*	*U*	*R*	*K*	*W*	*R*	*V*	*U*	*P*	*5*		
INJ 4	*YV0Q2QW8L*	*Y*	*V*	*0*	*Q*	*2*	*Q*	*W*	*8*	*L*		
INJ 5	*HH9LFMVU0*	*H*	*H*	*9*	*L*	*F*	*M*	*V*	*U*	*0*		
INJ 6	*CHGJEK516*	*C*	*H*	*G*	*J*	*E*	*K*	*5*	*1*	*6*		

51. Injector Drift Compensation (IDC) Scenario Guide

Scenario	InSite		Calterm		Comments
	Procedure	**Result**	**Procedure**	**Result**	
Updating from any HD build phase 71001 or prior to any HD build phase 71002 or later with IDC enabled. Installed injectors have > 250 hrs	Use InSite as normal to install calibration.	When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation - none is needed.	Use Calterm as normal to install calibration.	When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation - none is needed.	With Insite or Calterm injector reference hour values (P_IDC_ti_RunTimeRefHour[0-5]) will default to 65535 after any download. 65535 sets compensation to zero. If MIT trims are not altered the default reference hour values will not change.
Updating from any HD build phase 71001 or prior to any HD build phase 71002 or later with IDC enabled. Installed injectors have <250 hr	Use InSite as normal to install calibration.	When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation. If no further action is taken, the injectors will creep in from low fueling.	Use Calterm as normal to install the calibration. When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation. If injector hours are known or can be estimated, the reference hour data can be entered into the reference hour array: P_IDC_ti_RunTimeRefHour[0-5] **Please see Note 1 setting injector hours.** Be sure to execute a complete key cycle powerdown after injector hour entry to commit hours to powerdown memory.	If injector reference hours are not entered following the download the software will default to no compensation and the injectors will creep in from low fueling. If injector reference hours are entered and the calculated injector hours are less that 250, the injectors will be compensated as necessary.	With Insite or Calterm injector reference hour values (P_IDC_ti_RunTimeRefHour[0-5]) will default to 65535 after any download. 65535 sets compensation to zero. If MIT trims are not altered the default reference hour values will not change.
Updating from any build with IDC disabled to any 71002 or later build with IDC enabled. New Injectors already installed.	Use InSite as normal to install calibration.	When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation. If no further action is taken, the injectors will creep in from low fueling.	Use Calterm as normal to install the calibration. When the download completes, the injector reference hour data will be unpopulated. The software will default to no compensation. If injector reference hours are known or can be estimated, the hour data can be entered into the reference hour array: P_IDC_ti_RunTimeRefHour[0-5] **Please see Note 1 setting injector hours.** Be sure to execute a complete key cycle powerdown after injector hour entry to commit hours to powerdown memory.	If injector reference hours are not entered following the download the software will default to no compensation and the injectors will creep in from low fueling. If injector reference hours are entered and the calculated injector hours are less that 250, the injectors will be compensated as necessary.	With Insite or Calterm injector reference hour values (P_IDC_ti_RunTimeRefHour[0-5]) will default to 65535 after any download. 65535 sets compensation to zero. If MIT trims are not altered the default reference hour values will not change.
Software updates from any HD build phase 71002 or later with IDC enabled to any other HD build phase 71002 or later with IDC enabled. Injector hours < 250	Use InSite as normal to install calibration.	InSite save and restore will restore any injector reference hour data. Injectors will be compensated as necessary.	Before re-calibration save the injector reference hour data array from the ecm: P_IDC_ti_RunTimeRefHour[0-5] Download the calibration update. Restore the injector reference hour data saved prior to download to the ecm. **Please see Note 1 Setting injector hours.** Be sure to execute a complete key cycle powerdown after injector hour entry to commit hours to powerdown memory.	Injectors will be compensated as necessary.	Recommend verifying that H_IDC_ti_InjectorOperatingHours[x] are set to the desired value.

Scenario	InSite		Calterm		Comments
	Procedure	**Result**	**Procedure**	**Result**	
Software updates from any HD build phase 71002 or later with IDC enabled to any other HD build phase 71002 or later with IDC enabled. Injector hours > 250	Use InSite as normal to install calibration.	InSite save and restore will restore any injector reference hour data. Injectors should be compensated as necessary.	Download the calibration update.	Injector hours will default to 65535. Compensation is set to zero after 250 hours. Injectors will be uncompensated.	Compensation is not necessary for injectors over 250 hours.
Injectors are changed to new injectors in an engine equipped with a HD phase 71002 or later calibration with IDC enabled.	Install the injector(s) as usual, be sure to update the MIT trim(s).	When the MIT trims are changed, the injector hours for the associated injectors will be reset to zero. Injectors will be compensated as necessary.	Install the injector(s) as usual, be sure to update the MIT trim(s).	When the MIT trims are changed, the injector reference hours for the associated injectors will be reset. Injectors will be compensated as necessary for the next 250 hours.	MIT trims must be entered. Recommend verifying that the approriate values of H_IDC_ti_InjectorOperatingHours[x] and P_IDC_ti_RunTimeRefHour[x] are set when an injector change occurs.
Injector(s) are changed to used injector(s) in an engine equipped with a HD phase 71002 or later calibration with IDC enabled.	Update MIT trim(s) with Insite as usual. This should be avoided if possible.	When MIT trim(s) are changed, the hours for the associated injector(s) will be reset. The injector(s) will most probably overfuel for 250 hours.	Update MIT trim(s) with Calterm as usual. If the injector reference hours can be estimated or are known, the hours can be entered in the array: P_IDC_ti_RunTimeRefHour[0-5] If injector hours are not known, the hour array can be populated with 65535. **Please see Note 1 setting injector hours.** Be sure to execute a complete key cycle powerdown after injector hour entry to commit hours to powerdown memory.	If known injector hours are entered, the injectors will be compensated as desired. If 65535 is entered and the injectors have less than 250 hours, the injectors will creep in from under fueling.	MIT trims must be entered. Recommend verifying that the approriate values of H_IDC_ti_InjectorOperatingHours[x] and P_IDC_ti_RunTimeRefHour[x] are set when an injector change occurs. MIT trims must be entered, thus, injector reference hours will reset whether it is desired or not.
ECM Changed with IDC enabled	Use InSite as normal to install calibration.	Injectors will initially overfuel until IDC has calculated injector hours at over 250. The entry of MIT codes into the new ECM will reset the injector hours to zero.	Record injector reference hours before changing the ECM or estimate inejctor reference hours. Set IDC injector reference hours based on the recorded or estimated value or set inector hours to no compensation if desired. **Please see Note 1 setting injector hours.**	If no reference run hours are entered, injectors will overfuel until IDC has reached 250 hrs. The entry of MIT codes into the new ECM will reset the injector reference hours to zero. If valid injector reference hours are set, the injectors will be compensated as necessary.	Recommend verifying that H_IDC_ti_InjectorOperatingHours[x] are set to the desired value.
Injectors are swapped between cylinders as part of Trouble Shooting	InSite can not deal with this event. If injectors are swapped for TS do not change trim codes, DO restore injectors that are to remain in the engine to their original positions.	If trim codes are moved the injector hours will reset and compensation will start over for those injectors.	Care must be take to know injector reference hours if injecors are to be moved between cylinders and left there. Record the injector reference hour data making sure that the reference hours remain with their injector. **Please see Note 1 setting injector hours.**	If trim codes are moved the injector hours will reset and compensation will start over for those injectors. If hours are retained and restored to their injectors, the injectors will be compensated as necessary.	If using Calterm, recommend recording H_IDC_ti_InjectorOperatingHours[x] before injector swaps and verifying that the injecor hours have remained with their injecors when the work is finished.

Parameter Estimates and Predictions:

Comment [BJO10]: Not Updated

52. Ambient Parameters Estimate

(inm_amb_lib)

Ambient Air Temperature Estimate:

Ambient_Air_Tmptr	Deg_C	Vehicle_Speed	Km/hr
Ambient_Air_Tmptr_Status	---	Compressor_Inlet_Tmptr	Deg_C
Fresh_Air_Flow	Kg/min	Compressor_Inlet_Tmptr_Status	---
Fresh_Air_Flow_Source	---	Compressor_Inlet_Tmptr_Rise	Deg_C

Altitude Estimate:

Altitude	m	Ambient_Air_Press_Status	---
Ambient_Air_Press	kPa		

Humidity Estimation (engineering use only):

Ambient_Relative_Humidity	---	CBR_Feul_Ref	Mg/stroke
Engine_Speed	RPM		

53. Charge Flow Estimate

(inm_chp_chgflw_lib)

Estimate:

Charge_Tmptr	DEG_C	Charge_Press_Status	---
CHP_Intake_Manifold_Tmptr_R	DEG_K	Charge_Tmptr_Status	---
CHP_Volumetric_Efficiency	---	Exhaust_Press_Status	---
Charge_Flow	KG/MIN	Charge_Flow_Status	---

Volumetric Efficiency:

CHP_Veff_Mach	---	Exhaust_Press	kPa
CHP_Veff_Sqrt	---	Charge_Press	kPa
CHP_Flow_Area_Constant	---	Exhaust_Press_Disabled	
CHP_Veff_Mode			

Speed Density Equation:

CHP_Volumetric_Efficiency	---	CHP_Intake_Manifold_Tmptr_K	DEG_k
Charge_Press	kPa	C_CHP_Engine_Displacement	L

54. Charge Pressure Estimate

(inm_tpe_imp_lib)

C_Charge_Press_Estimate_Select
- 0 = Without Turbo Speed
- 1 = With Turbo Speed

T_Charge_Press_Estimate_Enable

Estimate With Turbo Speed

Charge_Press_Est	kPa	TPE_Pressure_Ratio_Estimate	---
Compressor_Inlet_Press	kPa	TPE_Pressure_Ratio_Scale	---
Engine_Speed	RPM	Charge_Press_EStat	---
TPE_Corrected_Turbo_Speed	---		

Estimate Without Turbo Speed

Charge_Press_Est	kPa	Charge_Tmptr	Deg_C
Compressor_Inlet_Press	kPa	CBM_Fdbktorquefuel	Mg/stroke
Compressor_Inlet_Density	Kg/m3	EGR_Valve_Is_Closed	---
TPE_Corrected_Engine_Speed	RPM_sqrt(K)_/_K	Charge_Press_EStat	---
Engine_Speed	RPM		

Status with Turbo Speed:

Turbo_Speed_Status	---	Air_Press_Status	---
Filtered_Turbo_Speed	KRPM	EGR_Position_Source	---
Compressor_Inlet_Tmptr_Status	---	EGR_Delta_Press_Status	---
Charge_Tmptr_Status	---	Exhaust_Press_Status	---

Status without Turbo Speed:

Air_Press_Status	---	Compressor_Inlet_Tmptr_Status	---
Charge_Tmptr_Status	---		

55. Charge Temperature Estimate

(inm_inp_ict_lib)

Charge_Tmptr_Est	Deg_C	CBR_Alpha	---
Charge_Tmptr_EStat	---	cbr_chi[]	
Compressor_Inlet_Tmptr	Deg_C	H_CBR_Chi_Value	
Compressor_Inlet_Tmptr_Status	---	TPE_MT_AP	Deg_C
T_Charge_Tmptr_Estimate_Enable	---	Intake_Manifold_Temperature	Deg_C

56. Compressor Inlet Density Estimate

(inm_tpe_cid_lib)

Estimate:

Compressor_Inlet_Density	kg/m3	Compressor_Inlet_Tmptr	Deg_C
		Compressor_Inlet_Press	kPa

Source:

Compressor_Inlet_Density_Status	---	Compressor_Inlet_Press_Status	---
Compressor_Inlet_Tmptr_Status	---		

57. Compressor Inlet Pressure Estimate

(inm_amb_lib)

Compressor_Inlet_Press	kPa	Compressor_Inlet_Pressure_Drop	kPa
Air_Press	kPa	Fresh_Air_Flow	Kg/min

58. Compressor Outlet Temperature Estimate

(inm_tpe_cot_lib)

COT Estimate:

Compressor_Outlet_Tmptr	Deg_C	TPE_CIT_Sqrt	---
T_TPE_COT_Estimation_Enable	---	Filtered_Turbo_Speed	None
TPE_COT_Est_Enable	---	TPE_Corrected_Air_Flow	---
Compressor_Inlet_Tmptr	Deg_C	TPE_Corrected_Turbo_Speed	---
Fresh_Air_Flow	kg/min	TPE_COT_To_Inlet_Tmptr_Ratio	---
Compressor_Inlet_Press	kPa	C_TPE_COT_Global_Default	Deg_C

COT Estimate Source:

Compressor_Outlet_Tmptr_Status	---	Turbo_Speed_Status	---
Compressor_Inlet_Tmptr_Status	---	Compressor_Inlet_Press_Status	---
Fresh_Air_Flow_Status	---		

59. EGR Fraction Estimate

(inm_chp_egrflw_lib)

EGR Fraction Estimate:

EGR_Fraction	---	Engine_Speed	RPM
EGR_Flow	kg/min	CHP_O2_Flow_Delay	s
Charge_Flow	kg/min	CHP_EGR_Flow_Delay	s
CBP_O2_Frac_Residual_Bef_Delay	---	EGR_Valve_Is_Closed	---
CHP_EGR_Flow_Before_Delay	kg/min		

Downstream EGR Flow Model:

CHP_Downstream_EGR_Flow	kg/min	EGR_Position_Status	---
EGR_Position	%	EGR_Orifice_Delta_Press_Status	---
EGR_Orifice_Delta_Press	kPa	EGR_Orifice_Tmptr_Status	---
Charge_Press	kPa	EGR_Flow_Source	---
EGR_Orifice_Tmptr	Deg_C		

60. EGR Valve and Engine Delta Pressure Estimates

(inm_tpe_dp_lib)

NOTE: Engine_Delta_Press = EGR_Valve_Delta_Press * (-1)

EGR Valve and Engine Delta Pressure Estimate:

EGR_Valve_Delta_Press	kPa	Exhaust_Press	kPa
Engine_Delta_Press	kPa	Charge_Press	kPa
EGR_Orifice_Delta_Press	kPa	EGR_Delta_Press	kPa

EGR Valve and Engine Delta Pressure Estimate Source:

EGR_Valve_Delta_Press_Status	---	Exhaust_Press_Status	---
Engine_Delta_Press_Status	---	Charge_Press_Status	---
EGR_Orifice_Delta_Press_Status	---		

61. Exhaust Flow Estimation

(inm_chp_airflw_lib)

Exhaust_Flow	kg/min	V_ATP_fg_Turbo_Out	kg/min
Fresh_Air_Flow	kg/min	Fuel_Delivery_Rate_Per_Min	kg/min

62. Exhaust Pressure Estimate

(inm_tpe_exhp_lib)

T_TPE_Exhaust_Press_Est_Enable	---	C_TPE_Exhaust_Press_Est_DPF_En	---
Exhaust Pressure Estimate:			
Exhaust_Press_Est	kPa	EGR_Position	%
Engine_Speed	RPM	Charge_Press	kPa
TGC_VT_Cmd	%	Ambient_Air_Press	kPa
Total_Fueling	Mg	Fresh_Air_Flow	Kg/min
Exhaust Pressure Estimate Source:			
Exhaust_Press_EStat	---	Charge_Press_Status	---
EGR_Position_Status	---	VGT_Position_Status	---

63. Exhaust Temperature Estimate

(inm_tpe_exht_lib)

Exhaust Temperature Estimate:			
Exhaust_Tmptr	Deg_C	Charge_Press	kPa
Exhaust_Metal_Tmptr	Deg_C	Charge_Tmptr	Deg_C
Engine_Speed	RPM	TPE_Invalid_Model	---
CBP_Charge_Fuel_Ratio	---	TPE_Delta_Exhaust_Tmptr	Deg_C
FSS_SOI	CRANK_DEG_BTDC	TPE_Energy_Fraction	Deg_C
		CBM_Fdbk_Accumulator_Press	Bar
Exhaust Temperature Source:			
Exhaust_Tmptr_Status	---	Charge_Tmptr_Status	---
Charge_Flow_Status	---	TPE_Invalid_Model	---
Charge_Press_Status	---		

64. Fresh Air Flow Estimation

(inm_chp_airflw_lib)

Fresh Air Flow Estimate:			
Fresh_Air_Flow	kg/min	Charge_Flow	kg/min
EGR_Flow	kg/min		
Fresh Air Flow Source:			
Fresh_Air_Flow_Status	---	EGR_Flow_Status	---
Charge_Flow_Status	---		

65. IMT Prediction

(inm_chp_law1_lib)

CHP_Predicted_IMT	Deg_C	Coolant_Temperature	Deg_C
Charge_Tmptr	Deg_C	Ambient_Air_Tmptr	Deg_C
CBR_Base_Chi_Factor	---	EGR_Valve_Is_Closed	---
Exhaust_Tmptr	Deg_C		

66. IMT Lead-Lag Compensation

(inm_inp_ict_lib)

TPE_IMT_AP	Deg_C	Charge_Tmptr_Status	HEX
TPE_IMT_After_Lead	Deg_C	TPE_IMT_Lead_Term	Deg_C
Charge_Tmptr	Deg_C	T_INM_ICT_Lead_Enable	---
TPE_IMT_Lead_Time_Constant	s	C_Bench_Test	---

67. NOx Estimation

(inm_cbp_lib)

H_CBR_Nox_Out_Rate_Model	g/hr	EGR_Fraction	----
Intake_Manifold_Temperature	Deg_C	CBM_FdbkTotalFuel	mg/stroke
CBR_Main_SOI	BTDC	CBM_FdbkTorqueFuel	mg/stroke
Engine_Speed	RPM	FCR_Instantaneous_Fuel_Rate	L/hr
Charge_Flow	Kg/min	CBM_Fdbk_AccumulatorPress	Bar_A
H_Total_O2_in_Cylinder		CBM_Air_Fuel_Ratio	---
Charge_Tmptr	Deg_C	CBR_Pilot1_SOI	BTDC
Charge_Press	kPa	CBR_Pilot1_Fuel_Quantity_Final	mg/stk
CBR_Post1_SOI	BTDC	CBR_Pilot2_SOI	mg/stk
CBR_Post1_Fuel_Quantity_Final	mg/stk	CBR_Pilot2_Fuel_Quantity_Final	mg/stk
CBR_Post2_SOI	BTDC	CBR_Post2_Fuel_Quantity_Final	mg/stk

68. O2 Estimation

(inm_cbp_lib)

CBM_O2_Out_Frac	----	Fresh_Air_Flow	kg/min
H_CBM_O2_Out_Frac_Status	----	Engine_Speed	RPM
		Total_Fueling	mg/stk

69. Particulate Matter Estimation

(inm_cbp_lib)

Engine_Speed	RPM	H_PME_MCF_Cmd_Filtered	None
H_PME_PM_Factor_AFR	None	H_PME_SootRateClamped	None
H_PME_PM_Factor_AFR_Ref	None	H_PME_SootRateUnclamped	None
H_PME_PM_Factor_EGR_Frac	None	H_PME_SootRateUnclamped_Ref	None
H_PME_PM_Factor_EGRSOI	None	PME_GainFactor	None
H_PME_PM_Factor_Fuel	None	PME_M270_SootRate_Ref	g/hr
H_PME_PM_Factor_PIF	None	CBM_PM_Out_Rate	g/hr
H_PME_PM_Factor_PRS	None	CBM_Comb_Load_Ref	g/hr
H_PME_PM_Factor_PRSPIF	None	CBM_Fdbk_AccumulatorPress	Bar
H_PME_PM_Factor_SOI	None	CBP_Air_Fuel_Ratio	None
H_PME_PM_Factor_Speed	None	CBR_Main_SOI	Deg_BTDC
H_PME_PMFuel	None	EGR_Fraction	None
H_PME_FuelDeliveryAftGain	None	CBR_Pilot1_Fuel_Quantity_Final	Mg/str
CBR_Pilot1_SOI	None	CBR_Pilot2_Fuel_Quantity_Final	Mg/str
CBR_Pilot2_SOI	None	CBR_Post1_Fuel_Quantity_Final	Mg/str
CBR_Post1_SOI	None	CBR_Post2_Fuel_Quantity_Final	Mg/str
CBR_Post2_SOI	None		

70. Robust Torque Model / Torque to Fuel

(csdd_combustion_manager => COMB_combustion_control_loop_demands => ACTTOR)

Engine_Speed	RPM	CBP_Comb_Torque_Limit	N_m
H_CBM_Friction_Torque	N_m	CBP_Charge_Fuel_Ratio	---
H_CBM_Net_Torque_Demand	N_m	CBP_Air_Fuel_Ratio	---
CHP_Pumping_Torque	N_m	CBP_Net_Combustion_Torque	N_m
CBM_Indicated_Fuel	Mg/stroke	CBP_Combustion_Torque	N_m
OFC_Fuel_Limit	Mg/stroke	H_NDOT_Gov_Torque	N_m
CBM_Indicated_Trq_Fuel	Mg/stroke	CBM_Indicated_Trq_Cmd	N_m
CBM_FdbkTorqueFuel	Mg/stroke	Accelerator_Pedal_Position	%
H_NDOT_FF_Torque	N_m	H_NDOT_PP_Torque	N_m
H_NDOT_INT_Torque	N_m		

71. Saturation Temperature Estimate

(inm_tpe_sat_lib)

Saturation Temperature Estimate:

Charge_Saturation_Tmptr	Deg_C	CBP_Phi	---
Exhaust_Saturation_Tmptr	Deg_C	Ambient_Air_Tmptr	kPa
Exhaust_H2O_PP	kPa	Ambient_Relative_Humidity	---
Charge_H2O_PP	kPa	Ambient_Air_Press	kPa
Charge_Press	kPa	TPE_Charge_H2O_Mole_Fraction	---
EGR_Fraction	---	TPE_Exhaust_H2O_Mole_Fraction	---
CBR_Base_Chi_Factor	---		

Charge H2O Mole Fraction:

TPE_Charge_H2O_Mole_Fraction	---	TPE_Saturation_Vapor_Press	kPa
CBR_Base_Chi_Factor	---	TPE_Vapor_Partial_Press	kPa
EGR_Fraction	---	Ambient_Relative_Humidity	---
CBP_Phi	---	Ambient_Air_Press	kPa
TPE_Inlet_H2O_Mole_Fraction	---	Charge_Saturation_Tmptr	Deg_C
Ambient_Air_Tmptr	Deg_C		

Inlet Mole Fraction of Water:

TPE_Inlet_H2O_Mole_Fraction	---	Ambient_Air_Tmptr	Deg_C
TPE_Vapor_Partial_Press	kPa	Ambient_Relative_Humidity	---
Ambient_Air_Press	kPa	TPE_Saturation_Vapor_Press	kPa

Exhaust H2O Mole Fraction:

TPE_Exhaust_H2O_Mole_Fraction	---	TPE_Inlet_H20_Mole_Fraction	---
CBR_Base_Chi_EGR_Frac_Cmd	---	Ambient_Air_Press	kPa
EGR_Fraction	---	Ambient_Air_Tmptr	Deg_C
CBP_Phi	---	Ambient_Relative_Humidity	---

Saturation Temperature Status

Charge_Saturation_Tmptr_Status	---	Charge_Press_Status	---
Exhaust_Saturation_Tmptr_Status	---	Ambient_Air_Press_Status	---
		Ambient_Air_Tmptr_Status	---

72. Turbine Out Temperature Estimation

(csdd_charge_manager_lib)

Turbine_Out_Tmptr	Deg C	TPE_Turb_Out_Press	kPa
V_ATP_tr_DOC_In	Deg_K	TPE_Turbine_Pressure_Ratio_Term	%
Exhaust_Metal_Tmptr	Deg C	Turbine_Out_Tmptr_Reg	Deg C
Exhaust_Press	kPa	Turbine_Out_Tmptr_Mod	Deg C
Exhaust_Flow	kg/min	CBR_Thermal_Oscar_Active	----
TPE_Turbiine_Press_Ratio	----	TPE_TOT_EFF	%
Filtered_Turbo_Speed	KRPM		

73. Turbo Speed Estimation

(inm_tpe_tsp_lib)

T_Turbo_Speed_Estimation_Enable	---		

Turbo Speed Estimate

Turbo_Speed_Est	KRPM	TPE_CIT_Sqrt	---
Engine_Speed	RPM	TPE_Corrected_Turbo_Speed_Est	---
Compressor_Inlet_Press	kPa	TPE_Turbo_Speed_Scale	---
Charge_Press	kPa		

Turbo Speed Estimate Status

Turbo_Speed_EStat	---	Compressor_Inlet_Tmptr_Status	---
Compressor_Inlet_Press_Status	---	Charge_Press_Status	---
T_Turbo_Speed_Estimation_Enable	---		

74. UHC (Unburned HydroCarbon) Estimation

(inm_cbp_lib)

Engine_Speed	RPM	CBP_UHC_BMEP	kPa
Total_Fueling	mg/stroke	CBP_Tmptr_At_BDC	Deg_K
Final_Timing	Deg_BTDC	CBP_Gamma_Final	----
Charge_Tmptr	Deg_C	CBP_Tmptr_At_Ref_SOI	Deg_K
Coolant_Temperature	Deg_C		
CBP_Net_Combustion_Torque	N_m		

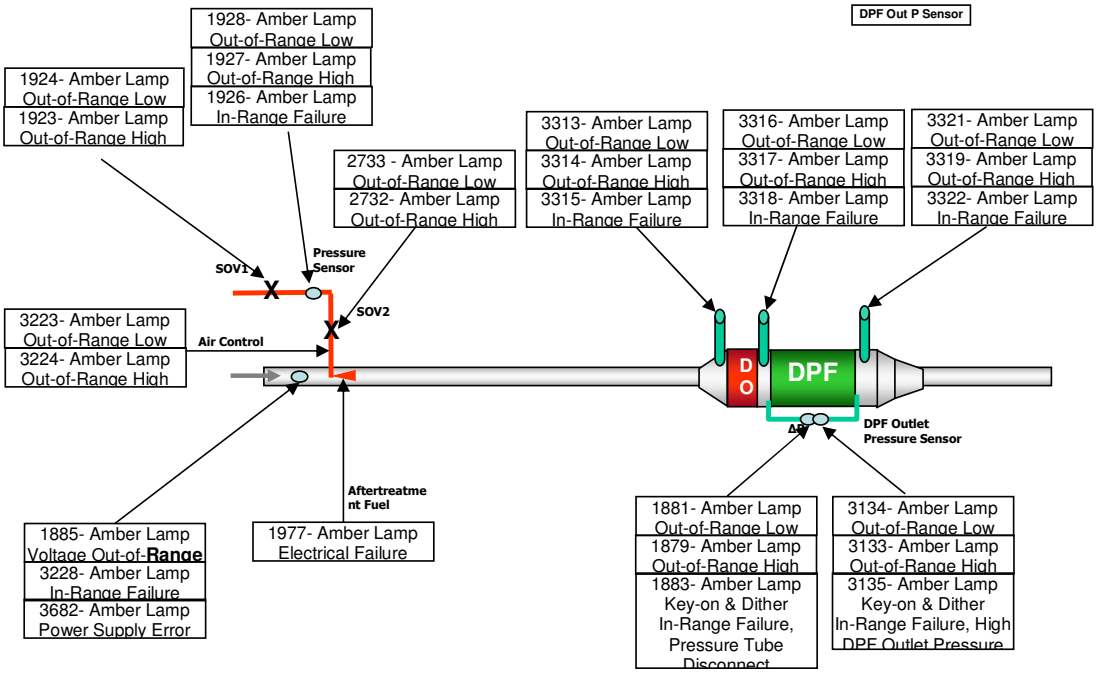
75. Unburned Hydrocarbon Timing Control (UHC IMT/Coolant Advance)

Engine_Speed	RPM	Charge_Flow	kg/min
Total_Fueling	MG/STROKE	Final_Timing	deg_BTDC
Charge_Tmptr	Deg_C	Combustion_Control_Path_Owner	None
Boost_Pressure	kPa_G	C_CBP_Gamma_Spd_Adj	None
Coolant_Temperature	Deg_C	Charge_Press_Est	kPa
Charge_Tmptrr_EStat	None	Ambient_Relative_Humidity	None
Charge_Press_IR_Fault_Cnt	counts	FIW_Lowest_Coolant_Temp	Deg_C
Charge_Press_Status	None	CBP_Gamma_Final	None
TPE_IMT_AP	Deg_C	CBP_UHC_BMEP	kPa
T_EMO_UHC_AECD_Enable	None	CBP_Gamma_Final	None
UHC_Advance	deg_BTDC	CBP_UHC_BMEP	kPa
C_EPS_ca_Main_Offset	deg_BTDC		

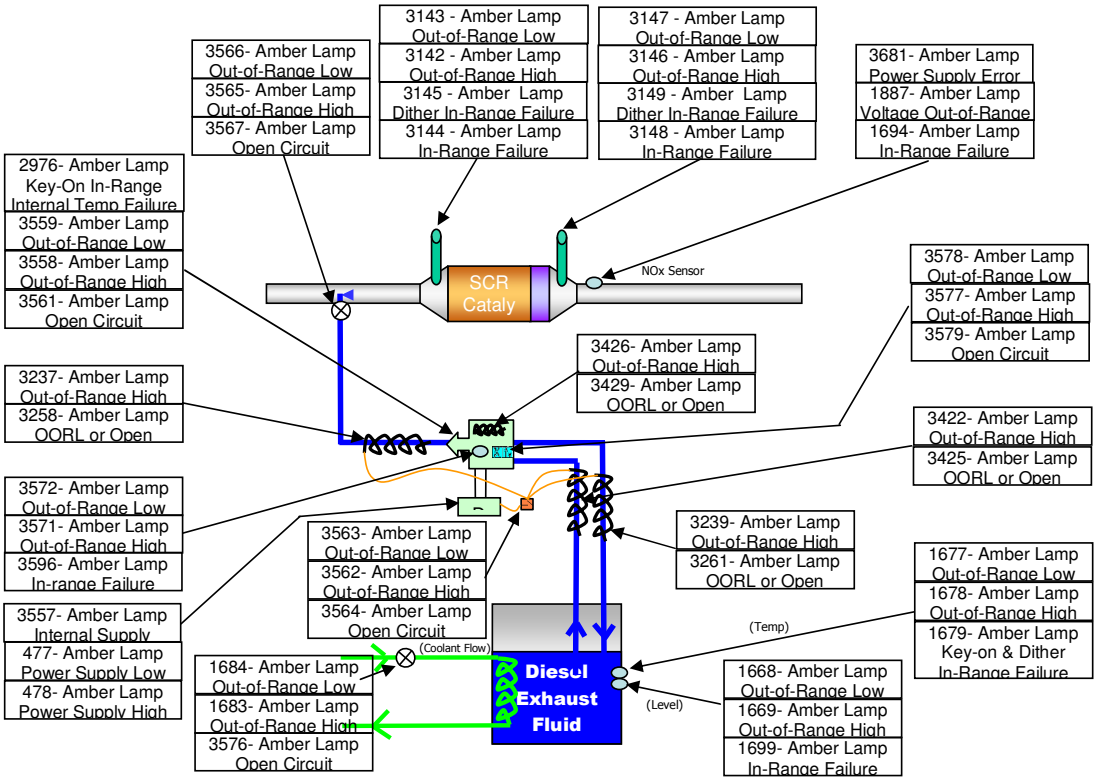
After-Treatment Diagnostics

Comment [BJO11]: Updated

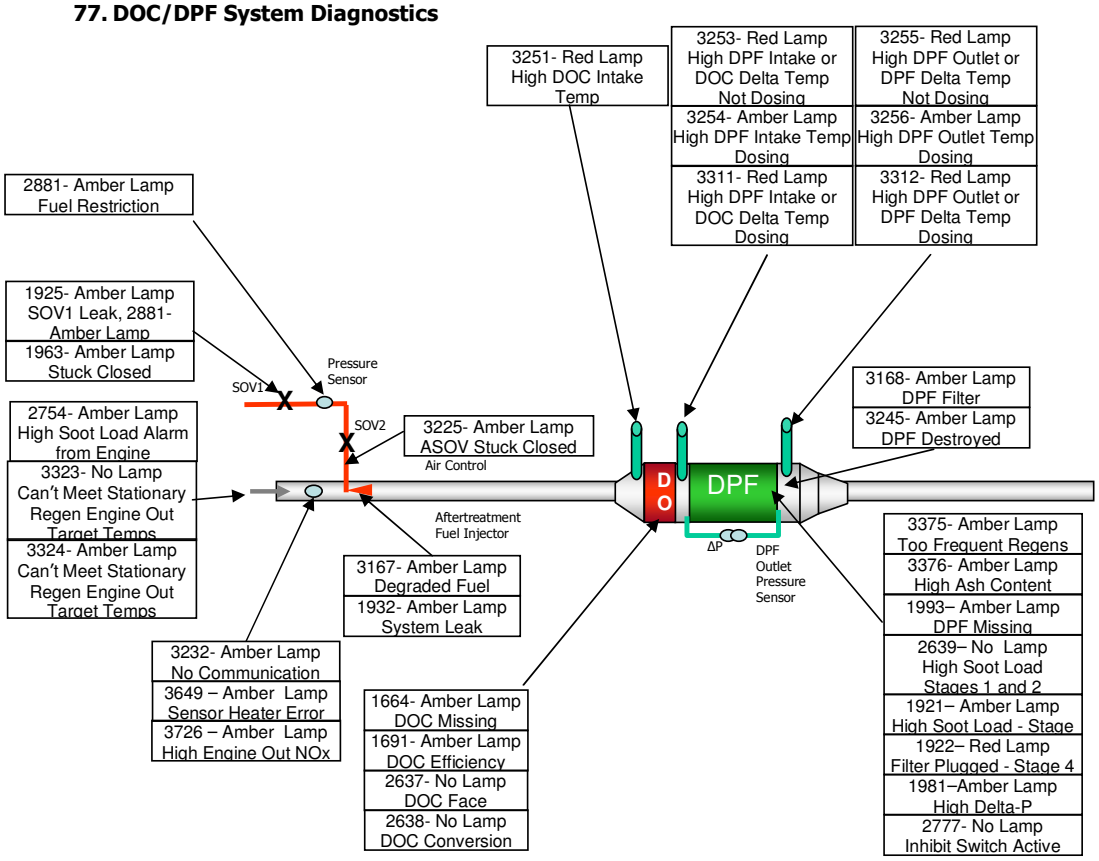
76. Aftertreatment Out-of-Range and In-Range Diagnostics



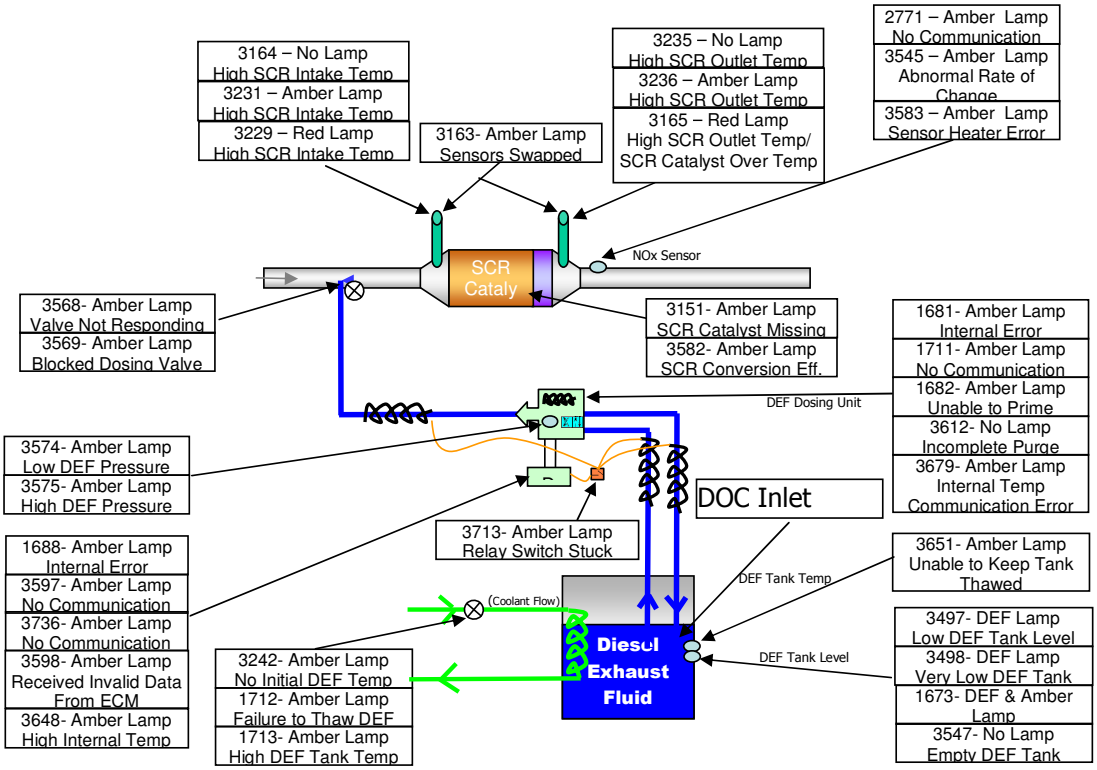
HD 2010 COMMON APPROACH TO CONTROL SYSTEM DIAGNOSTICS



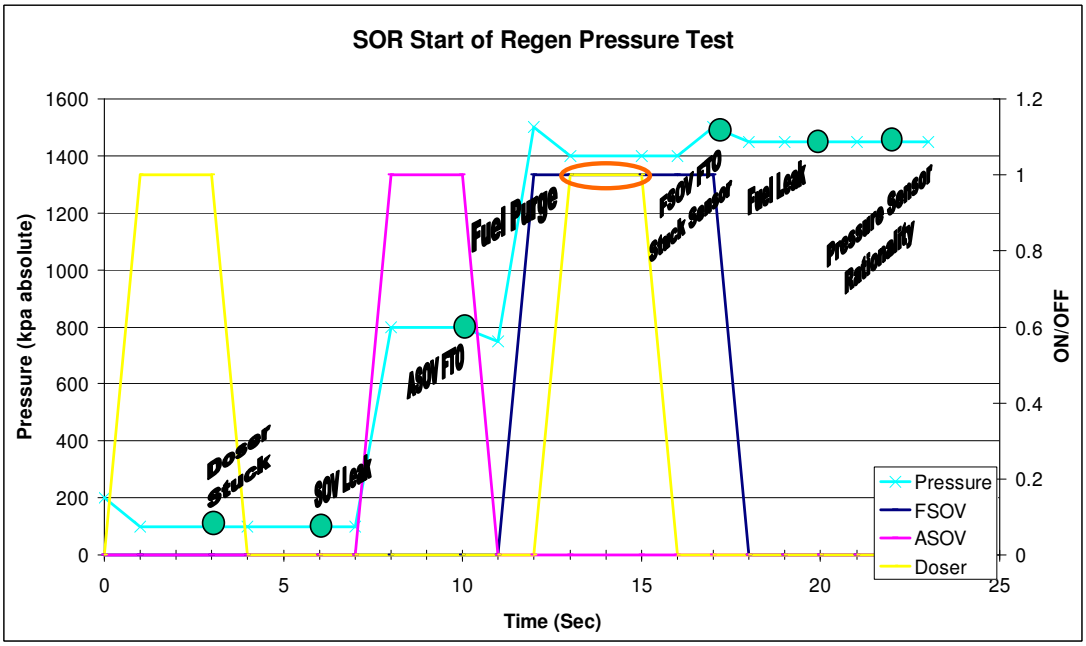
77. DOC/DPF System Diagnostics

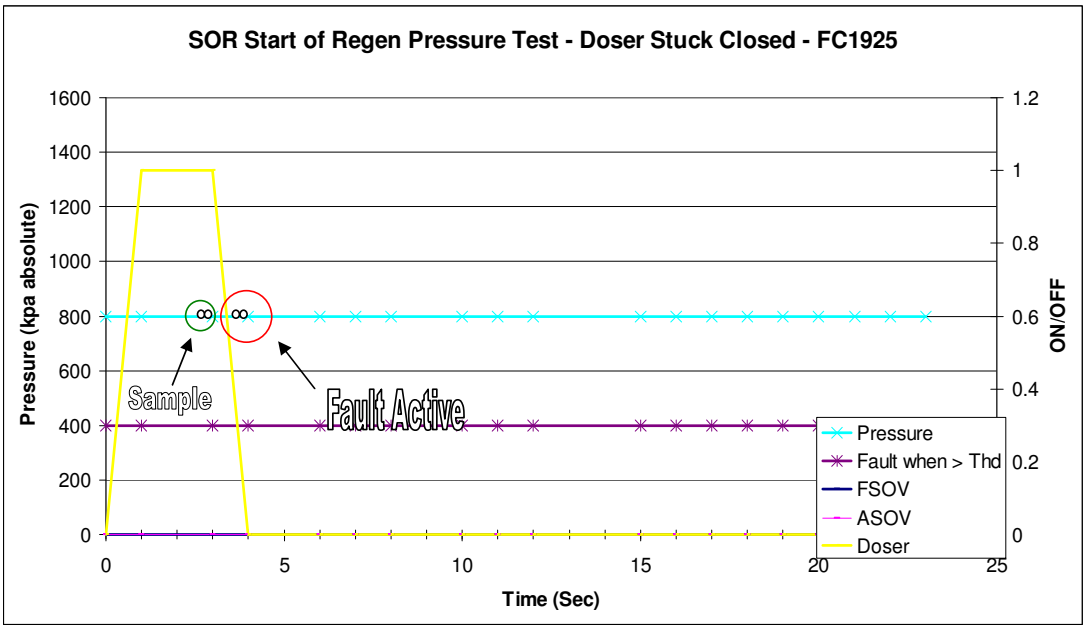


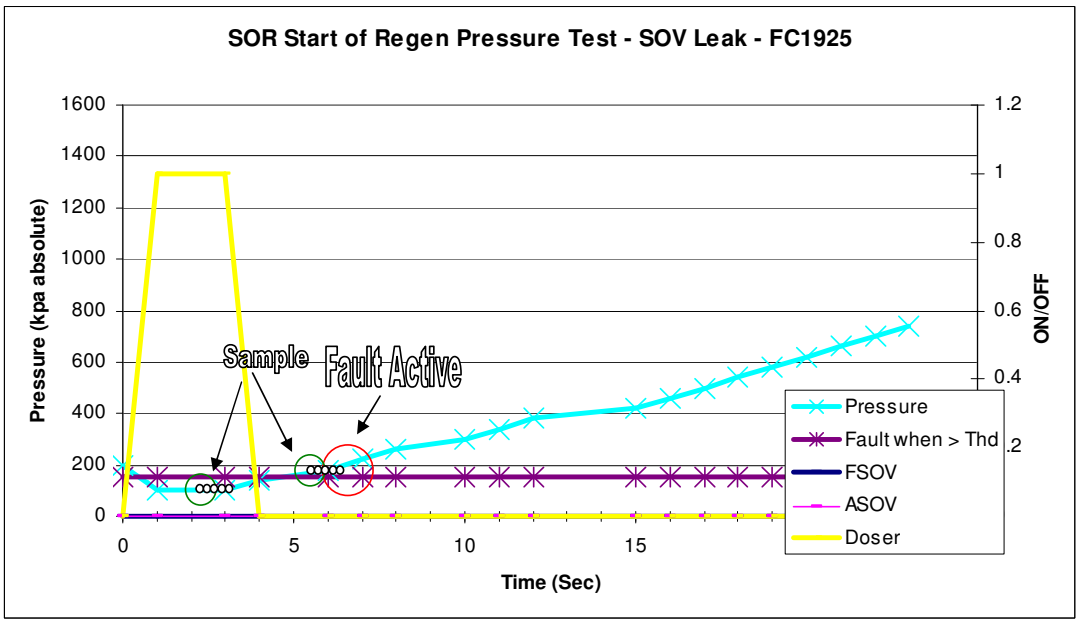
78. SCR System Diagnostics

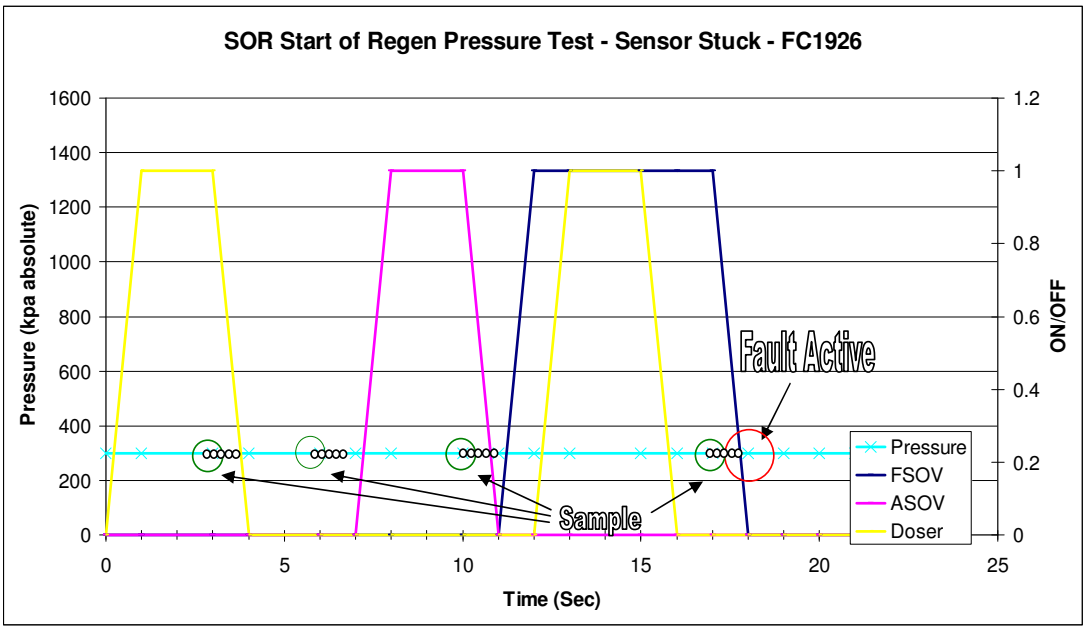


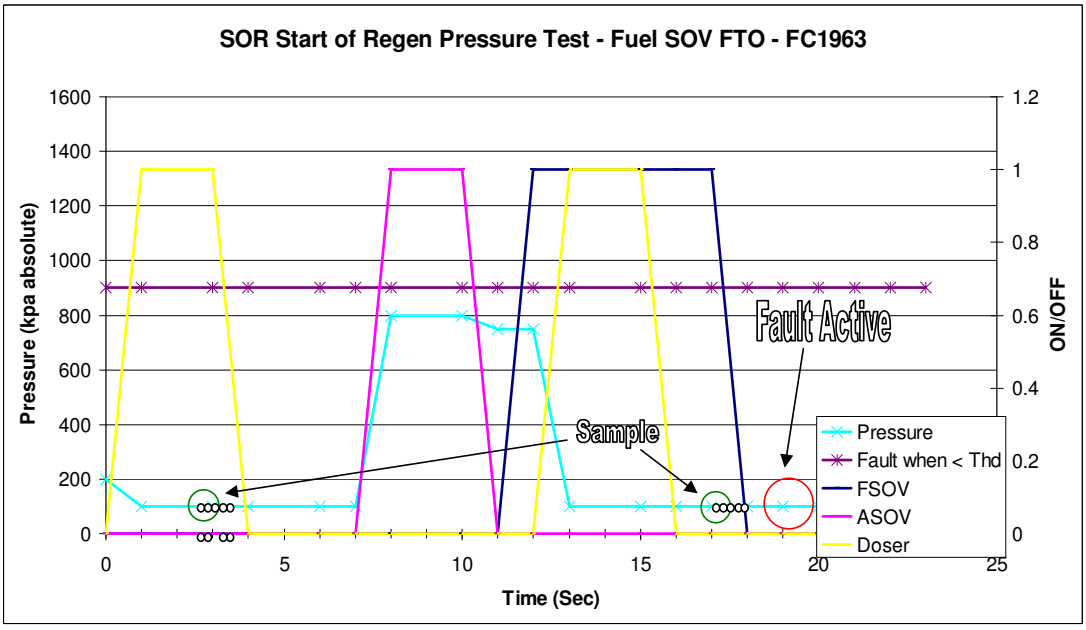
79. Dosing System Diagnostics

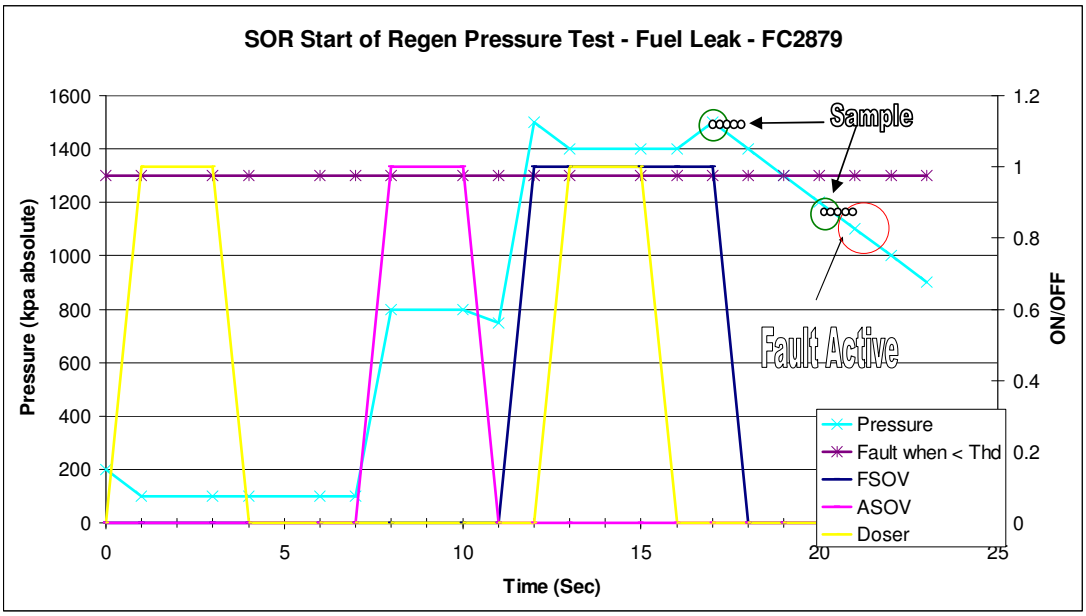


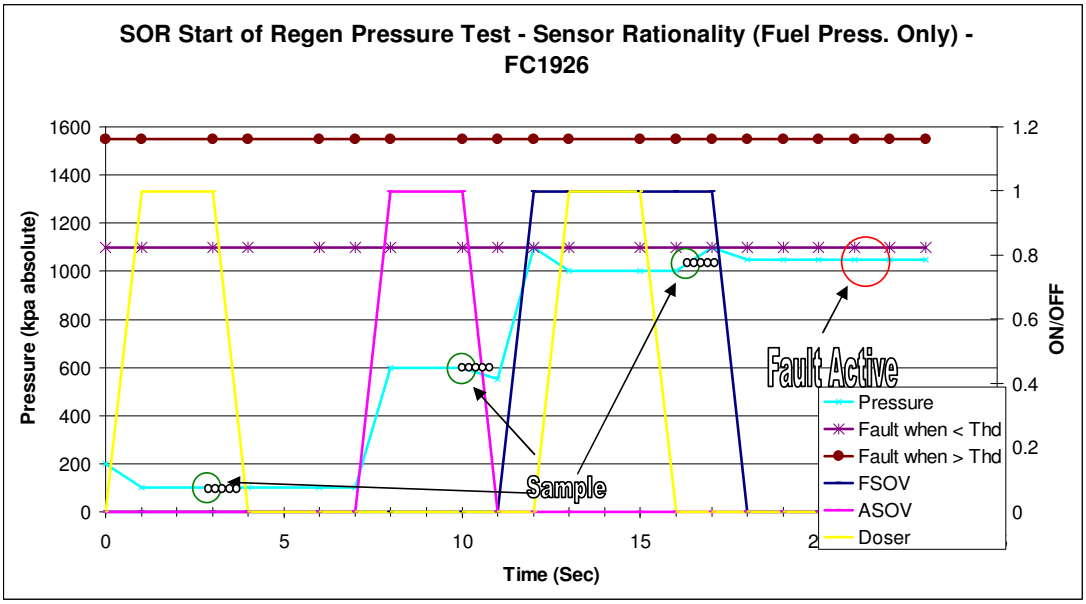


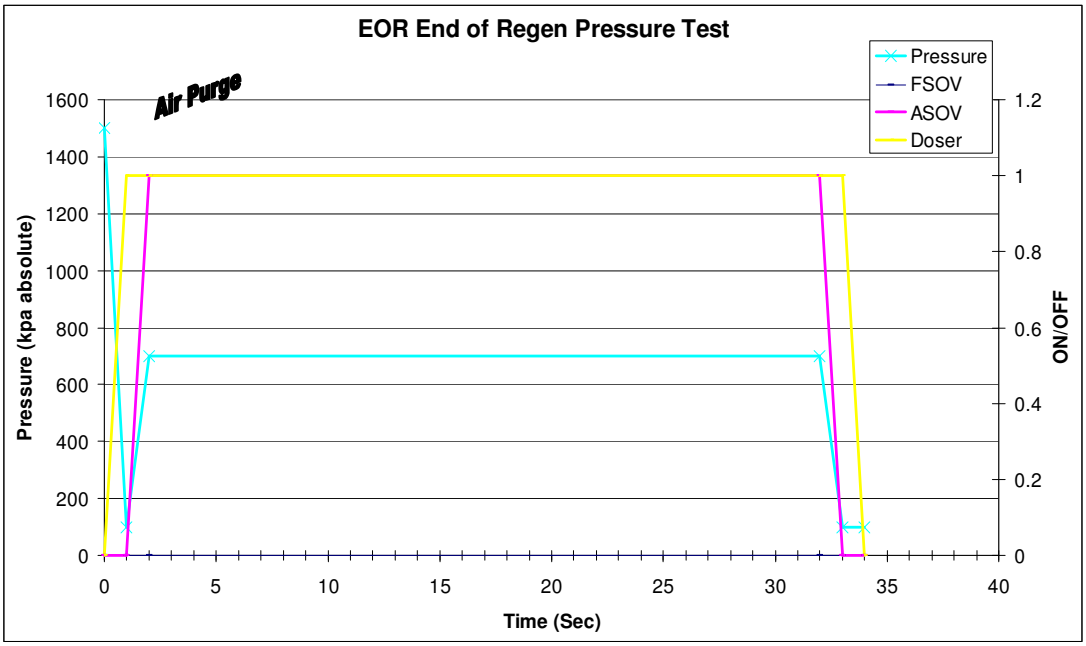

SOR Start of Regen Pressure Test - SOV Leak - FC1925
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Sample
Fault Active
Pressure
Fault when > Thd
FSOV
ASOV
Doser


SOR Start of Regen Pressure Test - Sensor Stuck - FC1926
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Fault Active
Sample
Pressure
FSOV
ASOV
Doser

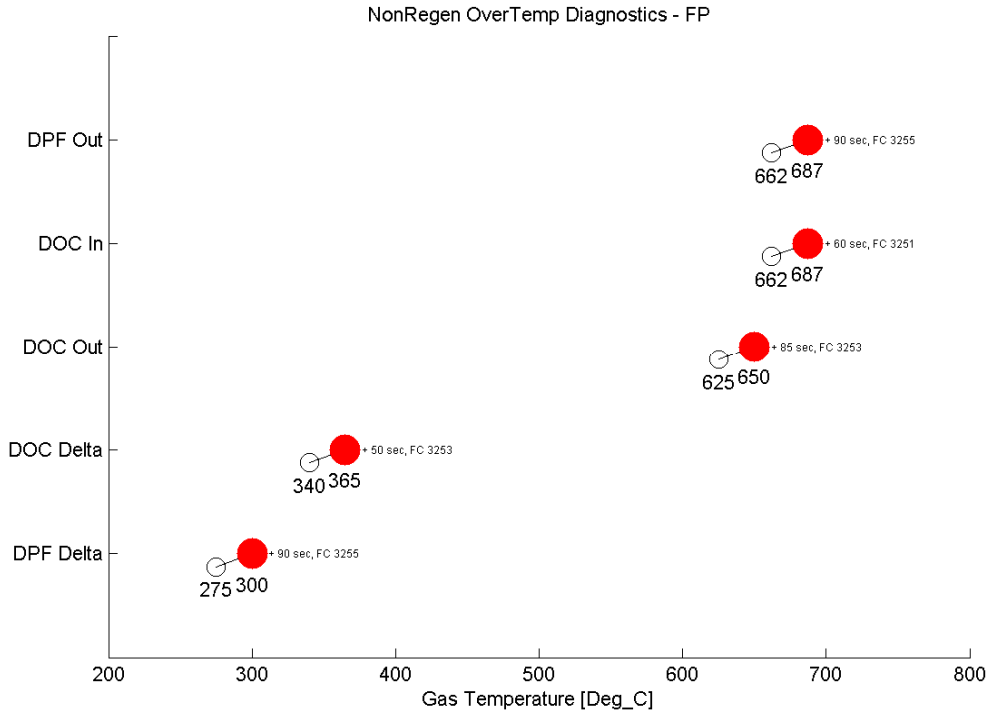

SOR Start of Regen Pressure Test - Fuel SOV FTO - FC1963
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Fault Active
Sample
Pressure
Fault when < Thd
FSOV
ASOV
Doser


SOR Start of Regen Pressure Test - Fuel Leak - FC2879
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Sample
Fault Active
Pressure
Fault when < Thd
FSOV
ASOV
Doser

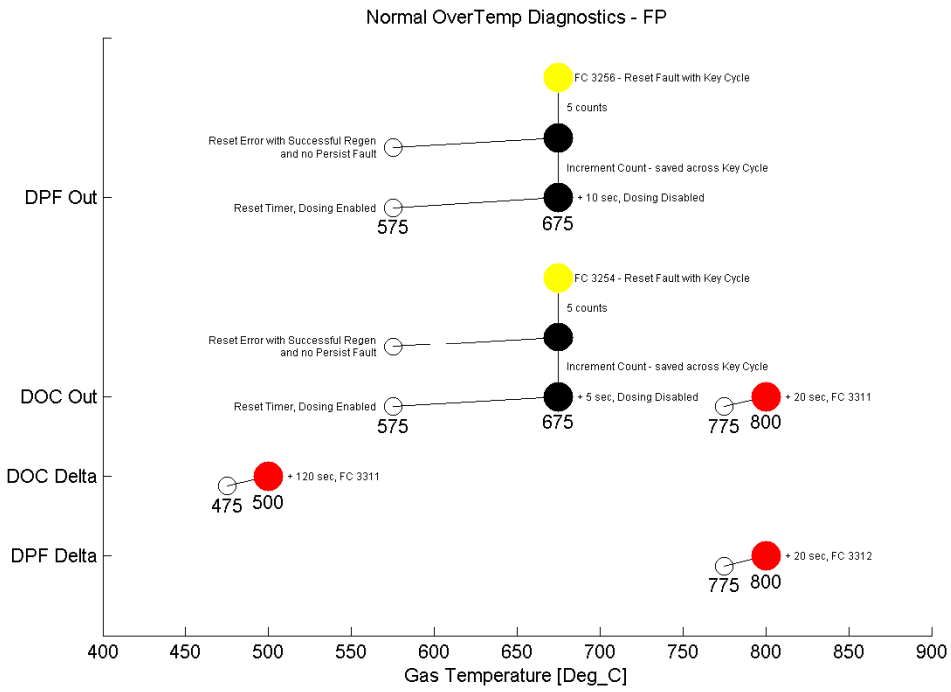

SOR Start of Regen Pressure Test - Sensor Rationality (Fuel Press. Only) - FC1926
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Fault Active
Sample
Pressure
Fault when < Thd
Fault when > Thd
FSOV
ASOV
Doser


EOR End of Regen Pressure Test
Air Purge
Pressure (kpa absolute)
ON/OFF
Time (Sec)
Pressure
FSOV
ASOV
Doser

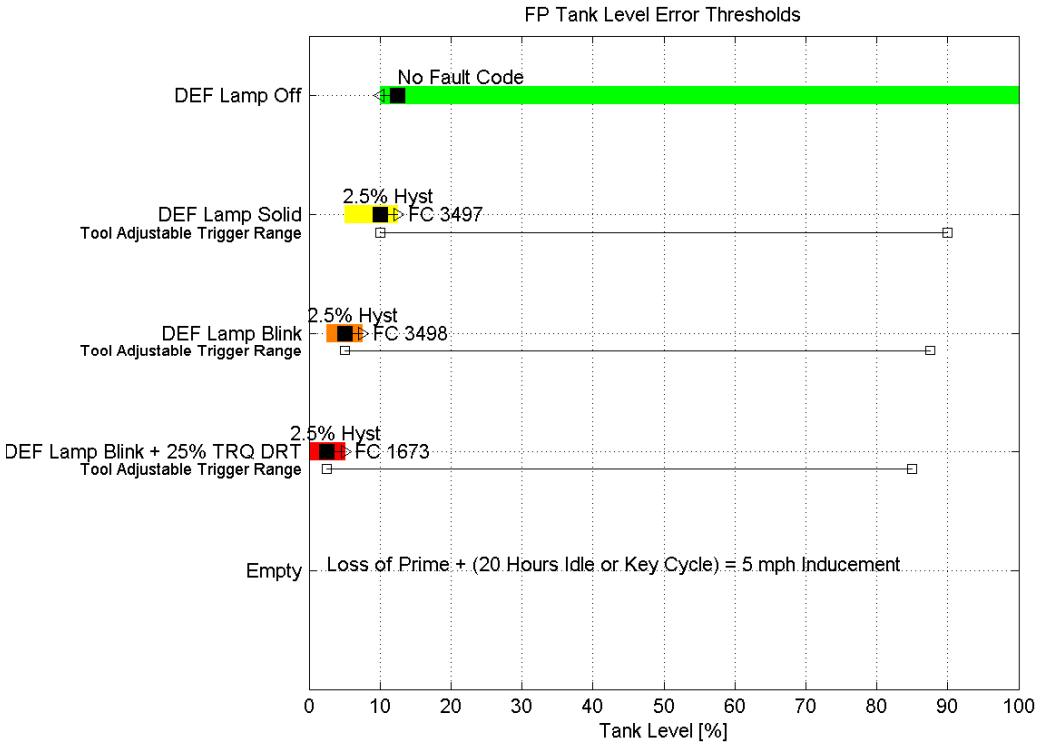
80. After-treatment Temperature Diagnostic



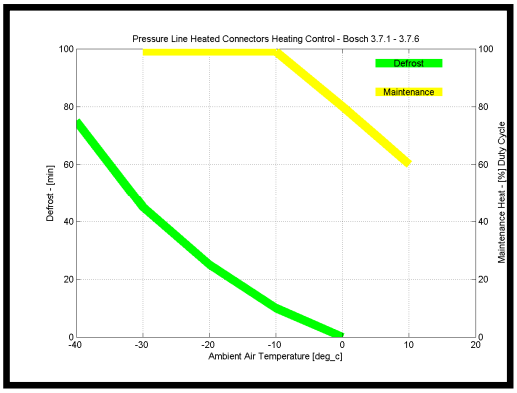
81. Normal OverTemp Diagnostics - FP

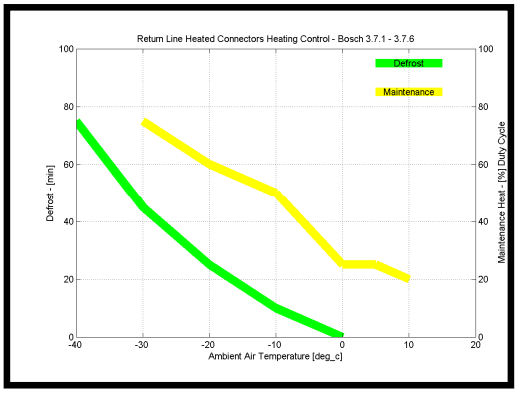


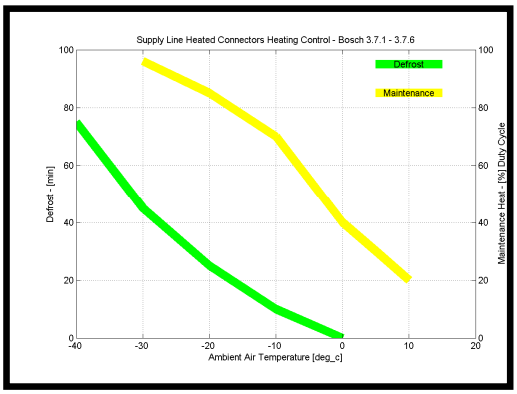
82. Urea Tank Level Diagnostics

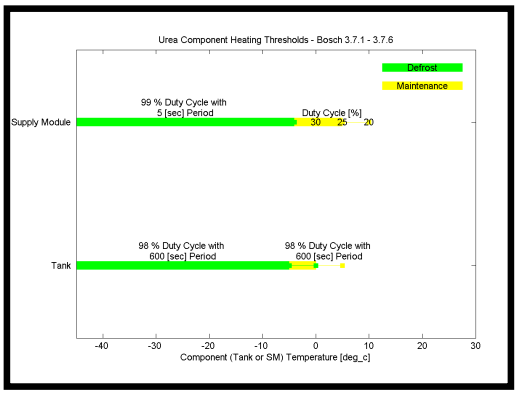


83. Urea Heating Control Operation – Tank, Supply Module, & Heated Lines with Heated Connectors

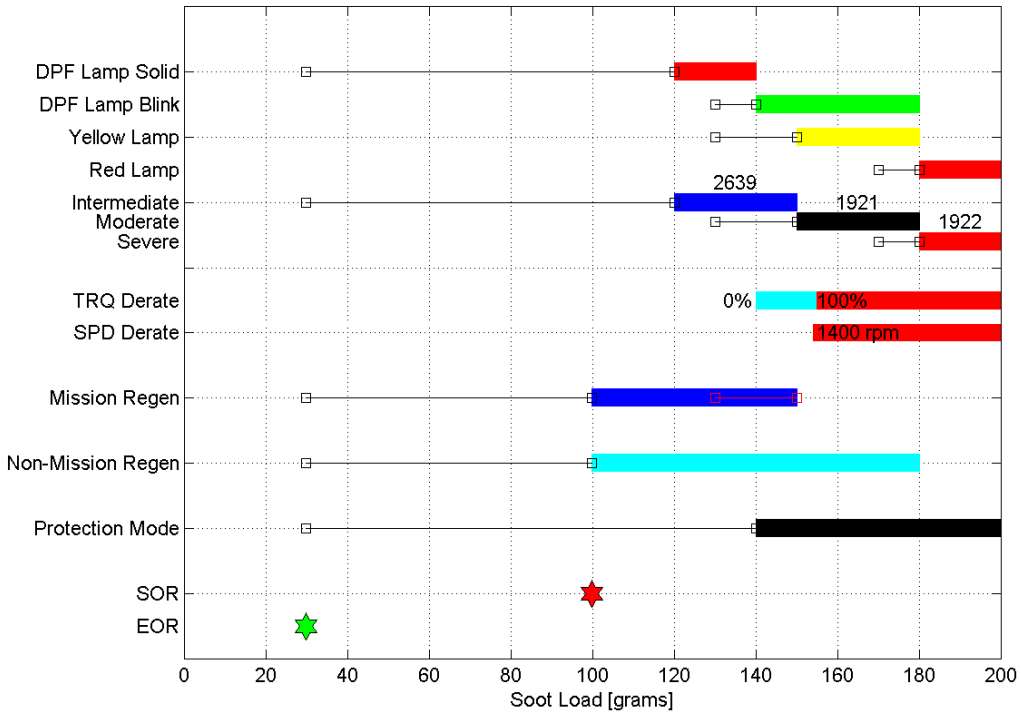




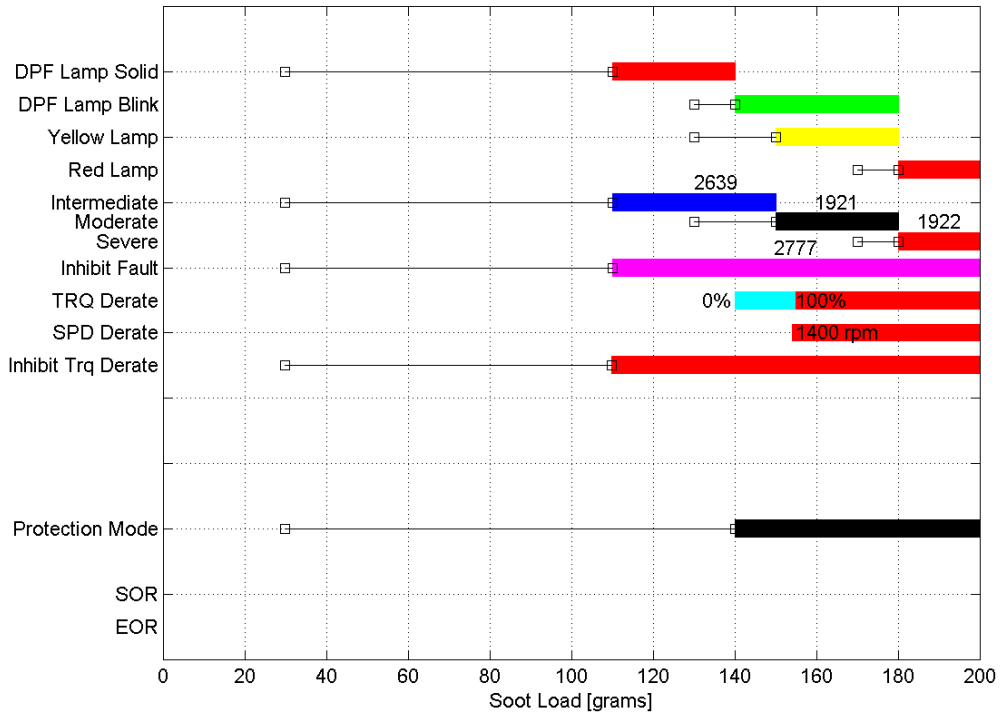




84. DPF Tactics – Normal Operation



85. DPF Tactics – Inhibit Operation



86. After-Treatment Lamp User Interface

New - DPF Lamp

Indicates Need for Assistance in Achieving Regeneration

New - HEST Lamp (High Exhaust System Temperature)

Indicates An Active Regeneration is Underway

Check Engine Lamp

Indicates Normal Operation No Longer Possible, Service Required

Stop Engine Lamp

Indicates That System Damage Has Occurred or is Imminent, the Engine Should be Stopped as Soon as Practical

87. DOC Missing - FC1664

T_OCD_DOC_Presence_Enable	None	V_ATP_trc_DOC_Out	Deg_C
V_ATP_trc_DOC_Out	Deg_C	V_OCM_fg_HC_In	g/sec
H_OCM_trc_Tmptr_In	Deg_C	V_OCD_tm_DOC_Presence_Diag	None
V_OCD_DOC_Reverse_Error	None	V_OCD_DOC_Presence_Fail	None
O_OCD_DOC_PresenceCounter_Reset	None	V_OCD_DOC_Presence_State	None
V_OCD_DOC_Presence_Retest	None	V_OCD_DOC_Presence_Error	None
V_ATD_bs_PFS_Sensor_Status	None	V_OCD_DOC_Presence_Retest	None

88. DEF Tank Level – FC1668, FC1669, FC1673, FC3497, FC3498, FC3547
DEF Tank Temperature – FC1677, FC1678, FC1679
DEF Tank Heaters – FC1683, FC 1684, FC1712, FC1713, FC3242, FC3576, FC3651
DEF Dosing Unit – FC 1681, FC1682, FC3557, FC3558, FC3559, FC3561, FC3679, FC3597, FC3598, FC3736
DEF Dosing Unit Temperature – FC2976, FC3648
DEF Line Heater – FC3258, FC3261, FC3422, FC3426, FC3429, FC3562, FC3563, FC3564, FC3713
DEF Dosing Valve – FC3565, FC 3566, FC3567, FC3568, FC3569, FC3726
DEF Pressure Sensor – FC3571, FC3572, FC3574, FC3575, FC3596
DEF Return Valve – FC3577, FC3578, FC3579

Ambient_Air_Tmptr	Deg_C	V_UIM_enk_PL_DfrstEnrgyConsmd	kJ
Battery_Voltage	V	V_UIM_enk_PL_DfrstEnrgyRqrd	kJ
Engine_Speed	RPM	V_UIM_enk_RL_DfrstEnrgyConsmd	kJ
J39_SCR_Soft_Id	HEX	V_UIM_enk_RL_DfrstEnrgyRqrd	kJ
J39_SCR_Soft_Id_Match	None	V_UIM_enk_SL_DfrstEnrgyConsmd	kJ
J39_SCR_Tank_Level	%	V_UIM_enk_SL_DfrstEnrgyRqrd	kJ
J39_SCR_Tank_Tmptr	Deg_C	V_UIM_flm_EstUreaInjRate	ml/sec
T_UIM_FT_SCR_Heating_Type	None	V_UIM_flm_InjRateCmd	ml/sec
V_AIM_tm_ModuleOffTime	s	V_UIM_PL_Heater_StateMachine	None
V_AIM_trc_SCR_In	Deg_C	V_UIM_pr_SM_PumpPress	kPa
V_AIM_trc_SCR_Out	Deg_C	V_UIM_PumpFailToPrime_Err	None
V_ATP_EngineState	None	V_UIM_PumpState	None
V_ATP_pc_Urea_TankLvl	%	V_UIM_RL_Heater_StateMachine	None
V_SCL_PrimeCondtActive	None	V_UIM_SCR_Sev_Indm_Active	None

V_SCM_EngineState	None	V_UIM_SL_Heater_StateMachine	None
V_SCM_Keyswitch	None	V_UIM_SM_Heater_StateMachine	None
V_UID_bs_DosingSysFaultStat_1	HEX	V_UIM_SoftIDMsgRcvd	None
V_UID_bs_DosingSysFaultStat_2	HEX	V_UIM_Tank_Heater_StateMachine	None
V_UID_bs_DosingSysFaultStat_3	HEX	V_UIM_tm_Doser_Init	s
V_UID_bs_DosingSysFaultStat_4	HEX	V_UIM_tm_Doser_Prime	s
V_UID_bs_DosingSysFaultStat_5	HEX	V_UIM_trc_SupplyModule	Deg_C
V_UID_bs_UDB_Sys1_Errs	HEX	V_UIM_trc_SupplyModuleHeater	Deg_C
V_UID_bs_UDB_Sys2_Errs	HEX	V_UIM_trc_UreaTank	Deg_C
V_UID_bs_UDB_Sys3_Errs	HEX	V_UIM_UreaDosingSysHeatingMod	None
V_UID_bs_UDB_Sys4_Errs	HEX	V_UIM_UreaDosingSysState	None
V_UID_bs_UDB_Sys5_Errs	HEX	V_UIM_UreaDosingSystStateRqst	None
V_UID_DCU_FalseFault	None	V_UIM_UreaPumpState	None
V_UID_DCU_TimeOutErr	None	V_UIM_VarDatasetSel	None
V_UID_PressCheckErr_Active	None	V_UIM_vr_UreaPumpSpeed	RPM
V_UID_DisableDosingErr	None	V_UTD_DEFLamp_State	None
V_UID_PressStableErr_Active	None	V_UTD_FailToThaw_State	None
V_UIM_bs_DiagStatus	HEX	V_UTD_NoFuncResp_State	None
V_UIM_ct_PrimeRetry	counts	V_UTD_tm_UHM_Timer	s
V_UIM_DCU_DataSet_Selected	None	V_UTD_trc_InitTmptrReference	Deg_C
V_UIM_DCU_DataSetErr	None	V_UIM_tm_PrimeRetry_SysFrozn	s
V_UIM_ECM_DoserState	None		

89. DOC Conversion Efficiency – FC1691

T_OCD_Dosing_Eff_Enbl	None	V_OCD_trc_dt_DPF_Bed	deg_C/s
P_OCD_DosEff_EWMA_Filt_Val	None	V_ATM_fg_FirstCatHCIn	g/sec
V_OCD_DosEff_EWMA_PassUp_Enbl	None	V_OCL_Eff_Comp	None
V_OCD_DosEff_EWMA_FailUp_Enbl	None	V_OCP_Expected_Therm_ConvEff	None
V_OCD_DosEff_Abort	None	V_SFP_ExpectedThermConvEff	None
P_ATR_SFM_OperModeRqst	None	V_OCD_fn_Dos_NmlEff_Cont	None
V_OCD_NMHC_Low_Eff_State	None	P_OCD_fn_Dosing_NmlEff	None
P_ATR_SFM_OperModeRqst	None	P_OCD_fn_CompEff	None
V_ATP_Combust_Ctrl_PathOwner	None	V_OCD_Eff_Sensor_Fault	None
V_OCD_Ideal_Int_Enbl	None	V_ATD_FT_Doser_Reset_Flag	None
V_OCD_tm_AftDos_Duration	s	V_ATD_FT_DOC_Reset_Flag	None
V_OCD_tm_Dosing_Duration	s	P_OCD_ct_DosEff_FIR_Tests_Compl	counts
V_ATP_trc_DOC_Out	Deg_C	P_OCD_ct_DosEff_RR_Tests_Compl	counts
H_OCM_trc_Tmptr_In	Deg_C	P_OCD_DosEff_RR_State	None
V_ATM_fg_HC_Fdbk_Total	g/sec	V_ATD_FT_Doser_Reset_Flag	None
V_ATP_trc_FirstCatIn	Deg_C	V_ATD_FT_DOC_Reset_Flag	None
H_OCM_fg_MassFlowRate_In	g/sec	V_ATM_OBD_Data_Reset	None
V_OCD_tm_Ideal_Time	s	P_OCD_fn_CompEff	None
V_OCD_tm_EffcThM_Duration	s	P_OCL_tm_FacePlug_Count	s
V_OCD_ThM_Effc_Value	None	V_OCD_Eff_CompLim	None
V_OCD_EffForComp_Valid_Flag	None	P_OCD_DOCD_Comp_Limit	None
V_OCD_Ideal_Flag	None	V_OCL_Eff_Comp	None
V_OCD_trc_dt_Bed	deg_C/s		

90. DPF Delta P Pressure Rationality – FC1879, FC1881, FC1883, FC1981

V_AIM_ct_DPF_DeltaP	counts	V_SFP_pr_Delta_High	kPa
V_AIM_ct_DPF_DeltaP_Raw	counts	V_SFP_pr_Delta_Clean	kPa
V_AIM_ev_DPF_DeltaP	V	V_SFP_GreenFilter	None
O_AIM_pr_DPF_DeltaP_FiltReset	None	V_SFP_pr_Delta	kPa
V_AIM_pr_DPF_DeltaP	kPa	V_SFP_fv_DPF	m3/s
V_AIM_pr_DPF_DeltaP_Status	None	H_SFD_fv_DPF_Filtered	m3/s
V_AIM_pr_DPF_DeltaP	kPa	H_SFD_tm_DeltaP_High	s
V_AIM_prg_DPF_OutP	kPa_G	H_SFD_DeltaP_High_Flag	None
V_ATP_fv_DPF_OutP	m3/s	V_SFD_fv_DPF_HighLog	m3/s
V_ATD_fv_DPF_PTD_Rng	m3/s	V_SFD_pr_Delta_HighLog	kPa
V_ATD_prg_DPF_PTD_Rng	kPa_G	T_ATD_DPF_dP_Keyon_Enable	None
V_ATD_DPF_PTD_Error	None	V_ATD_DPF_dP_Keyon_State	None
V_ATD_DPF_PTD_OBDState	None	V_ATD_PSR_Startup_Complete	None
V_ATD_DPF_PTD_Enbl	None	V_ATD_DPF_dP_Keyon_Error	None
V_ATD_DPF_PTD_DecisionMade	None	T_SFD_DPFdP_SIR_Enbl	None
V_ATD_prg_DPF_PTD_RngLog	kPa_G	V_ATD_DPF_dP_Keyon_Enbl_Met	None
V_SFD_DPFdP_SIR_Decision	None	V_ATD_pr_DPF_dP_KeyonLog	kPa
V_SFD_DPFdP_SIR_Enbl	None	V_SFP_fv_DPF	m3/s
V_SFD_DPFdP_SIR_Error	None	T_ATD_DPF_PTD_Enbl	None

V_SFD_DPFdP_SIR_OBDState	None	Engine_Speed	RPM
V_SFD_fv_DPFdP_SIR_Rng	m3/s	V_ATD_bs_PFS_SysIO_Errs	HEX
V_SFD_pr_DPFdP_SIR_Rng	kPa	V_AIM_prg_DPF_OutP_Status	None
V_SFD_pr_DPFdP_SIR_RngLog	kPa	V_AIM_pr_DPF_DeltaP_Status	None
V_SFP_DeltaPSaturated	None	V_ATP_Engine_Running	None
V_ATD_DPF_dP_Keyon_Error	None		
V_ATD_DPF_dP_Keyon_State	None		

91. Engine Out NOx Sensor Circuit Continuity – FC1885

EONOx_J39_Fault_Inhibit	None
EONOx_Dew_Point_State	None
EONOx_J39_AftIn_Temp	None
EONOx_J39_AftIn_Power_In_Range	None
EONOx_J39_AftIn_NOx_FMI	None
EONOx_J39_AftIn_Heater_FMI	None
EONOx_PwrErr_Timer	s
EONOx_SigErr_Timer	s
EONOx_HtrErr_Timer	s
Current_Engine_State	None
H_EONOx_Diag_State	None

92. System Out NOx Sensor Circuit Continuity – FC1887

V_AIM_SCR_FaultInhibit	None
AIM_Outlet_Dew_Point	None
V_ATP_tm_CatOutNOxDiag_Timer	s
V_AIM_SCR_Out_NOxAtTmptr	None
NOX_OUT_SENSOR_TIMEOUT_ERR	None
V_AIM_SCR_Out_NOxPowerInRange	None
V_AIM_SCR_Out_NOxFMI	None
V_AIM_SCR_Out_NOxHeaterFMI	s
V_ATP_tm_CatOutNOxPwrErr_Timer	s
V_ATP_tm_CatOutNOxSigErr_Timer	s
V_ATP_tm_CatOutNOxHtrErr_Timer	None
V_ATP_EngineState	None

93. DPF Outlet Pressure Sensor Rationality – FC3133, FC3134, FC3135

T_PFS_Enbl	None	V_ATD_DPFOutP_SIR_Enbl	None
T_AIM_DPF_OutP_RLOC	None	V_ATD_DPFOutP_SIR_Error	None
T_AIM_DPF_OutP_SupplyRLOC	None	V_ATD_DPFOutP_SIR_OBDState	None
V_AIM_ct_DPF_OutP	counts	V_ATD_fv_DPF_OutP_Filtered	m3/s
O_AIM_prg_DPF_OutP_FiltReset	None	V_ATD_fv_DPFOutP_HighLog	m3/s
V_AIM_ct_DPF_OutP_Raw	counts	V_ATD_fv_DPFOutP_SIR_Rng	m3/s
V_AIM_ev_DPF_OutP	V	V_ATD_prg_DPF_OutP_KeyonLog	kPa_G
V_AIM_prg_DPF_OutP	kPa_G	V_ATD_prg_DPFOutP_HighLog	kPa_G
V_AIM_prg_DPF_OutP_Status	None	V_ATD_prg_DPFOutP_SIR_Rng	kPa_G
T_ATD_DPF_OutP_Keyon_Enable	None	V_ATD_prg_DPFOutP_SIR_RngLog	kPa_G
T_ATD_DPFOutP_SIR_Enbl	None	V_ATD_PSR_Startup_Complete	None
V_AIM_pr_DPF_DeltaP	kPa	V_ATD_tm_DPFOutP_Hi	s
V_AIM_prg_DPF_OutP	kPa_G	V_ATP_fv_DPF_OutP	m3/s
V_AIM_prg_DPF_OutP_Status	None	V_ATP_fv_DPF_OutP	m3/s
V_AIM_prg_DPF_OutP_Status	None	V_ATP_fv_DPF_OutP	m3/s
V_ATD_DPF_OutP_Keyon_Enbl_Met	None	V_ATP_prg_DPF_OutP_Filtered	kPa_G
V_ATD_DPF_OutP_Keyon_Error	None		
V_ATD_DPF_OutP_Keyon_Error	None		
V_ATD_DPF_OutP_Keyon_State	None		
V_ATD_DPF_OutP_Keyon_State	None		
V_ATD_DPFOutP_HiFlag	None		
V_ATD_DPFOutP_SIR_Decision	None		

94. SCR Intake Temperature Sensor Rationality – FC3142, FC3143, FC3144, FC3145

V_AIM_trc_DPF_Out	Deg_C	V_AIM_trc_SCR_In	Deg_C
V_AIM_trc_SCR_In	Deg_C	V_AIM_trc_SCR_Out	Deg_C
V_AIM_trc_SCR_Out	Deg_C	H_HIM_fg_Dosing_Cmd	g/sec
H_HIM_fg_Dosing_Cmd	g/sec	V_ATD_mg_SCR_In_IR_Stuck_HcInt	g
V_ATP_fg_Turbo_Out	g/sec	V_ATD_SCR_In_IR_Stuck_State	None
V_ATD_trc_SCR_DeltaT_ScrAvg	Deg_C	V_ATD_trc_SCR_In_IR_Stuck_Rng	Deg_C
V_ATD_trc_SCR_DeltaT_PipeAvg	Deg_C	V_ATD_trc_SCR_Out_IR_Stuck_Rng	Deg_C

V_ATD_SCR_TSR_Allow	None
V_ATD_SCR_TSR_State	None

95. SCR Outlet Temperature Sensor Rationality – FC3146, FC3147, FC3148, FC3149

V_AIM_trc_DPF_Out	Deg_C	V_AIM_trc_SCR_In	Deg_C
V_AIM_trc_SCR_In	Deg_C	V_AIM_trc_SCR_Out	Deg_C
V_AIM_trc_SCR_Out	Deg_C	H_HIM_fg_Dosing_Cmd	g/sec
H_HIM_fg_Dosing_Cmd	g/sec	V_ATD_mg_SCR_In_IR_Stuck_HcInt	g
V_ATP_fg_Turbo_Out	g/sec	V_ATD_SCR_In_IR_Stuck_State	None
V_ATD_trc_SCR_DeltaT_ScrAvg	Deg_C	V_ATD_trc_SCR_In_IR_Stuck_Rng	Deg_C
V_ATD_trc_SCR_DeltaT_PipeAvg	Deg_C	V_ATD_trc_SCR_Out_IR_Stuck_Rng	Deg_C
V_ATD_SCR_TSR_Allow	None		
V_ATD_SCR_TSR_State	None		

96. SCR Overtemp – FC3165, FC3229, FC3231, FC3235

T_ATD_SCR_OT_ShutDwnDiagEnbl	None	P_ATD_tm_NR_SCR_In_Hi_Delay	s
V_ATP_trc_SCR_In	Deg_C	V_ATD_NR_OT_SCR_In_Enbl	None
V_ATD_SCR_In_Severe_Fault	None	V_ATD_tm_NR_SCR_In_Hi	s
V_ATD_SCR_In_Severe_Condition	None	V_ATD_NR_SCR_In_HiTmptr_Flag	None
V_ATD_tm_SCR_In_Severe_Tmptr	s	V_ATD_tm_NR_SCR_Out_Hi	s
V_ATP_trc_SCR_Out	Deg_C	V_ATD_NR_SCR_Out_HiTmptr_Flag	None
V_ATD_SCR_Out_Severe_Fault	None	V_ATD_SCR_pw_Cat	kW
V_ATD_SCR_Out_Severe_Condition	None	V_ATP_trc_SCR_In_Status	None
V_ATD_tm_SCR_Out_Severe_Tmptr	s	V_ATP_trc_SCR_Out_Status	None
V_ATP_Engine_Running	None	V_ATD_bs_SCR_SysIO1_Errs	HEX
P_ATD_tm_NR_SCR_Out_Hi_Delay	s	V_ATD_SCR_Delta_OverTmptr	None
V_ATD_NR_OT_SCR_Out_Enbl	None		

97. DEF Quality – FC3543

P_ATP_pc_Urea_TankLvl	%	V_SCD_CE_ct_Epsilon_Count	counts
P_SCD_CE_Epsilon	None	V_SCD_CE_ct_NormEff_Count	counts
P_SCD_CE_Epsilon_EWMA_Filt_Val	None	V_SCD_CE_fn_ANR	None
P_SCD_CE_Epsilon_Err	None	V_SCD_CE_mol_dt_NH3_Rate	mol/sec
P_SCD_CE_NormEff_EWMA_Filt_Val	None	V_SCD_UQ_UreaQualityError	None
P_SCD_CE_NormEff_Err	None	V_SCD_UQ_UreaQualityRun	None
P_SCD_CE_Normalized_NOx_Eff	None	V_SCL_flm_UreaInjCmd	ml/sec
P_SCD_UQ_vm_Urea_Injected	L	V_SCM_EngineState	None
V_AIM_pc_Urea_TankLvl	%	V_SCM_fg_MassFlow_In	g/sec
V_AIM_pc_Urea_TankLvl_Raw	%	V_SCM_flm_UreaInjCmd_Fdbk	ml/sec
V_AIM_pc_Urea_TankLvl_Status	None	V_SCM_ppm_SCR_Out_NOx	ppm
V_ATD_bs_SCR_ExtInput_Status	HEX	V_SCM_pr_Press_Ambient	kPa
V_ATD_bs_SCR_SysIO1_Errs	HEX	V_SCP_UreaInjMaxExceed	None
V_ATD_bs_SCR_SysIO2_Errs	HEX	V_SCP_trc_SCR_Bed	Deg_C
V_ATD_bs_SCR_SysPerf_Errs	HEX	V_SCR_Split_Corr_Factor	None
V_ATP_fg_SCR_In_NOx_Status	None	V_SCR_fn_DeNOxEff_Corr	None
V_ATP_ppm_SCR_Out_NOx_Status	None	V_SCR_mol_dt_NOx_In	mol/sec
V_ATP_trc_Ambient_Air	Deg_C	V_SCR_ppm_NOx_In	ppm
V_ATP_vl_Vehicle_Speed	km/hr	V_SCR_ppm_Screen_NH3_Slip	ppm
V_SCD_CE_CatEffMon_Abort	None	V_SCR_ppm_Screen_NO2_Slip	ppm
V_SCD_CE_Epsilon_Pause_Flag	None	V_UIM_bs_DiagStatus	HEX
V_SCD_CE_ExceedanceErr	None	V_UTD_TankDrain_Detected	None
V_SCD_CE_ExceedanceRun	None	V_UTD_TankRefill_Detected	None
V_SCD_CE_NormEff_Pause_Flag	None		
V_SCD_CE_Screening_Flag	None		

98. SCR Catalyst Efficiency – FC3582
SCR Catalyst Missing – FC3151

ECM_Run_Time	s	V_SCM_ppm_SCR_Out_NOx	ppm
Ambient_Air_Press	kPa	V_ATP_ppm_SCR_Out_NOx	ppm
Engine_Speed	RPM	V_ATP_tq_EngineTorque	N_m
J39_AFT_Intake_NOx	ppm	V_ATP_vr_Engine_Speed	RPM
J39_AFT_Outlet_NOx	ppm	V_ATR_fgh_TailpipeNOxTrgt	g/hr
Net_Engine_Torque	N_m	V_SCD_CE_ct_Epsilon_Count	counts
P_SCD_CE_Epsilon	None	V_SCD_CE_ct_NormEff_Count	counts
P_SCD_CE_Normalized_NOx_Eff	None	V_SCD_CE_fn_ANR	None
V_ATR_fgh_TailpipeNOxTrgt	g/hr	V_SCD_CE_Screening_Flag	None
V_ATP_mg_TotalFuelingPerStroke	mg/stroke	V_SCM_fg_MassFlow_In	g/sec

Total_Fueling	mg/stroke	V_SCM_pr_Press_In	kPa
V_ATP_fg_SCR_In_NOx_Status	None	V_SCM_trc_SCR_In	Deg_C
V_ATP_pr_Ambient_Air	kPa	V_SCM_trc_SCR_Out	Deg_C
V_ATP_ppm_SCR_Out_NOx_Status	None	V_SCP_fn_NO2NO_Split	None
V_SCM_fg_HC_In	g/sec	V_SCP_ppm_NO2_In	ppm
V_SCM_fg_NO2_In	g/sec	V_SCP_vs_SCR_Catalyst	1/sec
V_SCL_flm_UreaInjCmd	ml/sec	V_SCR_flm_UreaInjCmd	ml/sec
V_UIM_flm_EstUreaInjRate	ml/sec	V_SCR_ppm_NOx_In	ppm
V_SCM_fg_NOx_In	g/sec	V_UIM_bs_DiagStatus	HEX
V_AIM_trc_SCR_In	Deg_C	V_UIM_flm_InjRateCmd	ml/sec
V_AIM_trc_SCR_In_Status	None	V_SCD_FTIS_CatEff_Reset	None
V_AIM_trc_SCR_Out	Deg_C	V_ATM_OBD_Data_Reset	None
V_AIM_trc_SCR_Out_Status	None	V_SCM_pr_Press_In	kPa
V_ATD_bs_SCR_SysIO1_Errs	HEX	P_SCD_CE_Epsilon_EWMA_Filt_Val	None
V_ATD_bs_SCR_SysIO2_Errs	HEX	P_SCD_CE_NormEff_EWMA_Filt_Val	None
V_ATD_bs_SCR_SysPerf_Errs	HEX	V_SCD_pc_SCR_NOx_Conversion	%

99. SCR Stationary Performance Regen Efficiency – FC3751

V_SCP_trc_SCR_Bed	Deg_C	V_ATD_bs_SCR_ExtInput_Status	HEX
V_SCM_fg_MassFlow_In	g/sec	V_SCD_SrvPerf_Abort	None
V_SCR_ppm_NOx_In	ppm	V_SCD_SrvPerf_ANROvrEnbl	None
V_ATP_fg_SCR_In_NOx_Status	None	V_SCD_tm_SrvPerf	s
V_ATP_ppm_SCR_Out_NOx_Status	None	V_SCD_SrvPerf_ANR1_Comp	None
V_SCL_flm_UreaInjCmd	ml/sec	V_SCD_SrvPerf_ANR2_Comp	None
V_SCP_UreaInjMaxExceed	None	V_SCD_SrvPerf_ANR3_Comp	None
V_SCM_pr_Press_Ambient	kPa	V_SCR_mol_dt_NOx_In	mol/sec
V_ATP_trc_Ambient_Air	Deg_C	V_SCD_flm_SrvPerf_OvrInjVal	ml/sec
V_SCD_SrvPerf_Screen_Flag	None	V_SCM_ppm_SCR_Out_NOx	ppm
V_SCD_flm_NM_DosingOverride	None	V_SCR_ppm_NOx_In	ppm
V_ATR_SCR_Regen_Mode	None	V_SCD_SrvPerf_Eff1	None
V_ATD_bs_SCR_SysIO1_Errs	HEX	V_SCD_SrvPerf_Eff2	None
V_ATD_bs_SCR_SysIO2_Errs	HEX	V_SCD_SrvPerf_Eff3	None
V_ATD_bs_SCR_SysPerf_Errs	HEX		
V_UIM_bs_DiagStatus	HEX		

100. Engine Out NOx Sensor Rationality – FC3228, FC3748

EONOx_Comp_Value	ppm	Engine_Out_NOx_Rate_Sensor	g/sec
CBM_Indicated_Trq_Fuel	mg/stroke	Exhaust_Flow_Status	None
EONOx_Mot_Flag	None	Compressor_Inlet_Density	kg/m3
EONOx_IR_Mot_State	None	Ambient_Air_Tmptr	Deg_C
EONOx_Sensor_Status	None	CBR_Thermal_Oscar_Active	None
EONOx_Diag_Mot_Enbl	None	CBR_Thermal_Felix_Active	None
EONOx_OBD_CtrlPathOwner	None	Alpha	None
EONOx_IR_Mot_Hi_Counter	s	EMM_Protection_Flag	None
EONOx_IR_Mot_Lo_Counter	s	EGR_Fraction	None
EONOx_IR_Mot_State	None	CBM_Indicated_Trq_Fuel	mg/stroke
EONOx_IR_Mot_Hi_Error	None	EONOx_Sensor_Status	None
EONOx_IR_Mot_Lo_Error	None	EONOx_IR_NMot_Timer	s
Exhaust_Flow	kg/min	EONOx_IR_NMot_Enable	None
CBM_NOx_Out_Rate_Unlimited	g/hr	EONOx_Estimated_NOx	g/hr
H_CBM_NOx_Diff	ppm	CBM_NOx_Out_Rate	g/sec
EONOx_Sensor_Status	None	EONOx_IRH_Counter	None
Current_Engine_State	None	EONOx_IRL_Counter	s
EONOx_IR_Stuck_En	None	EONOx_IR_Stuck_Err	None
EONOx_SIR_Max	ppm	EONOx_IRH_Err	None
EONOx_SIR_Min	ppm	EONOx_IRL_Err	None
EONOx_SIR_Timer	s		
EONOx_SIR_Delta	ppm		
H_EONOx_SIR_Counter	None		
EONOx_IR_Stuck_Err	None		
C_EONOx_IR_Enable	None		

101. System Out NOx Sensor Rationality – FC1694, FC3749

V_SCR_ppm_NOx_In	ppm	P_SCD_ct_NXGRL_FIRTestsCompl	counts
V_SCM_fg_MassFlow_In	g/sec	P_SCD_ct_NXGRL_RRTestCompl	counts
V_SCM_ppm_SCR_Out_NOx	ppm	P_SCD_NXGRL_RRState	None

V_SCP_trc_SCR_Bed	Deg_C	T_SCD_NOxMonitor_Enbl	None
V_SCD_trc_NXGR_SCR_Filt	Deg_C	V_SCD_NM_IR_Motoring_Abort	None
V_SCD_SrvPerf_Active	None	V_ATD_bs_SCR_SysIO1_Errs	HEX
V_SCD_tm_NXGR_Phase_I	s	V_ATD_bs_SCR_SysIO2_Errs	HEX
V_ATR_SCR_Regen_Mode	None	V_ATD_bs_SCR_SysPerf_Errs	HEX
V_ATD_bs_SCR_SysIO1_Errs	HEX	V_UIM_bs_DiagStatus	HEX
V_ATD_bs_SCR_SysIO2_Errs	HEX	V_ATD_bs_SCR_ExtInput_Status	HEX
V_ATD_bs_SCR_SysPerf_Errs	HEX	V_ATP_ppm_SCR_Out_NOx_Status	None
V_UIM_bs_DiagStatus	HEX	V_ATM_OBD_Data_Reset	None
V_ATD_bs_SCR_ExtInput_Status	HEX	V_SCD_FTIS_NOxMon_Reset	None
V_ATM_OBD_Data_Reset	None	V_SCM_ppm_SCR_Out_NOx_PreClamp	ppm
V_ATP_ppm_SCR_Out_NOx_Status	None	V_ATP_vr_Engine_Speed	RPM
V_ATP_fg_SCR_In_NOx_Status	None	V_ATP_mg_TotalFuelingPerStroke	mg/stroke
V_SCD_fg_NXGR_NOx_In	g/sec	V_ATP_tq_EngineTorque	N_m
P_SCD_NXGR_Intrusive_Enbl	None	V_SCP_trc_SCR_Bed	Deg_C
V_SCD_flm_NM_DosingOverride	None	V_SCD_NOxMonHiRatResetFlag	None
V_SCD_flm_NM_DosingValue	ml/sec	V_SCD_NM_IRH_IRL_MotorRun	None
V_SCD_fg_NXGR_NOx_In	g/sec	V_SCD_NM_High_Motor_State	None
V_ATR_SCR_Regen_Mode	None	V_AIM_OBD_CtrlPathOwner	None
V_SCD_mg_NXGR_NOx_In_Accum	g	V_SCD_NM_ppm_NOxOutAvg	ppm
V_SCD_tm_NXGR_Intrusive	s	V_SCD_NM_IRH_Err_Motor	None
V_SCD_tm_NXGR_Phase_II	s	V_SCD_NM_IRL_Err_Motor	None
V_SCD_NXGR_PhaseII_Compl	None	V_SCD_NM_High_Motor_State	None
V_SCD_fg_NXGR_Flow	g/sec	V_SCD_NM_Low_Motor_State	None
V_SCD_tm_NXGR_PhaseII_Max	s	V_UIM_PumpState	None
V_SCD_NXGR_Pause	None	V_ATP_fg_SCR_In_NOx_Status	None
V_SCD_ct_NXGR_NOx	counts	V_SCD_NM_Dither_Abort	None
V_SCD_ppm_NXGR_NOx_Out	ppm	V_SCR_fn_DeNOx_Est	None
V_SCD_NXGR_Ratio	None	V_SCM_fg_MassFlow_In	g/sec
V_SCD_ppm_NXGR_NOx_In	ppm	V_SCR_ppm_NOx_In	ppm
V_SCD_tm_NXGR_Diagnosis	s	V_SCP_UreaInjMaxExceed	None
V_ATP_KeySwitch	None	V_SCD_NM_tm_Dither_Time	s
V_SCD_tm_NXGR_HiFlow	s	V_SCD_NM_ppm_Dither_Est_Range	ppm
V_SCD_NXGR_Update	None	V_SCD_NM_ppm_Dither_Act_Range	ppm
V_ATM_OBD_Data_Reset	None	V_SCD_NM_Dither_State	None
P_SCD_NXGRH_EWMA_Filt	None	V_SCD_NM_DitherRun	None
P_SCD_ct_NXGRH_FIRTestsCompl	counts	V_SCD_NM_DitherError	None
P_SCD_ct_NXGRH_RRTestCompl	counts		
P_SCD_NXGRH_RRState	None		
P_SCD_NXGRL_EWMA_Filt	None		

102. Engine Out NOx Sensor Power and Intermittent – FC3682

EONOx_J39_Fault_Inhibit	None	EONOx_J39_Fast_Power_In_Range	None
EONOx_Dew_Point_State	None	EONOx_Dew_Point_State	None
EONOx_J39_AftIn_Temp	None	EONOx_IntPwr_Timer	s
EONOx_J39_AftIn_Power_In_Range	None	EONOx_IntPwr_Counter	None
EONOx_J39_AftIn_NOx_FMI	None	EONOx_Power_Fault_Flag	None
EONOx_J39_AftIn_Heater_FMI	None	EONOx_Power_Fault_Flag	None
EONOx_PwrErr_Timer	s	EONOx_INT_Pwr	None
Current_Engine_State	None	EONOx_INT_Pwr_Err	None
H_EONOx_Diag_State	None		
EONOx_Stop_GPD	None		

103. System Out NOx Sensor Power and Intermittent – FC3681

V_AIM_SCR_FaultInhibit	None	V_ATP_EngineState	None
AIM_Outlet_Dew_Point	None	V_ATP_CatOutNOxDiag_State	None
V_ATP_tm_CatOutNOxDiag_Timer	s	T_ATM_NOxOut_SenPwrInt_Enbl	None
V_AIM_SCR_Out_NOxAtTmptr	None	V_AIM_SCR_Out_NOxPowerInRange	None
NOX_OUT_SENSOR_TIMEOUT_ERR	None	AIM_Outlet_Dew_Point_Status	None
V_AIM_SCR_Out_NOxPowerInRange	None	V_ATM_NOxOutPwrInt_Latch	s
V_AIM_SCR_Out_NOxFMI	s	V_ATM_tm_NOxOutPwrInt_Timer	counts
V_ATP_tm_CatOutNOxPwrErr_Timer	None		

104. Engine Out NOx Sensor Heater Repsonse – FC3649

EONOx_Dew_Point_State	None	EONOx_Gas_Velocity	m/s
EONOx_J39_AftIn_Heater_Control	None	EONOx_HtrPerfMonTimer	s

EONOx_Power_Fault_Flag	None	EONOx_Htr_Warmup_Err	None
EONOx_J39_Sensor_Status	None	H_EONOx_HtrWarmUp_State	None
EONOx_Power_Fault_Flag	None	EONOx_HtrPerfAvgTimer	s
EONOx_J39_AftIn_Power_In_Range	None	EONOx_HtrStatStableTimer	s
EONOx_FirstCatIn_Temp	Deg_C	EONOx_Htr_Resp_Err	None
Exhaust_Flow	kg/min	H_EONOx_HtrPerfMon_State	None
EONOx_FirstCatIn_Press	kPa		

105. System Out NOx Sensor Heater Repsonse – FC3583

AIM_Outlet_Dew_Point	None	V_ATP_ppm_SCR_Out_NOx_Status	None
V_AIM_SCR_OutletHeaterControl	None	V_ATP_KeySwitch	None
V_ATD_bs_SCR_SysIO1_Errs	HEX	V_SCD_Catalyst_Velocity	s
V_ATP_SCR_Out_NOxPwrIRValid	None	Battery_Voltage	V
V_SCM_trc_SCR_Out	Deg_C	V_SCD_bs_NOxSenHtrResetBitMap	HEX
V_ATM_NOxOutPwrInt_Latch	None	V_SCD_tm_NOxSenHtrPerfMonTimer	s
V_SCP_vs_SCR_Catalyst	1/sec	V_SCD_NOxSenHtrWarmUp_State	None
V_SCD_Catalyst_Velocity	s	V_SCD_tm_NOxSenHtrPerfAvgTimer	s
V_ATP_SCR_Out_NOxPwrIRValid	None	V_SCD_tm_NOxHtrStatStableTimer	s
V_AIM_SCR_Out_NOxAtTmptr	None	V_SCD_pc_NOxHtrStatStable	%
V_AIM_SCR_OutletHeaterControl	None	V_SCD_ct_NOxHtrStatFallCounter	counts
V_AIM_SCR_Out_NOxReadStbl	None	V_SCD_NOxSenHtrResp_State	None
V_ATP_fg_SCR_In_NOx_Status	None		

106. Engine Out NOx Sensor Response/Persist Not Valid – FC3725

CBM_Indicated_Trq_Fuel	mg/stroke	H_CBM_O2_Percent_Rate	%/s
EONOx_Resp_State	None	Exhaust_Flow_Status	None
EONOx_Sensor_Status	None	CBM_NOx_Out_Rate_Unlimited	g/hr
EONOx_Comp_Value	ppm	H_CBM_NOx_Rate	ppm/s
EONOx_Resp_Mot_Enbl	None	EONOx_FirstCatIn_Press	kPa
EONOx_OBD_CtrlPathOwner	None	H_Exhaust_Press_Rate	kPa/s
EONOx_Resp_Mot_Enbl	None	H_Exhaust_Flow_Rate	kg/m/sec
EONOx_Resp_State	None	EONOx_Persist_Not_Valid_Enbl	None
EONOx_Resp_Counter	None	EONOx_J39_AftIn_NOx_Read_Stbl	None
EONOx_Resp_Err	None	EONOx_NotValid_Abort_Flag	None
EONOx_Comp_Value	ppm	EONOx_Persist_Not_Valid_Timer	s
Exhaust_Flow	kg/min	EONOx_Persist_Not_Valid_Err	None
CBM_O2_Out_Rate	g/sec		

107. System Out NOx Sensor Response/Persist Not Valid – FC3545

T_SCD_NXRT_NOx_Sensor_Resp_Enbl	None	V_SCD_ppm_NXRT_NOxBuffer	ppm
V_SCM_ppm_SCR_Out_NOx_PreClamp	ppm	V_SCD_ppm_NXRT_NOx_iStartPoint	ppm
V_ATP_mg_TotalFuelingPerStroke	mg/stroke	V_SCD_ct_NXRT_iStartingPoint	counts
V_ATD_bs_SCR_SysIO1_Errs	HEX	V_SCD_ppm_NXRT_NOx_iEndingPoint	ppm
V_ATD_bs_SCR_SysIO2_Errs	HEX	V_SCD_NXRT_Log_Lim	None
V_ATD_bs_SCR_SysPerf_Errs	HEX	V_SCD_NXRT_SimR_NOx_Method	None
V_UIM_bs_DiagStatus	HEX	V_SCD_ct_NXRT_iStartingPoint	counts
V_ATD_bs_SCR_ExtInput_Status	HEX	V_SCD_NXRT_Filter_State	counts
V_ATM_OBD_Data_Reset	None	V_SCD_NXRT_Update	None
V_ATP_ppm_SCR_Out_NOx_Status	None	P_SCD_tc_NXRT_SR_EWMA_Filt	s
V_SCD_Engine_Fuel_Status	None	P_SCD_ct_NXRT_SR_FIRTestsCompl	counts
V_SCD_NXRT_Sensor_Resp_State	None	P_SCD_ct_NXRT_SR_RRTestCompl	counts
V_AIM_OBD_CtrlPathOwner	None	P_SCD_NXRT_SR_RRState	None
V_SCD_tm_NXRT_SimR_NOx_Tau	s	V_SCD_NXRT_Sensor_Resp_State	None
V_SCD_ppm_NXRT_SimR_NOx_Offset	ppm	T_ATP_SCR_Out_NOxSensor_Enbl	None
V_SCD_ppm_NXRT_SimR_NOx_Amp	ppm	AIM_Outlet_Dew_Point	None
V_SCD_ct_NXRT_Index	counts	V_ATM_NOxOutPwrInt_Latch	None
V_SCD_ct_NXRT_Reg_Npts	counts	V_ATP_mg_TotalFuelingPerStroke	mg/stroke
V_SCD_ppm_NXRT_Sum_NOx1	ppm	V_ATP_SCR_Out_NOx_NotStbl_Abort	None
V_SCD_NXRT_Sum_NOx1_NOx1	None	V_ATP_pc_SCR_In_O2	%
V_SCD_NXRT_Sum_NOx1_dNOx	None	V_ATP_NotStbl_O2Transient_Flag	None
V_SCD_NXRT_Sum_dNOx	None	V_AIM_SCR_Out_NOxReadStbl	None
V_SCD_ppm_NXRT_Sum_NOx	ppm	V_ATP_pc_SCROut_NotStable	%

108. Regen Timeout – FC3753

V_ATP_Engine_Running	None
P_SFR_Regen_Trigger_State	None
P_ATD_tmh_TimerRegenRqstActive	hr

V_ATP_ApplicationLabel	None

109. DPF Temperature Sensor Rationality – FC3316, FC3317, FC3318, FC3319, FC3321, FC3322

O_ATD_DeltaT_Allow_Enable	None	V_ATD_DeltaT_DOC_High	None
O_ATD_SystemCheck_Ok	None	V_ATD_DeltaT_DOC_In_Error	None
V_AIM_trc_DOC_In	Deg_C	V_ATD_DeltaT_DOC_Low	None
V_AIM_trc_DOC_In_Status	None	V_ATD_DeltaT_DOC_Out_Error	None
V_AIM_trc_DOC_Out	Deg_C	V_ATD_DeltaT_DPF_High	None
V_AIM_trc_DOC_Out_Status	None	V_ATD_DeltaT_DPF_Low	None
V_AIM_trc_DPF_Out	Deg_C	V_ATD_DeltaT_DPF_Out_Error	None
V_AIM_trc_DPF_Out_Status	None	V_ATD_trc_DeltaT_DOC_Average	Deg_C
V_ATD_bs_PFS_Sensor_Status	HEX	V_ATD_trc_DeltaT_DPF_Average	Deg_C
V_ATD_DeltaT_Allow_Average	None	V_ATM_Exhaust_Data_To_PFS[1]	None
V_ATD_DeltaT_Buffer_Filled	None	V_ATM_fg_HC_Fdbk_Total	g/sec
V_ATD_DeltaT_Buffer_Reset	None	V_ATP_Engine_Running	None

110. Feedback Used Up - FC2638

O_OCD_UsedUp_Condition_Enbl	None	V_OCD_PID_UsedUp_Abort	None
O_OCD_UsedUp_Condition_Val	None	V_OCD_PID_UsedUp_State	None
P_ATR_SFM_OperModeRqst	None	V_OCD_tm_UsedUp_Diag	s
P_OCD_ct_UsedUp_Diag	counts	V_OCL_fg_HC_Final_Limit	g/sec
T_OCD_Fdbk_Usedup_Enbl	None	V_OCR_fg_HC_Cmd	g/sec
V_ATD_bs_PFS_EngOut_Status	HEX	V_OCR_fg_HC_Corr	g/sec
V_ATD_bs_PFS_Sensor_Status	HEX	V_OCR_fg_HC_Nominal	g/sec
V_ATD_FT_DOC_Reset_Flag	None	V_OCR_fg_HC_PreCorr	g/sec
V_ATD_FT_Doser_Reset_Flag	None	V_OCR_trc_T_Cmd	Deg_C
V_ATM_OBD_Data_Reset	None	V_SFR_Ineff_Regen_Detected_Flag	None
V_ATP_trc_DOC_Out	Deg_C		

111. DPF Efficiency – FC3168

P_SFD_ct_DPFEff_N_Vec	counts	V_SFD_DPFEff_FRmean	None
P_SFD_DPFEff_R_Vec	None	V_SFD_DPFEff_Intercept	None
P_SFD_DPFEffEnblLatch	None	V_SFD_DPFEff_Ravg	None
P_SFD_fv_DPFEff_F_Vec	m3/s	V_SFD_DPFEff_Slope	None
P_SFD_tm_DPFEff_FlowOK	s	V_SFD_DPFEffResultDecision	None
P_SFD_tm_DPFEffRes_SinceEnbl	s	V_SFD_DPFEffResultErr	None
P_SFD_tm_DPFEffRes_SinceRegen	s	V_SFD_DPFEffResultUpdate	None
P_SFR_Regen_Trigger_State	None	V_SFD_DPFEffResultValid	None
T_SFD_DPFEff_Enbl	None	V_SFD_DpfEffState	None
V_ATD_bs_PFS_EngOut_Status	HEX	V_SFD_fv_DPFEff_Favg	m3/s
V_ATD_bs_PFS_Sensor_Status	HEX	V_SFP_fv_DPF	m3/s
V_ATD_bs_PFS_SysPerf1_Errs	HEX	V_SFP_GreenFilter	None
V_ATD_bs_PFS_SysPerf2_Errs	HEX	V_SFP_pr_Delta	kPa
V_ATP_Exhaust_Data_To_SFM[0]	None		

112. Frequent Regen – FC3375

P_SFD_FR_UpdateEnabled	None	V_ATD_bs_PFS_SysPerf2_Errs	HEX
P_SFD_tmh_FR_SteadyState	hr	V_ATM_OBD_Data_Reset	None
P_SFD_tmh_TimeSinceLastRegen	hr	V_ATP_Engine_Running	None
P_SFR_Regen_Trigger_State	None	V_ATP_Engine_SteadyState_Flag	None
T_SFD_FreqRegenDiag_Enbl	None	V_SFD_FreqRegen_Diag_Reset	None
V_ATD_bs_PFS_EngOut_Status	HEX	V_SFD_tmh_DutyCycle_RegenHr	hr
V_ATD_bs_PFS_Sensor_Status	HEX	V_SFP_GreenFilter	None
V_ATD_bs_PFS_SysPerf1_Errs	HEX		

113. Incomplete Regen – FC3376

T_SFD_IncompleteRegenEnable	None	V_SFP_gpl_Soot_Load_Comb	g/L
V_ATM_OBD_Data_Reset	None	V_SFR_Regen_Stage	None
V_SFP_GreenFilter	None	V_SFD_pc_AtTrgt	%
V_SFD_IncompleteRegenUpdt	None	V_SFD_tm_NotAtFlow	s
P_SFD_IncompleteRegenMILUpdate	None	V_SFD_FlowOK	None
P_SFR_Regen_Trigger_State	None	V_SFD_gpl_Min_DPSLE	g/L
V_SFR_Ineff_Regen_Detected_Flag	None	V_SFP_gpl_Soot_Load_DP	g/L
V_ATD_bs_PFS_EngOut_Status	HEX	V_SFD_gpl_IncompleteRegen_DPSLE	g/L

V_ATD_bs_PFS_Sensor_Status	HEX	V_SFD_IncompleteRegenState	None
V_SFM_trc_Tmptr_In	Deg_C		
V_SFR_trc_Regen_Trgt	Deg_C		
V_SFP_fv_DPF	m3/s		

114. DPF Missing – FC1993

T_SFD_DPFWithMufflerDiag_Enbl	None	P_SFD_gpl_MinDPSLE	g/L
P_SFP_gpl_Soot_Load_MB	g/L	P_SFD_gpl_MaxDPSLE	g/L
P_SFR_Regen_Trigger_State	None	V_SFD_DpfWithMufflerState	None
V_SFP_GreenFilter	None	T_SFD_DPF_Missing_Enable	None
P_SFD_MufflerDectectUpdate	None	V_ATD_PSR_Startup_Complete	None
V_SFD_DpfWithMufflerEnbl	None	V_SFP_fv_DPF	m3/s
H_SFP_Min_Flow_Trust	None	H_SFD_DPF_Monitor_Inhibit	None
P_SFD_tm_DpfWithMuffler_DPSLE	s	V_SFP_pr_Delta	kPa
V_SFD_DpfWithMufflerUpdate	None	H_SFD_tm_DPF_Rtest_Error	s
P_SFD_MufflerDectectUpdate	None	H_SFD_tm_DPF_Rtest_Pass	s
V_ATM_OBD_Data_Reset	None	V_SFD_FlwResist_MissDPF_Lim	None
V_ATD_bs_PFS_Sensor_Status	HEX	V_SFD_FlwResist_DPF_Actual	None
V_ATD_bs_PFS_EngOut_Status	HEX	H_SFD_DPF_ActualResist_Coeff	None
V_SFP_gpl_Soot_Load_DP	g/L	V_SFD_DPF_Missing_State	None
V_SFD_gpl_DPSLERange	g/L		

115. No Regen OverTemp – FC3247, FC3253, FC3255

P_ATD_tm_NR_DOC_Hi_Delay	s	V_ATD_NR_Overtemp_DOC_Enbl	None
P_ATD_tm_NR_DOC_Hi_Delay	s	V_ATD_NR_Overtemp_DPF_Enbl	None
P_ATD_tm_NR_DPF_Hi_Delay	s	V_ATM_fg_HC_Fdbk_Total	g/sec
P_ATD_tm_NR_DPF_Hi_Delay	s	V_ATP_Engine_Running	None
V_ATD_bs_PFS_Sensor_Status	HEX	V_OCL_H2O_Desorb_Request	None
V_ATD_NR_OT_DOC_Delta_Enbl	None	V_OCL_HC_Desorb_Request	None
V_ATD_NR_OT_DPF_Delta_Enbl	None		
DOC Inlet		DOC dT	
V_ATP_trc_DOC_In	Deg_C	V_ATD_NR_DOC_Delta_HiTmptr_Flag	None
V_ATD_NR_DOC_In_HiTmptr_Flag	None	V_ATD_tm_NR_DOC_Delta_Hi	s
V_ATD_tm_NR_DOC_In_Hi	s	V_ATP_trc_DOC_Out	Deg_C
		V_ATP_trc_DOC_In	Deg_C
DOC Outlet			
V_ATP_trc_DOC_Out	Deg_C	DPF dT	
V_ATD_NR_DOC_Out_HiTmptr_Flag	None	V_ATD_NR_DPF_Delta_HiTmptr_Flag	None
V_ATD_tm_NR_DOC_Out_Hi	s	V_ATD_tm_NR_DPF_Delta_Hi	s
		V_ATP_trc_DPF_Out	Deg_C
DPF Outlet		V_ATP_trc_DOC_Out	Deg_C
V_ATP_trc_DPF_Out	Deg_C		
V_ATD_NR_DPF_Out_HiTmptr_Flag	None		
V_ATD_tm_NR_DPF_Out_Hi	s		

116. RPF OverTemp – FC 3311, FC3254, FC3255, FC3256

DOC Delta T		DOC Out Hi	
V_ATD_bs_PFS_Sensor_Status	HEX	P_ATD_ct_DOCOut_HiTmptr_Persist	counts
V_ATD_bs_PFS_Sensor_Status	HEX	P_ATD_ct_DOCOut_HiTmptr_Persist	counts
V_ATD_DOC_Delta_Severe_Cond	None	V_ATD_bs_PFS_Sensor_Status	HEX
V_ATD_DOC_Delta_Severe_Enbl	None	V_ATD_DOC_Out_HiTmptr_Flag	None
V_ATD_DOC_Delta_Severe_Fault	None	V_ATD_DOC_Out_Persist_Fault	None
V_ATD_tm_DOC_Delta_Severe_Tmptr	s	V_ATD_Regen_End	None
V_ATP_trc_DOC_In	Deg_C	V_ATD_tm_DOC_Out_HiTmptr	s
V_ATP_trc_DOC_Out	Deg_C	V_ATM_OBD_Data_Reset	None
		V_ATP_trc_DOC_Out	Deg_C
DOC Out Severe			
V_ATD_DOC_Out_Severe_Condition	None	DPF Out High	
V_ATD_DOC_Out_Severe_Fault	None	P_ATD_ct_DPFOut_HiTmptr_Persist	counts
V_ATD_tm_DOC_Out_Severe_Tmptr	s	V_ATD_bs_PFS_Sensor_Status	HEX
V_ATP_trc_DOC_Out	Deg_C	V_ATD_DPF_Out_HiTmptr_Flag	None
		V_ATD_DPF_Out_Persist_Fault	None
DPF Out Severe		V_ATD_Regen_End	None
V_ATD_DPF_Out_Severe_Condition	None	V_ATD_tm_DPF_Out_HiTmptr	s
V_ATD_DPF_Out_Severe_Fault	None	V_ATM_OBD_Data_Reset	None
V_ATD_tm_DPF_Out_Severe_Tmptr	s	V_ATP_trc_DPF_Out	Deg_C

V_ATP_trc_DPF_Out	Deg_C

117. HIM Diagnostic – FC2639, FC1921, FC1922, FC1923, FC1925, FC1924, FC1926, FC1928, FC1977, FC1932, FC1963, FC2732, FC2733, FC2741, FC2777, FC2878, FC2879, FC2881, FC3167, FC3223, FC3224, FC3225

Decarb	
C_HIM_DDC_Logic_Enbl	None
H_HIM_DDC_tm_No_Dose	s
H_HIM_fg_ATM_HC_Cmd	g/sec
H_HIM_PRR_Pressure_High	None
T_HIM_DIAG_Test_Enbl	None
V_HIM_DDC_Rqst	None
V_HIM_DIAG_AirPurgeRqst	None
V_HIM_DIAG_NoDosing	None
V_HIM_DIAG_Pressure_Test_Comp	None
Restriction	
H_HIM_DIAG_Leak_Test_Failed	None
H_HIM_DIAG_Pressure_Test_Failed	None
H_HIM_DIAG_tm_RestrictTest	s
H_HIM_DIAG_tm_RestrictTestFail	s
H_HIM_fg_ATM_HC_Cmd	g/sec
H_HIM_pr_Inj_Fuel_Press_Comp	kPa
O_HIM_DIAG_RestrictTest_Enbl	None
P_ATR_SFM_OperModeRqst	None
T_HIM_DIAG_Test_Enbl	None
V_ATD_DisableDosing	None
V_HIM_DFSOV_Cmd	None
V_HIM_DFSOV2_Cmd	None
V_HIM_DIAG_Amb_Test_Failed	None
V_HIM_DIAG_Pressure_Test_Comp	None
V_HIM_DIAG_RestrictTestFail	None
V_HIM_DIAG_RestrictTestPass	None
V_HIM_FT_Test_Active	None
Pressure Relief	
H_HIM_pr_Inj_Fuel_Press_Comp	kPa
H_HIM_PRR_Blocked	None
H_HIM_PRR_Burst_Blocked	None
H_HIM_PRR_Burst_Pressure_High	None
H_HIM_PRR_Enabled	None
H_HIM_PRR_Pressure_High	None
P_HIM_PRR_ct_Burst	counts
T_HIM_DIAG_Test_Enbl	None
V_HIM_DFSOV_Cmd	None
V_HIM_DIAG_NoDrain	None
V_HIM_DIAG_Pressure_Test_Comp	None
V_HIM_PRR_Burst_Active	None
V_HIM_PRR_fg_Burst_Cmd	g/sec
V_HIM_PRR_fg_Cmd	g/sec
V_HIM_PRR_Rqst	None
General	
H_HIM_DIAG_fg_Pressure_Test_Cmd	g/sec
H_HIM_DIAG_Pressure_DFSOV_Cmd	None
H_HIM_DIAG_Pressure_DFSOV2_Cmd	None
H_HIM_DIAG_tm_Air_Purge_Delay	s
H_HIM_DIAG_tm_Pressure_Test	s
H_HIM_pr_Inj_Fuel_Press_Comp	kPa
O_HIM_tm_Plant_Fuel_Fill_Value	s
V_AIM_pr_HC_DoserP_Status	None
V_ATM_Exhaust_Data_To_PFS[1]	None
V_ATR_fg_HC_Fdbk_from_HIM	g/sec
V_HIM_bs_DiagStatus	HEX
V_HIM_DIAG_After_Regen_Active	None
V_HIM_DIAG_Air_Purge_Active	None
V_HIM_DIAG_Air_Purge_Low_HC	None
V_HIM_DIAG_Amb_Pause_Active	None

Pressure Test	
H_HIM_DIAG_fg_Pressure_Test_Cmd	g/sec
H_HIM_DIAG_Leak_Test_Active	None
H_HIM_DIAG_Pressure_DFSOV_Cmd	None
H_HIM_DIAG_Pressure_DFSOV2_Cmd	None
H_HIM_DIAG_Pressure_Test_Active	None
H_HIM_DIAG_Pressure_Test_Failed	None
H_HIM_DIAG_tm_Pressurize_Delay	s
H_HIM_fg_ATM_HC_Cmd	g/sec
O_HIM_DIAG_Pressure_Test_Enbl	None
P_ATR_SFM_OperModeRqst	None
T_HIM_DIAG_Test_Enbl	None
V_ATD_DisableDosing	None
V_HIM_ct_Press_Test_SpecialDen	counts
V_HIM_DIAG_After_Regen_Active	None
V_HIM_DIAG_AirPurgeRqst	None
V_HIM_DIAG_Before_Regen_Active	None
V_HIM_DIAG_ct_Press_Test_Retry	counts
V_HIM_DIAG_DDC_Air_Purge_Rqst	None
V_HIM_DIAG_Press_Error	None
V_HIM_DIAG_Pressure_DFSOV_Cmd	None
V_HIM_DIAG_Pressure_DFSOV2_Cmd	None
V_HIM_DIAG_Pressure_Doser_Cmd	None
V_HIM_DIAG_Pressure_Test_Comp	None
V_HIM_DIAG_Pressure_Test_State	None
V_HIM_Engine_Running	None
V_HIM_FT_Test_Active	None
ASOVFTO and Stuck	
V_HIM_DIAG_ASOV_FTO	None
V_HIM_DIAG_ASOV_FTO_Update	None
V_HIM_DIAG_InRange_Update	None
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_ASOV_FTO	kPa
V_HIM_DIAG_pr_ASOV_PreFTO	kPa
V_HIM_DIAG_pr_DFSOV_FTO	kPa
V_HIM_DIAG_Stuck_Test	None
Air Leak	
V_HIM_DIAG_Air_Leak_Test	None
V_HIM_DIAG_pr_Air_Leak	kPa
V_HIM_DIAG_pr_PreAir_Leak	kPa
V_HIM_DIAG_System_Leak_Update	None
Ambient Press Check	
V_HIM_DIAG_Amb_Test_Failed	None
V_HIM_DIAG_ASOV_FTO	None
V_HIM_DIAG_Doser_FTP	None
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_SOV_Leak_Update	None
DFSOV2FTO	
V_HIM_DIAG_DFSOV2_FTO	None
V_HIM_DIAG_DFSOV2_FTO_Update	None
V_HIM_DIAG_pr_ASOV_FTO	kPa
V_HIM_DIAG_pr_ASOV_PreFTO	kPa
DFSOVFTO	
V_HIM_DIAG_DFSOV_FTO	None
V_HIM_DIAG_DFSOV_FTO_Update	None
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_DFSOV_FTO	kPa

V_HIM_DIAG_Before_Regen_Active	None
V_HIM_DIAG_Fuel_Fill_Active	None
V_HIM_DIAG_Integration_Complete	None
V_HIM_DIAG_Max_Purge_Reached	None
V_HIM_DIAG_mg_Integration	g
V_HIM_DIAG_pr_Air_Leak	kPa
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_ASOV_FTO	kPa
V_HIM_DIAG_pr_ASOV_PreFTO	kPa
V_HIM_DIAG_pr_Decay_To_Amb_Init	kPa
V_HIM_DIAG_pr_DFSOV_FTO	kPa
V_HIM_DIAG_pr_Doser_FTP	kPa
V_HIM_DIAG_pr_Fuel_Leak	kPa
V_HIM_DIAG_pr_PreAir_Leak	kPa
V_HIM_DIAG_pr_SOV_Leak	kPa
V_HIM_DIAG_Pressure_DFSOV_Cmd	None
V_HIM_DIAG_Pressure_DFSOV2_Cmd	None
V_HIM_DIAG_Pressure_Doser_Cmd	None
V_HIM_DIAG_Pressure_Test_State	None
V_HIM_DIAG_Tip_Dry_Complete	None
V_HIM_fg_HC_Final_Limit	g/sec

SOV Leak

V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_SOV_Leak	kPa
V_HIM_DIAG_SOV_Leak	None
V_HIM_DIAG_SOV_Leak_Update	None

DFSOV Swap

V_HIM_DIAG_DFSOV_Swap	None
V_HIM_DIAG_DFSOV_Swap_Update	None
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_DFSOV_FTO	kPa
V_HIM_DIAG_pr_SOV_Leak	kPa

Doser FTP

V_HIM_DIAG_Doser_FTP	None
V_HIM_DIAG_pr_Air_Leak	kPa
V_HIM_DIAG_pr_Doser_FTP	kPa
V_HIM_DIAG_SOV_Leak_Update	None

Fuel Leak

V_HIM_DIAG_Fuel_Leak_Test	None
V_HIM_DIAG_pr_DFSOV_FTO	kPa
V_HIM_DIAG_pr_Fuel_Leak	kPa
V_HIM_DIAG_System_Leak_Update	None

Pressure Rationality

V_HIM_DIAG_ASOV_FTO	None
V_HIM_DIAG_Doser_FTP	None
V_HIM_DIAG_InRange_Update	None
V_HIM_DIAG_pr_Ambient	kPa
V_HIM_DIAG_pr_ASOV_FTO	kPa
V_HIM_DIAG_pr_DFSOV_FTO	kPa
V_HIM_DIAG_pr_Fuel_Leak	kPa
V_HIM_DIAG_pr_SOV_Leak	kPa
V_HIM_DIAG_Rationality_Test	None

After-Treatment Parameter Estimates

118. Engine Out PM Estimate

Fuel_Delivery_Rate_Per_Min	kg/min	H_PME_SootRateClamped	g/hr
Engine_Speed	RPM	CBM_FdbkTorqueFuel	Mg/str
EGR_Fraction	None	PME_M270_SootRate_Ref	g/hr
CBP_Air_Fuel_Ratio	None	PME_GainFactor	None
CBR_Main_SOI	deg_BTDC	H_PME_FuelDeliveryAftGain	None
CBM_PM_Out_Rate	g/hr	H_PME_SootRateUnclamped	None
CBM_Fdbk_AccumulatorPress	Bar	H_PME_PM_Factor_AFR	None
CBM_Comb_Load_Ref	Mg/str	H_PME_PM_Factor_Speed	None
CBR_Pilot1_SOI	None	H_PME_PM_Factor_EGR_Frac	None
CBR_Pilot2_SOI	None	H_PME_PM_Factor_EGRSOI	None
CBR_Post1_SOI	None	H_PME_PM_Factor_SOI	None
CBR_Post2_SOI	None	H_PME_PM_Factor_PRS	None
CBR_Pilot1_Fuel_Quantity_Final	Mg/str	H_PME_PM_Factor_Fuel	None
CBR_Pilot2_Fuel_Quantity_Final	Mg/str	H_PME_PM_Factor_PRSPIF	None
CBR_Post1_Fuel_Quantity_Final	Mg/str	H_PME_PM_Fuel	None
CBR_Post2_Fuel_Quantity_Final	Mg/str		None

119. DeltaP Soot Load Estimate

Engine_Speed	RPM	V_SFP_pr_Delta_Clean	kPa
V_SFP_pr_Max_At_High_Flow	kPa	V_SFP_pr_Delta_Low	kPa
V_SFP_pr_Delta	kPa	V_SFP_pr_Delta_Mid	kPa
V_SFP_DeltaP_Saturated	kPa	V_SFP_pr_Delta_High	kPa
H_SFP_fv_Unfiltered	ACMS	P_SFP_gpl_Soot_Load_DP	g/l
P_SFP_gpl_DPSLE_Adj	g/l	V_SFP_mg_Soot_Load_DP	G
V_SFP_gpl_Soot_Load_DP_No_Clamp	g/l	T_SFP_gpl_Ash_Adj_Enbl	None
H_SFP_tm_DeltaPNotSaturated	s	H_SFP_gpl_Soot_Load	g/l
H_SFP_Min_Flow_Trust	ACMS	H_SFP_pr_MBPE	kPa
P_SFP_mg_Soot_Load_DP	G	V_SFP_trc_DPF_Bed	Deg_C

120. Mass Balanced Soot Load Estimate

Engine_Speed	RPM	V_SFM_fg_MassFlow_In	g/sec
V_SFP_gph_NetSootAccumRate	g/hr	V_SFM_fg_Mass_Flow_Out	g/sec
V_SFP_gpl_Soot_Load_MB	g/l	V_SFM_fg_NO2_Out	g/sec
V_SFP_mg_Soot_Load_MB	Gm	V_ATD_bs_PFS_Sensor_Satus	HEX
V_SFM_fg_NO2_In	g/sec	V_ATD_bs_PFS_EngOut_Status	HEX
V_SFM_fg_O2_In	g/sec	H_SFP_MBSLRSensorErrors	None
V_SFM_fg_NOx_In	g/sec	P_SFR_ct_Ineff_Regen_Occr	Counts
V_SFP_trc_DPF_Bed	Deg_C	H_SFP_nu_Exp_Arrhenius_Term	None
H_SFP_ConsMBSLR	None	H_SFP_gph_Oxid_Rate	g/hr
H_SFP_gph_Noxid_Rate	g/hr	H_SFP_nu_Soot_Load_Norm	None
H_SFP_nu_O2_In_Norm	None	V_SFP_gpl_Soot_Load_Comb	g/l

Aftertreatment Overrides

121.User Overrides

Description	Variable	Override Enable	Override Value
Turbo out mass flow	V_ATP_fg_Turbo_Out	O_AIM_fg_TrbnOut_Enbl	O_AIM_fg_TrbnOut_Val
Turbo out NO2	V_ATP_fg_Turbo_Out_NO2	O_AIM_fg_TrbnOutExh_NO2_Enbl	O_AIM_fg_TrbnOutExh_NO2_Val
Turbo out NOx	V_ATP_fg_Turbo_Out_NOx	O_AIM_fg_TrbnOutExh_NOx_Enbl	O_AIM_fg_TrbnOutExh_NOx_Val
Turbo out O2	V_ATP_fg_Turbo_Out_O2	O_AIM_fg_TrbnOutExh_O2_Enbl	O_AIM_fg_TrbnOutExh_O2_Val
Turbo out HC target feedback	V_ATP_fg_Turbo_Out_HC	O_AIM_fg_TrbnOutHCTrgtFdbk_Enbl	O_AIM_fg_TrbnOutHCTrgtFdbk_Val
Turbo Out PM	V_ATP_gph_Turbo_Out_PM	O_AIM_gph_TrbnOutExh_PM_Enbl	O_AIM_gph_TrbnOutExh_PM_Val
Non-Mission Regen Switch	V_ATP_NMRegen_Switch	O_AIM_NMRegen_Sw_Enbl	O_AIM_NMRegen_Sw_Val
Permit Switch	V_ATP_Permit_Switch	O_AIM_PermitSwEnbl	O_AIM_PermitSwVal
DPF Pressure Delta	V_AIM_pr_DPF_DeltaP	O_AIM_pr_DPF_DeltaP_Enable	C_AIM_pr_DPF_DeltaP_Default
HC Doser pressure	V_AIM_pr_HC_DoserP	O_AIM_pr_HC_DoserP_Enable	C_AIM_pr_HC_DoserP_Default
Turbo out pressure	V_ATP_pr_Turbo_Out	O_AIM_pr_TrbnOut_Enbl	O_AIM_pr_TrbnOut_Val
DPF out pressure	V_AIM_prg_DPF_OutP	O_AIM_prg_DPF_OutP_Enable	C_AIM_prg_DPF_OutP_Default
CCC In Temperature	V_AIM_trc_CCC_In	O_AIM_trc_CCC_In_Enable	C_AIM_trc_CCC_In_Default
CCC Out temperature	V_AIM_trc_CCC_Out	O_AIM_trc_CCC_Out_Enable	C_AIM_trc_CCC_Out_Default
DOC In Temperature	V_AIM_trc_DOC_In	O_AIM_trc_DOC_In_Enable	C_AIM_trc_DOC_In_Default
DOC Out Temperature	V_AIM_trc_DOC_Out	O_AIM_trc_DOC_Out_Enable	C_AIM_trc_DOC_Out_Default
DPF Out Temperature	V_AIM_trc_DPF_Out	O_AIM_trc_DPF_Out_Enable	C_AIM_trc_DPF_Out_Default
SCR In Temperature	V_AIM_trc_SCR_In	O_AIM_trc_SCR_In_Enable	C_AIM_trc_SCR_In_Default
SCR Out Temperature	V_AIM_trc_SCR_Out	O_AIM_trc_SCR_Out_Enable	C_AIM_trc_SCR_Out_Default
Turbo Out Temperature	V_ATP_trc_Turbo_Out	O_AIM_trc_TrbnOut_Enbl	O_AIM_trc_TrbnOut_Val
Operation Mode permitted from EXM	V_ATP_Oper_Mode_Permitted	O_ATP_Oper_Mode_Permitted_Enbl	O_ATP_Oper_Mode_Permitted_Val
Vehicle Speed	V_ATP_vl_Vehicle_Speed	O_ATP_vl_Vehicle_Speed_Enbl	O_ATP_vl_Vehicle_Speed_Val
Non Mission Regen	V_ATR_NonMissionRegenActive	O_ATR_NMRegen_Enbl	O_ATR_NMRegen_Val
Non Mission Regen Switch	V_ATP_NMRegen_Switch	O_AIM_NMRegen_Sw_Enbl	O_AIM_NMRegen_Sw_Val
Aftertreatment Operating Mode	V_ATR_Final_Oper_Mode	O_ATR_Oper_Mode_Enbl	O_ATR_Oper_Mode_Val
AT Fuel Shut-Off Valve	V_HIM_DFSOV_Cmd	O_HIM_DFSOV_Control_Enbl	O_HIM_DFSOV_Control_Value
AT Drain Shut-Off Valve	V_HIM_DFSOV2_Cmd	O_HIM_DFSOV2_Control_Enbl	O_HIM_DFSOV2_Control_Value
Max HC slip fueling	V_HIM_fg_HC_Final_Limit	O_HIM_DIAG_fg_OCL_Limit_Enbl	O_HIM_DIAG_fg_OCL_Limit_Value
Doser fueling cmd	H_HIM_fg_Dosing_Cmd	O_HIM_fg_Inj_Cmd_Enbl	O_HIM_fg_Inj_Cmd_Value
Doser injector on time	H_HIM_tm_Inj_On	O_HIM_tm_Inj_On_Enbl	O_HIM_tm_Inj_On_Value
Soot load reset	P_SFP_gpl_Soot_Load_Reset_Val	O_SFP_gpl_Soot_Load_Reset_En	O_SFP_gpl_Soot_Load_Reset_En
Dosing Override	V_SFR_Regen_Trigger	O_SFR_Regen_Trigger_On	
Regeneration stage	V_SFR_Regen_Stage	O_SFR_RegenStage_Enbl	O_SFR_RegenStage_Val
Regeneration target	V_SFR_trc_Regen_Trgt	O_SFR_trc_RegenTrgt_Enbl	O_SFR_trc_RegenTrgt_Val
Urea Pump Prime Condition	V_SCL_PrimeCondtActive	O_SCL_PumpCondt_Enbl	O_SCL_PumpCondt_Val
Urea Tank Level	V_AIM_pc_Urea_TankLvl	O_AIM_pc_Urea_TankLvl_Enable	C_AIM_pc_Urea_TankLvl_Default
Urea Tank Temp	V_AIM_trc_Urea_TankT	O_AIM_trc_Urea_TankT_Enable	C_AIM_trc_Urea_TankT_Default
Permit Switch	Permit_Switch	O_AIM_PermitSwEnbl	O_AIM_PermitSwVal
NOx Inlet to SCR	V_ATP_fg_SCR_In_NOx	O_ATP_fg_SCR_In_NOx_Enbl	O_ATP_fg_SCR_In_NOx_Val
Urea Dosing	V_UIM_flm_InjRateCmd	O_UIM_flm_UreaInjCmd_Enbl	O_UIM_flm_UreaInjCmd_Val
Urea Tank Heater	V_UTM_TNK_HeaterStateRqst	O_UTC_TankHeater1_Enbl	O_UTC_TankHeater1_Val
Urea Supply Line Heater	V_UTM_SL_HeaterStateRqst	O_UTC_LineHeater3_Enbl	O_UTC_LineHeater3_Val
Urea Return Line Heater	V_UTM_RL_HeaterStateRqst	O_UTC_LineHeater2_Enbl	O_UTC_LineHeater2_Val
Urea Pressure Line Heater	V_UTM_PL_HeaterStateRqst	O_UTC_LineHeater1_Enbl	O_UTC_LineHeater1_Val

122.User Resets

Faulted Parameter	**Reset Enable**
V_OCD_tm_DOC_Presence_Diag / V_OCD_DOC_Presence_Error	O_OCD_DOC_PresenceCounter_Reset
FC3311, DOC_SEVERE_TMPTR_LATCHED_ERR	O_ATD_DOC_Out_SevereFault_Reset
FC3254, DOC_OUT_OVERTEMP_ERR	O_ATD_DOCOut_PersistFault_Reset
FC3312, DPF_SEVERE_TMPTR_LATCHED_ERR	O_ATD_DPF_Out_SevereFault_Reset
V_ATD_fv_DPF_PTD_Rng / V_ATD_prg_DPF_PTD_Rng / V_ATD_DPF_PTD_OBDState	O_ATD_DPF_PTD_Reset
FC3256, DPF_OUT_OVERTEMP_ERR	O_ATD_DPFOut_PersistFault_Reset
V_ATD_tm_DPFOutP_Hi / DPF_OUTP_HIGH_ERR	O_ATD_DPFOutP_HiFlagReset
V_ATD_fv_DPFOutP_SIR_Rng / V_ATD_prg_DPFOutP_SIR_Rng / V_ATD_DPFOutP_SIR_OBDState	O_ATD_DPFOutP_SIR_Reset
P_ATD_Switch_Latched	O_ATD_SwitchTest_Time_Reset
V_OCD_tm_DOC_Reverse_Diag / V_OCD_DOC_Reverse_Error	O_OCD_DOC_ReverseCounter_Reset
V_OCP_tm_Bed_Tmptr_Warmup / V_OCP_Not_Warm_Yet_Flag	O_OCP_Bed_Tmptr_Timer_Reset
H_OCR_Integrator_Reset /	O_OCR_TmptrFdbkInt_Reset
V_SFD_fv_DPFdP_SIR_Rng / V_SFD_pr_DPFdP_SIR_Rng / V_SFD_DPFdP_SIR_OBDState	O_SFD_DPFdP_SIR_Reset
H_SFD_tm_DeltaP_High / DPF_DELTAP_HIGH_ERR	O_SFD_Limit_Flag_Reset
V_SFD_DPFdP_SIR_Enbl	O_SFD_SystemCheck_Ok
V_SFP_gpl_Soot_Load_Comb	O_SFP_Soot_Load_Reset

Procedures

123. Soot Load Override

1. Set parameter *O_SFP_gpl_Soot_Load_Reset_Val* to the desired soot load (in grams per liter)
    a. Divide desired soot load in grams by 20.39 liters.
2. Set override *O_SFP_gpl_Soot_Load_Reset_En* to a value *1*
3. Set override *O_SFP_Soot_Load_ResetReset* to a value *1*
4. Steps 5-6 need completed so that the soot load will decrease per the regeneration (if they are not performed the soot load will not decrement and stay at the value set in step 1)
5. Set override *O_SFP_Soot_Load_Reset* to a value *0*
6. Set override *O_SFP_gpl_Soot_Load_Reset_En* to a value *0*

124. Trigger Stationary Regeneration without the Stationary Regen Switch

1. Set override *O_SFR_Regen_Trigger_On* to a value of *1*
2. Verify *T_AIM_PermitSwitchEnbl* = 1
3. Set override *O_AIM_NMRegen_Sw_Val* to a value *1*
4. Set override *O_AIM_NMRegen_Sw_Enbl* to a value *1*
5. When testing is complete, switch all three overrides in steps 1-3 to a value of 0

125. After-treatment Fuel Shutoff Valve, After-treatment Air Shutoff Valve, and Doser Override Procedure

The following procedure allows you to individually override SOV#1, SOV#2, to diagnose after-treatment fuel system issues.

1. Set *O_HIM_DFSOV_Control_Enbl, O_HIM_DFSOV2_Control_Enbl, and O_HIM_tm_Inj_On_Enbl* to a value of *1* for doser and SOV override enables
2. Set *O_HIM_DFSOV_Control_Value* to a value of *1* to open the Supply SOV and supply doser with fuel pressure
3. Set *O_HIM_DFSOV2_Control_Value* to a value of *0* to close Air SOV
4. Set *O_HIM_tm_Inj_On_Value* to a value of *10 ms* to turn on the doser

126. After-treatment Fuel Injector (Doser) Bucket Test

This procedure will inject 300ml of fuel in 2.5 minutes. The doser must flow a minimum of 275ml during this test. Note, this procedure must be performed with the doser removed from the engine.

1. Set *C_HIM_FT_DoserTest_Enbl* to a value of *1*
2. Set *V_HIM_FT_Test_Mode* to a value of *0*
3. Set *V_HIM_FT_DoserTest_Start* to a value of *1*
4. Set all three overrides in steps 1-3 to a value of *0* after test is complete

127. Trigger Dosing System Diagnostics

1. Set *O_HIM_Enbl* to a value of *1*
2. Set *O_HIM_DIAG_Leak_Test_Enbl* to a value of 1 to run the Leak Diagnostic
3. Set *O_HIM_DIAG_RestrictTest_Enbl* to a alue of 1 to run the Restriction Diagnostic
4. Set *O_HIM_DIAG_Pressure_Test_Enbl* to a alue of 1 to run the Pressure Test Diagnostic
5. Set all four overrides in steps 1-4 to a value of *0* after test is complete

128. Prime Urea Pump

1. Set *O_SCL_PumpCondt_Enbl* to a value of 1
2. Set *O_SCL_PumpCondt_Val* to a value of 1
3. Verify V_UIM_UreaPumpState ends up at 5 (Metering Control)

129. Override Urea Dosing

4. Set *O_UIM_flm_UreaInjCmd_Enbl* to a value of 1
5. Set *O_UIM_flm_UreaInjCmd_Val* to a desired value
6. Monitor *V_UIM_flm_InjRateCmd*

Engine Diagnostics (Non Fuel System)

Comment [i12]: New for 2010

130. FC 122, 123: Charge Pressure Sensor

1. FC 122: CHARGE_PRESS_OOR_HIGH_ERROR
Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source
(csdd_charge_manager)

2. FC 123: CHARGE_PRESS_OOR_LOW_ERROR
Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source
(csdd_charge_manager)

Charge_Press	kPa	Charge_Press_Sensor	kPa
Charge_Press_Sensor_Volts	V	Charge_Press_Status	---
C_AIP_ChargePressDefault	kPa	C_AIP_ChargePressSupplyID	---
C_ChargePressEnable	---	H_Charge_Press_Raw	counts
T_AIP_ChargePressRLOC	---	C_AIP_ChargePressOverride_En	---
C_AIP_ChargePressOverride_Raw	kPa	Boost_Pressure	kPa_G
Boost_Pressure_Status	---		

131. FC 0124:

Intake Manifold 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level.

MCF_HIFLOW_ERROR
Error Flag: MCF_HiFlow_Error
(obd_mcf_flow_lib.mdl)

C_MCF_OBD_HiFlow_Cusum_Max	None	H_MCF_OBD_HiFlow_Condition_En	None
C_MCF_OBD_HiFlow_Cusum_Thd	None	H_MCF_OBD_HiFlow_Cusum_Counter	None
C_MCF_OBD_HiFlow_EGR_Pos_Cmd_Min	%	H_MCF_OBD_HiFlow_Cusum_Latch	None
C_MCF_OBD_HiFlow_En_Persis_Time	None	H_MCF_OBD_HiFlow_Cusum_Timer	s
C_MCF_OBD_HiFlow_Enable	None	H_MCF_OBD_HiFlow_Cusum_Value	None
C_MCF_OBD_HiFlow_FC	None	H_MCF_OBD_HiFlow_Enabled	None
C_MCF_OBD_HiFlow_Flow_Max	kg/min	H_MCF_OBD_HiFlow_Input_Enable	None
C_MCF_OBD_HiFlow_Flow_Max_Rate	kg/min_sec	H_MCF_OBD_HiFlow_Max_Cusum_Value	None
C_MCF_OBD_HiFlow_Flow_Min	kg/min		
C_MCF_OBD_HiFlow_Flow_Rate_FC	None	EGR_Position	%
C_MCF_OBD_HiFlow_IAT_Pos_Cmd_Min	%	VGT_Position	%
C_MCF_OBD_HiFlow_Noise_Tol	None	CBR_Protection_Chi_flag	None
C_MCF_OBD_HiFlow_Ovrd_En	None		
C_MCF_OBD_HiFlow_Ovrd_Value	None	Charge Flow	kg/min
C_MCF_OBD_HiFlow_Reset	None	controller_faf_cmd	kg/min
C_MCF_OBD_HiFlow_Timer	s	controller_mcf_cmd	kg/min
C_MCF_OBD_Fueling_Min	mg/st	Fresh_Air_Flow	kg/min
C_MCF_OBD_VGT_Pos_Max	%	Charge_Flow_Status	None
C_MCF_OBD_En_Condn_Bitmask	None	engine_at_idle	None
Engine_Is_Warm	None	vehicle_speed	km/hr
Current_Engine_State	None		
Total_Fueling	mg/st		
eac_egr_valve_cmd	%		

132. FC 0125:

Intake Manifold 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level. I ntake manifold pressure is below the minimum operating limit.

MCF_LOFLOW_ERROR
Error Flag: CBR_OFC_Error_Flag
(obd_mcf_flow_lib.mdl)

C_OFC_LLimErrorSet_Thd	s		
C_OFC_LLimRampDelayTime	s	Combustion_Control_Path_Owner	None
C_OFC_LLimRampTime	s	CBM_Net_Torque_Demand	Nm
C_CBR_OFC_Torque_Min	N_m	CBR_OFC_LLamptimer	s
C_CBR_EMD_Enable	None	CBR_total_ofc_time	s
C_CBR_EMD_Enable	None	CBR_OFC_Error_Flag	None
		CBR_OFC_Max_Time	s
		obd_number_of_operation_cycles	None

133. FC 135, 141:

1. **FC 135: OIL_PRESSURE_HIGH_ERROR**
   Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_lube_cool)

2. **FC 135: OIL_PRESSURE_LOW_ERROR**
   Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_lube_cool)

Oil_Pressure_Absolute	kPa	**Override:**	
Oil_Pressure_Sensor_Volts	V	T_AIP_OP_User_Override	---
Oil_Pressure	kPa_G	AIP_Oil_Press_Override_Value	kPa
Diagnostics:			
C_AIP_OP_Count_OOR_Low_Limit	---		
C_AIP_OP_Count_OOR_High_Limit	---		

134. FC 144, 145: Coolant Temperature Sensor

1. **FC 144: COOLANT_TEMPERATURE_HIGH_ERROR**
   Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_lube_cool)

1. **FC 145: COOLANT_TEMPERATURE_LOW_ERROR**
   Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_lube_cool)

T_Coolant_Temperature_Sensor_Enable	---	T_AIP_CT_User_Override	---
Coolant_Temperature	Deg_C	AIP_Cool_Tmptr_Override_Value	Deg_C
Coolant_Tmptr_Sensor_Volts	V	**Diagnostics:**	
T_AIP_Coolant_Temperature_RLOC	---	C_AIP_CT_Count_OOR_High_Limit	---
		C_AIP_CT_Count_OOR_Low_Limit	---

135. FC 153, 154: Charge Temperature Sensor / Intake Manifold Temperature

1. **FC 153: CHARGE_TMPTR_OOR_HIGH_ERROR**
   Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_manager)

2. **FC 154: CHARGE_TMPTR_OOR_LOW_ERROR**
   Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source

(csdd_charge_manager)

Charge_Tmptr	Deg_C	Charge_Tmptr_Status	---
Charge_Tmptr_Sensor_Volts	V	C_ChargeTmptrEnable	---
C_AIP_ChargeTmptrDefault	Deg_C	T_AIP_ChargeTmptrRLOC	---
H_Charge_Tmptr_Raw	counts	AIP_Charge_Tmptr_Override_Value	Deg_C
T_AIP_CHT_User_Override_En	---		
Intake_Manifold_Temperature	Deg_C		

136. FC 195, 196: Coolant Level Sensor

Barometric Pressure - Data erratic, intermittent or incorrect. An error in the barometric pressure sensor signal was detected by the ECM.

1. **COOLANT_LEVEL_HIGH_ERROR**
   Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
   (csdd_lube_cool)

2. **COOLANT_LEVEL_HIGH_ERROR**
   Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source
   (csdd_lube_cool)

Coolant_Level	---	T_AIP_Cool_Lev_User_Override_En	---
T_AIP_Coolant_Level_RLOC	---	AIP_Cool_Lev_Override_Value	---
C_AIP_Clvl_SensorSupply_ID	---		
C_Coolant_Level_Type_Select	---	**Diagnostics :**	
C_Coolant_Level_Sensor_Type	---	C_AIP_Clvl_OOR_Upper_Limit	---
Coolant_Level_Sensor_Voltage	V	C_AIP_Clvl_OOR_Lower_Limit	---

137. FC 212, FC 213

a. **OIL_TEMPERATURE_HIGH_ERROR**
   Engine Oil Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
   (csdd_lube_cool)

b. **OIL_TEMPERATURE_LOW_ERROR**
   Engine Oil Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
   (csdd_lube_cool)

Oil_Tmptr_Sensor_Volts	V	C_AIP_OT_Count_OOR_High_Limit	---
Oil_Temperature	Deg_C	C_AIP_OT_Count_OOR_Low_Limit	---
Override:		**Diagnostics:**	
T_AIP_OT_User_Override	---	C_AIP_OT_Count_OOR_High_Limit	---
AIP_Oil_Tmptr_Override_Value	Deg_C	C_AIP_OT_Count_OOR_Low_Limit	---

138. FC 221, 222:

1. **AMBIENT_AIR_PRESS_IR_HIGH_ERROR**
   Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_base_mgr_lib.mdl)

2. **AMBIENT_AIR_PRESS_IR_LOW_ERROR**
   Barometric Pressure Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_charge_base_mgr_lib.mdl)

Air_Press	kPa	C_AMB_AirPressRawHighLimit	counts
Air_Press_Sensor	kPa	C_AMB_AirPressRawLowLimit	counts

Air_Press_Sensor_Status	None
Air_Press_Sensor_Volts	V
Air_Press_Status	None

139. FC 295:

Barometric Pressure - Data erratic, intermittent or incorrect. An error in the barometric pressure sensor signal was detected by the ECM.

3. AMBIENT_AIR_PRESS_IR_HIGH_ERROR
Error Flag: AAP_IR_High_Err
(csdd_charge_base_mgr_lib.mdl)

4. AMBIENT_AIR_PRESS_IR_LOW_ERROR
Error Flag: AAP_IR_Low_Err
(csdd_charge_base_mgr_lib.mdl)

5. AMBIENT_AIR_PRESS_KEYOFF_ERROR
Error Flag: AAP_IR_Low_Err
(csdd_magt_mach_monitor.mdl)

Air_Press	kPa	AAP_High_Cusum_Value	kPa
Air_Press_Sensor	kPa	AAP_In_Range_Cusum_Timer	s
Air_Press_Sensor_Status	None	AAP_IR_High_Err	None
Air_Press_Sensor_Volts	V	AAP_IR_Low_Err	None
Air_Press_Status	None	AAP_IR_Stuck_Err	None
Air_Press_IR_Enable	None	AAP_Low_Cusum_Value	kPa
		AAP_Stuck_Cusum_Value	kPa
Charge_Press_sensor	KPa		
Exhaust_Press_sensor	KPa	MMon_AAP_Keyoff_Error_Flag	None
Oil_Pressure_Absolute_Sensor	KPa	MMon_Keyoff_Press_Check_Timer	S
EGR_Orif_Press_Sensor	KPa	MMon_Keyoff_Press_Check_State	None
Engine_Speed	RPM	MMon_Keyoff_Press_Delay_Timer	S
ECM_Run_Time	S	Engine_Is_Warm	None
Key_Switch	None		

140. FC 334:

Engine Coolant Temperature - Data erratic, intermittent or incorrect.

1. COOLANT_TMPTR_KEYON_ERROR
Error Flag: MMon_CT_Keyon_Error_Flag
(csdd_magt_mach_monitor.mdl)

2. COOLANT_TMPTR_IR_STUCK_ERROR
Error Flag: OBD_LUCL_CT_IR_ERROR_FLAG
(csdd_obd_lbe_cool.mdl)

3. COOLANT_TMPTR_IR_LOW_ERROR
Error Flag: OBD_LUCL_CT_IR_ERROR_FLAG
(csdd_obd_lbe_cool.mdl)

ECM_Run_Time	S	MMon_BHD_Check_Enable	None
Engine_Speed	RPM	MMon_BHD_Monitor_State	None
		MMon_BHD_State	None
Coolant_Tmptr_Sensor_Volts	V	MMon_BHD_Timer	s
Coolant_Temperature	Deg_C	MMon_Keyon_Tmptr_Check_State	None
Coolant_Temperature_Sensor	Deg_C	MMon_CT_Keyon_Error_Flag	None
		MMon_Keyon_Tmptr_Check_Timer	S

OBD_LUCL_CT_Delta_Tmptr	Deg_C		
OBD_LUCL_CT_IR_ERROR_FLAG	None	Air_Tmptr_Sensor	Deg_C
OBD_LUCL_CT_IRL_State	None	Charge_Tmptr_Sensor	Deg_C
OBD_LUCL_CT_Monitor_State	None	Compressor_Inlet_Tmptr_Sensor	Deg_C
OBD_LUCL_CT_Stuck_State	None	EGR_Orifice_Tmptr_Sensor	Deg_C
OBD_LUCL_CT_Stuck_Max_Tmptr	Deg_C	InternalTmptr_Sensor	Deg_C
OBD_LUCL_CT_Stuck_Min_Tmptr	Deg_C	Oil_Temperature_Sensor	Deg_C

OBD_LUCL_CT_IRL_State
1 = NO_ERROR
2 = PAUSE
3 = NOT_STARTED
4 = ERROR
5 = COMPLETE

OBD_LUCL_CT_Stuck_State
1 = NO_ERROR
2 = PAUSE
3 = NOT_STARTED
4 = ERROR
5 = COMPLETE

OBD_LUCL_CT_Monitor_State
0 = CT_DISABLED
1 = CT_NO_ERROR
2 = CT_STUCK_RUNNING
3 = CT_IR_LOW_RUNNING
4 = CT_STUCK_PAUSE
5 = CT_IR_LOW_PAUSE
6 = CT_KEYON_ERROR
7 = CT_SIR_ERROR
8 = CT_IRL_ERROR
9 = CT_IRH_ERROR
10 = CT_ABORT
11 = (Future Implementation)

141. FC 418:

Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Least Severe Level. Water has been detected in the fuel filter.

1. WATER_IN_FUEL_ERROR

Error Flag: None
(csdd_cagt_eem.mdl)

Engine_Speed	RPM	EEM_WIF_Current_Err_Time	s
Net_Engine_Torque	N_m	EEM_WIFState	None
Vehicle_Speed	km/hr	EEM_WIFTotalTime	s
AIP_WIF_Sensor_Voltage	V		

142. FC 425:

Engine Oil Temperature - Data erratic, intermittent or incorrect.

1. OIL_TMPTR_KEYON_ERROR

Error Flag: MMon_OT_Keyon_Error_Flag
(csdd_magt_mach_monitor.mdl)

ECM_Run_Time	S	MMon_BHD_Check_Enable	None
Engine_Speed	RPM	MMon_BHD_Monitor_State	None
		MMon_BHD_State	None
Oil_Temperature	Deg_C	MMon_BHD_Timer	s
Oil_Temperature_Sensor	Deg_C	MMon_Keyon_Tmptr_Check_State	None
Oil_Tmptr_Sensor_Volts	V	MMon_OT_Keyon_Error_Flag	None
		MMon_Keyon_Tmptr_Check_Timer	S
		Air_Tmptr_Sensor	Deg_C
		Charge_Tmptr_Sensor	Deg_C
		Compressor_Inlet_Tmptr_Sensor	Deg_C
		EGR_Orifice_Tmptr_Sensor	Deg_C
		InternalTmptr_Sensor	Deg_C
		Coolant_Temperature_Sensor	Deg_C

2. **OIL_TMPTR_IR_HIGH_ERROR**
   Error Flag: OBD_LUCL_OT_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)
3. **OIL_TMPTR_IR_LOW_ERROR**
   Error Flag: OBD_LUCL_OT_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)
4. **OIL_TMPTR_IR_STUCK_ERROR**
   Error Flag: OBD_LUCL_OT_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)

Engine_Speed	RPM	OBD_LUCL_OT_Diag_Sys_State	None
Net_Engine_Torque	N_m	OBD_LUCL_OT_Sensor_IR_Err_Flag	None
Vehicle_Speed	km/hr	OBD_LUCL_OT_Lbnd	Deg_C
Oil_Temperature	Deg_C	OBD_LUCL_OT_Lbnd	Deg_C
Oil_Temperature_Sensor	Deg_C		
Oil_Tmptr_Sensor_Volts	V		

OBD_LUCL_OT_Diag_Sys_State
0 = OIL_DIAG_SYS_DISABLED
1 = OIL_DIAG_SYS_RUNNING
2 = (not used)
3 = NO_GOOD_TMPTR_SENSOR
4 = (not used)
5 = ENGINE_NOT_RUNNING
6 = PENDING_STARTUP_DELAY
7 = IRH_ERROR
8 = IRL_ERROR
9 = SIR_ERROR
10 = OIL_TMPTR_SENSOR_ERROR
11 = COOLANT_TMPTR_SENSOR_ERROR

143. FC 435:

Engine Oil Rifle Pressure - Data erratic, intermittent or incorrect. The engine oil pressure sensor is reading an erratic value.

1. **OIL_PRESS_KEYOFF_ERROR**
   Error Flag: MMon_OP_Keyoff_Error_Flag
   (csdd_magt_mach_monitor.mdl)

Air_Press_Sensor	kPa	MMon_Keyoff_Press_Check_State	None
Oil_Pressure_Absolute_Sensor	kPa	MMon_Keyoff_Press_Check_Timer	s
Exhaust_Press_Sensor	kPa	MMon_Keyoff_Press_Delay_Timer	s
Charge_Press_Sensor	kPa	MMon_OP_Keyoff_Error_Flag	None
EGR_Orif_Press_Sensor	kPa	Engine_Is_Warm	None
ECM_Run_Time	s	Key_Switch	None
Engine_Speed	RPM		

2. **OIL_PRES_IR_HIGH_ERROR**
   Error Flag: OBD_LUCL_OP_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)

3. **OIL_PRES_IR_LOW_ERROR**
   Error Flag: OBD_LUCL_OP_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)

4. **OIL_PRES_IR_STUCK_ERROR**
   Error Flag: OBD_LUCL_OP_Sensor_IR_Err_Flag
   (csdd_obd_lbe_cool.mdl)

Engine_Speed	RPM	OBD_LUCL_OP_Diag_Sys_State	None
Net_Engine_Torque	N_m	OBD_LUCL_OP_Sensor_IR_Err_Flag	None
Vehicle_Speed	km/hr	OBD_LUCL_OP_Lbnd	Deg_C
Oil_Pressure	kPa_G	OBD_LUCL_OP_Lbnd	Deg_C
Oil_Pressure_Absolute	kPa	Oil_Press_Sensor_Type	None
Oil_Pressure_Absolute_Sensor	kPa		
Oil_Tmptr_Sensor_Volts	V		

OBD_LUCL_OP_Diag_Sys_State
0 = OIL_DIAG_SYS_DISABLED
1 = OIL_DIAG_SYS_RUNNING
2 = ENG_SPD_SENSOR_ERROR
3 = NO_GOOD_TMPTR_SENSOR
4 = OIL_PRES_SENSOR_ERROR
5 = ENGINE_NOT_RUNNING
6 = PENDING_STARTUP_DELAY
7 = IRH_ERROR
8 = IRL_ERROR
9 = SIR_ERROR
10 = (not used)
11 = (not used)

144. FC 436:

Intake Manifold 1 Temperature - Data erratic, intermittent or incorrect.

1. **CHARGE_TMPTR_IR_HIGH_ERROR**
   Error Flag: ChargeTmptr_IR_High_Err
   (csdd_charge_base_mgr_lib.mdl)

2. **CHARGE_TMPTR_IR_LOW_ERROR**
   Error Flag: ChargeTmptr_IR_Low_Err
   (csdd_charge_base_mgr_lib.mdl)

3. **CHARGE_TMPTR_KEYON_ERROR**
   Error Flag: ChargeTmptr_IR_Low_Err
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	ChargeTmptr_High_Cusum_Value	Deg_C
Engine_Speed	RPM	ChargeTmptr_In_Range_Cusum_Timer	s
Vehicle_speed	kmph	ChargeTmptr_IR_Enable	None
Fresh_Air_Flow	kg/min	ChargeTmptr_IR_High_Err	None
Ambient_Air_Tmptr	Deg_C	ChargeTmptr_IR_Low_Err	None
		ChargeTmptr_IR_Stuck_Err	None
Charge_Tmptr	Deg_C	ChargeTmptr_Low_Cusum_Value	Deg_C
Charge_Tmptr_Est	Deg_C	ChargeTmptr_Stuck_Cusum_Value	Deg_C
Charge_Tmptr_EStat	None		
Charge_Tmptr_Sensor	Deg_C	MMon_BHD_Check_Enable	None
Charge_Tmptr_Sensor_Status	None	MMon_BHD_Monitor_State	None
Charge_Tmptr_Sensor_Volts	V	MMon_BHD_State	None
Charge_Tmptr_Status	None	MMon_BHD_Timer	s
CAC_Outlet_Tmptr_Est	Deg_C	MMon_Keyon_Tmptr_Check_State	None
CAC_Outlet_Tmptr_Est_Status	None	MMon_CT_Keyon_Error_Flag	None
		MMon_Keyon_Tmptr_Check_Timer	S
Oil_Temperature_Sensor	Deg_C	Air_Tmptr_Sensor	Deg_C
Compressor_Inlet_Tmptr_Sensor	Deg_C	InternalTmptr_Sensor	Deg_C
EGR_Orifice_Tmptr_Sensor	Deg_C	Coolant_Temperature_Sensor	Deg_C

145. FC 595:

Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Moderately Severe Level.

1. **TURBO_SPEED_OOR_HIGH_ERROR**
   Error Flag: Turbo_Speed_High_Error
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	Turbo_Speed_Sensor	KRPM
Engine_Speed	RPM	Unfiltered_Turbo_Speed	KRPM
Net_Engine_Torque	Nm	Raw_Turbo_Speed	Hz
		Raw_Turbo_Speed_High	None
Charge_Press	KPa	Raw_Turbo_Speed_Low	None
Ambient_Air_Press	KPa	Turbo_Speed_High_Error	None
HP_Turbo_Condition_Met	None	Turbo_Speed_Low_Error	None

146. FC 249, 256: Ambient Air Temperature

1. **AIR_TMPTR_OOR_HIGH_ERROR**
   Ambient Air Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_base_mgr_lib.mdl)

2. **AIR_TMPTR_OOR_LOW_ERROR**
   Ambient Air Temperature Sensor 1 Circuit - Voltage below normal, or shorted to low source
   (csdd_charge_base_mgr_lib.mdl)

Ambient Air Temperature Sensor 1 Circuit - Voltage above normal, or shorted to high source

Ambient_Air_Tmptr	Deg_C	Air_Tmptr_Sensor	Deg_C
Air_Tmptr_Raw	counts	Air_Tmptr_Sensor_Status	---
Ambient_Air_Tmptr_Status		Air_Tmptr_Sensor_Volts	V
C_CHM_AAT_Source		T_AIP_AAT_RLOC	

147. FC 649:

Engine Oil Change Interval - Condition Exists. Change engine oil and filter.

3. **LUBE_OIL_REQUIRES_CHANGE_ERROR**
   Error Flag: None
   (csdd_oil_change_monitor.mdl)

Engine_Speed	RPM	OCM_TimeSinceLastReset	hr
Net_Engine_Torque	N_m	OCM_FuelSinceLastReset	L
Vehicle_Speed	km/hr	OCM_DistanceSinceLastReset	km
Oil_Temperature	Deg_C	OCM_PercentIntervalUsed	%
		OCM_FuelFaultStatus	None
H_OCM_AutoOilSeverityFactor	None	OCM_TimeFaultStatus	None
H_OCM_TimeThreshold	hr	OCM_DistanceFaultStatus	None
H_OCM_DistanceThreshold	km		
H_OCM_FuelThreshold	L	TI_Vehicle_Total_ECM_Distance	km
H_OCM_AutoPctTimeUsed	%	TI_Base_Total_Fuel_Used	L
H_OCM_AutoPctFuelUsed	%	TI_Base_Trip_Data_Fault_Status	None
H_OCM_AutoPctDistanceUsed	%	Accelerator_Pedal_Position	%
		Service_Brake_Switch	None
		TI_Vehi_Trip_Data_Fault_Status	None
		Engine_Run_Time	s
		Warning_Fault_Lamp	None

148. FC 687:

Turbocharger 1 Speed - Data Valid But Below Normal Operating Range - Moderately Severe Level.

1. **TURBO_SPEED_OOR_LOW_ERROR**
   Error Flag: Turbo_Speed_Low_Error
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	Turbo_Speed_Sensor	KRPM
Engine_Speed	RPM	Unfiltered_Turbo_Speed	KRPM
Net_Engine_Torque	Nm	Raw_Turbo_Speed	Hz
		Raw_Turbo_Speed_High	None
Charge_Press	KPa	Raw_Turbo_Speed_Low	None
Ambient_Air_Press	KPa	Turbo_Speed_High_Error	None
HP_Turbo_Condition_Met	None	Turbo_Speed_Low_Error	None

149. FC 691, 692: Compressor Inlet Temperature

c. COMP_IN_TMPTR_OOR_HIGH_ERROR
Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source
(csdd_charge_base_mgr_lib.mdl)

d. COMP_IN_TMPTR_LOW_HIGH_ERROR
Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source
(csdd_charge_base_mgr_lib.mdl)

Compressor_Inlet_Tmptr	Deg_C	Compressor_Inlet_Tmptr_Sensor	Deg_C
Compressor_Inlet_Tmptr_Raw	counts	Compressor_Inlet_Tmptr_Status	---
Compressor_Inlet_Tmptr_State	HEX	C_CompInletTmptrEnable	---
C_AIP_CompInTmptrDefault	Deg_C	Compressor_Inlet_Tmptr_Raw	counts
T_AIP_CompInTmptrRLOC	---	AIP_CompInTmptr_Override_Value	Deg_C
T_AIP_CompInTmptr_Ovrd_En	---	Ambient_Air_Tmptr_Status	---
Ambient_Air_Tmptr	Deg_C		

150. FC 693:
Turbocharger 1 Compressor Intake Temperature - Data erratic, intermittent or incorrect.

1. COMP_IN_TMPTR_IR_HIGH_ERROR
Error Flag: CIT_IR_High_Err
(csdd_charge_base_mgr_lib.mdl)

2. COMP_IN_TMPTR_IR_STUCK_ERROR
Error Flag: CIT_IR_Stuck_Err
(csdd_charge_base_mgr_lib.mdl)

3. COMP_IN_TMPTR_KEYON_ERROR
Error Flag: MMon_CIT_Keyon_Error_Flag
(csdd_magt_mach_monitor.mdl)

ECM_Run_Time	S	MMon_BHD_Check_Enable	None
Engine_Speed	RPM	MMon_BHD_Monitor_State	None
		MMon_BHD_State	None
Compressor_Inlet_Tmptr	Deg_C	MMon_BHD_Timer	s
Compressor_Inlet_Tmptr_Sensor	Deg_C	MMon_Keyon_Tmptr_Check_State	None
Compressor_Inlet_Tmptr_Sensor_Status	None	MMon_CIT_Keyon_Error_Flag	None
Compressor_Inlet_Tmptr_Raw	counts	MMon_Keyon_Tmptr_Check_Timer	S
CIT_IR_High_Err	None	Air_Tmptr_Sensor	Deg_C
CIT_IR_Low_Err	None	Charge_Tmptr_Sensor	Deg_C
CIT_IR_Stuck_Err	None	Oil_Temperature_Sensor	Deg_C
CIT_High_Cusum_Value	Deg_C	EGR_Orifice_Tmptr_Sensor	Deg_C
CIT_In_Range_Cusum_Timer	s	InternalTmptr_Sensor	Deg_C
CIT_Low_Cusum_Value	Deg_C	Coolant_Temperature_Sensor	Deg_C
CIT_IR_Stuck_Err	None		
CIT_Stuck_Cusum_Value	Deg_C	OBD_Number_Of_Operation_Cycles	None

151. FC 755:

Fuel Rail Pressure Rationality High/Low Error – The fuel rail pressure sensor measurement accuracy has drifted beyond acceptable limits.

6. **PRESS_RATIONALITY_HIGH_ERROR**
   Error Index: prd_high_error_index
   (prd_lib.mdl)
7. **PRESS_RATIONALITY_LOW_ERROR**
   Error Index: prd_low_error_index
   (prd_lib.mdl)

Engine_Speed	Rpm	H_PRD_r_VarianceScaledPress	None
FSI_q_TotalFueling	mg/stroke	H_PRD_r_VarianceSlope	None
APC_hp_Fdbk	Bar	H_PRD_s_Active (1 = active)	None
APC_qr_Cmd	Bar	H_PRD_s_ConditionsReady	None
H_PRD_ct_DelaySlopeSamples	Counts	H_PRD_s_CorrCnvrgd	None
H_PRD_ct_InrangeHighError	Counts	H_PRD_s_EngineAtIdle	None
H_PRD_ct_InrangeLowError	Counts	H_PRD_s_EngineIsWarm	None
H_PRD_ct_NumSamples	Counts	H_PRD_s_FLMonitorEnable	None
H_PRD_ct_RunsPerOpCycle	Counts	H_PRD_s_HighErrUpdate	None
H_PRD_ct_SampleResetTestHook	Counts	H_PRD_s_LowFuelingErrUpdate	None
H_PRD_hp_Cmd	Bar	H_PRD_s_LowSlopeErrUpdate	None
H_PRD_hp_MeanScaledPress	Bar	H_PRD_s_NeverRun	None
H_PRD_q_AvgMeanFeuling	mg/stroke	H_PRD_s_OperationReset	None
H_PRD_q_MeanFueling	mg/stroke	H_PRD_s_OverrideEnbl	None
H_PRD_r_CorrelationSqrd	None	H_PRD_s_PressCmdStatus	None
H_PRD_r_Covariance	bar.mg/stroke	H_PRD_s_PtmFinalOperMode	None
H_PRD_r_MeanCorrSqrd	None	H_PRD_s_Reset	None
H_PRD_r_MeanPressFueling	None	H_PRD_ti_CycleActivetime	s
H_PRD_r_MeanSlope	mg/stroke/100bar	H_PRD_ti_HighPressHold	s
H_PRD_r_Slope	mg/stroke/100bar	H_PRD_ti_VarSlopeDelay	s
H_PRD_r_VarianceFueling	None	H_PRD_x_DiagStatus	HEX

Note: PRD is active when H_PRD_s_Active = 1. 40 to 80 msec rate EDM log preferred.

152. FC 1139, 1141, 1142, 1143, 1144, 1145:

Quantity and Timing Diagnsotic – Critical Ontime of Injection Out of Tolerance, Injection timing or fueling quantity accuracy out of tolerance.

4. **FC1139, QTD_INJECTOR_1_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)
5. **FC1141, QTD_INJECTOR_2_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)
6. **FC1142, QTD_INJECTOR_3_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)
7. **FC1143, QTD_INJECTOR_4_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)
8. **FC1144, QTD_INJECTOR_5_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)
9. **FC1145, QTD_INJECTOR_6_COI_ERROR**
   Error Index: qtd_coi_error_index
   (qtd_lib.mdl)

10. **FC554, QTD_COIDEV_CUMSUM_ERROR**
    Error Index: qtd_coi_error_index
    (qtd_lib.mdl)

Engine_Speed	rpm	APC_qr_Cmd	g/sec
APC_hp_Cmd	bar	H_QTD_ct_PassVoteCount	counts
APC_hp_Fdbk	bar	H_QTD_ct_VoteCount	counts
FSI_q_TotalFueling	mg/stroke	P_QTD_ti_DeltaCOIEstimate_T[0]	mSec
C_QTD_s_Enable	None	P_QTD_ti_DeltaCOIEstimate_T[1]	mSec
QTD_s_Mode	None	P_QTD_ti_DeltaCOIEstimate_T[2]	mSec
H_QTD_ct_CycleCount	counts	P_QTD_ti_DeltaCOIEstimate_T[3]	mSec
H_QTD_ct_CylIndex	None	P_QTD_ti_DeltaCOIEstimate_T[4]	mSec
H_QTD_ct_ToothIndex	None	P_QTD_ti_DeltaCOIEstimate_T[5]	mSec
H_QTD_hp_CycleMeanPressure	bar	H_QTD_ti_COIEstimate_T[0]	mSec
H_QTD_hp_DslPressure	bar	H_QTD_ti_COIEstimate_T[1]	mSec
H_QTD_hp_InjPressureDrop	bar	H_QTD_ti_COIEstimate_T[2]	mSec
H_QTD_r_ParasiticLeakage	bar/sec	H_QTD_ti_COIEstimate_T[3]	mSec
H_QTD_ti_TestOntime	mSec	H_QTD_ti_COIEstimate_T[4]	mSec
C_QTD_ct_RunsPerOpCycle	counts	H_QTD_ti_COIEstimate_T[5]	mSec
H_QTD_s_COISearchComplete	None	P_QTD_ti_FltrAvgCOIDev	mSec
OBD_Number_Of_Operation_Cycles	None	C_QTD_s_Enable	None
H_QTD_ct_RunsPerOpCycle	counts	EPS_ct_MainInterrupt	None
C_QTD_s_Enable	None		
EPS_ct_MainInterrupt	None		

Note: QTD is active when QTD_s_Mode = 1. 40 to 80 msec rate EDM Log preferred

153. <u>FC 1228:</u>

EGR Valve Position - Data erratic, intermittent or incorrect.

1. **EGA_VALVE_POSITION_IRH_ERROR**
   Error Flag: H_EGA_BM_Pos_Cusum_IRH_Fault
   (csdd_dd_egr_blm.mdl)

2. **EGA_VALVE_POSITION_IRL_ERROR**
   Error Flag: H_EGA_BM_Pos_Cusum_IRL_Fault
   (csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

154. <u>FC 1654-1659, FC1718</u>

Injector misfire has been detected. The injector is not generating a measurable combustion event.

1. **FC1654, CYLINDER_1_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

2. **FC1655, CYLINDER_2_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

3. **FC1656, CYLINDER_3_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

4. **FC1657, CYLINDER_4_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask

(misfire_montor.c)

5. **FC1658, CYLINDER_5_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

6. **FC1659, CYLINDER_6_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

7. **FC1718, MULTIPLE_CYLINDERS_MISFIRE_ERROR**
   Error Flag: MFM_x_MisfireCylMask
   (misfire_montor.c)

EPS_ti_MFMAccelBuffer[0]	uSec	FSI_q_TotalFueling	mg/stroke
EPS_ti_MFMAccelBuffer[4]	uSec	OBDAD_Intrusive_Ctrl_Path_Owner	None
EPS_ti_MFMAccelBuffer[2]	uSec	H_PRD_s_Active	None
EPS_ti_MFMAccelBuffer[5]	uSec	H_PRD_x_DiagStatus	HEX
EPS_ti_MFMAccelBuffer[1]	uSec	OBD_Number_Of_Operation_Cycles	None
EPS_ti_MFMAccelBuffer[3]	uSec	OBD_Engn_At_Idle	None
H_MFM_ct_TestCylNumber	None	MFM_s_MonitorStatus	None
FSI_s_CylCutOutToolStatus	None	MFM_x_MisfireCylMask	HEX
H_FSI_x_CylCutOutToolMask	HEX	Engine_Speed	RPM
H_FDH_x_ErrorState	HEX	EPS_s_status	None

Note: Misfire Monitor is active when MFM_s_MonitorStatus = 1. 20 to 40 msec EDM data preferred.

155. FC 1843, 1844:

1. **CRANKCASE_PRESS_OOR_HIGH_ERROR**
   Crankcase Pressure Circuit - Voltage above normal, or shorted to high source

2. **CRANKCASE_PRESS_OOR_LOW_ERROR**
   Crankcase Pressure Circuit - Voltage below normal, or shorted to low source

Crankcase_Press_Sensor	kPa_G	Net_Engine_Torque	N_m
Crankcase_Press	kPa_G	Engine_Speed	RPM
T_CCP_Zero_Adjustment	kPa_G	OCV_Pressure_Relief_Active	None
H_CCP_Mod_High_Thd	kPa_G	Prev_emx_CCP_Trq_Drt_Idx	None
H_CCP_Sev_High_Thd	kPa_G	Boost_Pressure	kPa_G
Crankcase_Press_Sensor_Volts	V	Crankcase_Press_Source	
Crankcase_Press_State		C_AIP_CrankcasePressLLim	Counts
		C_AIP_CrankcasePressULim	Counts

156. <u>FC 1852:</u>

Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Moderately Severe Level.

3. **WATER_IN_FUEL_EXTENDED_TIME_ERROR**
   Error Flag: None
   (csdd_cagt_eem.mdl)

Engine_Speed	RPM	EEM_WIF_Current_Err_Time	s
Net_Engine_Torque	N_m	EEM_WIFState	None
Vehicle_Speed	km/hr	EEM_WIFTotalTime	s
AIP_WIF_Sensor_Voltage	V	EEM_WIFDistance	km

157. <u>FC 1866:</u>

Exhaust Gas Recirculation Valve Delta Pressure - Data erratic, intermittent or incorrect. An error in the EGR delta pressure signal was detected at initial key-on or the sensor failed the autozero test.

1. **EGR_DELTA_P_IR_HIGH_ERROR**
   Error Flag: EGR_DeltaP_IR_High_Errr
   (csdd_charge_base_mgr_lib.mdl)

2. **EGR_DELTA_P_IR_LOW_ERROR**
   Error Flag: EGR_DeltaP_IR_Low_Err
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	EGR_DeltaP_High_Cusum_Value	kPa
Engine_Speed	RPM	EGR_DeltaP_IR_Cusum_Timer	s
Net_Engine_Torque	Nm	EGR_DeltaP_IR_Enable	None
EGR_Flow	Kg/min	EGR_DeltaP_IR_High_Err	None
EGR_Position	%	EGR_DeltaP_IR_Low_Err	None
VGT_Position	%	EGR_DeltaP_Low_Cusum_Value	kPa
Charge_Press	KPa		
Exhaust_Press	KPa	EGR_Delta_Press_AP	kPa
EGR_Orif_press	KPa	EGR_Delta_Press_IR_Filt	kPa
OBD_Number_Of_Operation_Cycles	None	EGR_Delta_Press_Sensor_Status	None
		EGR_Delta_Press_Status	None
		EGR_DeltaP_Est	KPa
		EGR_DeltaP_Est_Status	None

3. **EGR_DP_AUTOZERO_ERROR**
   Error Flag: EGR_Delta_P_Autozero_Error
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	EGR_Delta_Press_Sensor	KPa
Engine_Speed	RPM	EGR_Delta_Press_Sensor_Status	None
EGR_Flow	Kg/min	EGR_Delta_Press_Status	None
EGR_Position	%	EGR_Delta_P_Autozero_Error	None
Charge_Tmptr	Deg_C		
Coolant_Temperature	Deg_C		
Key_Switch	None	EGR_Delta_P_AZ_Precondition	None
InternalTmptr	Deg_C	EGR_Delta_P_Sensor_Warm	None
		EGR_Delta_P_Autozero_Enable	None
		EGR_DP_AZ_Allowed	None
		EGR_Delta_P_Autozero_Offset	KPa
		EGR_Delta_P_AZ_Bypass	None
		EGR_Delta_P_AZ_Tolerance	Kpa
		EGR_Valve_Is_Closed	None

158. FC 1867:

Exhaust Gas Recirculation Temperature - Data erratic, intermittent or incorrect.

1. **EGR_ORIFICE_TMPTR_IR_HIGH_ERROR**
   Error Flag: EGRT_IR_High_Err
   (csdd_charge_base_mgr_lib.mdl)

2. **EGR_ORIFICE_TMPTR_IR_STUCK_ERROR**
   Error Flag: EGRT_IR_High_Err
   (csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	EGRT_IR_Enable	None
Engine_Speed	RPM	EGRT_IR_High_Err	None
Net_Engine_Torque	Nm	EGRT_IR_Stuck_En	None
EGR_Flow	Kg/min	EGRT_IR_Stuck_Err	None
EGR_Position	%	H_EGRT_RPM_Diff	RPM
		EGRT_Stuck_Delta_Value	Deg_C
EGR_Orifice_Tmptr	Deg_C	EGRT_In_Range_Cusum_Timer	s
EGR_Orifice_Tmptr_Sensor	Deg_C	H_EGRT_SIR_Timer	s
EGR_Orifice_Tmptr_Sensor_Status	None		
EGR_Orifice_Tmptr_Sensor_Volts	V		
EGR_Orifice_Tmptr_Status	None		

3. EGR_ORIFICE_TMPTR_KEYON_ERROR
Error Flag: MMon_EOT_Keyon_Error_Flag
(csdd_magt_mach_monitor.mdl)

ECM_Run_Time	S	MMon_BHD_Check_Enable	None
Engine_Speed	RPM	MMon_BHD_Monitor_State	None
		MMon_BHD_State	None
EGR_Orifice_Tmptr	Deg_C	MMon_BHD_Timer	s
EGR_Orifice_Tmptr_Sensor	Deg_C	MMon_Keyon_Tmptr_Check_State	None
EGR_Orifice_Tmptr_Sensor_Status	None	MMon_EOT_Keyon_Error_Flag	None
EGR_Orifice_Tmptr_Sensor_Volts	V	MMon_Keyon_Tmptr_Check_Timer	S
EGR_Orifice_Tmptr_Status	None		
Compressor_Inlet_Tmptr_Sensor	Deg_C	Air_Tmptr_Sensor	Deg_C
InternalTmptr_Sensor	Deg_C	Charge_Tmptr_Sensor	Deg_C
Coolant_Temperature_Sensor	Deg_C	Oil_Temperature_Sensor	Deg_C

159. FC 1896:
EGR Valve Controller - Out of Calibration. The EGR valve has failed the automatic calibration procedure at initial key-on.

1. EGA_VALVE_STUCK_ERROR
Error Flag: EGA_Valve_Autozero_Fault
(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

160. FC 1938:
ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Range - Moderately Severe Level. Low battery voltage detected by the VGT actuator.

1. VGA_DL_VOLTAGE_LOW_ERROR
Error Flag: H_VGT_Fault_Voltage_Low
(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

161. FC 1942:
Crankcase Pressure - Data erratic, intermittent or incorrect. The ECM has detected that the crankcase pressure signal is not changing with engine operating conditions.

1. BEYOND_THD_AZ_ERROR
Error Flag: None
(csdd_engine_cv_ext.mdl)

2. CCP_DITHER_ERROR
Error Flag: None
(csdd_engine_cv_ext.mdl)

Engine_Speed	RPM	Key_Switch	None
Net_Engine_Torque	N_m	Current_Engine_State	None
Vehicle_Speed	km/hr	Crankcase_Press_Sensor_Volts	V
Boost_Pressure	kPa_G	Crankcase_Press	kPa_G
		Crankcase_Pressure	kPa_G
		Crankcase_Press_Sensor	kPa_G

162. FC 1943:
Ambient Air Density - Data Valid But Below Normal Operating Range - Least Severe Level. Engine torque has been reduced because the vehicle was operating at a high altitude condition.

1. CBR_DENSITY_DERATE_ERROR_ID
Error Flag: CBR_Density_Derate_Error
(csdd_cbm_base_lib.mdl)

ECM_Run_Time	S	VGT_Position	%
Engine_Speed	RPM	Ambient_Air_Press	KPa
Net_Engine_Torque	Nm	Altitude	m
EGR_Position	%	Compressor_Inlet_Density	Kg/m3
CBR_Density_Derate_Error	None	CBM_Indicated_Fuel	Mg/str
CBR_Density_Derate_Fault_Timer	S	H_CBR_Density_Max_Fuel	Mg/str

163. FC 1961:
EGR Valve Control Circuit Over Temperature - Data Valid But Above Normal Operating Range - Least Severe Level.

1. EGA_DRIVER_IC_OVER_TMPTR_ERROR
Error Flag: EGA_Driver_IC_Over_Tmptr_Fault
(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

164. FC 1962:
VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Normal Operating Range - Least Severe Level. High internal VGT actuator temperature has been detected.

1. VGA_DL_ OVER_TEMPERATURE_ERROR
Error Flag: H_VGT_Fault_Over_Temperature
(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

165. FC 2198:

VGT Actuator Driver Circuit - Root Cause Not Known. Intermittent communication between the smart VGT controller and the ECM and been detected. The VGT controller is not interpreting the J1939 message from the ECM correctly.

1. VGA_DL_COMMAND_SOURCE_ERROR

Error Flag: H_VGT_Fault_Command_Source

(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

166. FC 2272:

EGR Valve Position Circuit - Voltage below normal, or shorted to low source. Low signal voltage has been detected at the EGR position sensor circuit.

1. EGA_VALVE_POSITION_ERROR

Error Flag: EGA_Position_Fault

(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

167. FC 2273, 2274:

1. EGR_DELTA_P_OOR_HIGH_ERROR

Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source.

(csdd_charge_base_mgr_lib.mdl)

2. EGR_DELTA_P_OOR_LOW_ERROR

Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal, or shorted to low source.

(csdd_charge_base_mgr_lib.mdl)

EGR_Delta_P_Autozero_Offset	kPa	**Diganostics:**	
EGR_DeltaP_Sensor_Volts	V	C_AIP_EGRDeltaPressULim	Counts
EGR_Delta_Press	kPa	C_AIP_EGRDeltaPressLLim	Counts
H_EGR_Delta_Press_Raw	Counts		
EGR_Delta_Press_Sensor	kPa	**Override:**	
EGR_Delta_Press_AP	kPa	T_EGR_Delta_P_AZ_User_Override	---
EGR_Orifice_Delta_Press	kPa	C_EGR_Delta_P_AZ_Override_Value	kPa
		T_AIP_EGRDeltaPress_Ovrd_En	---
		C_AIP_EGRDeltaPress_Ovrd_Val	kPa

168. FC 2288:

Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - High turbocharger speed has been detected by the ECM.

1. TURBO_SPEED_TORQUE_DERATE_ERROR

Error Flag: TSD_Active

(csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	VGT_Position	%
Engine_Speed	RPM	Ambient_Air_Press	KPa
Net_Engine_Torque	Nm	Acceleration_Pedal_Position	%
EGR_Position	%	Total_Fueling	Mg/str
Filtered_Turbo_Speed	KRPM	TSD_Active	None
Turbo_Speed_Est	KRPM	Turbo_Speed_Sensor_Status	None
Turbo_Speed_Est_Scaled	KRPM	Turbo_Speed_Status	None
Combustion_Control_Path_Owner	None	Turbo_Speed_EStat	None

169. FC 2346:

Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe Level. Turbocharger turbine inlet temperature has exceeded the engine protection limit.

1. CBR_TFC_DERATE_ERROR_ID

Error Flag: CBR_TFC_Derate_Error

(csdd_cbm_base_lib.mdl)

ECM_Run_Time	S	VGT_Position	%
Engine_Speed	RPM	Exhaust_Metal_Tmptr	Deg_C
Net_Engine_Torque	Nm		
EGR_Position	%	CBM_Indicated_Fuel	Mg/str
CBR_TFC_Derate_Error	None	Texh_Fuel_Limit	Mg/str
CBR_TFC_Derate_Fault_Timer	S		

170. FC 2349:

EGR Valve Control Circuit - Current below normal or open circuit. Motor terminal or motor coil open circuit has been detected by the smart EGR controller.

1. EGA_DRIVER_OPEN_CIRCUIT_ERROR

Error Flag: EGA_Driver_Open_Circuit_Fault

(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

171. FC 2353:

EGR Valve Control Circuit - Current above normal or grounded circuit.

1. EGA_DRIVER_SHORT_CIRCUIT_ERROR

Error Flag: EGA_Driver_Short_Circuit_Fault

(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec

EGA_PWM_Abs_Duty_Cycle	%
H_EGA_BM_Motor_Current	A
Battery_Voltage	V
EGA_Control_State	--

172. FC 2373, 2374

1. **EXHAUST_PRESS_OOR_HIGH_ERROR**
   Exhaust Gas Pressure Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_base_mgr_lib.mdl)

2. **EXHAUST_PRESS_OOR_LOW_ERROR**
   Exhaust Gas Pressure Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_charge_base_mgr_lib.mdl)

Exhaust_Press_Sensor_Volts	V	**Diagnostics:**	
Exhaust_Press	kPa	C_AIP_ExhaustPressULim	---
Exhaust_Press_Sensor	kPa	C_AIP_ExhaustPressULim	---
C_AIP_ExhaustPressDefault	kPa	Exhaust_Pressure_Keyon_Error	---
H_Exhaust_Press_Raw	Counts		
C_AIP_ExhaustPressULim	---	**Estimate:**	
C_AIP_ExhaustPressLLim	---	Exhaust_Press_Est	kPa
		Exhaust_Press_EStat	---
Override:			
T_AIP_ExhaustPress_Ovrd_En	---		
AIP_ExhaustPress_Ovrd_Val	kPa		

173. FC 2375, 2376

3. **EGR_ORIFICE_TMPTR_OOR_HIGH_ERROR**
   Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_base_mgr_lib.mdl)

4. **EGR_ORIFICE_TMPTR_OOR_LOW_ERROR**
   Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_charge_base_mgr_lib.mdl)

EGR_Orifice_Tmptr_Status	---	**Override:**	
EGR_Orifice_Tmptr	Deg_C	T_AIP_EGROrificeTmptr_Ovrd_En	---
EGR_Orifice_Tmptr_Sensor_Volts	V	C_AIP_EGROrificeTmptr_Ovrd_Val	Deg_C
H_EGR_Orifice_Tmptr_Raw	counts		
C_AIP_EGROrificeTmptrDefault	Deg_C	**Diagnostics:**	
EGR_Orifice_Tmptr_Source	---	C_AIP_EGROrificeTmptrULim	---
EGR_Orifice_Tmptr_State	---	C_AIP_EGROrificeTmptrLLim	---

174. FC 2387:

VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment. The smart VGT controller has detected incorrect stop limits or the VGT is unable to move to the closed position.

1. **VGA_DL_ACTUATION_ERROR**
   Error Flag: H_VGT_Fault_Actuation
   (csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

175. FC 2398:

Ambient Air Temperature - Data erratic, intermittent or incorrect.

5. AIR_TMPTR_IR_HIGH_ERROR

Error Flag: EMP_IRH_Err

(csdd_charge_base_mgr_lib.mdl)

6. AIR_TMPTR_KEYON_ERROR

Error Flag: MMon_AT_Keyon_Error_Flag

(csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	MMon_BHD_Check_Enable	None
Engine_Speed	RPM	MMon_BHD_Monitor_State	None
		MMon_BHD_State	None
Air_Tmptr_Sensor	Deg_C	MMon_BHD_Timer	s
Air_Tmptr_Sensor_Status	None	MMon_Keyon_Tmptr_Check_State	None
Air_Tmptr_Sensor_Volts	V	MMon_AT_Keyon_Error_Flag	None
Ambient_Air_Tmptr	Deg_C	MMon_Keyon_Tmptr_Check_Timer	S
Ambient_Air_Tmptr_Status	None		
		Compressor_Inlet_Tmptr_Sensor	Deg_C
Air_Tmptr_IR_Enable	None	Charge_Tmptr_Sensor	Deg_C
AT_High_Cusum_Value	Deg_C	Oil_Temperature_Sensor	Deg_C
AT_In_Range_Cusum_Timer	s	EGR_Orifice_Tmptr_Sensor	Deg_C
AT_IR_High_Err	None	InternalTmptr_Sensor	Deg_C
AT_IR_Low_Err	None	Coolant_Temperature_Sensor	Deg_C
AT_Low_Cusum_Value	Deg_C		
		OBD_Number_Of_Operation_Cycles	None

176. FC 2449:

VGT Actuator Controller - Out of Calibration. The VGT has failed the automatic calibration procedure at initial key-on. VGT will be in the open position.

1. VGA_DL_LEARNED_CAL_ERROR

Error Flag: H_VGT_Fault_Learned_Calibration

(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

177. FC 2451:

Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level. Turbocharger turbine inlet temperature has exceeded the engine protection limit.

1. AIR_TMPTR_IR_HIGH_ERROR

Error Flag: NA

(csdd_charge_base_mgr_lib.mdl)

ECM_Run_Time	S	EPD_EMT_Enable	None
Engine_Speed	RPM	H_EPD_EMTLogDurSecs	s
Net_Engine_Torque	Nm	H_EPD_EMTLogExtremeVal	Deg_C
EGR_Position	%	H_EPD_EMTLogRealTime	s
Exhaust_Metal_Tmptr	Deg_C	H_EPD_EMTLogRunTime	s
VGT_Position	%		
Total_Fueling	Mg/str		
Combustion_Control_Path_Owner	None		

178. FC 2554:

Exhaust Gas Pressure - Data erratic, intermittent or incorrect. The exhaust gas pressure sensor is reading an erratic value.

1. **EXHAUST_PRESS_IR_HIGH_ERROR**
   Error Flag: EMP_IRH_Err
   (csdd_charge_base_mgr_lib.mdl)

2. **EXHAUST_PRESS_IR _LOW_ERROR**
   Error Flag: EMP_IRL_Err
   (csdd_charge_base_mgr_lib.mdl)

3. **EXHAUST_PRESS_KEYOFF_ERROR**
   Error Flag: MMon_EP_Keyoff_Error_Flag
   (csdd_magt_mach_monitor.mdl)

OBD_Number_Of_Operation_Cycles	None	VGT_Position	%
Total_Fueling	Mg/str	Net_Engine_Torque	N_m
EMP_Irh_Err	None	Exhaust_Press	kPa
EMP_Irl_Err	None	Exhaust_Press_Est	kPa
EMP_Cusum_Hi_Value	kPa	Exhaust_Press_Est_Status	None
EMP_Cusum_Low_Value	kPa	Exhaust_Press_Sensor	kPa
EMP_Cusum_Sir_Value	kPa	Exhaust_Press_Sensor_Status	None
EMP_Cusum_Timer_Value	s	Exhaust_Press_Sensor_Volts	V
H_EMP_Enabled	None	Exhaust_Press_Status	None
Air_Press_Sensor	kPa	MMon_Keyoff_Press_Check_State	None
Oil_Pressure_Absolute_Sensor	kPa	MMon_Keyoff_Press_Check_Timer	s
Exhaust_Press_Sensor	kPa	MMon_Keyoff_Press_Delay_Timer	s
Charge_Press_Sensor	kPa	MMon_EP_Keyoff_Error_Flag	None
EGR_Orif_Press_Sensor	kPa	Engine_Is_Warm	None
ECM_Run_Time	s	Key_Switch	None
Engine_Speed	RPM		

179. FC 2634:

VGT Actuator Controller - Bad intelligent device or component. An internal error has been detected by the smart VGT controller.

1. **VGA_DL_DRIVER_CIRCUIT_ERROR**
   Error Flag: H_VGT_Fault_Driver_Circuit
   (csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Driver_Circuit	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

180. FC 2635:

VGT Actuator Driver Circuit - Condition Exists. A calibration mismatch between VGT actuator and the ECM has been detected.

1. **VGA_DL_MISMATCH_ERROR**
   Error Flag: H_VGT_Fault_Software_Release, H_VGT_Fault_Cust_ID_Mismatch, H_VGT_Fault_Voltage_Mismatch

(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Software_Release	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C	H_VGT_Fault_Cust_ID_Mismatch	None
J39_VGT_Actuator_Position	%	H_VGT_Fault_Voltage_Mismatch	None
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

181. FC 2787:

Engine Speed At Idle - Data erratic, intermittent or incorrect.

1. **IDLE_FUEL_HIGH_ERROR**
   Error Flag: None
   (csdd_mca_base.mdl)

Engine_Speed	RPM	Engine_At_Idle	None
Net_Engine_Torque	N_m	Current_Engine_State	None
CBM_Torque_Fuel	mg/str	Vehicle_Speed	km/hr
		PTO_Status	None
		Accelerator_Pedal_Position	%
		LSI_ReferenceSpd	RPM
		Coolant_Temperature	Deg_C
		Coolant_Temperature_Sensor	Deg_C
		Coolant_Tmptr_Sensor_Volts	V
		EPS_s_Status	
		Fuel_System_Failure	None

182. FC 2973:

Intake Manifold 1 Pressure - Data erratic, intermittent or incorrect.

1. **CHARGE_PRESS_IR_HIGH_ERROR**
   Error Flag: CHP_IR_High_Err
   (csdd_charge_base_mgr_lib.mdl)

2. **CHARGE_PRESS_IR_LOW_ERROR**
   Error Flag: CHP_IR_Low_Err
   (csdd_charge_base_mgr_lib.mdl)

3. **CHARGE_PRESS_KEYOFF_ERROR**
   Error Flag: MMon_CHP_Keyoff_Error_Flag
   (csdd_magt_mach_monitor.mdl)

Filtered_Turbo_Speed	KRPM	Charge_Press_Tolerance	kPa
Charge_Press_Est_Offset	kPa		
Charge_Press	kPa	CHP_High_Cusum_Value	kPa
Charge_Press_Est	kPa	CHP_In_Range_Cusum_Timer	s
Charge_Press_EStat	None	CHP_IR_High_Err	None
Charge_Press_IR_Enable	None	CHP_IR_Low_Err	None
Charge_Press_Sensor	kPa	CHP_IR_Stuck_Err	None
Charge_Press_Sensor_Status	None	CHP_Low_Cusum_Value	kPa
Charge_Press_Sensor_Volts	V		
Charge_Press_Status	None		
Air_Press_Sensor	kPa	MMon_Keyoff_Press_Check_State	None
Oil_Pressure_Absolute_Sensor	kPa	MMon_Keyoff_Press_Check_Timer	s
Exhaust_Press_Sensor	kPa	MMon_Keyoff_Press_Delay_Timer	s
Charge_Press_Sensor	kPa	MMon_CHP_Keyoff_Error_Flag	None
EGR_Orif_Press_Sensor	kPa	Engine_Is_Warm	None
ECM_Run_Time	s	Key_Switch	None

Engine_Speed	RPM

183. FC 3136, 3137:

1. **EGR_ORIFICE_PRESS_IR_HIGH_ERROR**
   Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source
   (csdd_charge_base_mgr_lib.mdl)

2. **EGR_ORIFICE_PRESS_IR_LOW_ERROR**
   Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage below normal, or shorted to low source
   (csdd_charge_base_mgr_lib.mdl)

EGR_Orifice_Press_Status	---	EGR_Orifice_Press_Est	kPa
EGR_Orifice_Press	kPa	EGR_Orifice_Press_EStat	---
EGR_Orifice_Press_Sensor_Volts	V	**Diagnostics:**	---
H_EGR_Orifice_Press_Raw	counts	C_AIP_EGROrificeTmptrULim	counts
C_AIP_EGROrifPressDefault	kPa	C_AIP_EGROrificeTmptrLLim	counts

184. FC 3138:

Engine Exhaust Gas Recirculation Outlet Pressure - Data erratic, intermittent or incorrect.

3. **EGR_ORIFICE_PRESS_IR_HIGH_ERROR**
   Error Flag: EGR_Orif_Press_IR_High_Err
   (csdd_charge_base_mgr_lib.mdl)

4. **EGR_ORIFICE_PRESS_IR_LOW_ERROR**
   Error Flag: EGR_Orif_Press_IR_Low_Err
   (csdd_charge_base_mgr_lib.mdl)

5. **EGR_ORIFICE_PRESS_KEYOFF_ERROR**
   Error Flag: MMon_EOP_Keyoff_Error_Flag
   (csdd_magt_mach_monitor.mdl)

Charge_Press	kPa	ECM_Run_Time	S
Exhaust_Press	kPa	Engine_Speed	RPM
EGR_Flow	kg/min	EGR_Position	%
		VGT_Position	%
EGR_Orif_Press	kPa_A	Net_Engine_Torque	N_m
EGR_Orif_Press_Est	kPa		
EGR_Orif_Press_Est_Status	None	EGR_Orif_Press_High_Cusum_Value	kPa
EGR_Orif_Press_Sensor	kPa	EGR_Orif_Press_IR_Cusum_Timer	s
EGR_Orif_Press_Sensor_Status	None	EGR_Orif_Press_IR_Enable	None
EGR_Orif_Press_Sensor_Volts	V	EGR_Orif_Press_IR_High_Err	None
EGR_Orif_Press_Status	None	EGR_Orif_Press_IR_Low_Err	None
		EGR_Orif_Press_Low_Cusum_Value	kPa
Air_Press_Sensor	kPa		
Oil_Pressure_Absolute_Sensor	kPa	MMon_Keyoff_Press_Check_State	None
Exhaust_Press_Sensor	kPa	MMon_Keyoff_Press_Check_Timer	s
Charge_Press_Sensor	kPa	MMon_Keyoff_Press_Delay_Timer	s
EGR_Orif_Press_Sensor	kPa	MMon_EOP_Keyoff_Error_Flag	None
		Engine_Is_Warm	None
		Key_Switch	None

185. FC 3243:

Engine Cooling System Monitor - Data Valid But Below Normal Operating Range – Moderately Severe Level.

1. Cooling_System_Monitor_Error
Error Flag: OBD_LUCL_OP_Sensor_IR_Err_Flag
(csdd_obd_lbe_cool.mdl)

Engine_Speed	RPM	OBD_LUCL_CSM_Accumulated_Fuel	mg
Net_Engine_Torque	N_m	OBD_LUCL_CSM_Disable_Time	s
Vehicle_Speed	km/hr	OBD_LUCL_CSM_Engine_Duty_Cycle	%
Engine_At_Idle	None	OBD_LUCL_CSM_Idle_Time	s
Coolant_Temperature	Deg_C	OBD_LUCL_CSM_Max_Monitor_Time	s
Coolant_Temperature_Sensor	Deg_C	OBD_LUCL_CSM_Run_Time	s
Coolant_Tmptr_Sensor_Volts	V	OBD_LUCL_CSM_Initial_Cool_Temp	Deg_C
		OBD_LUCL_CSM_PredictedCoolTemp	Deg_C
		OBD_LUCL_CSM_Monitor_State	None

OBD_LUCL_CSM_Monitor_State
0 = DISABLED
1 = STARTUP_DELAY_TIME
2 = CT_SENSOR_ERROR
3 = WARM_START
4 = COLD_DISABLE
5 = MAX_TIMEOUT
6 = WARMUP_PASSED
7 = IDLE_TIME
8 = CHT_SENSOR_ERROR
9 = PREDICTION_RUNNING
10 = PREDICTION_FINISHED

186. FC 3337:
Engine Idle Fuel Quantity - Data Valid But Above Normal Operating Range - Moderately Severe Level.

1. IDLE_SPEED_HIGH_ERROR
Error Flag: None
(csdd_mca_base.mdl)

Engine_Speed	RPM	Engine_At_Idle	None
Net_Engine_Torque	N_m	Current_Engine_State	None
CBM_Torque_Fuel	mg/str	Vehicle_Speed	km/hr
		PTO_Status	None
		Accelerator_Pedal_Position	%
		LSI_ReferenceSpd	RPM
		Coolant_Temperature	Deg_C
		Coolant_Temperature_Sensor	Deg_C
		Coolant_Tmptr_Sensor_Volts	V
		EPS_s_Status	
		Fuel_System_Failure	None

187. FC 3338:
Engine Idle Fuel Quantity - Data Valid But Below Normal Operating Range - Moderately Severe Level.

1. IDLE_SPEED_LOW_ERROR
Error Flag: None
(csdd_mca_base.mdl)

Engine_Speed	RPM	Engine_At_Idle	None
Net_Engine_Torque	N_m	Current_Engine_State	None
CBM_Torque_Fuel	mg/str	Vehicle_Speed	km/hr
		PTO_Status	None
		Accelerator_Pedal_Position	%
		LSI_ReferenceSpd	RPM

		Coolant_Temperature	Deg_C
		Coolant_Temperature_Sensor	Deg_C
		Coolant_Tmptr_Sensor_Volts	V
		EPS_s_Status	
		Fuel_System_Failure	None

188. FC 3342:

Engine Exhaust Gas Recirculation Cooler Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level.

CEGR_UNDERCOOLING_ERROR

Error Flag: CEGR_UnderCooling_Err

(obd_cegr_htxh_lib.mdl)

C_CEGR_OBD_BP_Time_Delay	s	H_CEGR_OBD_BP_Enable	None
C_CEGR_OBD_Cusum_Max	Deg_C	H_CEGR_OBD_Condition_En	None
C_CEGR_OBD_Cusum_Thd	Deg_C	H_CEGR_OBD_Cusum_Counter	None
C_CEGR_OBD_Delta_Tmptr_Min	Deg_C	H_CEGR_OBD_Cusum_Latch	Deg_C
C_CEGR_OBD_Enable	None	H_CEGR_OBD_Cusum_Timer	s
C_CEGR_OBD_Flow_Min	kg/min	H_CEGR_OBD_Cusum_Value	Deg_C
C_CEGR_OBD_Noise_Tol	None	H_CEGR_OBD_Enabled	None
C_CEGR_OBD_Reset	None	H_CEGR_OBD_Input_Enable	None
C_CEGR_OBD_Thd_Filt_Const	None	H_CEGR_OBD_Max_Cusum_Value	Deg_C
C_CEGR_OBD_Threshold_Value_Min	Deg_C	CEGR_OBD_Tmptr_Thd	Deg_C
C_CEGR_OBD_Timer	s	EGR_Orifice_Tmptr	Deg_C
C_CEGR_OBD_CT_Axis	Table	CEGR_Undercooling_Error	None
C_CEGR_OBD_EGR_Flow_Axis	Table		
C_CEGR_OBD_Tmptr_Thd_Table	Table		
Cegr_obd_coolant_temperature	Deg_C		
EGR_Flow	Kg/min		
Exhaust_Tmptr	Deg_C		
EGR_Flow_Status	None		
Coolant_temperature_status	None		
Egr_orifice_tmptr_status	None		
Exhaust_tmptr_status	None		

189. FC 3343:

Engine Charge Air Cooler Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level.

CHT_HIGH_TMPTR_ERROR

Error Flag: CHT_High_Tmptr_Error

(obd_cac_htxh_lib.mdl)

C_CAC_OBD_Enable	None	Current_Engine_State	None
C_CHT_High_Tmptr_COT_Min	Deg_C	Charge_Tmptr_Status	None
C_CHT_High_Tmptr_TQ_Min	Nm	Compressor_Outlet_Tmptr_Status	None
C_CAC_OBD_AMB_Air_Tmptr_Min	Deg_C	CEGR_Undercooling_Error	None
C_CHT_High_Tmptr_Thd	Deg_C		
C_CHT_High_Tmptr_Fault_Time	s	CHT_High_Tmptr_Fault_Timer	s
		CHT_High_Tmptr_Error	None
Net_engine_torque	Nm		
Ambient_Air_Tmptr	Deg_C		
Compressor_Outlet_Tmptr	Deg_C		
Charge_Tmptr	Deg_C		

C_MCF_OBD_En_Condn_Bitmask	
State	**Hex Value**
ENGINE_WARM_CHECK	1
ENGINE_IDLE_CHECK	2
PROTECTION_MODE_CHECK	4
AFT_OPER_MODE_CHECK	8

C_EGRFL_OBD_En_Condn_Bitmask	
State	**Hex Value**
ENGINE_WARM_CHECK	1
ENGINE_IDLE_CHECK	2
PROTECTION_MODE_CHECK	4
AFT_OPER_MODE_CHECK	8

190. FC 3361:

Intake Manifold 1 Pressure - Abnormal rate of change.

1. VGA_DL_POS_SIR_ERROR

Error Flag: H_VGA_DL_Pos_Cusum_SIR_Fault

(csdd_dd_vgt_dl.mdl)

2. VGA_DL_POS_IRH_ERROR

Error Flag: H_VGA_DL_Pos_Cusum_IRH_Fault

(csdd_dd_vgt_dl.mdl)

3. VGA_DL_POS_IRL_ERROR

Error Flag: H_VGA_DL_Pos_Cusum_IRL_Fault

(csdd_dd_vgt_dl.mdl)

C_VGA_DL_Pos_IR_Enable	None	H_VGA_DL_Pos_Cusum_Count	counts
obd_number_of_operation_cycles	None	H_VGA_DL_Position_IR_Fault	None
C_VGA_DL_Pos_IR_Fault_Count_Lim	counts	H_VGA_DL_Pos_Cusum_Enable	None
C_VGA_DL_Pos_IR_Trans_FiltConst	None	H_VGA_DL_Pos_IR_Filtered_Cmd	%
C_VGA_DL_Pos_Cusum_Tolerance	%	H_VGA_DL_Pos_Cusum_Reset	None
C_VGA_DL_Pos_Cusum_IRH_Thd	%	H_VGA_DL_Pos_Cusum_IRH_Fault	None
C_VGA_DL_Pos_Cusum_IRL_Thd	%	H_VGA_DL_Pos_Cusum_IRL_Fault	None
C_VGA_DL_Pos_Cusum_SIR_Thd	%	H_VGA_DL_Pos_Cusum_SIR_Fault	None
C_VGA_DL_Pos_Cusum_Max	%	H_VGA_DL_Pos_Cusum_IRH_Value	%
C_VGA_DL_Pos_Cusum_Timeout	s	H_VGA_DL_Pos_Cusum_IRL_Value	%
C_VGA_DL_Pos_Cusum_Reset_Mode	None	H_VGA_DL_Pos_Cusum_SIR_Value	%
C_VGA_DL_Pos_IR_Trans_Thd	%	H_VGA_DL_Pos_Cusum_Timer	s
		H_VGA_DL_Pos_Cusum_IRH_MaxValue	%
		H_VGA_DL_Pos_Cusum_IRL_MaxValue	%
		H_VGA_DL_Pos_Cusum_SIR_MaxValue	%
VGT_Position	%	H_VGA_DL_Pos_Cusum_Reset_Count	counts
VGT_DL_Desired_Position	%	H_VGA_DL_Pos_IR_Trans_Value	%
VGT_Position_Status	None	H_VGA_DL_Pos_IR_Set_Clear_En	None
VGT_Driver_Failure	None		
H_VGA_Shutdown	None		

191. FC 3382:

Engine Exhaust Gas Recirculation (EGR) System - Data Valid But Below Normal Operating Range - Moderately Severe Level. .

EGR_LOFLOW_ERROR

Error Flag: EGR_LoFlow_Error

(obd_egr_flow_lib.mdl)

C_EGRFL_OBD_VGT_Pos_Max	%	H_EGRFL_OBD_LoFlow_Condition_En	None
C_EGRFL_OBD_En_Condn_Bitmask	HEX	H_EGRFL_OBD_LoFlow_Cusum_Counter	None
C_EGRFL_OBD_LoFlow_Cusum_Max	None	H_EGRFL_OBD_LoFlow_Cusum_Latch	None
C_EGRFL_OBD_LoFlow_Cusum_Thd	None	H_EGRFL_OBD_LoFlow_Cusum_Timer	s
C_EGRFL_OBD_LoFlow_EGR_Pos_Cmd_Min	%	H_EGRFL_OBD_LoFlow_Cusum_Value	None
C_EGRFL_OBD_LoFlow_En_Persis_Time	None	H_EGRFL_OBD_LoFlow_Enabled	None
C_EGRFL_OBD_LoFlow_Enable	None	H_EGRFL_OBD_LoFlow_Input_Enable	None
C_EGRFL_OBD_LoFlow_Eng_Spd_Max	RPM	H_EGRFL_OBD_LoFlow_Max_Cusum_Val	None
C_EGRFL_OBD_LoFlow_Eng_Spd_Min	RPM		

C_EGRFL_OBD_LoFlow_FC	None	Engine_Speed	RPM
C_EGRFL_OBD_LoFlow_Flow_Max_Rate	kg/min _sec	EGR_Position	%
C_EGRFL_OBD_LoFlow_Flow_Min	kg/min	VGT_Position	%
C_EGRFL_OBD_LoFlow_Flow_Rate_FC	None	CBR_Protection_Chi_flag	None
C_EGRFL_OBD_LoFlow_Noise_Tol	None	Engine_Is_Warm	None
C_EGRFL_OBD_LoFlow_Ovrd_En	None	EGR_Flow	kg/min
C_EGRFL_OBD_LoFlow_Ovrd_Value	None	TAHR_EGR_Flow_Cmd	Kg/min
C_EGRFL_OBD_LoFlow_Reset	None	Egr_flow_status	None
C_EGRFL_OBD_LoFlow_Timer	s	eac_egr_valve_cmd	%
C_EGRFL_OBD_LoFlow_Torque_Max	None	H_egrfl_obd_loflow_en_wo_persis	None
C_EGRFL_OBD_LoFlow_Torque_Min	None	H_egrfl_obd_loflow_en_duration	s
Current_Engine_State	None	Cbm_chrg_load_ref	None

192. FC 3383:

Engine Exhaust Gas Recirculation (EGR) System - Data Valid But Above Normal Operating Range - Moderately Severe Level.

EGR_HIFLOW_ERROR
Error Flag: EGR_HiFlow_Error
(obd_egr_flow_lib.mdl)

C_EGRFL_OBD_VGT_Pos_Max	%	H_EGRFL_OBD_HiFlow_Condition_En	None
C_EGRFL_OBD_En_Condn_Bitmask	HEX	H_EGRFL_OBD_HiFlow_Cusum_Counter	None
		H_EGRFL_OBD_HiFlow_Cusum_Latch	None
C_EGRFL_OBD_HiFlow_Cusum_Max	None	H_EGRFL_OBD_HiFlow_Cusum_Timer	s
C_EGRFL_OBD_HiFlow_Cusum_Thd	None	H_EGRFL_OBD_HiFlow_Cusum_Value	None
C_EGRFL_OBD_HiFlow_EGR_Pos_Max	%	H_EGRFL_OBD_HiFlow_Enabled	None
C_EGRFL_OBD_HiFlow_Enable	None	H_EGRFL_OBD_HiFlow_Input_Enable	None
C_EGRFL_OBD_HiFlow_Eng_DP_Min	kPa	H_EGRFL_OBD_HiFlow_Max_Cusum_Val	None
C_EGRFL_OBD_HiFlow_FC	None		
C_EGRFL_OBD_HiFlow_Flow_Max	kg/min		
C_EGRFL_OBD_HiFlow_Noise_Tol	None	EGR_Position	%
C_EGRFL_OBD_HiFlow_Ovrd_En	None	VGT_Position	%
C_EGRFL_OBD_HiFlow_Ovrd_Value	None	CBR_Protection_Chi_flag	None
C_EGRFL_OBD_HiFlow_Reset	None	EGR_Valve_Delta_Press	Kpa
C_EGRFL_OBD_HiFlow_Timer	s	CHP_HDR_EGR_Flow	kg/min
C_CHP_HDR_EGR_Flow_Active	None	TAHR_EGR_Flow_Cmd	Kg/min
Current_Engine_State	None	EGR_Flow	Kg/min
		EGR_Valve_Delta_Press_status	None
		EGR_Flow_status	None

193. FC 3389:

Engine Exhaust Gas Recirculation (EGR) System - Abnormal rate of change.
.

EGR_FLOW_SR_ERROR
Error Flag: EGR_Flow_SR_Error
(obd_egr_flow_lib.mdl)

C_EGRFL_OBD_VGT_Pos_Max	%	H_EGRFL_OBD_SR_Condition_En	None
C_EGRFL_OBD_En_Condn_Bitmask	HEX	H_EGRFL_OBD_SR_Cusum_Counter	None
		H_EGRFL_OBD_SR_Cusum_Latch	None
C_EGRFL_OBD_SR_Cusum_Max	None	H_EGRFL_OBD_SR_Cusum_Timer	s
C_EGRFL_OBD_SR_Cusum_Thd	None	H_EGRFL_OBD_SR_Cusum_Value	None
C_EGRFL_OBD_SR_Enable	None	H_EGRFL_OBD_SR_Enabled	None
C_EGRFL_OBD_SR_Flow_Max_Rate	Kg/min /s	H_EGRFL_OBD_SR_Input_Enable	None
C_EGRFL_OBD_SR_Flow_Min	Kg/min	H_EGRFL_OBD_SR_Max_Cusum_Value	None
C_EGRFL_OBD_SR_Flow_Min_Rate	Kg/min /s		
C_EGRFL_OBD_SR_Flow_Rate_FC	None		
C_EGRFL_OBD_SR_Noise_Tol	None	EGR_Position	%
C_EGRFL_OBD_SR_Ovrd_En	None	VGT_Position	%

C_EGRFL_OBD_SR_Ovrd_Value	None	CBR_Protection_Chi_flag	None
C_EGRFL_OBD_SR_Reset	None	Current_Engine_State	None
C_EGRFL_OBD_SR_Timer	s	Engine_Is_Warm	None
TAHR_EGR_Flow_Cmd	Kg/min		
EGR_Flow	kg/min		
Egr_flow_status	None		

194. FC 3616:

Engine VGT Nozzle Position - Mechanical system not responding or out of adjustment.

VGA_DL_ ACTUATION_NL_ERROR

Error Flag: H_VGT_Fault_Actuation_NL

(csdd_dd_vgt_dl.mdl)

TGC_VT_Cmd	%	H_VGT_Fault_Learned_Calibration	None
J39_Motor_Effort	None	VGT_Driver_Failure	None
J39_Actuator_Status	Hex	VGT_Actuator_Status	None
J39_Actuator_State	None	Engine_Speed	RPM
J39_VGT_Temperature	C		
J39_VGT_Actuator_Position	%		
J39_VGT_Commanded_State	None		
VGT_Actuator_Error_Status	None		

195. FC 3724:

Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe Level.

EGA_DRIVER_POWER_LOW_ERROR

Error Flag: EGA_Driver_PwrLo_Fault

(csdd_dd_egr_blm.mdl)

EGR_Position	%	EGA_Electrical_Fault	None
EAC_EGR_Valve_Cmd	%	EGA_Driver_Short_Circuit_Fault	None
EGA_Position_Cmd	%	EGA_BM_Status	None
EGA_Position_Ref_Filtered	%	ECM_Run_Time	Sec
EGA_PWM_Abs_Duty_Cycle	%		
H_EGA_BM_Motor_Current	A		
Battery_Voltage	V		
EGA_Control_State	--		

Engine Protection (EPD)

Comment [i13]: Updated

196. EPD - Line Haul Derate Engine Protection Logic

	Sensor	DerateType (T)orque/(R)PM	Threshold derate begins after X sec	Max derate occurs:	
	Coolant Temperature	Tseverity based	> C_EPD_CT_Trq_Drt_Err_Sev for C_EPD_CT_Trq_Err_Dur sec	>= C_EPD_CT_Trq_Drt_Max_Thd	
		Rtime based	> C_EPD_CT_RPM_Drt_Err_Sev for C_EPD_CT_RPM_Error_Dur sec	>= C_EPD_CT_TB_Time_To_Max_RPM_D	
	Coolant Temp (2)	Tseverity based	>C_EPD_CT2_Trq_Drt_Err_Sev for C_EPD_CT2_Trq_ Err_Dur sec	>= C_EPD_CT2_Trq_Drt_Max_Thd	
	Charge Temperature	Tseverity based	> C_EPD_CHT_Trq_Drt_Err_Sev for C_EPD_CHT_Trq_Err_Dur sec	>= C_EPD_CHT_Trq_Drt_Max_Thd	
		Rtime based	> C_EPD_CHT_RPM_Drt_Err_Sev for C_EPD_CHT_RPM_Error_Dur sec	>=C_EPD_CHT_TB_Time_To_MaxRPMI	
	Oil Temperature	Tseverity based	> C_EPD_OT_Trq_Drt_Err_Sev for C_EPD_OT_Trq_Err_Dur sec	>= C_EPD_OT_Trq_Drt_ Max_Thd	
	Oil Pressure	Ttime based	Min Torque Drt Table for C_EPD_OP_Trq_Err_Dur sec	>= C_EPD_OP_TB_Time_To_Max_Trq_Dr	
		Rtime based	Max Torque Drt Table for C_EPD_OP_RPM_Error_Dur sec	>= C_EPD_OP_TB_Time_To_Max_RPM_D	
	Exhaust Metal Temp (Virtual)	Tseverity based	> C_EPD_EMT_Trq_Drt_Err_Sev for C_EPD_EMT_Trq_Err_Dur sec	>= C_EPD_EMT_Trq_Drt_Max_Thd	
	Comp Out Temp (Virtual)	Tseverity based	> C_EPD_COT_Trq_Drt_Err_Sev for C_EPD_COT_Trq_Err_Dur sec	>= C_EPD_COT_Trq_Drt_ Max_Thd	
	EGR Return Temp	Tseverity based	> C_EPD_EGR_Trq_Drt_Err_Sev for C_EPD_EGR_Trq_Err_Dur sec	>= C_EPD_EGR_Trq_Drt_Max_Thd	
		Rtime based	> C_EPD_EGR_RPM_Drt_Err_Sev for C_EPD_EGR_RPM_Error_Dur sec	>= C_EPD_EGR_TB_Time_To_MaxRPMDrt	
	EGR Return Temp (2)	Tseverity based	> C_EPD_EGR2_Trq_Drt_Err_Sev for C_EPD_EGR2_Trq_Err_Dur sec	>= C_EPD_EGR2_Trq_Drt_Max_Thd	
	Crank Case Pressure	N/A	C_EPD_CCP_Tbl1 for C_EPD_CCP_Trq_Err_Dur sec		
		Ttime based	C_EPD_CCP_Tbl2 for C_EPD_CCP_Trq_Err_Dur sec	>= C_EPD_CCP_TB_TimeToMax_Trq_Drt	
	Engine Speed	N/A	C_EPD_Overspeed_Limit for C_EPD_Overspeed_Allowed_Time sec	N/A	
	Soot Load	N/A	>C_SFR_RegenTrgtVec1-8 bit 10 for C_EPD_Soot_RPM_Error_Dur	N/A	
		Rtime based	> C_EPD_Soot_RPM_Drt_Err_Sev for C_EPD_Soot_RPM_Error_Dur	>= C_EPD_Soot_TB_TimeToMaxRPM_Drt	
		Rtime based	> C_SFP_mg_Soot_Stage_3_To_4 for C_EPD_Soot_RPM_Error_Dur	>= C_EPD_Soot_TB_TimeToMaxRPM_Drt	
	Coolant Level	N/A	= 2 for C_EPD_CL_Trq_Err_Dur sec	N/A	
	Exhaust Pressure	Rtime based	> C_EPD_EP_RPM_Drt_Err_Sev for C_EPD_EP_RPM_Error_Dur sec	>= C_EPD_EP_TB_Time_To_MaxRPMDrt s	

2448 *: Next key on, yellow lamp flash 30 sec

197. EPF - Line Haul Shut Down Engine Protection Logic

	Sensor	Shutdown Type (T)orque /(R)PM	Threshold Shutdown begins after X sec (and lamp begins flashing):	Time before engine shutdown flashes):	
	Coolant Temperature	Tseverity based	> C_EPD_CT_Sev_SD_Thd 0 sec	C_EPD_CT_SD_Warning_Time_Du	
	Charge Temperature	Tseverity based	> C_EPD_CHT_Sev_SD_Thd for 0 sec	C_EPD_CHT_SD_Warning_Time_D	
	Oil Temperature	Tseverity based	> C_EPD_OT_Sev_SD_Thd for 0 sec	C_EPD_OT_SD_Warning_Time_Du	
	Oil Pressure	Ttime based	C_EPD_OP_Min_Trq_Drt_Tbl for C_EPD_OP_Trq_SD_Time_Dur+ C_EPD_OP_SD_Delay_Time sec	C_EPD_OP_SD_Warning_Time_Du	
		Rtime based	C_EPD_OP_Max_Trq_Drt_Tbl for C_EPD_OP_RPM_SD_Time_Dur+ C_EPD_OP_SD_Delay_Time sec	C_EPD_OP_SD_Warning_Time_D	
	Aftertreatment Temp	Ttime based	V_ATP_tr_DOC_Out > C_APM_tr_DOCOut_Severe_HiThd for C_APM_tm_DOC_Severe_Tmptr + C_ATM_tm_OT_EPSD_Delay sec	C_ATM_tm_OT_EPSD_Warning Se	
		Ttime based	V_ATP_tr_DPF_Out> C_APM_tr_DPFOut_Severe_HiThd for C_APM_tm_DPF_Severe_Tmptr + C_ATM_tm_OT_EPSD_Delay sec	C_ATM_tm_OT_EPSD_Warning Se	

198. EPF - FireTruck Derate Engine Protection Logic

	Sensor	Derate Type (T)orque/(R)PM	Threshold Fault Code and Lamps begins after X sec	NO Derate NOShutdown	
	Coolant Temperature	Tseverity based	> C_EPD_CT_Trq_Drt_Err_Sev for C_EPD_CT_Trq_Err_Dur sec		2963 (No
		Rtime based	> C_EPD_CT_RPM_Drt_Err_Sev for C_EPD_CT_RPM_Error_Dur sec		151 (Red
	Coolant Temp (2)	Tseverity based	>C_EPD_CT2_Trq_Drt_Err_Sev for C_EPD_CT2_Trq_ Err_Dur sec		
	Charge Temperature	Tseverity based	> C_EPD_CHT_Trq_Drt_Err_Sev for C_EPD_CHT_Trq_Err_Dur sec		
		Rtime based	> C_EPD_CHT_RPM_Drt_Err_Sev for C_EPD_CHT_RPM_Error_Dur sec		
	Oil Temperature	Tseverity based	> C_EPD_OT_Trq_Drt_Err_Sev for C_EPD_OT_Trq_Err_Dur sec		
	Oil Pressure	Ttime based	Min Torque Drt Table for C_EPD_OP_Trq_Err_Dur sec		
		Rtime based	Max Torque Drt Table for C_EPD_OP_RPM_Error_Dur sec		
	Exhaust Metal Temp (Virtual)	Tseverity based	> C_EPD_EMT_Trq_Drt_Err_Sev for C_EPD_EMT_Trq_Err_Dur sec		
	Comp Out Temp (Virtual)	Tseverity based	> C_EPD_COT_Trq_Drt_Err_Sev for C_EPD_COT_Trq_Err_Dur sec		
	EGR Return Temp	Tseverity based	> C_EPD_EGR_Trq_Drt_Err_Sev for C_EPD_EGR_Trq_Err_Dur sec		
		Rtime based	> C_EPD_EGR_RPM_Drt_Err_Sev for C_EPD_EGR_RPM_Error_Dur sec		
	EGR Return Temp (2)	Tseverity based	> C_EPD_EGR2_Trq_Drt_Err_Sev for C_EPD_EGR2_Trq_Err_Dur sec		
	Crank Case Pressure	N/A	C_EPD_CCP_Tbl1 for C_EPD_CCP_Trq_Err_Dur sec		
		Ttime based	C_EPD_CCP_Tbl2 for C_EPD_CCP_Trq_Err_Dur sec		
	Engine Speed	N/A	C_EPD_Overspeed_Limit for C_EPD_Overspeed_Allowed_Time sec		
	Soot Load	N/A	>C_SFR_RegenTrgtVec1-8 bit 10,for C_EPD_Soot_RPM_Error_Dur sec		
		Rtime based	> C_EPD_Soot_RPM_Drt_Err_Sev for C_EPD_Soot_RPM_Error_Dur sec		1921 (Ye
		Rtime based	> C_SFP_mg_Soot_Stage_3_To_4 for C_EPD_Soot_RPM_Error_Dur sec		
	Coolant Level	N/A	= 2 for C_EPD_CL_Trq_Err_Dur sec		
	Exhaust Pressure	Rtime based	> C_EPD_EP_RPM_Drt_Err_Sev for C_EPD_EP_RPM_Error_Dur sec		

2448* :Next key on, yellow lamp flash 30 sec

Engine Performance Diagnostics:

Comment [BJO14]: Not Updated

199. Acceleration Noise Control (ANC)

Engine_Speed	RPM	H_ANC_CompensatedEngineSpeed	RPM
Total_Fueling	mg/stroke	H_ANC_Ndot_Demand	RPM/S
Engine_Acceleration	RPM/S	Combustion_Control_Path_Owner	None
Effective_Gear_Ratio	None	Vehicle_Speed	km/h

200. Aftertreatment Doser Diagnostics

Engine_Speed	RPM	H_HIM_fg_Dosing_Cmd	g/sec
H_HIM_DIAG_Pressure_Test_Active	None	V_HIM_DIAG_pr_Doser_FTP	kPa
H_HIM_DIAG_Pressure_Test_Retry	Counts	V_HIM_DIAG_pr_PreAir_Leak	kPa
V_HIM_DIAG_Pressure_Test_Comp	None	V_HIM_DIAG_pr_Fuel_Leak	kPa
H_HIM_DIAG_Pressure_Test_Failed	None	V_HIM_DIAG_ASOV_FTO	None
V_HIM_DIAG_Pressure_Test_State	None	V_HIM_DIAG_Stuck_Test	None
V_HIM_DIAG_Press_Error	None	V_HIM_DIAG_Air_Leak_Test	None
H_HIM_DIAG_Pressure_DFSOV_Cmd	None	V_HIM_DIAG_Amb_Test_Failed	None
V_HIM_DIAG_Pressure_DFSOV2_Cmd	None	V_HIM_DIAG_DFSOV2_FTO	None
V_HIM_DIAG_pr_ASOV_PreFTO	kPa	V_HIM_DIAG_DFSOV_FTO	None
V_HIM_DIAG_pr_Ambient	kPa	V_HIM_DIAG_DFSOV_Swap	None
V_HIM_DIAG_pr_SOV_Leak	kPa	V_HIM_DIAG_Doser_FTP	None
V_HIM_DIAG_pr_DFSOV_FTO	kPa	V_HIM_DIAG_Fuel_Leak_Test	None
V_HIM_DIAG_pr_Air_Leak	kPa	V_HIM_DIAG_Rationality_Test	None
V_HIM_DIAG_pr_ASOV_FTO	kPa	V_HIM_DIAG_SOV_Leak	None
V_OCL_Eff_Comp	None		

201. Aftertreatment Regeneration / Triggers

Engine_Speed	RPM	Net_Engine_Torque	N_m
H_CBR_Chi_Value	None	TGC_VT_Cmd	%
EAC_EGR_Valve_Cmd	%	CBR_Alpha	None
V_AIM_trc_DOC_In	Deg_C	V_AIM_trc_DOC_Out	Deg_C
V_AIM_trc_DPF_Out	Deg_C	V_SFP_mg_Soot_Load_DP	Gm
Ambient_Air_Tmptr	Deg_C	Filtered_Turbo_Speed	KRPM
V_SFR_Ineff_DPF_Reward	None	H_SFR_RegenTriggerStateUncond	None
V_SFR_Ineff_Regen_Detected_Flag	None	V_SFR_FilterCondInProgress	None
P_SFR_ct_Ineff_Regen_Occr	Counts	V_SFP_mg_Soot_Load_Comb	Gm
P_SFR_Regen_Trigger_State	None	H_SFR_tm_FilterConditioning	S
V_SFR_Ineff_Regen_Help	None	V_SFM_Oper_Mode_In	None
V_SFR_Ineff_Regen_React	None	H_SFR_Forced_Regen_Flag	None
V_SFR_Ineff_Regen_Error	None	O_SFR_Regen_Trigger_On	None
V_SFR_Normal_Regen_End	None	V_SFR_MBPE_Regen_Rqst	None
V_ATR_NonMissionRegenActive	None	H_SFP_fv_Unfiltered	ACMS
V_SFR_IneffNMRegen	None	V_SFP_pr_Max_At_High_Flow	kPa
P_SFR_tm_Ineff_Dosing	S	V_SFP_GreenFilter	None
V_SFR_trc_Regen_Trgt	Deg_C	V_SFP_DeepCleanRqst	None
V_ATM_fg_HC_Fdbk_Total	g/sec	V_ATP_Oper_Mode_Permitted	HEX
H_SFP_gph_Oxid_Rate	g/hr	H_SFR_gpl_Regen_On_Soot_Load	g/l
H_SFP_gph_Noxid_Rate	g/hr	V_ATM_Persist_Data_Error	None
V_SFR_RegenDurationExpired	None	P_SFP_GreenFilterInPlant	None
V_SFR_Ineff_Dosing_Help	None	V_SFR_RegenDurationExpired	None
V_SFR_trc_Warmup_Trgt	Deg_C	V_ATM_Persist_Data_Error	None
V_SFR_trc_dt_WarmupRampRate	Deg_C/s	P_SFR_TimerCleaningRqst	None
V_SFR_tm_Warmup_Rqst	S	V_ATP_Engine_Running	None
V_SFR_trc_dt_RegenRampRate	Deg_C/s	P_SFR_tmh_SinceActiveRegen	Hr
H_SFR_fv_Min_Flow_Rate	ACMS	P_SFR_tmh_ElapsedCleaningTime	Hr
V_SFR_ppm_Max_Inlet_HC	Ppm	V_SFM_trc_Tmptr_In	Deg_C
V_SFR_FilterCondInProgress	None	V_SFR_trc_Regen_Trgt	Deg_C
V_SFR_Regen_Trigger	None	V_SFP_trc_DPF_Bed	Deg_C

202. Aftertreatment Soot Load

Engine_Speed	RPM	Net_Engine_Torque	N_m
H_CBR_Chi_Value	None	TGC_VT_Cmd	%
EAC_EGR_Valve_Cmd	%	CBR_Alpha	None
V_AIM_trc_DOC_In	Deg_C	V_AIM_trc_DOC_Out	Deg_C
V_AIM_trc_DPF_Out	Deg_C	V_SFP_mg_Soot_Load_DP	Gm

Ambient_Air_Tmptr	Deg_C	Filtered_Turbo_Speed	KRPM
H_SFP_tc_DPTrust_To_Time	S	H_SFP_HighTrustTblUsed	None
V_SFP_fv_DPF	ACMS	V_SFP_GreenFilter	None
H_SFP_DPTrust_Fctr_Adjusted	None	H_SFP_DPTrust_Factor	None
V_SFP_mg_Soot_Load_Comb	Gm	V_SFP_gpl_Soot_Load_DP	g/l
H_SFM_TrustFactorEquivalent	None	P_SFP_DPSLE_DPF_TrustCond	None
V_SFP_pr_Delta_Clean	kPa	V_SFP_pr_Max_At_High_Flow	kPa
V_SFP_pr_Delta_Low	kPa	V_SFP_pr_Delta	kPa
V_SFP_pr_Delta_Mid	kPa	V_SFP_DeltaPSaturated	None
V_SFP_pr_Delta_High	kPa	V_SFP_gpl_Soot_Load_DP_NoClamp	g/l
P_SFP_gpl_DPSLE_Adj	g/l	H_SFP_gpl_Soot_Load	g/l
H_SFP_tm_DeltaPNotSaturated	S	H_SFP_pr_MBPE	kPa
H_SFP_Min_Flow_Trust	None	V_SFP_gph_NetSootAccumRate	g/hr
V_SFM_fg_Mass_Flow_Out	g/sec	V_SFM_fg_NO2_Out	g/sec
V_SFP_gpl_Soot_Load_MB	g/l	V_ATD_bs_PFS_Sensor_Status	HEX
V_SFP_mg_Soot_Load_MB	Gm	H_SFP_MBSLRSensorErrors	None
V_SFM_fg_NO2_In	g/sec	P_SFR_ct_Ineff_Regen_Occr	Counts
V_ATD_bs_PFS_EngOut_Status	HEX	H_SFP_gph_Noxid_Rate	g/hr
H_SFP_ConsMBSLR	None	H_SFP_nu_O2_In_Norm	None
H_SFP_nu_Exp_Arrhenius_Term	None	V_SFP_gpl_Soot_Load_Comb	g/l
H_SFP_gph_Oxid_Rate	g/hr	H_SFP_nu_Soot_Load_Norm	None

203. Altitude Determination

Engine_Speed	RPM	CHL_MCF_Cmd	mg/stroke
Net_Engine_Torque	N_m	Charge_Flow	kg/min
		CBL_EGR_Frac_Cmd	None
Combustion_Control_Path_Owner	None	CHL_EGR_Frac_Cmd	None
Ambient_Air_Press	kPa	EGR_Fraction	None
Ambient_Air_Tmptr	kPa	EGR_Position	%
H_CBR_Compressor_Inlet_Density	kg/m3	VGT_Position	%
Altitude	m	Compressor_Outlet_Tmptr	Deg_C
EGR_Valve_Delta_Press	kPa	Compressor_Inlet_Tmptr	Deg_C
Exhaust_Tmptr	Deg_C	Compressor_Inlet_Press	kPa
Exhaust_Metal_Tmptr	Deg_C	Charge_Press	kPa
H_NDOT_Gov_Torque	N_m	Charge_Tmptr	Deg_C
CBR_Density_Max_Fuel	mg/stroke	Exhaust_Press	kPa
Final_Timing_State	None	Filtered_Turbo_Speed	KRPM
CBR_Max_Fuel_Limit	mg/stroke	EMM_AECD_State	None
CSE_Xform_Error_1	None	EMM_Protection_State	None
CSE_Xform_Error_2	None	ENGN_Final_Torque_Cmd	Nm
Net_Engine_Torque	N_m		

204. Cab Switchable Governor (All Speed and 4D Governors)

Engine_Speed	RPM	Engine_No_Load_Torque	None
Total_Fueling	mg/stroke	Accelerator_Pedal_Position	None
Combustion_Control_Path_Owner	None	H_ABS_Ndot_Demand	RPM/s
Selected_Governor	None	Ndot_Demand	RPM/S
H_MACH_NetTorqueCmd	N-m	H_NDOT_INT_Torque	N-m
NDOT_UserPathOwner	None	H_MCAA_DU_Request_Reference	N-m
Inertia_Index	None	H_ABS_ReferenceSpd	RPM
Net_Brake_Torque	N-m	H_NDOT_User_Demand	N-m

205. PTO Governor

Engine_Speed	RPM	H_PTO_IntegralPathTorque	N-m
Total_Fueling	mg/st	H_PTO_DroopedReference	RPM
Combustion_Control_Path_Owner	None	H_PTO_ES_Override_Value	None
H_NDOT_INT_Torque	N-m	PTO_State	None
Net_Brake_Torque	N-m	PTO_Ref_Speed	RPM
H_PTO_CompensatedEngineSpeed	RPM	PTO_Status	None
H_PTO_Device_Detected	None	PTO_Winning_Switch	None
H_PTO_NDOT_Demand	RPM/s	Vehicle_Speed	km/hr

206. Remote PTO

Engine_Speed	RPM	Vehicle_Speed	km/hr

Total_Fueling	mg/st	PTO_State	None
Combustion_Control_Path_Owner	None	PTO_Remote_Switch	None
H_NDOT_INT_Torque	N-m	PTO_Ref_Speed	RPM
Net_Brake_Torque	N-m	Max_Engine_Speed_With_Zero_Vss	RPM

207. Machine Mass Estimator

Engine_Speed	RPM	MME_Torque_Aero	N-m
MME_Engine_Inertia_At_Wheels	Kg	MME_Torque_Axle	N-m
MME_Vehicle_Mass	kg	MME_Torque_Grade	N-m
H_MME_Oog_Avg_Road_Speed	km/hr	MME_Torque_Rolling	N-m
H_MME_Oog_Road_Speed_1	km/hr	Net_Brake_Torque	N-m
H_MME_Oog_Road_Speed_Delta	km/hr	Actual_Gear_Ratio	None
Vehicle_Speed	km/hr	Combustion_Control_Path_Owner	None
H_MME_Oog_Vehicle_Speed_Rate	km/hr/s	C_GEAR_DefaultGearRatio	None
MME_Tire_Radius	m	H_MME_Confidence_Samples	None
H_MME_Vehicle_Acceleration	m/s^2	H_MME_Instantaneous_Samples	None
Total_Fueling	mg/st	H_MME_Road_Grade_Detected	None
H_MME_Average_GCVW	N	H_MME_Start_Data_Processing	None
H_MME_Estimated_Vehicle_Weight	N	Out_of_Gear	None
H_MME_Instantaneous_Avg_GCVW	N	Rear_Axle_Ratio	None
MME_Estimated_GCVW	N	H_MME_Major_Change_Flag	None
H_MME_Adjusted_Avg_GCVW	N	H_MME_Mass_Increase_Confirmed	None
H_MME_Excess_Machine_Torque	N-m	H_MME_Major_Mass_Increase_Flag	None
H_MME_Filtered_Torque	N-m	T_TWA_Adjusted_Tire_Size	rev/km
H_MME_Net_Torque_At_Wheels	N-m	H_MME_Oog_Time	s
MME_Torque_Accel	N-m	MME_Torque_Transmission	N-m

208. Load Based Speed Control (LBSC)

Engine_Speed	RPM	H_LBSC_Ref_Speed_Adjust	RPM
ACA_Torque	N-m	H_LBSC_Reference_Speed	RPM
Actual_Gear_Ratio	None	H_LBSC_Torque_Accel	N-m
Combustion_Control_Path_Owner	None	H_LBSC_Torque_Grade	N-m
H_LBSC_Downshift_Active	None	H_LBSC_Torque_Threshold	N-m
H_LBSC_Engine_Torque	N-m	H_LBSC_Vehicle_Acceleration	m/s^2
LBSC_High_Load	None	Net_Brake_Torque	N-m
LBSC_Low_Load	None	Out_Of_Gear	None
LBSC_Ref_Mode	None	PTO_Status	None
LBSC_Status	None	Rear_Axle_Ratio	None
Torque_Limit_At_Current_Speed	N-m	T_RSC_GD_GearRatio	None
Total_Fueling	mg/st	T_RSC_TopGearRatio	None
Vehicle_Speed	Km/hr		

LBSC Thresholds

MME_Engine_Inertia_At_Wheels	Kg	MME_Torque_Transmission	N-m
MME_Tire_Radius	m	PTO_Status	None
MME_Torque_Aero	N-m	Rear_Axle_Ratio	None
MME_Torque_Axle	N-m	T_RSC_GD_GearRatio	None
MME_Torque_Grade	N-m	T_RSC_TopGearRatio	None
MME_Torque_Rolling	N-m	Torque_Limit_At_Current_Speed	N-m

209. Low Speed Governor (LSG)

Engine_Speed	RPM	H_LSI_CompensatedEngineSpeed	RPM
Total_Fueling	mg/st	H_LSI_ActiveIsocSpd	RPM
Engine_Acceleration	RPM/s	LS_Idle_Reference	RPM
Combustion_Control_Path_Owner	None	H_LSI_ActiveBrkPtSpd	RPM
H_NDOT_INT_Torque	N-m	H_LSI_ActiveDroopSlope	None
LSI_ReferenceSpd	RPM	LSI_Breakpoint_Speed	RPM
LSI_NDOT_Demand	RPM/s		

210. Low Idle – Shutdown

PrcntLoadAtCurSpd	%	Vehicle_Speed	km/hr
Engine_Speed	RPM	ISD_Has_Shutdown_Engine	None

Total_Fueling	mg/st	ISD_Driver_Alert_Mode	None
Engine_Acceleration	RPM/s	HSLS_Request_Shutdown	None
Combustion_Control_Path_Owner	None	ISD_Operator_Activity	None
Accelerator_Pedal_Position	%	ISD_Allowed_By_Machine	None
Clutch_Switch	None	ISD_Timer_Override	None
Coolant_Temperature	Deg_C	H_ISD_Timer	s
Parking_Brake_Switch	None	OEM_Ambient_Air_Tmptr	Deg_C
Service_Brake_Switch	None	PTO_State	None

211. High Idle (HSG)

Engine_Speed	RPM	HSI_ActiveBrkPtSpd	RPM
Total_Fueling	mg/st	HSI_DroopWidth	RPM
Engine_Acceleration	RPM/s	HSI_ActiveDroopSlope	None
Combustion_Control_Path_Owner	None	HSI_ReferenceSpd	RPM
H_NDOT_INT_Torque	N-m	H_HSI_CompensatedEngineSpeed	RPM
H_HSI_ActiveDroop	%	H_HSI_NDOT_Demand	RPM/s

212. Smart Torque and Vocational Smart Torque

Engine_Speed	RPM	Actual_Gear_Ratio	None
Total_Fueling	mg/st	Tau_State	None
Engine_Acceleration	RPM/s	VSP_Smart_Torque_State	None
Combustion_Control_Path_Owner	None	T_CC_MaxRoadSpeed	km/hr
Inertia_Index	None	Vehicle_Speed	km/hr
VSP_Smart_Torque_State	None	PTO_State	None
STQ_Gear_Ratio	None	Coolant_Temperature	Deg_C
T_RSC_GD_GEARRATIO	None		

213. Road Speed Governor (RSG)

Accelerator_Pedal_Position	%	Net_Brake_Torque	N-m
C_VSS_ZeroRoadSpdThd	km/hr	Out_Of_Gear	None
Combustion_Control_Path_Owner	None	RSC_CompensatedVehicleSpeed	km/hr
Effective_Gear_Ratio	None	RSC_IsochronousSpeed	km/hr
Engine_Speed	RPM	RSC_ReferenceSpeed	km/hr
Engine_Acceleration	RPM/s	RSC_Status	None
H_NDOT_INT_Torque	N-m	T_MaxEngSpd_With_Zero_Vss	RPM
H_RSC_Droop	km/hr	Total_Fueling	mg/st
H_RSC_NDOT_Demand	RPM/s	Vehicle_Speed	km/hr

214. Cruise Control

Accelerator_Pedal_Position	%	Out_Of_Gear	None
C_VSS_ZeroRoadSpdThd	km/hr	CANC_ABS_Cruise_Cancel	None
Combustion_Control_Path_Owner	None	CC_IsochronousSpeed	km/hr
Effective_Gear_Ratio	None	CC_ReferenceSpeed	km/hr
Engine_Speed	RPM	H_CC_Droop	km/hr
Engine_Acceleration	RPM/s	H_CC_NDOT_Demand	RPM/s
Engine_Acceleration	RPM/s	Vehicle_Speed	km/hr
H_NDOT_INT_Torque	N-m	RSC_CompensatedVehicleSpeed	km/hr
Net_Brake_Torque	N-m	CC_Status	None

215. Out of Gear Protection

Accelerator_Pedal_Position	%	Out_Of_Gear	None
C_VSS_ZeroRoadSpdThd	km/hr	T_MaxEngSpd_With_Zero_Vss	RPM
Combustion_Control_Path_Owner	None	Total_Fueling	mg/st
Effective_Gear_Ratio	None	Vehicle_Speed	km/hr
Engine_Speed	RPM	OOG_ProtectionState	None
Engine_Acceleration	RPM/s	RSC_ReferenceSpeed	km/hr
H_NDOT_INT_Torque	N-m	RSC_OOGTorqueLimit	N-m
Net_Brake_Torque	N-m	H_RSC_NDOT_Demand	RPM/s

216. Gear Down Protection

RSC_GearEvaluation	None	H_NDOT_INT_Torque	N-m
Accelerator_Pedal_Position	%	Net_Brake_Torque	N-m

C_VSS_ZeroRoadSpdThd	km/hr	Out_Of_Gear	None
Combustion_Control_Path_Owner	None	RSC_IsochronousSpeed	km/hr
Effective_Gear_Ratio	None	H_RSC_NDOT_Demand	RPM/s
Engine_Speed	RPM	T_RSC_GD_GearRatio	None
Engine_Acceleration	RPM/s	T_RSC_GD_ProtectionEnable	None

217. Charge Flow Derate

Engine_Speed	RPM	Charge_Flow	kg/min
Total_Fueling	mg/stroke	CHL_MCF_Cmd	kg/min
Net_Engine_Torque	Nm	CHL_EGR_Frac_Cmd	None
Combustion_Control_Path_Owner	None	CHL_COT_Drt_Active	None
CHS_MCF_Cmd	kg/min	CHL_Delta_P_Drt_Active	None
CBL_EGR_Frac_Cmd	None	CHL_Turbo_Speed_Drt_Active	None
CHL_Derate_State	None	CHL_EGR_Off_DP_Drt_Active	None
CHL_Surge_Derate_Active	None	CHL_EMP_Drt_Active	None

218. Charge Limit Management (CHL)

(chm_chl_lib)

Engine_Speed	RPM	CHL_Surge_Drt_Active	None
Total_Fueling	mg/stroke	CHS_MCF_Cmd	kg/min
Net_Engine_Torque	Nm	CHL_COT_Drt_Offset	kg/min
Combustion_Control_Path_Owner	None	CHL_COT_Drt_Active	None
CHL_EGR_Frac_Cmd	None	CHL_Turbo_Speed_Drt_Offset	kg/min
EGR_Fraction	None	CHL_Turbo_Speed_Drt_Active	None
CHL_MCF_Cmd	kg/min	CHL_Delta_P_Drt_Offset	kg/min
Charge_Flow	kg/min	CHL_Delta_P_Drt_Active	None
CBL_EGR_Frac_Cmd	None	CHL_EGR_Off_DP_Drt_Offset	kg/min
CHL_Surge_Drt_Offset	None	CHL_EGR_Off_DP_Drt_Active	None
CHL_Derate_State	None	CHL_EMP_Drt_Offset	kg/min
		CHL_EMP_Drt_Active	None

219. CHL – Compressor Outlet Temperature Limit Function

CHL_MCF_Cmd	kg/min	C_CHL_COT_MCF_Cmd_Rate_ULim	kg/min_sec
CHL_Derate_State	None	Compressor_Outlet_Tmptr	Deg_C
CHL_COT_Drt_Offset	kg/min	C_CHL_COT_Drt_Limit	Deg_C
Charge_Flow	kg/min	C_CHL_COT_Drt_On_Ratio	None
CHS_MCF_Cmd	kg/min	C_CHL_COT_Drt_Off_Ratio	None
CHL_COT_Drt_Active	None	C_CHL_COT_Drt_Max	kg/min

220. CHL - Delta-P Derate Function

EGR_Valve_Delta_Press	kPa	C_CHL_Delta_P_Drt_On_Ratio	None
C_CHL_Delta_P_Drt_Limit	kPa	C_CHL_Delta_P_Drt_Off_Ratio	None
Charge_Flow	kg/min	CHL_Delta_P_Drt_Active	None
CHS_MCF_Cmd	kg/min	CHL_Delta_P_Drt_Offset	kg/min
CHL_Derate_State	None	CHL_MCF_Cmd	kg/min

221. CHL - EGR Off Delta-P Derate Function

EGR_Valve_Delta_Press	kPa	C_CHL_EGR_Off_DP_Drt_On_Ratio	None
C_CHL_EGR_Off_DP_Drt_Limit	kPa	C_CHL_EGR_Off_DP_Drt_Off_Ratio	None
Charge_Flow	kg/min	CHL_EGR_Off_DP_Drt_Active	None
CHS_MCF_Cmd	kg/min	CHL_EGR_Off_DP_Drt_Offset	kg/min
CHL_Derate_State	None	CHL_MCF_Cmd	kg/min

222. CHL - Surge Limit Function

Surge_Line_CFP	None	C_CHL_Surge_Drt_On_Ratio	None
Surge_Margin_Source	None	C_CHL_Surge_Drt_Off_Ratio	None
CHL_Surge_Limit	None	CHL_Surge_Drt_Offset	None
TPE_Corrected_Air_Flow	None	CHL_Surge_Drt_Active	None
CHL_Derate_Is_Active	None	C_CHL_Surge_Drt_Limit	%
CHL_MCF_Cmd	kg/min	Charge_Flow	kg/min
CHS_MCF_Cmd	kg/min		

223. CHL - Turbo Speed Limit Function

Compressor_Outlet_Tmptr	Deg_C	C_CHL_COT_Drt_On_Ratio	None

Compressor_Outlet_Tmptr	Deg_C	C_CHL_COT_Drt_On_Ratio	None
C_CHL_COT_Drt_Limit	Deg_C	C_CHL_COT_Drt_Off_Ratio	None
Charge_Flow	kg/min	CHL_COT_Drt_Active	None
CHS_MCF_Cmd	kg/min	CHL_COT_Drt_Offset	kg/min
CHL_Derate_Status	None	CHL_MCF_Cmd	kg/min
Ambient_Air_Tmptr	Deg_C	Compressor_Inlet_Tmptr	Deg_C
J39_VGT_Actuator_Position	%	Boost_Pressure	kPa_G
Intake_Manifold_Temperature	Deg_C	EGR_Position	%
Compressor_Outlet_Tmptr	Deg_C	C_CHL_COT_Drt_On_Ratio	None

224. Charge System Errors (CSE)

CHL_EGR_Frac_Cmd	None	CHL_MCF_Cmd	kg/min
EGR_Fraction	None	Charge_Flow	kg/min

225. Chi Determination

Engine_Speed	RPM	CBR_Base_Chi_High_Index	None
Net_Engine_Torque	N_m	CBR_Prot_Chi_High_Index	None
Total_Fueling	mg/stroke	CBR_SCRTM_Chi_High_Index	None
H_CBR_Compressor_Inlet_Density	kg/m3	CBR_TM1_Chi_High_Index	None
Ambient_Air_Press	kPa	CBR_TM2_Chi_High_Index	None
Compressor_Inlet_Tmptr	Deg_C	CBR_Base_Chi_Mixing_Factor	None
Combustion_Control_Path_Owner	None	CBR_Protection_Mixing_Factor	None
CBR_Protection_Chi_Flag	None	CBR_SCRTM_Mixing_Factor	None
EMM_Protection_state	None	CBR_Thermal_Mgt_Mixing_Factor	None
CBR_Alpha	None	CBR_Thermal_Mgt2_Mixing_Factor	None
CBR_Base_Chi_Low_Index	None	CBR_Base_Chi_WT_Factor	None
CBR_Prot_Chi_Low_Index	None	CBR_Prot_WT_Factor	None
CBR_SCRTM_Chi_Low_Index	None	CBR_TM1_WT_Factor	None
CBR_TM1_Chi_Low_Index	None	CBR_TM2_WT_Factor	None
CBR_TM2_Chi_Low_Index	None	CBR_SCRTM_WT_Factor	None
		CBR_Alpha_WT_Factor	None

226. EGR Off Conditions

Engine_Speed	RPM	EGR_Position	% (EFA)
Net_Engine_Torque	N_m	EGR_Valve_Delta_Press	kPa
Total_Fueling	mg/stroke	EGR_Orifice_Delta_Press	kPa
Combustion_Control_Path_Owner	None	EGR_Valve_Is_Closed	None
H_CBR_Chi_Value	None	CHL_EGR_Frac_Cmd	None
CBR_Alpha	None	EMM_AECD_State	None
CBR_EGR_Off	None	EMM_Protection_State	None
EGR_Orifice_Tmptr	Deg_C	CHH_EGRT_Over_Temperature	None

227. EGR On Conditions

Engine_Speed	RPM	Compressor_Outlet_Tmptr	Deg_C
Net_Engine_Torque	N_m	Filtered_Turbo_Speed	KRPM
Total_Fueling	mg/stroke	EGR_Position	% (EFA)
Combustion_Control_Path_Owner	None	EGR_Valve_Delta_Press	Kpa
H_CBR_Chi_Value	None	EGR_Orifice_Delta_Press	kPa
CBR_Alpha	None	EGR_Fraction	None
Charge_Press	kPa	CHL_EGR_Frac_Cmd	None
Charge_Tmptr	Deg_C	CHL_MCF_Cmd	None
Coolant_Temperature	Deg_C	Charge_Flow	kg/min
EMM_AECD_State	None	EMM_Protection_State	None
EGR_Orifice_Tmptr	Deg_C		

228. EGR Valve Actuator

EAC_EGR_Valve_Cmd	%	EGA_PWM_Abs_Duty_Cycle	%
EGA_Position_Cmd	%	H_EGA_BM_Motor_Current	A

EAC_EGR_Valve_Cmd	%	EGA_PWM_Abs_Duty_Cycle	%
EGA_PositionRef_Filetered	%	Battery_Voltage	V
EGR_Position	%	EGA_Control_State	---
EGR_Position_Status	%	T_EGA_Cycle_Counter	Counts
Diagnostics:		**Override:**	
EGR_Driver_Failure	None	T_EAC_User_Override	---
EGA_Electrical_Fault	None	C_EAC_Override_Value	%
EGA_Valve_Autozero_Fault	None	T_EGA_Cmd_User_Override	---
EGA_Position_Fault	None	C_EGA_Cmd_Override_Value	%
H_EGA_BM_Position_Error_Flag	None	T_EGA_PWM_User_Overrride	---
		C_EGA_PWM_Override_Value	%

229. EGR Valve Controller

Engine_Speed	RPM	CHL_MCF_Cmd	None
Total_Fueling	mg/stroke	Charge_Flow	kg/min
Combustion_Control_Path_Owner	None	TAHR_EGR_Flow_Error	None
EGR_Position	%	TAHR_EFA_EGR_Hi	Deg
EAC_EGR_Valve_Cmd	None	EGR_Valve_Is_Closed	None
TAHR_EGR_Flow_Cmd	Kg/min	EGR_Valve_Delta_Press	kPa
TAHR_EGR_Frac_Cmd	None	Charge_Temptr	DEG_C
EGR_Fraction	%	T_EGA_Cycle_Counter	counts
EGA_Position_Ref_Unfiltered	%	CBR_Alpha	None
EGR_Flow	Kg/min	Compressor_Inlet_Density	%

230. Engine Brake Command Level Determination

Engine_Speed	RPM	Clutch_Switch	None
Total_Fueling	mg/stroke	RetarderStatus	None
Combustion_Control_Path_Ower	None	RetarderSwitchTorque	N_m
H_MACH_NetTorqueCmd	N_m	Actual_Gear_Ratio	None
EGR_Position_Source	None	EGR_Valve_Position_Commanded	%
H_ERC_GrossTorqueLmtd	N_m	C_ERC_TransTrqLimGearRatioThd	None

231. Engine Braking Performance

Engine_Speed	RPM	ERC_DriverFractionCmd	None
Fueling_MG	mg/stroke	RetarderStatus	None
Accelerator_Pedal_Position	%	H_ERC_ChargeFlowCmd	kg/min
Vehicle_Speed	km/hr	Charge_Flow	kg/min
RetarderSwitchLevel	%	C_CBL_VGT_Brake_MCF	kg/min
RetarderSwitchTorque	N_m	Boost_Pressure	kPa_G
H_ERC_ActualGrossTrq	None	Compressor_Inlet_Density	kg/m3
EngBrkDriver1	None	C_ERC_EngBrkDriver1Type	None
EngBrkDriver2	None	C_ERC_EngBrkDriver2Type	None
EngBrkDriver3	None	EGR_Position	%
VGT_Position	%		

232. Engine Retarder Control

Engine_Speed	RPM	CC_EngageRetarder	None
Total_Fueling	mg/stroke	RetarderSwitchTorque	N_m
Combustion_Control_Path_Owner	None	H_ERC_ChargeFlowCmd	kg/min
H_MACH_NetTorqueCmd	N_m	EngBrkDriver1	None
Charge_Flow	kg/min	EngBrkDriver2	None
CHL_MCF_Cmd	kg/min	EngBrkDriver3	None
Exhaust_Press	kPa	Charge_Press	kPa
CC_BrakingInhibit	None	RetarderStatus	None

233. Engine_Protection EPF

Engine_Speed	RPM	Compressor_Outlet_Temperature	Deg_C
Total_Fueling	mg/stroke	Coolant_Level	
Combustion_Control_Path_Owner	None	Coolant_Temperature	Deg_C
EPD_TorqueDerateValue	N_m	EGR_Orifice_Tmptr	Deg_C
H_EPD_SpeedDerateValue	RPM	Exhaust_Metal_Tmptr	Deg_C
T_EPD_Engine_Protection_En	None	Charge_Tmptr	Deg_C

T_EPD_Shutdown_En	None	Oil_Pressure	kPa_G
Net_Engine_Torque	N_m	Oil_Temperature	Deg_C
ECM_Run_Time	s	CHL_EGR_Frac_Cmd	None
Charge_Flow	kg/min	EGR_Fraction	None
Accelerator_Pedal_Position	%	EGR_Position	%
EGR_Flow	kg/min	TGC_VT_Cmd	%
H_CBR_Chi_Value	None	J39_VGT_Actuator_Position	%
CHL_MCF_Cmd	kg/min	VGT_Position	%
		EPD_Auxiliary_Shutdown_Switch	None

234. EPF - Aftertreatment High Temp Engine Protection

Engine_Speed	RPM	Net_Engine_Torque	N_m
~~V_ATP_trc_CCC_In~~	Deg_C	~~V_ATP_trc_CCC_Out~~	Deg_C
V_AIM_trc_DOC_In	Deg_C	V_AIM_trc_DOC_Out	Deg_C
V_AIM_trc_DPF_Out	Deg_C	V_ATD_NR_DOC_In_HiTmptr_Flag	None
V_ATD_NR_DOC_Out_HiTmptr_Flag	None	V_ATD_NR_DOC_Delta_HiTmptr_Flag	None
V_ATD_DOC_Delta_Severe_Fault	None	~~V_CCD_NR_CCC_In_HiTmptr_Flag~~	None
~~V_CCD_NR_CCC_Out_HiTmptr_Flag~~	None	~~V_CCD_NR_CCC_Delta_HiTmptr_Flag~~	None
V_ATD_DOC_Out_Severe_Fault	None	V_ATD_NR_DPF_Out_HiTmptr_Flag	None
V_ATD_DPF_Out_Severe_Fault	None	O_ATD_DPF_Out_SevereFault_Reset	None
V_ATD_NR_DPF_Delta_HiTmptr_Flag	None	O_ATD_DOC_Out_SevereFault_Reset	None
O_ATD_DOCOut_PersistFualt_Reset	None	O_ATD_DPFOut_PersistFault_Reset	None
V_ATD_DPF_Out_Persist_Fault	None	V_ATD_DOC_Out_Persist_Fault	None
V_ATD_OT_EPSD_Request	None	V_ATD_OT_PrevEPSD	None
V_ATD_OORShutdownInvalid	None	V_ATD_EPSD_InProgress	None
V_ATD_bs_PFS_SysPerf1_Errs	HEX	V_ATD_bs_PFS_SysPerf2_Errs	HEX
V_ATD_OT_ResetTimer	None	V_ATD_tm_EPSDRequest	S
V_ATD_DOC_Out_Severe_Condition	None	V_ATD_bs_PFS_SysIO_Errs	HEX
V_ATD_DOC_Delta_Severe_Cond	None	V_ATD_DPF_Out_Severe_Condition	None
P_ATD_OT_EPSD_Request	None	V_ATP_Engine_Running	None
V_ATD_EPSD_InProgress	None	V_ATD_EPSD_ClrLatch	None
V_ATD_OORShutdownInvalid	None	V_ATD_OT_EPSD_Request	None
P_ATD_bs_OORErrors	HEX	V_ATD_tm_NR_DOC_Delta_Hi	S
V_ATD_tm_NR_DOC_In_Hi	S	V_ATD_tm_NR_DPF_Out_Hi	S
V_ATD_tm_NR_DOC_Out_Hi	S	V_ATD_tm_NR_DPF_Delta_Hi	S
P_ATD_tm_NR_DOC_Hi_Delay	S	P_ATD_tm_NR_DPF_Hi_Delay	S
V_ATD_NR_Overtemp_DOC_Enbl	None	V_ATD_NR_OT_DOC_Delta_Enbl	None
V_ATD_NR_OT_DPF_Delta_Enbl	None	V_ATD_NR_Overtemp_DPF_Enbl	None
H_HIM_fg_Dosing_Cmd	g/sec	~~V_CCD_tm_NR_CCC_Delta_Hi~~	S
V_CCD_NR_OverTmptr_Delta_Enbl	None	~~V_CCD_CCC_Delta_Severe_Enbl~~	None
~~V_CCD_NR_Overtemp_CCC_Enbl~~	None	~~V_CCD_CCC_Delta_Severe_Fault~~	None
~~P_CCD_tm_NR_CCC_HiDelay~~	S	~~V_CCD_CCC_Delta_Severe_Cond~~	None
V_ATD_bs_PFS_Sensor_Status	HEX	~~V_CCD_tm_CCC_Delta_Severe_Tmptr~~	S
~~V_CCD_tm_NR_CCC_In_Hi~~	S	~~P_CCD_ct_Outlet_HiTmptr_Persist~~	counts
~~V_CCD_tm_NR_CCC_Out_Hi~~	S	V_ATD_Regen_End	None
~~V_CCD_CCC_Out_Severe_Fault~~	None	~~V_CCD_tm_CCC_Out_HiTmptr~~	S
~~V_CCD_CCC_Out_Severe_Condition~~	None	~~V_CCD_CCC_Out_HiTmptr_Flag~~	None
~~V_CCD_tm_CCC_Out_Severe_Tmptr~~	S	~~P_CCD_ct_Outlet_HiTmptr_Persist~~	Counts
V_ATD_bs_PFS_Sensor_Status	HEX	~~V_CCD_CCC_Out_Persist_Fault~~	None
V_ATM_Oper_Mode	None	V_OCL_H2O_Desorb_Request	None
V_OCL_HC_Desorb_Request	None	P_ATD_tm_NR_DPF_Hi_Delay	s
P_ATD_tm_NR_DOC_Hi_Delay	S	V_ATD_DOC_Delta_Severe_Cond	None
V_ATD_tm_DOC_Delta_Severe_Tmptr	S	V_ATD_DeltaT_DOC_In_Error	None
V_ATD_DeltaT_DOC_Out_Error	None	V_ATD_tm_DOC_Out_Hi_Tmptr	S
V_ATD_DOC_Out_HiTmptr_Flag	None	P_ATD_ct_DOCOut_HiTmptr_Persist	Counts
V_ATD_DOC_Out_Persist_Fault	None	V_ATD_tm_DOC_Out_Severe_Tmptr	S
V_ATD_tm_DPF_Out_HiTmptr	S	P_ATD_ct_DPFOut_HiTmptr_Persist	Counts
V_ATD_DPF_Out_Persist_Fault	None	V_ATD_tm_DPF_Out_Severe_Tmptr	S

235. EPF - Compressor Outlet Temperature Engine Protection

Compressor_Outlet_Tmptr	Deg_C	C_EPD_COT_Trq_Drt_Fault_Code	None
C_EPD_COT_Trq_Drt_En	None	C_EPD_COT_Trq_Err_Dur	s
C_EPD_COT_Start_Time	s	C_EPD_COT_Trq_Drt_Err_Sev	Deg_C
C_EPD_COT_RPM_Thd	RPM	C_EPD_COT_Trq_Drt_Max_Thd	Deg_C
Prev_COT_Trq_Drt_Idx	None	C_EPD_COT_Sev_SD_En	None
C_EPD_COT_Sev_SD_Thd	Deg_C	C_EPD_COT_SD_Warning_Time_Dur	s
C_EPD_COT_SD_Delay_Time	s	CHRG_CotPrevSevSdReq	

236. EPF - Coolant Level Engine Protection

Coolant_Level	None	C_EPD_CL_Trq_SD_Time_Dur	s
T_AIP_Cool_Lev_User_Override_En	None	C_EPD_CL_RPM_Thd	RPM
AIP_Cool_Lev_Override_Value	None	C_EPD_CL_Trq_Drt_En	None
C_EPD_CL_SD_Delay_Time	s	C_EPD_CL_Trq_Drt_Fault_Code	None
C_EPD_CL_SD_Warning_Time_Dur	s	C_EPD_CL_Trq_Drt_Threshold	None
C_EPD_CL_TB_Time_To_Max_Trq_Drt	s	C_EPD_CL_Trq_Drt_Type	None
C_EPD_CL_Time_Trq_SD_En	None	C_EPD_CL_Trq_Err_Dur	s

237. EPF - Coolant Temperature Engine Protection

Coolant_Temperature	Deg_C	C_EPD_CT_Trq_Drt_En	None
C_EPD_CT_RPM_Drt_En	None	C_EPD_CT_Start_Time	s
C_EPD_CT_RPM_Thd	RPM	Prev_CT_Trq_Drt_Idx	None
Prev_CT_RPM_Drt_Idx	None	C_EPD_CT_Trq_Drt_Fault_Code	None
C_EPD_CT_RPM_Drt_Fault_Code	None	C_EPD_CT_Trq_Err_Dur	s
C_EPD_CT_RPM_Drt_Err_Sev	Deg_C	C_EPD_CT_Trq_Drt_Max_Thd	Deg_C
C_EPD_CT_RPM_Error_Dur	s	C_EPD_CT_RPM_Drt_Err_Sev	Deg_C
C_EPD_CT_Sev_SD_En	None	C_EPD_CT_Time_RPM_SD_En	None
C_EPD_CT_Sev_SD_Thd	Deg_C	C_EPD_CT_RPM_SD_Time_Dur	s
C_EPD_CT_SD_Delay_Time	s	C_EPD_CT_SD_Warning_Time_Dur	s
LUCL_CtPrevSevSdReq	None		

238. EPF - Coolant Temp2 Engine Protection

Coolant_Temperature	Deg_C	C_EPD_CT2_Trq_Drt_En	None
C_EPD_CT2_Start_Time	Sec	C_EPD_CT2_RPM_Thd	RPM
Prev_CT2_Trq_Drt_Idx	None	C_EPD_CT2_Trq_Drt_Fault_Code	None
C_EPD_CT2_Trq_Err_Dur	s	C_EPD_CT2_Trq_Drt_Err_Sev	Deg_C
C_EPD_CT2_Trq_Drt_Max_Thd	Deg_C		

239. EPF - CrankCase Pressure Engine Protection

Crankcase_Press	kPa_G	C_EPD_CCP_Trq_Drt_Fault_Code	None
C_EPD_CCP_Tbl1	Kpa	C_EPD_CCP_Trq_Drt_Ramp_Rate	N_m
C_EPD_CCP_Tbl2	Kpa	C_EPD_CCP_Trq_Drt_Type	None
C_EPD_CCP_TB_TimeToMax_Trq_Drt	s	C_EPD_CCP_Trq_Err_Dur	s
C_EPD_CCP_RPM_Thd	RPM	C_EPD_CCP_yellow_lamp_delay	s

240. EPF - EGR Orifice Temperature Engine Protection

EGR_Orifice_Tmptr	Deg_C	C_EPD_EGR_Trq_Drt_En	None
C_EPD_EGR_RPM_Drt_En	None	C_EPD_EGR_Start_Time	s
C_EPD_EGR_RPM_Thd	RPM	Prev_EGR_Trq_Drt_Idx	None
Prev_EGR_RPM_Drt_Idx	None	C_EPD_EGR_Trq_Drt_Fault_Code	None
C_EPD_EGR_RPM_Drt_Fault_Code	None	C_EPD_EGR_Trq_Err_Dur	s
C_EPD_EGR_Trq_Drt_Err_Sev	Deg_C	C_EPD_EGR_Trq_Drt_Max_Thd	Deg_C
C_EPD_EGR_RPM_Error_Dur	s	C_EPD_EGR_RPM_Drt_Err_Sev	Deg_C
C_EPD_EGR_Sev_SD_En	None	C_EPD_EGR_Sev_SD_Thd	Deg_C
C_EPD_EGR_SD_Delay_Time	s	C_EPD_EGR_SD_Warning_Time_Dur	s
CHRG_EgrPrevSevSdReq	None		

241. EPF - EGR Orifice Temperature 2 Engine Protection

EGR_Orifice_Tmptr	Deg_C	C_EPD_EGR2_Trq_Drt_En	None
C_EPD_EGR2_Start_Time	s	C_EPD_EGR2_RPM_Thd	RPM
Prev_EGR2_Trq_Drt_Idx	None	C_EPD_EGR2_Trq_Err_Dur	s
C_EPD_EGR2_Trq_Drt_Err_Sev	Deg_C	C_EPD_EGR2_Trq_Drt_Max_Thd	Deg_C

242. EPF - Engine Over Speed Protection

Engine_Speed	RPM	C_EPD_Overspeed_Error_Reset	RPM
C_EPD_Overspeed_Allowed_Time	s		
C_EPD_Overspeed_Limit	RPM		

243. EPF - Exhaust Metal Temperature Engine Protection

Exhaust_Metal_Tmptr	Deg_C	C_EPD_EMT_Trq_Err_Dur	s
Charge_Press	Kpa	C_EPD_EMT_SB_Time_To_MaxTrqDrt	s
C_TFC_Fuel_Limit_LLim	mg/stroke	C_EPD_EMT_RPM_Thd	RPM
C_EPD_EMT_Trq_Drt_En	None	C_EPD_EMT_Spd_Derate	RPM
C_EPD_EMT_Trq_Drt_Err_Sev	Deg_C	C_EPD_EMT_Virtual_Sensor_En	None

C_EPD_EMT_Trq_Drt_Fault_Code	None	C_EPD_EMT_Trq_Drt_Type	None
C_EPD_EMT_Trq_Drt_Max_Thd	Deg_C		

244. EPF - Exhaust Pressure Engine Protection

Exhaust_Press	Kpa	C_EPD_EP_RPM_Thd	RPM
C_EPD_EP_RPM_Drt_En	None	C_EPD_EP_Spd_Derate	RPM
C_EPD_EP_RPM_Drt_Err_Sev	Kpa	C_EPD_ C EP_Start_Time	s
C_EPD_EP_RPM_Drt_Fault_Code	None	C_EPD_EP_TB_Time_To_MaxRPMDrt	s
C_EPD_EP_RPM_Error_Dur	s		

245. EPF - Intake Manifold Temperature Engine Protection

Exhaust_Metal_Tmptr	Deg_C	C_EPD_EMT_Trq_Drt_En	None
C_EPD_EMT_Start_Time	s	C_EPD_EMT_RPM_Thd	RPM
Prev_EMT_Trq_Drt_Idx	None	C_EPD_EMT_Trq_Drt_Fault_Code	None
C_EPD_EMT_Trq_Err_Dur	s	C_EPD_EMT_Trq_Drt_Err_Sev	Deg_C
C_EPD_EMT_Trq_Drt_Max_Thd	Deg_C	C_EPD_EMT_Sev_SD_En	None
C_EPD_EMT_Sev_SD_Thd	Deg_C	C_EPD_EMT_SD_Delay_Time	s
C_EPD_EMT_SD_Warning_Time_Dur	s	CHRG_EmtPrevSevSdReq	None

246. EPF - Oil Pressure Engine Protection

Oil_Pressure	kPa_G	C_EPD_OP_Trq_Drt_En	None
C_EPD_OP_RPM_Drt_En	None	C_EPD_OP_Start_Time	s
C_EPD_OP_RPM_Thd	RPM	Prev_OP_Trq_Drt_Idx	None
Prev_OP_RPM_Drt_Idx	None	C_EPD_OP_Trq_Drt_Fault_Code	None
C_EPD_OP_RPM_Drt_Fault_Code	None	C_EPD_OP_Trq_Err_Dur	s
C_EPD_OP_RPM_Error_Dur	s	C_EPD_OP_Time_Trq_SD_En	None
C_EPD_OP_Time_RPM_SD_En	None	C_EPD_OP_Trq_SD_Time_Dur	s
C_EPD_OP_RPM_SD_Time_Dur	s	C_EPD_OP_SD_Delay_Time	s
C_EPD_OP_SD_Warning_Time_Dur	s	LUCL_OpPrevTbTrqSdReq	None
LUCL_OpPrevTbSpdSdReq	None		

247. EPF - Oil Temperature Engine Protection

Oil_Temperature	Deg_C	C_EPD_OT_Trq_Drt_En	None
C_EPD_OT_RPM_Drt_En	None	C_EPD_OT_Start_Time	s
C_EPD_OT_RPM_Thd	RPM	Prev_OT_Trq_Drt_Idx	None
Prev_OT_RPM_Drt_Idx	None	C_EPD_OT_Trq_Drt_Fault_Code	None
C_EPD_OT_RPM_Drt_Fault_Code	None	C_EPD_OT_Trq_Err_Dur	s
C_EPD_OT_Trq_Drt_Err_Sev	Deg_C	C_EPD_OT_Trq_Drt_Max_Thd	Deg_C
C_EPD_OT_RPM_Drt_Err_Dur	s	C_EPD_OT_RPM_Drt_Err_Sev	Deg_C
C_EPD_OT_Sev_SD_En	None	C_EPD_OT_Sev_Sd_Thd	Deg_C
C_EPD_OT_SD_Delay_Time	s	C_EPD_OT_SD_Warning_Time_Dur	s
LUCL_OtPrevSdReq	None		

248. EPF - Soot Load Engine Protection

Engine_Speed	RPM	C_EPD_SL_RPM_Drt_Err_Sev	Gm
Net_Engine_Torque	N_m	C_EPD_SL_Spd_Derate	RPM
V_SFP_mg_Soot_Load_Comb	gm	C_EPD_SL_Time_RPM_SD_En	None
O_SFP_gpl_Soot_Load_Reset_En	None	C_EPD_SL_Time_Trq_SD_En	None
O_SFP_gpl_Soot_Load_Reset_Val	g/l	C_EPD_SL_Trq_Drt_En	None
O_SFP_Soot_Load_Reset	None	C_EPD_SL_Trq_Drt_Err_Sev	Gm
		C_EPD_SL_Trq_Drt_Max_Thd	Gm
		C_EPD_SL_Trq_Err_Dur	S

249. Ether Start Injection

Engine_Speed	RPM	EIS_PWM_Duty_Cycle	%
Total_Fueling	mg/stroke	EIS_PWM_Period	mSec
Combustion_Control_Path_Owner	None	C_EIS_CrankTimeDelay	s
Coolant_Temperature	Deg_C	C_EIS_CrankMaxTime	s
EGR_Valve_Is_Closed	None	C_EIS_PreloadMaxTime	s
EIS_Preload_Counter	None	C_EIS_PulseOffTime	mSec
EIS_Active	None	C_EIS_PulseOnTime	mSec
C_EIS_PreloadTmptrThd	Deg_C	C_EIS_CrankTmptrThd	Deg_C
EGR_Position_Source	None	EIS_Ether_Used	s
EIS_Number_Injections	None	C_EIS_System_Select	None
C_EIS_TmptrSel	None	C_EIS_PreloadMaxCoount	None
Charge_Tmptr	Deg_C		

250. Exhaust Temperature Fuel Limit

Engine_Speed	RPM	Texh_Fuel_Limit	mg/stroke
Net_Engine_Torque	N_m	Exhaust_Metal_Tmptr	Deg_C
Total_Fueling	mg/stroke	Charge_Flow	kg/min
Combustion_Control_Path_Owner	None	TPE_Energy_Fraction	Deg_C
Charge_Tmptr	Deg_C	TFC_Fuel_Flow_Limit	kg/min

251. Fan Control

Engine_Speed	RPM	FCC_Fan_Torque	N_m
Combustion_Control_Path_Owner	None	FCC_Fan_Clutch_PWM_Duty_Cycle	%
Total_Fueling	mg/stroke	FCC_Fan_Clutch_PWM_Period	mSec
T_FCC_PWM_Inversion	None	Vehicle_Speed	km/hr
Coolant_Temperature	Deg_C	C_FCC_Min_On_Time	s
Charge_Tmptr	Deg_C	T_FCC_AC_Time	s
Air_Conditioner_Pressure_Switch	None	T_FCC_Charge_Tmptr_En	None
Manual_Fan_Input	None	T_FCC_Coolant_Tmptr_En	None
FCC_Fan_Request	%	Fan_Speed	RPM
Fan_Drive_State	None	T_FCC_AC_VS_Interaction_En	None
ERC_DriverFractionCmd	None	T_FCC_RT_En	None
T_FCC_AC_Pressure_En	None	T_FCC_Fan_Type_Selection	None
T_FCC_Fan_Clutch_En	None	T_FCC_SIP_Lock_Fan_Enable	None
T_FCC_Engine_Brake_En	None	T_FCC_Manual_Input_En	None
T_AC_Pressure_Switch_Mux_Enable	None		

252. Limp Home Mode

Total_Fueling	mg/stroke	Combustion_Control_Path_Owner	None
Net_Brake_Torque	N_m	Accelerator_Pedal_Position	%
Primary_Accel_Ped_Pos	%	Secondary_Accel_Pedal_Pos	%
Filtered_Raw_Accel_Value	counts	Vehicle_Speed	km/hr
T_LMP_En	None	T_Test_Cell_Throt_En	None
T_Dual_Accelerator_Enable	None	T_ACD_Rmt_APP_En	None
Idle_Validation_State	None	H_APP_Before_Auto_Zero	%
Accelerator_Auto_Zero	%	H_MCAA_DU_Request_Reference	N_m

253. NDOT Governor

Engine_Speed	RPM	Accelerator_Pedal_Position	%
H_Ndot_Gov_Torque	N-m	Vehicle_Speed	km/hr
Ndot_PathOwner	None	Inertia_Index	None
H_NDOT_INT_Torque	N-m	Ndot_Demand	RPM/S
H_NDOT_PP_Torque	N-m	Engine_Acceleration	RPM/S
H_NDOT_FF_Torque	N-m	H_NDOT_Filtered_Accel	RPM/s
H_NDOT_Engine_Acceleration	RPM/s	H_NDOT_Actual_Feedback	RPM/s
H_Torque_Derived_Ndot	None	NDOT_Feedforward_Gain	None
H_NDOT_Proportional_Gain	None	H_NDOT_Integral_Gain	None
Combustion_Control_Path_Owner	None	H_MACH_NetTorqueCmd	None
H_NDOT_IntegratorResetAdj	None	ACA_Torque	N-m
Torque_Limit_At_Current_Speed	N-m	H_NDOT_UserDemand	RPM/S
NDOT_UserPathOwner	None	H_NDOT_CONV_SREF	None
LSI_Ndot_Demand	RPM/s	N_NDOT_INT_Torque	N-m
Driver_Demand_Torque	N-m	Mach_Control_Path_Owner	None
Engine_Demand_Torque_Mach_Limit	N-m	Net_Brake_Torque	N-m

254. Oxygen / Fuel Control (OFC) Fuel Limit

Engine_Speed	RPM	CBR_Fuel_Ref	mg/stroke
Net_Engine_Torque	N_m	H_CBR_Compressor_Inlet_Density	kg/m3
Total_Fueling	mg/stroke	OFC_EGR_Disable	None
Combustion_Control_Path_Owner	None	C_CBP_Stoic_OF_Ratio	None
OFC_Fuel_Limit	mg/stroke	Total_O2_In_Cylinder	mg/stroke
CBR_Gross_Fuel	mg/stroke	J39_VGT_Actuator_Position	%
EGR_Position	%	H_OFC_Felix_Gain_Adjust	None
H_OFC_Equiv_Ratio_Limit	None		

255. Powertrain Protection

Engine_Speed	RPM	PTP_Torque_Limit_Switch	None
Total_Fueling	mg/stroke	PTP_Torque_Limit	N_m
Combustion_Control_Path_Owner	None	PrcntLoadAtCurSpd	%
Vehicle_Speed	km/hr	Actual_Gear_Ratio	None
T_TSP_SensorType	None	T_PTP_Enable	None
T_PTP_TrqLimSw_En	None	PTP_Torque_Request	N_m

256. Remote Throttle Control

Accelerator_Pedal_Position	%	Accel_Pedal_Position_ID	None
RMT_Remote_Accel_Valid_Reading	None	T_RMT_Remote_Accelerator_Mode	None
T_ACD_Rmt_APP_En	None	Remote_APP_Switch	None
T_RMT_Accelerator_Mux_Enable	None	RMT_Active_Accel_Indicator	None
Remote_Accelerator	%	H_RMT_Accelerator_Priority	None
T_AIP_RMT_Accelerator_Ovrd_En	None	H_AIP_RMT_Accel_User_Ovrd_Val	%

257. Starter Lockout

SLO_Discrete_Output	None	SLO_Relay	None
Engine_Speed	RPM	SLO_Drv_DutyCycle	%
Key_Switch	None	SLO_RelayState	None
T_SLO_Enable	None	Starter_Lockout_Request	None
C_SLO_ExitSpd	RPM	Combustion_Control_Path_Owner	None
Total_Fueling	mg/stroke	C_DSO_Enable	None

258. Throttle Characteriztion

Combustion_Control_Path_Owner	None	Accelerator_Pedal_Position	%
Primary_Accel_Ped_Pos	%	Secondary_Accel_Pedal_Pos	%
Filtered_Raw_Accel_Value	counts	T_Test_Cell_Throt_En	None
T_Dual_Accelerator_Enable	None	Idle_Validation_State	None
H_APP_Before_Auto_Zero	%	Accelerator_Auto_Zero	%
H_APP2_Before_Auto_Zero	%	Dual_Conformance_Error	None
Accelerator_Position_Error	None	H_Filtered_Raw_Accel2_Value	counts
Secondary_Accel_Auto_Zero	%		

259. Torque Manager Derates

Engine_Speed	RPM	EPD_No_Derate_Torque	N_m
Net_Engine_Torque	N_m	EEPD_TorqueDerateValue	N_m
Total_Fueling	MG/STROKE	TSD_Active	None
Combustion_Control_Path_Owner	None	Engn_Control_Path_Owner	None
CHH_Charge_Mgr_Derate_Torque	N_m	H_MACH_NetTorqueCmd	N_m
EWP_Max_Torque	N_m	Mach_EngineStatePathOwner	None
H_NDOT_Gov_Torque	N_m	H_ENGN_Unadj_Torque_Demand	N_m
ENGN_Final_Torque_Cmd	N_m	Engine_Protection_Derate_Torque	N_m

260. Turbocharger VG Actuator

TGC_VT_Cmd	%	**Diagnostics:**	
VGA_DL_Desired_Position	%	J39_VGT_Actuator_Status	None
J39_VGT_Actuator_Position	%	C_VGA_DL_StatusUB_Fault_Enable	HEX
VGT_Position	%	C_VGA_DL_StatusLB_Fault_Enable	HEX
VGT_Position_Source	None	VGT_Fault_Communication	None
J39_VGT_Motor_Effort	None	VGT_Fault_Over_Temperature	Deg_C
VGA_DL_Mode_Command	HEX	VGT_Fault_Actuation	None
J39_VGT_Temperature	Deg_C	VGT_Fault_Driver_Circuit	None
C_J39_VGT_Soft_ID_MjRev	HEX	VGT_Fault_Voltage_Low	None
J39_VGT_Soft_Id	HEX	VGT_Fault_Command_Source	None
J39_VGT_Soft_Id_Minore_Rev	HEX	VGT_Driver_Failure	None
J39_VGT_Soft_Id_Bug_Fix	HEX	C_J39_VGT_Status_Timeout	None
J39_VGT_Motor_Type	None	VGT_Position_At_Shutdown	None
J39_VGT_Customer_ID	None	**Override:**	
VGT_Actuator_Status	HEX	T_TGC_User_Override	None
J39_VGT_Addr_Claim_Count	counts	C_TGC_Override_Value	%
		T_VGA_DL_Cmd_User_Override	None
		C_VGA_DL_Cmd_Override_Value	%

261. UHC Timing Control

Engine Speed	RPM	Charge_Flow	kg/min
Total_Fueling	mg/stroke	Final_Timing	Deg_BTDC
Intake_Manifold_temperature	Deg_C	Combustion_Control_Path_Owner	None
Charge_Tmptr	Deg_C	Charge_Tmptr_Status	HEX
Boost_Pressure	kPa_G	C_CBP_Gamma_Spd_Adj	None
Ambient_Air_Tmptr	Deg_C	Charge_Tmptr	Deg_C
Charge_Press	kPa	Charge_Press_Est	kPa
Coolant_Temperature	Deg_C	Ambient_Relative_Humidity	None
Charge_Tmptrr_EStat	None	FIW_Lowest_Coolant_Temp	Deg_C
Charge_Press_IR_Fault_Cnt	counts	C_EPS_Ca_MainOffset	deg_BTDC
Charge_Press_Status	None	CBP_Gamma_Final	None
TPE_IMT_AP	Deg_C	UHC_SOI_Advance	deg_BTDC
T_emo_uhc_AECD_Enable	None	CBP_UHC_BMEP	kPa

262. VGT Controller

Engine_Speed	RPM	EGR_Valve_Delta_Press	kPa
Net_Engine_Torque	N_m	CBM_Retarder_Comb_Active	None
Total_Fueling	mg/stroke	TAHR_VGT_LLim	%
Combustion_Control_Path_Owner	None	TAHR_VGT_ULim	%
TAHR_EMP_Controller_Error	None	TGC_VT_Cmd	%

Vehicle Feature Information

263. Automated Transmissions

Jcomm_Engine_Speed_Limit_RPM	RPM	Jcomm_Reference_RPM	RPM
Jcomm_Derate_Torque	%	Jcomm_Engine_Control_Byte	HEX
Jcomm_Engine_Torque_Command	%		

264. Driver Reward

TI_Vehicle_Trip_Avg_Fuel_Eco	km/L	T_CC_MaxRoadSpeed	km/hr
H_DRS_CC_Delta	km/hr	T_RSC_MaxRoadSpeed	km/hr
H_DRS_RSC_Delta	km/hr	Tau_State	None
CC_ReferenceSpeed	km/hr	C_DRS_Reward_Period	s
RSC_ReferenceSpeed	km/hr	DRS_Reward_State	None
Vehicle_Speed	km/hr		

NOTE THE FOLLOWING VALUES:

T_DRS_RSG_CC_Reward1	km/hr	T_DRS_RSG_CC_Reward2	km/hr
T_DRS_RSG_CC_Reward3	km/hr	T_DRS_RSG_CC_Reward4	km/hr
T_DRS_FuelEco_Thd1	km/L	T_DRS_IdleTimePct1	%
T_DRS_FuelEco_Thd2	km/L	T_DRS_IdleTimePct2	%
T_DRS_FuelEco_Thd3	km/L	T_DRS_IdleTimePct3	%
T_RSC_Enable	None	T_DRS_Enable	None

265. ECM Trip Information / Fuel Economy Accuracy

For comparison of fill gallons / miles against data-logged ECM data at start and end of trip.
Calculate ECM MPG accuracy based on actual (fill/odom/hubo) versus ECM.
Log data at state line crossings or freeway mile markers for reference to Trip_Distance.
Confidence in results increases with long trips. If possible, trips length to require multiple fuel fills between start and end.

Mmon_Trip_Drive_Distance	km	TI_PTO_Trip_Fuel_Used	L
Trip_CC_Distance	km	TI_Base_Trip_Drive_Fuel_Used	L
TI_Vehicle_Trip_Gear_Down_Dist	km	TI_Base_Engine_Trip_Run_Time	s
TI_Base_Total_HC_Fuel_Used	L	TI_Base_Trip_Idle_Time	s
TI_Base_Trip_Dosing_Fuel_Used	L	TI_PTO_Trip_Time	s
Trip_RSG_Distance	km	TI_Vehicle_Total_Engine_Dist	km
TI_Base_Trip_Fuel_Used	L	TI_Base_Total_Fuel_Used	L
TI_Base_Trip_Idle_Fuel_Used	L	TI_Base_Trip_Average_Load	%

266. VSS Anti-Tampering

Engine_Speed	RPM	Primary_Accel_Ped_Pos	%
Vehicle_Speed	km/hr	Combustion_Control_Path_Owner	None

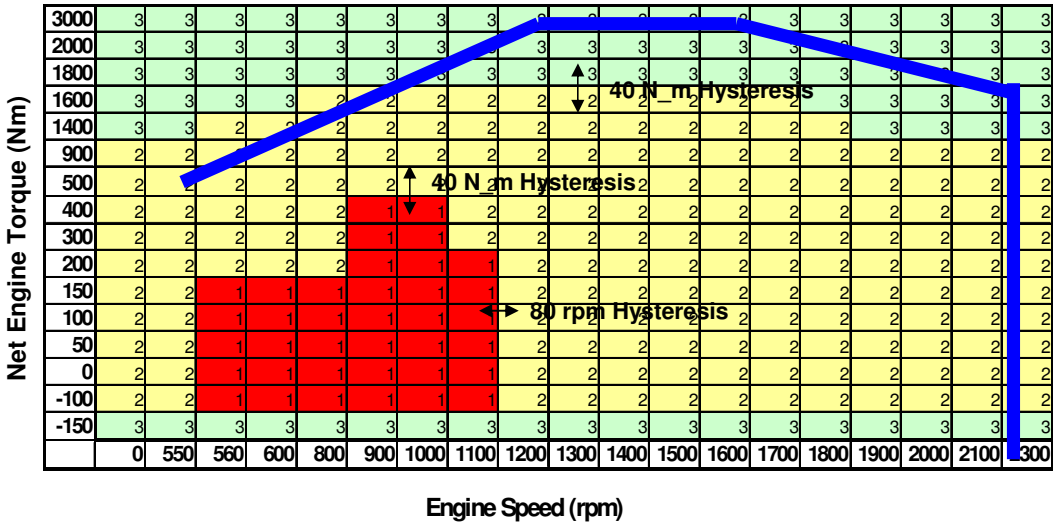
Total_Fueling	mg/stroke	T_VSS_Tamper_Sensitivity	None
Actual_Gear_Ratio	None	PrcntLoadAtCurSpd	%

Thermal Management

Comment [BJO15]: Not Updated

267. Thermal Management Regions

2007 DIAGRAM – 2010 NOT READY UNTIL MS4



268. Mission and Non-Mission ReGen Engine Thermal Management

Accelerator_Pedal_Position	%	EXM_PTOIneff_Desoot	None
Altitude	M	EXM_Regen_Fan_Request	%
Ambient_Air_Press	kPa	EXM_TMMode	None
Ambient_Air_Tmptr	Deg_C	EXM_YLamp_Ineff_NM_Desoot	None
APC_hp_Cmd	Bar	Filtered_Turbo_Speed	KRPM
APC_hp_Fdbk	Bar	H_CBR_Compressor_Inlet_Density	Kg/m3
CBM_Chrg_Load_Ref	None	H_CSE_dP_IMP_Filtered	None
CBM_FdbkTorqueFuel	Mg/stroke	H_EXM_AcceleratorPedalEnCond	None
CBM_Indicated_Trq_Fuel	Mg/stroke	H_EXM_AirHandlingSysEnCond	None
CBR_Alpha	None	H_EXM_ClutchEnCond	None
CBR_Alpha_WT_Factor	None	H_EXM_ControlStateEnCond	None
CBR_Base_Chi_WT_Factor	None	H_EXM_CtrlPTO_EnCond	None
CBR_Cold_AMB_WT_Factor	None	H_EXM_DL_ShiftInProgress	None
CBR_Main_SOI	Deg_BTDC	H_EXM_DL_ShiftInProgress_Status	None
CBR_Prot_WT_Factor	None	H_EXM_DLC_Prevent_Regen	None
CBR_Thermal_Oscar_Active	None	H_EXM_EngineWarmEnCond	None
CBR_TM1_WT_Factor	None	H_EXM_EPD_EnCond	None
CBR_TM2_WT_Factor	None	H_EXM_FirstCat_In_Tmptr	Deg_C
Charge_Flow	Kg/min	H_EXM_J1939_Eng_Ctrl_SA	None
Charge_Press	kPa	H_EXM_MobileRegenVehSpdEnThd	Km/hr
CHL_EGR_Frac_Cmd	None	H_EXM_MobileVehicleSpeedEnCond	None
CHL_MCF_Cmd	Kg/min	H_EXM_OOGearEnCond	None
Combustion_Control_Path_Owner	None	H_EXM_ServiceBrakeEnCond	None
Compressor_Inlet_Density	Kg/m3	H_EXM_VehicleSpeedEnCond	None
Compressor_Inlet_Tmptr	Deg_C	H_HIM_fg_Dosing_Cmd	g/sec
CSE_OCVGT_dP_IMP_Ref	None	J39_VGT_Actuator_Position	%
EAC_EGR_Valve_Cmd	%	Net_Engine_Torque	N_m
EGR_Fraction	None	TAHR_dP_over_P	None
EGR_Position	%	TAHR_dP_over_P_Limit	None
Engine_Is_Running	None	TAHR_EGR_Frac_Cmd_Final	None
Engine_Speed	RPM	TAHR_EGR_Valve_Fdbk_Cmd	%
Exhaust_Press	kPa	TAHR_EMP_Cmd_Final	kPa

EXM_ATM_Flow_LLim_Rqst	g/sec	TAHR_IMP_Cmd	kPa
EXM_ATM_Flow_Lo_Trgt_Rqst	g/sec	TAHR_MCF_Cmd_Final	Kg/min
EXM_ATM_HC_Lo_Trgt_Rqst	g/sec	TAHR_OSR_dPoP_Final_Cmd	None
EXM_ATM_Oper_Mode_Rqst	None	TAHR_OSR_EGRFrac_Error	None
EXM_ATM_Tmptr_Lo_Trgt_Rqst	Deg_C	TGC_VT_Cmd	%
EXM_CID_Desoot_EngSpdTgt	RPM	V_ATP_fg_Turbo_Out	g/sec
EXM_CID_DPoP_Mix_Factor	None	V_ATP_pr_DPF_Delta	kPa
EXM_DOCInTmptrErr_Mix_Factor	None	V_ATP_prg_DPF_OutP	kPa
EXM_EOPM_Rate_Error	None	~~V_ATP_trc_CCC_In~~	Deg_C
EXM_ExhFlow_LLim_Active	None	V_AIM_trc_DOC_In	Deg_C
EXM_Felix_TM_Allowed	None	V_AIM_trc_DOC_Out	Deg_C
EXM_Felix_TM_Allowed	None	V_AIM_trc_DPF_Out	Deg_C
EXM_Mission_Regen_Active	None	V_ATP_trc_Turbo_Out	Deg_C
EXM_Mission_Regen_Active	None	V_SFP_mg_Soot_Load_Comb	Gm
EXM_NoLamp_Ineff_NM_Desoot	None	V_SFP_mg_Soot_Load_DP	Gm
EXM_NonMission_Regen_Active	None	V_SFR_Regen_Stage	None
EXM_NonMissionRegen_En	None	V_SFR_Regen_Trigger	None
EXM_OSCAR_DeltaPoP_Ref	None	V_SFR_trc_Regen_Trgt	Deg_C
EXM_Oscar_TM_Allowed	None	Vehicle_Speed	Km/hr
EXM_PostHeat_Fuel_Cmd	Mg/stroke		
EXM_ProtectiveChi_Rqst	None		

269. OSCAR – Differential Engine Pressure Control

Engine_Speed	RPM	CBR_Thermal_Oscar_Active	None
Net_Engine_Torque	N_m	TGC_VT_Cmd	%
TAHR_dP_over_P_Limit	None	J39_VGT_Actuator_Position	%
TAHR_dP_over_P	None	Turbine_Out_Tmptr	Deg_C
TAHR_OSR_dPoP_Final_Cmd	None	V_ATP_fg_Turbo_Out	g/sec
H_CSE_dP_IMP_Filtered	None	V_ATP_trc_CCC_In	Deg_C
Exhaust_Press	KPA	V_ATP_trc_DOC_Out	Deg_C
Charge_Press	KPA	V_ATP_trc_DPF_Out	Deg_C
EXM_CSE_OCVGT_dP_IMP_Ref	None	V_ATP_trc_DOC_In	Deg_C
CHL_Derate_State	None	V_ATP_pr_DPF_Delta	KPA

270. OSCAR – Exhaust Pressure Limiter

Engine_Speed	RPM	CHL_Derate_State	Hex
Net_Engine_Torque	N_m	TGC_VT_Cmd	%
CBM_FdbkTorqueFuel	mg/stroke	J39_VGT_Actuator_Position	%
Exhaust_Press	KPA	V_ATP_trc_CCC_In	Deg_C
TAHR_dP_over_P	None	V_ATP_fg_Turbo_Out	g/sec
TAHR_EMP_Cmd_Final	kPa	Charge_Press	kPa
TAHR_OSR_dPoP_Final_Cmd	None	V_ATP_trc_DOC_Out	Deg_C
EXM_CSE_OCVGT_dP_IMP_Ref	None	V_ATP_trc_DPF_Out	Deg_C
CSE_OCVGT_dP_IMP_Ref	None	V_ATP_trc_DOC_In	Deg_C
H_CSE_dP_IMP_Filtered	None	V_ATP_pr_DPF_Delta	kPa

271. Stationary Regen Enable Conditions

Engine_Speed	RPM	H_EXM_AirHandlingSysEnCond	None
Net_Engine_Torque	N_m	Clutch_Switch	None
Total_Fueling	mg/stroke	Service_Brake_Switch	None
Accelerator_Pedal_Position	%	H_EXM_ClutchEnCond	None
Service_Brake_Switch	None	H_EXM_ServiceBrakeEnCond	None
H_EXM_EGR_Sys_Failure	None	H_EXM_ClutchBrake_EnCond	None
H_EXM_VGT_Sys_Failure	None	H_EXM_ControlStateEnCond	None
H_EXM_J1939_Eng_Cntrl_SA	None	Combustion_Control_Path_Owner	None
H_EXM_EPD_EnCond	None	Engine_Is_Running	None
H_EXM_EngineWarmEnCond	None	H_EXM_OOGearEnCond	None
H_EXM_DLC_Prevent_Regen	None	H_EXM_CtrlPTO_EnCond	None
Vehicle_Speed	Kph	H_EXM_VehicleSpeedEnCond	None
EXM_NonMissionRegen_En	None		

272. Non-Mission Regen Enable Conditions

Engine_Speed	RPM	H_EXM_AirHandlingSysEnCond	None
Net_Engine_Torque	N_m	Clutch_Switch	None
Total_Fueling	mg/stroke	Service_Brake_Switch	None
Accelerator_Pedal_Position	%	H_EXM_ClutchEnCond	None
Service_Brake_Switch	None	H_EXM_ServiceBrakeEnCond	None

H_EXM_EGR_Sys_Failure	None	H_EXM_ClutchBrake_EnCond	None
H_EXM_VGT_Sys_Failure	None	H_EXM_ControlStateEnCond	None
H_EXM_J1939_Eng_Cntrl_SA	None	Combustion_Control_Path_Owner	None
H_EXM_EPD_EnCond	None	Engine_Is_Running	None
H_EXM_EngineWarmEnCond	None	H_EXM_OOGearEnCond	None
H_EXM_DLC_Prevent_Regen	None	H_EXM_CtrlPTO_EnCond	None
Vehicle_Speed	Kph	H_EXM_VehicleSpeedEnCond	None
EXM_NonMissionRegen_En	None	EXM_NonMissionRegenProhibitState	None

273. In-Mission Regen Enable Conditions

Engine_Speed	RPM	Net_Engine_Torque	N_m
Vehicle_Speed	Kph	~~V_ATP_trc_CCC_In~~	Deg_C
~~V_ATP_trc_CCC_Out~~	Deg_C	V_AIM_trc_DOC_In	Deg_C
V_AIM_trc_DOC_Out	Deg_C	V_AIM_trc_DPF_Out	Deg_C
~~V_CCP_trc_Bed~~	Deg_C	V_OCP_trc_Bed	Deg_C
V_SFP_trc_DPF_Bed	Deg_C	EXM_ATM_Oper_Mode_Rqst	None
EXM_Oper_Mode_Permitted	None	V_ATR_Final_Oper_Mode	None
V_ATP_Oper_Mode_Permitted	HEX	H_EXM_DL_RTD_InhibitRegen	None
H_EXM_DLC_Prevent_Braking	None	H_EXM_AirHandlingSysEnCond	None
H_EXM_EPD_EnCond	None	H_EXM_EngineWarmEnCond	None
H_EXM_PTO_Regen_EnCond	None	EXM_PTOIneff_Desoot	None
Compressor_Inlet_Density	Kg/m3	EXM_CID_Desoot_EngSpdTgt	RPM
H_EXM_MobileVehicleSpeedEnCond	None	H_EXM_MobileRegenVehSPdEndThd	None
T_EXM_MobileRegenVehSpdDisThd	kph		

274. "Reverse" AFC / AFC Transient Surge

Engine_Speed	RPM	H_CBR_Max_Chi_Fuel_Low	mg/stroke
CBM_FdbkTorqueFuel	mg/stroke	H_CBR_Max_Chi_Fuel_High	mg/stroke
Surge_Margin_CFP	kg_sqrt(K)/sec_MPa	H_CBR_Max_Chi_Fuel	mg/stroke
Surge_Margin_Status	None	CBR_Surge_Limit_Fuel	mg/stroke
Surge_Margin	%	CBR_Gross_Fuel	mg/stroke
Surge_Line_CFP	kg_sqrt(K)/sec_MPa	CBM_Indicated_Trq_Fuel	mg/stroke
CHL_Surge_Limit	None	CHL_Derate_State	mg/stroke
CHL_Surge_Drt_Offset	None	Boost_Pressure	kPa_G
CHL_Surge_Drt_Active	None	H_CBR_Surge_Limit_Inhibit	None
CHL_MCF_Cmd	kg/min	H_CBR_Surge_Limit_Off_Timer	s
	None	H_CBR_Surge_Limit_Max_Timer	s
TPE_Corrected_Turbo_Speed_Est	None	H_CBR_Surge_Limit_Inhibit	None
TPE_Corrected_Turbo_Speed	None	H_CBR_Surge_Limit_Off_Timer	s
TPE_Corrected_Air_Flow	None	H_CBR_Surge_Limit_Max_Timer	s
Combustion_Control_Path_Owner	None	H_CBR_Surge_Limit_Active	None
TSD_Active	mg/stroke	H_CBR_Surge_Limit_Fuel	mg/stroke
CBR_Max_Fuel_Limit	mg/stroke	H_CBR_Prelim_Fuel_State	None

275. Engine Torque Limits

Engine_Speed	RPM	H_MME_Filtered_Torque	N_m
Net_Engine_Torque	N_m	H_LBSC_Engine_Torque	N_m
CBM_FdbkTorqueFuel	mg/stroke	ENGN_Final_Torque_Cmd	N_m
CBR_Main_SOI	Deg_BTDC	EWP_Max_Torque	N_m
H_MACH_NetTorqueCmd	N_m	Engine_Demand_Torque_from_Ndot	N_m
H_MACH_Neg_Trq_Limit_At_HSI	N_m	Jcomm_Percent_Retarder_Torque	%
H_MACH_Neg_Trq_Limit_At_LSI	N_m	Jcomm_Derate_Torque	%
H_MACH_Neg_Trq_Limit_At_PK_Trq	N_m	H_ERC_GrossTorqueLmtd	N_m
H_MACH_Neg_Trq_Limit_At_PT3	N_m	FCC_Fan_Torque	N_m
H_MACH_Neg_Trq_Limit_At_PT4	N_m	EPD_Torque_Derate_Value_id	None
H_SAT_CurrentTorqueLimit	None	EPD_No_Derate_Torque	N_m
Engine_No_Load_Torque	N_m	EPD_TorqueDerateValue	N_m
PTP_Torque_Limit	N_m	Filtered_Net_Brake_Torque	N_m
Friction_Torque	N_m	Torque_Limit_At_Current_Speed	N_m
Coolant_Torque_Adjustment	N_m	Torque_Curve_Selection_Switch	None
CBM_Indicated_Trq_Fuel	mg/stroke	Engine_Torque_Mode	None
ACA_Torque	N_m	H_NDOT_Gov_Torque	N_m
H_APC_hp_Deviation	bar		

276. Robust Torque Model / Torque to Fuel

Engine_Speed	RPM	CBP_Comb_Torque_Limit	N_m

H_CBM_Friction_Torque	N_m	CBP_Charge_Fuel_Ratio	---
H_CBM_Net_Torque_Demand	N_m	CBP_Air_Fuel_Ratio	---
CHP_Pumping_Torque	N_m	CBP_Net_Combustion_Torque	N_m
CBM_Indicated_Fuel	mg/stroke	CBP_Combustion_Torque	N_m
OFC_Fuel_Limit	mg/stroke	H_NDOT_Gov_Torque	N_m
CBM_Indicated_Trq_Fuel	mg/stroke	CBM_Indicated_Trq_Cmd	N_m
CBM_FdbkTorqueFuel	mg/stroke	Accelerator_Pedal_Position	%
H_NDOT_FF_Torque	N_m	H_NDOT_PP_Torque	N_m
H_NDOT_INT_Torque	N_m		

VPI-TP Fuel System:

277. Boost Voltage Control (BVC) FC351 NEW DONE

Engine_Speed	RPM	H_BVC_p_AdjustPWM	%
BVC_ct_MaxInjPulses	Counts	H_BVC_p_SlopeAdjustPWM	%
BVC_s_LowBoostVoltage	Noine	H_BVC_ti_LowBoostVoltage	Sec
BVC_vb_DriverVoltage	V	H_IFC_v_BoostDriverVoltage	V

278. Inlet Metering Accuator (IMA) FC2311, FC271, FC272 NEW DONE

Engine_Speed	RPM	H_IMA_r_Fdbk	Ohms
H_IMA_i_Fltr	Amps	H_IMA_s_ResisError	None
H_IMA_p_Fdbk	%		

279. Engine Speed Procesing (EPS) FC731, FC689, FC115, FC778, FC2321, & FC2322 DONE

Engine_Speed	RPM	EPS_s_CamHalfCycle	None
EPS_s_SensorSelect		P_EPS_ti_BkupGlitch	s
EPS_s_Status	None	P_EPS_ti_MainGlitch	s
EPS_s_MainSync	None	EPS_ct_MainInterrupt	counts
EPS_s_BkupSync	None	EPS_ct_BkupInterrupt	counts
H_EPS_n_MainRPM	RPM	H_EPS_ct_MainAtBkupSync	counts
H_EPS_n_BkupRPM	RPM	H_EPS_ca_BkupPhase	Deg BTDC
H_EPS_ct_MainAtBkupTooth	counts	H_EPS_th_ActMainAtBkupSync	counts

280. Injection Pulse Control & IFC – NEW DONE

Inputs for determining IFC Conversion		**Outputs from IFC**	
Engine_Speed	RPM	H_IFC_ca_FirstCylSOTTL_T[0-10]	Deg_BTDC
FSI_q_totalFueling_v	MG/STROKE	H_IFC_ca_SecondCylSOTTL_T[0-10]	Deg_BTDC
H_IFC_q_TotalFueling	MG/STROKE	H_IFC_ca_ThirdCylSOTTL_T[0-10]	Deg_BTDC
APC_hp_Fdbk	MG/STROKE	H_IFC_q_Quantity	MG/STROKE
H_FSI_ct_DisplayCylinder	Counts	H_IFC_s_PulseActionMask	Hex
H_FSI_ca_DisplaySOI[0-10]	Deg_BTDC	H_IFC_ti_FirstCylOntime_T	MSec
H_FSI_q_DisplayQuantity[0-10]	MG/STROKE	H_IFC_ti_SecondCylOntime_T	MSec
H_FSI_s_DisplayPulseAction[0-10]	None	H_IFC_ti_ThirdCylOntime_T	MSec
H_FSI_ti_DisplayOnTime[0-10]	MSec	H_IFC_ti_MinSeparation	MSec
H_FSI_ti_DisplaySeparation[0-10]	Msec	H_IFC_ti_Separation	Msec

281. Acummulator Pressure Control (APC) FC449, 553, 559, 1911, 2249, 2261, 2262, 2215 NEW DONE

Engine_Speed	RPM	H_APC_hp_Deviation	Bar
APC_hp_Cmd	BAR	H_APC_s_Error	None
APC_hp_Fdbk	BAR	H_APC_hp_MdvDrivePeak	Bar
APC_qr_Cmd	G/Sec	H_APC_s_FdbkConfidence	None
APC_v_DslPrsSensor	V	H_APC_ct_DriveMdvResets	Counts
H_APC_hp_FxdFbk	Bar	H_IMA_i_Fltr	Amps
H_APC_hp_MdvPeak	Bar	H_IMA_i_Fdbk	Amps
P_APC_hp_MdvDriver	Bar	P_APC_ct_TotalMdvResets	Counts
P_APC_ct_TotalMdvPeakCounts	Counts		

282. Lift Pump Control (LPP) FC2265, 2266 NEW DONE

Engine_Speed	RPM	H_APC_s_Error	None
APC_s_LppOn	None		

283. Fuel Sytem Accuator Driver Diagnostics (ADD) FC322-325, FC331, FC332, FC1548, FC1549, FC1622, FC1551-1559 NEW DONE

Engine_Speed	RPM	H_ADD_x_DfrCyl4	None
ADD_s_Misfire	None	H_ADD_x_DfrCyl5	None
ADD_s_PWMDriveError	None	H_ADD_x_DfrCyl6	None
ADD_x_DieselInjDriverError	None	H_ADD_x_FsrLatchOff	None
H_ADD_ti_Misfire		H_ADD_x_FsrPulseTerm	None
H_ADD_x_DfrCyl1		H_ADD_s_InmtPwmOffError	None
H_ADD_x_DfrCyl2		H_ADD_s_InmtPwmOnError	None
H_ADD_x_DfrCyl3			

284. Fuel System Fault Derate Handler (FDH) NEW DONE

Engine_Speed	RPM	EPS_s_MainSync	None
Combustion_Control_Path_Owner	None	EPS_s_BkupSync	None
Fuel_Rail_Pressure	bar_A	EPS_s_Status	None
Fuel_Temperature	Deg_C	Battery_Voltage	V
FSI_t_Fuel	Deg_C	Coolant_Temperature	Deg_C
H_FDH_r_TrqDerate	None	FSI_t_Coolant	Deg_C
		H_FSI_q_TotalFueling	MG/STROKE

H_FDH_x_ErrorState	**Bit**		**Bit**
Mechanical Dump Valve Popped	0		
Accumulator pressure is high	1	ADD OFB/Adler (IMV) error	16
Accumulator pressure is low	2	Accumulator pressure bank-to-bank imbalance	17
Accumulator pressure is very low	3	Accumulator pressure is very high	18
Accumulator pressure signal is electrically out of range	4	EPS half cycle is unknown	19
Accumulator pressure signal is not rational (SIR)	5	Shut down from other FSM CEN ECM	20
EPS main sensor problem or running on backup sensor	6	Large derate from other FSM CEN ECM	21
EPS backup sensor problem	7	Moderate derate from other FSM CEN ECM	22
EPS phase error between main and backup sensor	8	Selected Msg Time Out from other FSM CEN ECM	23
Cylinder Balancing Diagnostic (CBD) Trim error	9	Pressure command derate from other FSM CEN ECM	24
Injector Boost Voltage is too low	10	Not Used	25
IMV electrical resistance error	11	Not Used	26
Inlet Metering Valve Flow Demand is high	12	Not Used	27
Inlet Metering Valve Flow Demand is low	13	Not Used	28
ADD Injector error	14	Not Used	29
ADD FSPWM0 (Lift Pump) error	15	Not Used	30
		Not Used	31

285. Fuel Systems Interface (FSI) DONE

Combsution_Control_Path_Owner	None	Final_Timing	deg_BTDC
Engine_Speed	RPM	Battery_Voltage	V
H_FSI_q_TotalFueling	MG/STROKE	Coolant_Temperature	Deg_C
FSI_q_TotalFueling	MG/STROKE	Charge_Press	kPa
FSI_v_Batt	V	H_FSI_ct_DisplayCylinder	Counts
FSI_t_Fuel	MG/STROKE	H_FSI_ca_DisplaySOI[0-10]	Deg_BTDC
Fuel_Temperature	Deg_C	H_FSI_q_DisplayQuantity[0-10]	MG/STROKE
FSI_t_Coolant	None	H_FSI_s_DisplayPulseAction[0-10]	None
C_FSI_s_StopFuel	1=Override	H_FSI_ti_DisplayOnTime[0-10]	MSec
APC_hp_Cmd	Bar	H_FSI_ti_DisplaySeparation[0-	Msec

		10]	
APC_hp_Fdbk	Bar	FSI_s_Key	None
		H_FSI_s_Cranking	None

286. Fuel Rate Limiter (FRL) NEW DONE

Engine_Speed	RPM	H_FRL_r_NegRateLim	BAR/Sec
APC_hp_Cmd	BAR	H_FRL_r_PosRateLim	BAR/Sec
APC_hp_Fdbk	BAR	H_FRL_s_PulseUpdateFlag	None
FSI_q_TotalFueling	MG/STROKE	H_FRL_s_RateLim	HEX
H_FRL_q_TotalFuel	MG/STROKE	H_FRL_ti_ActiveTime	Sec

287. Manufacturer Injector Trim (MIT) FC2765 New DONE

H_MIT_x_Error	None		
_Injector_Barcode_Cylinder1	None	T_MIT_x_InjectorCode_Cyl1	HEX
_Injector_Barcode_Cylinder2	None	T_MIT_x_InjectorCode_Cyl2	HEX
_Injector_Barcode_Cylinder3	None	T_MIT_x_InjectorCode_Cyl3	HEX
_Injector_Barcode_Cylinder4	None	T_MIT_x_InjectorCode_Cyl4	HEX
_Injector_Barcode_Cylinder5	None	T_MIT_x_InjectorCode_Cyl5	HEX
_Injector_Barcode_Cylinder6	None	T_MIT_x_InjectorCode_Cyl6	HEX

User Overrides

Comment [BJO16]: Not Updated

288. 2010 ISM and ISX Common User Overrides (Actuators)

Description	Variable	Override Enable	Override Value
EGR Valve Cmd	EAC_EGR_Valve_Cmd	T_EAC_User_Override	C_EAC_Override_Value
Total Fueling	Total_Fueling	T_CBL _Fuel_User_Override	C_CBL_Fuel_Override_Value
VGT Cmd (legacy)	TGC_VT_Cmd	T_TGC_User_Override	C_TGC_Override_Value
VGT Cmd (before sent to actuator)	TGC_VT_Cmd	T_VGA_DL_Cmd_User_Override	C_VGA_DL_Cmd_Override_Value

289. 2010 ISM and ISX Common User Overrides (Commands)

Description	Variable	Override Enable	Override Value
Delta Press Over Charge Pressure	CSE_OCVGT_dP_IMP_Ref	T_CSE_dp_IMP_User_Override	C_CSE_dp_IMP_Override_Value
EGR Fraction Cmd	CHL_EGR_Frac_Cmd	T_CBL_EGR_Frac_User_Override	C_CBL_EGR_Frac_Override_Value
Mass Charge Flow Cmd	CHL_MCF_Cmd	T_CBL_MCF_User_Override	C_CBL_MCF_Override_Value
OFC Fuel Limit	OFC_Fuel_Limit	T_OFC_Fuel_Limit_Override_Value	C_OFC_Fuel_Limit_Override_Value
Exhaust pressure reference	TAHR_EMP_Cmd	T_TAHR_EMP_Ovrd_En	C_TAHR_EMP_Ovrd

290. 2010 ISM and ISX Common User Overrides (Inputs)

Description	Variable	Override Enable	Override Value
Battery Voltage	Battery_Voltage	T_AIP_Battery_Voltage_Ovrd_En	H_AIP_Battery_Voltage_Ovrd_Val

291. 2010 ISX Only Fuel System User Overrides (Sensors)

Description	Variable	Override Enable	Override Value
Fuel Pressure	Fuel_Rail_Pressure	C_APC_s_DslPrsCmdEnable	
Fuel Temperature	Fuel_Temperature	C_FSI_s_FuelTempUserOverrideEnable	H_FSI_t_FuelTempOverrideValue

292. 2010 ISM and ISX Common User Overrides (Sensors)

Description	Variable	Override Enable	Override Value
Ambient Air Pressure	Ambient_Air_Press	T_AIP_AMB_User_Override_En	AIP_AMB_User_Override_Value
Charge Pressure (Abs)	Charge_Press	T_AIP_Charge_Press_User_Ovrd_En	C_AIP_Charge_Press_Ovrd_Value
CCV Pressure	Crankcase_Press	T_AIP_CrankcasePress_Usr_Ovr_En	C_AIP_CrankcasePress_Ovrd_Value
Comp Inlet Temperature	Compressor_Inlet_Tmptr	T_AIP_CompInTmptr_Ovrd_En	C_AIP_CompInTmptr_Ovrd_Val
Coolant Level	Coolant_Level	T_AIP_Cool_Lev_User_Override_En	AIP_Cool_Lev_Override_Value
Coolant Temperature	Coolant_Temperature	T_AIP_CT_User_Override	AIP_Cool_Tmptr_Override_Value
ECM Internal Temperature	InternalTmptr	T_AIP_InternalTmptr_Ovrd_En	C_AIP_InternalTmptr_Ovrd_Val
EGR Delta Pressure	EGR_Delta_Press	T_AIP_EGRDeltaPress_Ovrd_En	C_AIP_EGRDeltaPress_Ovrd_Val
EGR Return Temperature	EGR_Orifice_Tmptr	T_AIP_EGROrificeTmptr_Ovrd_En	C_AIP_EGROrificeTmptr_Ovrd_Val
EGR Return Temperature 2	EGR_Orifice_Tmptr2	T_AIP_EGROrificeTmptr2_Ovrd_En	C_AIP_EGROrificeTmptr2_Ovrd_Val
Exhaust Pressure	Exhaust_Press	T_AIP_ExhaustPRess_Ovrd_En	C_AIP_ExhaustPress_Ovrd_Val

Charge Temperature	Charge_Tmptr	T_AIP_CHT_User_Override	C_AIP_CHT_Override_Value
OEM Pressure 1	OEM_Pressure_1	T_AIP_OEMPress_Ovrd_En	AIP_OEMPress_Ovrd_Val
OEM Pressure 2	OEM_Pressure_2	T_AIP_OEMPress2_Ovrd_En	AIP_OEMPress2_Ovrd_Val
OEM Temperature 1	OEM_Temperature_1	T_AIP_OEMTmptr_Ovrd_En	AIP_OEMTmptr_Ovrd_Val
OEM Temperature 2	OEM_Temperature_2	T_AIP_OEMTmptr2_Ovrd_En	AIP_OEMTmptr2_Ovrd_Val
OEM Remote Accelerator	RMT_Remote_Accelerator_Posn	T_AIP_RMT_Accelerator_Ovrd_En	H_AIP_RMT_Accel_User_Ovrd_Val
Oil Pressure	Oil_Pressure	T_AIP_OP_User_Override	AIP_Oil_Press_Override_Value
Oil Temperature	Oil_Temperature	T_AIP_OT_User_Override	AIP_Oil_Tmptr_Override_Value
Throttle Position (1)	Accelerator_Pedal_Position	T_AIP_Accelerator_Ovrd_En	AIP_AccPd_User_Ovrd_Val
Throttle Position (2)	Secondary_Accel_Pedal_Pos	T_AIP_APP2_Ovrd_Enable	H_AIP_APP2_User_Ovrd_Val
Turbo Speed	Turbo_Speed_Sensor	T_Turbo_Speed_Override_Enable	T_Turbo_Speed_Override
Water In Fuel	EEM_WIFState	T_AIP_WIF_User_Override_En	H_AIP_WIF_User_Override_Value

293. 2010 ISM and ISX Common User Overrides (States)

Description	Variable	Override Enable	Override Value
Alpha	CBR_Alpha	T_CBR_Alpha_User_Override	C_CBR_Alpha_Override_Value
Chi	H_CBR_Chi_Value	T_CBR_Chi_User_Override	C_CBR_Chi_Override_Value
Emissions Protection State	EMM_Protection_State	T_EMO_State_User_Override	C_EMO_State_Override_Value
Turbo Speed State	Turbo_Speed_State	T_Turbo_Spd_State_User_Override	Turbo_Speed_State
Thermal Management		T_EXM_Thermal_Mgt_User_Ovrd	C_EXM_Thermal_Mgt_Ovrd_Val

294. 2010 ISM and ISX Common User Overrides (Switches)

Description	Variable	Override Enable	Override Value
Air Conditioner Pressure Switch	Air_Conditioner_Pressure_Switch	T_DIP_AC_Pressure_User_Ovrd_En	
Clutch Interlock Switch	Clutch_Interlock_Switch	T_DIP_SLO_Clutch_Intlk_Ovrd_En	
Manual Fan Input	Manual_Fan_Input	T_DIP_Manual_Fan_User_Ovrd_En	
Clutch Switch	Clutch_Switch	T_DIP_ClutchSwitchOvrdEn	H_DIP_ClutchSwitchOvrdVal

295. 2010 ISM and ISX Common User Overrides (Virtual Sensors)

Description	Variable	Override Enable	Override Value
Ambient Temp	Ambient_Air_Tmptr	T_AMB_Amb_Tmptr_User_Override	AMB_Amb_Tmptr_Override_Value
Boost Press (Gage)	Boost_Pressure	T_AIP_Charge_Press_User_Ovrd_En	C_AIP_Charge_Press_Ovrd_Value

ENGINEERING STATES

Comment [BJO17]: Not updated

BINARY DEFINITION:

1 = ACTIVE							
0 = NOT ACTIVE							
0000 = 0	0001 = 1	0010 = 2	0011 = 3	0100 = 4	0101 = 5	0110 = 6	0111 = 7
1000 = 8	1001 = 9	1010 = 10	1011 = 11	1100 = 12	1101 = 13	1110 = 14	1111 = 15

Converting DECIMAL to BINARY:
Divide the DECIMAL value by 2, and keep dividing the remainder by 2 until you reach a value of 1. Integer values are only used, so 1 divided by 2 becomes 0 with a remainder of 1. The combined remainders become the BINARY equivalent. Example:

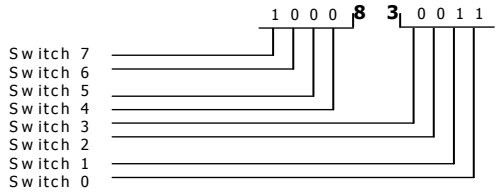
512/2 = 256	remainder	0	BIT 0	87/2 = 43	remainder	1	BIT 0
256/2 = 128	remainder	0	BIT 1	43/2 = 21	remainder	1	BIT 1
128/2 = 64	remainder	0	BIT 2	21/2 = 10	remainder	1	BIT 2
64/2 = 32	remainder	0	BIT 3	10/2 = 5	remainder	0	BIT 3
32/2 = 16	remainder	0	BIT 4	5/2 = 2	remainder	1	BIT 4
16/2 = 8	remainder	0	BIT 5	2/2 = 1	remainder	0	BIT 5
8/2 = 4	remainder	0	BIT 6	1/2 = 0	remainder	1	BIT 6
4/2 = 2	remainder	0	BIT 7				
2/2 = 1	remainder	0	BIT 8				
1/2 = 0	remainder	1	BIT 9				

The BINARY equivalent of 512 is 0010 0000 0000

The BINARY equivalent of 87 is 0101 0111

HEXADECIMAL DEFINITION:

1 = ACTIVE							
0 = NOT ACTIVE							
0000 = 0	0001 = 1	0010 = 2	0011 = 3	0100 = 4	0101 = 5	0110 = 6	0111 = 7
1000 = 8	1001 = 9	1010 = A	1011 = B	1100 = C	1101 = D	1110 = E	1111 = F



Device Driver - Ether Injection Control
C_EIS_System_Select
EIS_CONSTANT_ON_SYSTEM = 0,
EIS_MEASURED_SHOT_SYSTEM = 1

Device Driver - Ether Injection Control

AFTERTREATMENT:

EXM_ATM_Oper_Mode_Rqst **H_OCM_Oper_Mode** **O_ATR_Oper_Mode_Val** **PTM_Final_Oper_Mode** **V_ATM_Oper_Mode** **V_ATR_Oper_Mode_to_OCM** **V_ATR_Oper_Mode_to_PFS**	**V_ATR_Oper_Mode_to_SFM** **V_SFM_Oper_Mode_In** **V_ATR_PFS_OperMode_toATM** **V_ATR_SFM_OperModeRqst** **C_OCD_SFM_OperModeRqst** **O_ATR_SFM_OperModeRqst_Val** **P_ATR_SFM_OperModeRqst** **V_ATR_PFS_OperMode_toATM**
State	**Decimal Value**
RPF_NONE_MODE	0
RPF_NORM_MODE	1
RPF_DeNOx_MODE	2
RPF_MISSION_DESOOT_MODE	3
RPF_DESOX_MODE	4
RPF_PROT_MODE	5
RPF_H2O_DESORB_MODE	6
RPF_HC_DESORB_MODE	7
RPF_NON_MISSION_DESOOT_MODE	8
RPF_SCR_TM_MODE	9

EXM_Oper_Mode_Permitted **O_ATP_Oper_Mode_Permitted_Val**	**V_ATP_Oper_Mode_Permitted**
State	**Bit**
Normal	0
DeNOx	1
Mission Desoot	2
DeSOx	3
Protection Mode	4
H2O Desorb	5
HC Desorb	6
NonMission Desoot	7
SCR TMMode	8
(Not) Stay Warm Permit	9

~~**PTM_DPF_DL_Lamp_Status**~~ ~~**V_ATD_DPF_DL_Lamp_Status**~~ **V_ATD_DPF_Lamp_Test_State**	**PTM_HET_Lamp_State** ~~**V_ATM_HET_Status**~~ **V_ATD_HET_Lamp_Test_State**
State	**Decimal Value**
Solid	0
Blink	2
Off	3

PTM_DPF_DL_Lamp_Status	**V_ATD_DPF_DL_Lamp_Status**
State	**Decimal Value**
Solid	1
Blink	2

Off	3

Current Engine State	**Bit**
ENGINE_STOP_STATE	0
ENGINE_CRANK_STATE	1
ENGINE_RUN_STATE	2
ENGINE_SHUTDOWN_STATE	3
ENGINE_BRAKING_STATE (ENGINE_RETARDER_STATE)	4
	5
ENGINE_SIP_STATE	6
ENGINE_SIP_NO_TM_STATE	7

V_ATM_SCR_DEFLamp_State **V_UIM_EOL_DEFLamp_State**	**V_UTD_DEFLamp_State**
State	**Decimal Value**
OFF	0
ON	1
Blinking	2

V_ATD_DPF_Lamp_State	
State	**Decimal Value**
Solid	1
Blink	2
Off	3

V_ATM_HET_Status	
State	**Decimal Value**
Temperature Only	0
Temperature Or Active Regen	1

P_SFR_Regen_Trigger_State	
State	**Bit**
Soot	1
Delta P Limit	2
Override	4
Timed	8
Ineff Regen	16
Forced Regen	32
Deep Clean	64
Conditioning	128
Reactive (DEF Deposit)	256

PTM_Allow_Regen_State **V_ATP_Allow_Regen_State**	
State	**Decimal Value**
Permit Regen	1
Inhibit Regen	2
No Switch Signal	3

V_ATD_DeltaT_State	**V_OCD_DOC_Presence_State**
V_ATD_DPF_dP_Keyon_State	**V_OCD_DOC_Reverse_State**
V_ATD_DPF_OutP_Keyon_State	**V_OCD_NMHC_Low_Eff_State**
V_ATD_SCR_OverTmptr_State	**V_OCD_DOC_Presence_State**
V_SCD_CatPres_KeyonRat_State	**V_OCD_DOC_Reverse_State**
V_SCD_CE_CatDegradation_State	**V_OCD_Insuff_Exoth_State**
V_SCD_CE_ReductantDeliver_State	**V_SCD_UQ_UreaQuality_State**
V_SCD_NM_ExceedMon_State	**V_SCD_CPH_OBD_State**
V_SCD_NM_High_Motor_State	**V_SCD_NM_Dither_State**
V_SCD_NM_High_NonMotor_State	**V_SCD_NM_Low_State**
V_SCD_NOxSenHtrPerfMon_State	**V_UTD_FailToThaw_State**
V_SCD_NOxSenHtrWarmUp_State	**V_UTD_NoFuncResp_State**
V_SCD_NXRT_Sensor_Resp_State	**V_SFD_DPF_Missing_State**
State	**Decimal Value**

DIAG_NOT_RUN / DIAG_IDLE	0
DIAG_COMPLETE_PASS	1
DIAG_COMPLETE_FAIL	2
DIAG_PRELIM_FAIL	3
DIAG_ABORT	4
DIAG_PASS	5
DIAG_PROCESSING / DIAG_RUN	6
DIAG_FAIL	7
DIAG_RESET	8
DIAG_PAUSE	9
DIAG_OFF	99

V_ATP_EngineState	
State	**Bit**
Stopped	0
Starting	1
Running	2
Stopping	3
Braking	4

V_AIM_fg_Turbo_Out_HC_Status **V_AIM_fg_Turbo_Out_NO2_Status** **V_AIM_fg_Turbo_Out_O2_Status** **V_AIM_fg_Turbo_Out_NOx_Status** **V_AIM_fg_Turbo_Out_Status** **V_AIM_gph_Turbo_Out_PM_Status** **V_AIM_pr_DPF_DeltaP_Status** **V_AIM_pr_HC_DoserP_Status** **V_AIM_prg_DPF_OutP_Status** ~~**V_AIM_trc_CCC_In_Status**~~ ~~**V_AIM_trc_CCC_Out_Status**~~	**V_AIM_trc_DOC_In_Status** **V_AIM_trc_DOC_Out_Status** **V_AIM_trc_DPF_Out_Status** ~~**V_AIM_trc_PFS_CCC_In_Status**~~ ~~**V_AIM_trc_PFS_CCC_Out_Status**~~ **V_ATP_pr_DPF_DeltaP_Status** **V_ATP_trc_Ambient_Air_Status** **V_AIM_pc_Urea_TankLvl_Status** **V_AIM_trc_SCR_In_Status** **V_AIM_trc_SCR_Out_Status** **V_AIM_trc_Urea_TankT_Status**
State	**Decimal Value**
Data Valid	1
Data Not Available	-1
Data Suspect	-2
Data Error High Confidence	-3
Data Error Medium Confidence	-4
Data Error Default	-5
Data Error No Value	-6
Data Error Timeout	-7

V_ATD_bs_PFS_SysIO_Errs **C_AIM_bs_SysIO_StartUp_Mask**	**C_OCD_bs_DOCD_Eff_Enable**
State	**Bit**
CCC_IN_OOR_HI_ERR	0
CCC_IN_OOR_LO_ERR	1
CCC_IN_IR_DELTAT_ERR	2
CCC_OUT_OOR_HI_ERR	3
CCC_OUT_OOR_LO_ERR	4
CCC_OUT_IR_DELTAT_ERR	5
DOC_IN_OOR_HI_ERR	6
DOC_IN_OOR_LO_ERR	7
DOC_IN_IR_DELTAT_ERR	8
DOC_OUT_OOR_HI_ERR	9
DOC_OUT_OOR_LO_ERR	10
DOC_OUT_IR_DELTAT_ERR	11
DPF_OUT_OOR_HI_ERR	12
DPF_OUT_OOR_LO_ERR	13
DPF_OUT_IR_DELTAT_ERR	14
RSRVD_ERR15	15
RSRVD_ERR16	16
RSRVD_ERR17	17
DPF_DELTAP_OOR_HI_ERR	18
DPF_DELTAP_OOR_LO_ERR	19
DPF_DELTAP_KEYON_ERR	20
DPF_DELTAP_DITHER_ERR	21

DPF_OUTP_OOR_HI_ERR	22
DPF_OUTP_OOR_LO_ERR	23
DPF_OUTP_KEYON_ERR	24
DPF_OUTP_DITHER_ERR	25
DPF_OUTP_HIGH_ERR	26

V_ATD_bs_PFS_SysPerf1_Errs **C_AIM_bs_SysPerf1_StartUp_Mask** **C_ATD_FT_bs_DOC_Reset_Mask** **C_ATD_FT_bs_Doser_Reset_Mask** **C_ATD_bs_ProtMode_BySysPerf1** **C_ATD_bs_StopDosing_BySysPerf1** **C_ATD_bs_StopRegen_BySysPerf1** **C_HIM_bs_PFS_SysPerf1_Mask** **C_ATD_bs_OT_EngSD_SysPerf1Mask**	**C_ATP_bs_NOxStatus_BySysPerf1** **C_ATP_bs_NO2Status_BySysPerf1** **P_ATD_bs_PFS_SysPerf1_Errs** **C_SFD_bs_SysPerf1_FR_Mask** **C_SFD_bs_SysPerf1_DPFEff_Mask** **C_ATM_PFS_AECD_bs_10_3_P1** **C_ATM_PFS_AECD_bs_7_6G1_P1** **C_ATM_PFS_AECD_bs_7_6G2_P2** **C_ATP_bs_NOxStatus_BySysPerf1** **C_ATP_bs_NO2Status_BySysPerf1**
State	**Bit**
DOC_NMHC_INVASIVE_EFF_ERR	0
DOC_NMHC_LOW_EFF_ERR	1
RSRVD_ERR34	2
DOC_INSUFF_EXOTHERM_ERR	3
DOC_NOT_PRESENT_ERR	4
DOC_THERM_REVERSED_ERR	5
DOC_OUT_OVERTEMP_ERR	6
DOC_SEVERE_TMPTR_ERR	7
DOC_SEVERE_TMPTR_LATCHED_ERR	8
DOC_IN_NR_SEVERE_TMPTR_ERR	9
DOC_OUT_NR_SEVERE_TMPTR_ERR	10
DOC_DELTA_NR_SEVERE_TMPTR_ERR	11
DOC_FACE_PLUGGED_ERR	12
RSRVD_ERR45	13
DOC_DET_PERSIST_ERR	14
DOC_OUT_HI_TMPTR_ERR	15
RSRVD_ERR48	16
RSRVD_ERR49	17
CCC_NOT_PRESENT_ERR	18
CCC_THERM_REVERSED_ERR	19
CCC_OUT_OVERTMPTR_ERR	20
CCC_SEVERE_TMPTR_ERR	21
CCC_SEVERE_TMPTR_LATCHED_ERR	22
CCC_IN_NR_SEVERE_TMPTR_ERR	23
CCC_OUT_NR_SEVERE_TMPTR_ERR	24
CCC_DELTA_NR_SEVERE_TMPTR_ERR	25
CCC_OUT_HI_TMPTR_ERR	26
PID_SLIP_USEDUP_ERR	27
DOSER_USEDUP_ERR	28
DOSER_USEDUP_DFM_ERR	29
RSRVD_ERR62	30
SCR_DISABLE_HC_DOSING_ERR	31

V_ATD_bs_PFS_SysPerf2_Errs **C_AIM_bs_SysPerf2_StartUp_Mask** **C_ATD_FT_bs_Filter_Reset_Mask** **C_ATD_bs_ProtMode_BySysPerf2** **C_ATD_bs_StopDosing_BySysPerf2** **C_ATD_bs_StopRegen_BySysPerf2** **C_HIM_bs_PFS_SysPerf2_Mask** **C_ATD_bs_OT_EngSD_SysPerf2Mask** **P_ATD_bs_PFS_SysPerf2_Errs**	**C_ATP_bs_NOxStatus_BySysPerf2** **C_ATP_bs_NO2Status_BySysPerf2** **C_SFD_bs_SysPerf2_FR_Mask** **C_SFD_bs_SysPerf2_DPFEff_Mask** **C_ATM_PFS_AECD_bs_10_3_P2** **C_ATM_PFS_AECD_bs_7_6G1_P2** **C_ATM_PFS_AECD_bs_7_6G2_P2** **C_ATP_bs_NOxStatus_BySysPerf2** **C_ATP_bs_NO2Status_BySysPerf2**
State	**Bit**
DPF_FILTRATION_EFF_ERR	0
DPF_SEVERE_TMPTR_LATCHED_ERR	1
DPF_NOT_PRESENT_ERR	2
DPF_TOO_FREQUENT_REGEN_ERR	3
DPF_OUT_OVERTEMP_ERR	4
DPF_SEVERE_TMPTR_ERR	5

DPF_OUT_NR_SEVERE_TMPTR_ERR	6
DPF_DELTAP_HIGH_ERR	7
DPF_DELTA_NR_SEVERE_TMPTR_ERR	8
RSRVD_ERR73	9
DPF_SOOT_LOAD_SEVERE_ERR	10
DPF_SOOT_LOAD_MEDIUM_ERR	11
DPF_SOOT_LOAD_HI_ERR	12
DPF_PRESS_TUBE_DISCONNECT_ERR	13
RSRVD_ERR78	14
DPF_INCOMPLETE_REGEN_ERR	15
SOOT_LOAD_PROTECTION	16
INHIBIT_SWITCH_HI_SOOT_ERR	17
DPF_OUT_HI_TMPTR_ERR	18
DPF_DESTROYED_ERR	19
DPF_REPLACED_WITH_MUFFLER_ERR	20
INHIBIT_SWITCH_TIMED_REGEN_ERR	21
TIMED_REGEN_TIMEOUT_ERR	22
RSRVD_ERR87	23
RSRVD_ERR88	24
RSRVD_ERR89	25
RSRVD_ERR90	26
RSRVD_ERR91	27
ATM_CEN_TIMEOUT_ERR	28
SFM_INEFF_DOSING_HELP	29
SFM_INEFF_DOSING_ERR	30
INEFF_STAT_REGEN_ERR	31

V_ATD_bs_PFS_Sensor_Status **C_ATD_bs_ProtMode_BySensor** **C_ATD_bs_StopDosing_BySensor** **C_SFP_bs_Sensor_MBSLR_Mask** **C_OCD_bs_PFS_Sensor_Eff_Enbl** **C_ATD_bs_NR_OT_SensorStat_Mask** **C_CCD_bs_NR_OT_Sensor_Mask** **C_SFD_bs_SensorStatus_FR_Mask** **C_OCD_bs_DOCD_Sensor_Enbl** **C_SFD_bs_Incomplete_Sensor_Enbl** **C_SFR_bs_PFS_TimerRst_Mask** **C_HIM_bs_PFS_Sensor_Mask**	**C_ATD_bs_AECDProtMode_Sensor** **C_OCD_bs_DOCTmptrs_SensStatMask** **C_SFD_bs_DpfWithMuffler_Sensor** **C_SFP_bs_DPSLE_Sensor_Err** **C_SFP_bs_MBSLR_Sensor_Err** **C_OCD_bs_Sensor_UsedUp_Enbl** **C_HIM_bs_DFM_SensStat_Mask** **C_SFD_bs_DPFEffSensorStatusMask** **C_ATM_PFS_AECD_bs_10_7_Sens** **C_ATM_PFS_AECD_bs_7_6G1_Sens** **C_ATM_PFS_AECD_bs_7_6G2_Sens**
State	**Bit**
CCC_In_Tmptr	0
CCC_Out_Tmptr	1
DOC_In_Tmptr	2
DOC_Out_Tmptr	3
DPF_Out_Tmptr	4
Rsrvd5	5
DPF_deltaP	6
DPF_Out_Gauge_Press	7
HC_Ext_Doser	8
Rsrvd9	9
Rsrvd10	10
Rsrvd11	11
Rsrvd12	12
Rsrvd13	13
Rsrvd14	14
Rsrvd15	15
CCC_In_Tmptr	16
CCC_Out_Tmptr	17
DOC_In_Tmptr	18
DOC_Out_Tmptr	19
DPF_Out_Tmptr	20
Rsrvd21	21
DPF_deltaP	22
DPF_Out_Gauge_Press	23
HC_Ext_Doser	24

V_ATD_bs_PFS_EngOut_Status **C_ATD_bs_ProtMode_ByEngOut** **C_ATD_bs_StopDosing_ByEngOut** **C_SFP_bs_EngOut_MBSLR_Mask** **C_OCD_bs_PFS_EngOut_Eff_Enbl** **C_SFD_bs_EngOutStatus_FR_Mask** **C_OCD_bs_DOCD_EngOut_Enbl** **C_SFD_bs_Incomplete_EngOut_Enbl** **C_SFR_bs_EngOut_TimerRst_Mask**	**C_HIM_bs_PFS_EngOut_Mask** **C_SFD_bs_DpfWithMuffler_EngOut** **C_SFP_bs_DPSLE_EngOut_Err** **C_SFP_bs_MBSLR_EngOut_Err** **C_OCD_bs_EngOut_UsedUp_Enbl** **C_SFD_bs_DPFEffEngOutStatusMask** **C_ATM_PFS_AECD_bs_10_7_Eng** **C_ATM_PFS_AECD_bs_7_6G1_Eng** **C_ATM_PFS_AECD_bs_7_6G2_Eng**
State	**Bit**
Turbo_Out_Tmptr (Modeled)	0
Turbo_Out_Mass_Flow (Modeled)	1
Turbo_Out_Press (Modeled)	2
Turbo_Out_NOx (Modeled)	3
Turbo_Out_O2 (Modeled)	4
Turbo_Out_HC_Dosing (Modeled)	5
Turbo_Out_NO2 (Modeled)	6
Turbo_Out_PM (Modeled)	7
Turbo_Out_Sox (Modeled)	8
Turbo_Out_Residual_ HC (Modeled)	9
Ambient_Air_Press (Modeled)	10
Engine_Speed (Modeled)	11
MBSLR (Modeled)	12
Fuel_System_Failure (Modeled)	13
Rsrvd14	14
Rsrvd15	15
Turbo_Out_Tmptr (Defaulted)	16
Turbo_Out_Mass_Flow (Defaulted)	17
Turbo_Out_Press (Defaulted)	18
Turbo_Out_NOx (Defaulted)	19
Turbo_Out_O2 (Defaulted)	20
Turbo_Out_HC_Dosing (Defaulted)	21
Turbo_Out_NO2 (Defaulted)	22
Turbo_Out_PM (Defaulted)	23
Turbo_Out_Sox (Defaulted)	24
Turbo_Out_Residual_ HC (Defaulted)	25
Ambient_Air_Press (Defaulted)	26
Engine_Speed (Defaulted)	27
MBSLR (Defaulted)	28
Fuel_System_Failure (Defaulted)	29

V_HIM_bs_DiagStatus **C_HIM_bs_DiagStat_StartUp_Mask** **C_HIM_DIAG_bs_NoDosing_Mask** **C_HIM_DIAG_bs_NoDrain_Mask**	**C_HIM_bs_Diag_DoserDisabled** **C_HIM_bs_Diag_DoserErrored** **C_HIM_bs_Air_Purge_Mask** **C_HIM_bs_FT_ProtMode_Mask**
State	**Bit**
DOSER_FSOV_PWM_LOW_ERR	0
DOSER_FSOV_PWM_HIGH_ERR	1
DOSER_INJ_ELEC_ERR	2
DFSOV_LEAK_DOSER_FTP_ERR	3
DFSOV_FTO_ERR	4
HC_DOSER_SYS_LEAK_ERR	5
HC_DOSER_FUEL_RESTRICT_ERR	6
HC_DOSERP_INRANGE_ERR	7
HC_DOSERP_OOR_HI_ERR	8
HC_DOSERP_OOR_LO_ERR	9
ASOV_FTO_ERR	10
DOSER_ASOV_PWM_LOW_ERR	11
DOSER_ASOV_PWM_HIGH_ERR	12
DFSOV_SWAP_ERR	13
DFSOV2_FTO_ERR	14
RSRVD_ERR207	15
HC_DOSERP_DATA_DEFAULT_ERR	16
DOSER_DSOV_PWM_LOW_ERR	17
DOSER_DSOV_PWM_HIGH_ERR	18

V_ATD_bs_SCR_SysIO1_Errs **C_AIM_bs_SysIO1_StartUp_Mask** **C_UIM_FT_bs_SysIO1_DOT_Mask** **C_ATD_bs_SCRSysDisable_Mask1** **C_SCD_bs_SysIO1_NOxMonitorMask** **C_SCD_bs_SysIO1_CatPresRev_Mask** **C_ATD_bs_SCRCatOverTmptr_Mask** **C_ATM_SCR_bs_Tamp_Indm_SysIO1** **C_SCD_bs_SysIO1_NM_IRMotMask** **C_SCD_bs_NXGR_SysIO1_SR_Mask**	**C_ATM_bs_SCRCatalystEPD_Mask** **CAT_OVR_TMP_IO_MASK** **C_SCD_bs_SysIO1_UreaQuaMask** **C_SCD_CPH_bs_SysIO1_Mask** **C_SCD_bs_SysIO1_CatEffMonMask** **C_SCD_bs_SysIO1_NOxMonitorMask** **C_UTD_bs_UHMSysIO1_Mask** **C_ATM_SCR_AECD_bs_13_4a_SysIO1** **C_SCD_bs_SysIO1_NM_DitherMask** **C_SCD_bs_NXRT_SysIO1_SR_Mask**
State	**Bit**
SCR_IN_OOR_HI_ERR	0
SCR_IN_OOR_LO_ERR	1
SCR_IN_IR_DELTAT_ERR	2
SCR_IN_IR_STUCK_ERR	3
SCR_OUT_OOR_HI_ERR	4
SCR_OUT_OOR_LO_ERR	5
SCR_OUT_IR_DELTAT_ERR	6
SCR_OUT_IR_STUCK_ERR	7
SCR_IR_DELTAT_ERR	8
NOX_OUT_SENSOR_IR_LO_MOTOR_ERR	9
NOX_OUT_SENSOR_IR_HI_MOTOR_ERR	10
NOX_OUT_SENSOR_HTR_WARMUP_ERR	11
NOX_IN_SENSOR_PWR_ERR	12
NOX_IN_SENSOR_HTR_ERR	13
NOX_IN_SENSOR_SIGNAL_ERR	14
NOX_OUT_SENSOR_PWR_ERR	15
NOX_OUT_SENSOR_HTR_ERR	16
NOX_OUT_SENSOR_SIGNAL_ERR	17
NOX_OUT_SENSOR_IR_HI_ERR	18
NOX_OUT_SENSOR_IR_LO_ERR	19
UREA_DOSER_INTERNAL_ERR	20
UREA_DOSER_EXTERNAL_ERR	21
NOX_IN_SENSOR_TIMEOUT_ERR	22
NOX_OUT_SENSOR_TIMEOUT_ERR	23
NOX_OUT_SENSOR_DITHER_ERR	24
UREA_DOSER_PRIME_ERR	25
EONOX_TAMPERING_ERR	26
UIMB_DOSER_ERR	27
UIMB_TANK_LEVEL_ERR	28
UIMB_TANK_TMPTR_ERR	29
UIMB_PRESSURE_SENSOR_ERR	30
UIMB_TANK_HEATER_ERR	31

V_ATD_bs_SCR_SysIO2_Errs **C_AIM_bs_SysIO2_StartUp_Mask** **C_UIM_FT_bs_SysIO2_DOT_Mask** **C_ATD_bs_SCRSysDisable_Mask2** **C_SCD_bs_SysIO2_NOxMonitorMask** **C_SCD_bs_SysIO2_NM_DitherMask** **C_SCD_bs_SysIO2_NM_IRMotMask**	**C_SCD_bs_SysIO2_UreaQuaMask** **C_SCD_bs_SysIO2_CatEffMonMask** **C_SCD_bs_SysIO2_NOxMonitorMask** **C_UTD_bs_UHMSysIO2_Mask** **C_ATM_SCR_bs_Tamp_Indm_SysIO2** **C_ATM_SCR_AECD_bs_13_4a_SysIO2** **C_SCD_bs_NXRT_SysIO2_SR_Mask** **C_SCD_bs_NXGR_SysIO2_SR_Mask**
State	**Bit**
UREA_TANKLVL_OOR_HI_ERR	0
UREA_TANKLVL_OOR_LO_ERR	1
UREA_TANKLVL_IR_ERR	2
UREA_TANKT_OOR_HI_ERR	3
UREA_TANKT_OOR_LO_ERR	4
UREA_TANKT_IR_ERR	5
UREALINET1_OOR_HI_ERR	6
UREALINET1_OOR_LO_ERR	7
UREALINET1_IR_ERR	8
UREALINET2_OOR_HI_ERR	9
UREALINET2_OOR_LO_ERR	10
UREALINET2_IR_ERR	11
UREA_TANKHTR1_SHORTED_HIGH_ERR	12

UREA_TANKHTR1_SHORTED_LOW_ERR	13
UREA_TANKHTR2_SHORTED_HIGH_ERR	14
UREA_TANKHTR2_SHORTED_LOW_ERR	15
UREA_LINEHTR1_SHORTED_HIGH_ERR	16
UREA_LINEHTR1_SHORTED_LOW_ERR	17
UREA_LINEHTR2_SHORTED_HIGH_ERR	18
UREA_LINEHTR2_SHORTED_LOW_ERR	19
NOX_OUT_SENSOR_VOLT_MISMATCH_ERR	20
UIMB_COLD_AMBIENT_SHUTOFF	21
UIMB_PRESSURE_LINE_HTR_ERR	22
UIMB_SUCTION_LINE_HTR_ERR	23
UIMB_RETURN_LINE_HTR_ERR	24
UIMB_HTR_RELAY_ERR	25
UIMB_DCU_ERR	26
UIMB_COMMUNICATION_ERR	27
UIMB_PUMP_ERR	28
UIMB_TAMPERING_ERR	29
NOX_OUT_SENSOR_IR_HI_GAIN_ERR	30
NOX_OUT_SENSOR_IR_LO_GAIN_ERR	31

V_ATD_bs_SCR_SysPerf_Errs **C_AIM_bs_SysPerf_StartUp_Mask** **C_UIM_FT_bs_SysPerf_DOT_Mask** **C_ATD_bs_PerfRdyStatus_Mask** **C_SCD_bs_SysPerf_NOxMonitorMask** **C_SCD_bs_SysPerf_NM_DitherMask** **C_SCD_bs_SysPerf_NM_IRMotMask**	**C_SCD_bs_SysPerf_UreaQuaMask** **C_SCD_bs_NOxExceedance_Error** **C_SCD_bs_SysPerf_CatEffMonMask** **C_SCD_bs_SysPerf_NOxMonitorMask** **C_ATM_SCR_bs_Tamp_Indm_SysPerf** **C_ATM_SCR_AECD_bs_13_4a_SysPerf** **C_SCD_bs_NXRT_SysPerf_SR_Mask** **C_SCD_bs_NXGR_SysPerf_SR_Mask**
State	**Bit**
SCR_CAT_OVER_TMPTR_ERR	0
SCR_CAT_SEVERE_TMPTR_ERR	1
SCR_CAT_PRESENCE_ERR	2
SCR_CAT_REVERSE_ERR	3
SCR_CAT_EFFICIENCY_DEGRADED_ERR	4
SCR_CAT_OVER_TMPTR_DERATE_ERR	5
SCR_SYS_EFF_STAT_PERF_ERR	6
SCR_DOSING_EFF_STAT_PERF_ERR	7
SCR_NOX_EXCEEDANCE_LO_ERR	8
SCR_NOX_EXCEEDANCE_HI_ERR	9
SCR_REDUCTANT_QUALITY_ERR	10
SCR_OUT_NOX_SENSOR_HTR_RESP_ERR	11
SCR_OUT_NOX_SENSOR_RESPONSE_ERR	12
UREA_DOSER_INCOMPLETE_PURGE_ERR	13
UREA_TANKLVL_WARNING_MAINT_ERR	14
UREA_TANKLVL_INDUCEMENT_MAINT_ERR	15
UREA_TANK_FROZEN_ERR	16
UREA_TANKLVL_LO_MAINT_ERR	17
UREA_TANKLVL_EMPTY_MAINT_ERR	18
UREA_TANKHTR1_FAIL_TO_THAW_ERR	19
UREA_TANKHTR1_NO_INITIAL_TMPTR_RISE_ERR	20
UREA_TANKHTR1_STUCK_ON_ERR	21
SCR_IN_NR_SEVERE_TMPTR_ERR	22
SCR_OUT_NR_SEVERE_TMPTR_ERR	23
SCR_REDUCTANT_DELIVERY_FAIL_ERR	24
NOX_OUT_SENSOR_PERSIST_NOT_VALID_ERR	25
SCR_IN_SEVERE_TMPTR_ERR	26
SCR_OUT_SEVERE_TMPTR_ERR	27
UREA_DOSER_INJ_ERR	28
SCR_CATALYST_SYSTEM_MISSING_ERR	29
SCR_TMPTR_SENSORS_REVERSED_ERR	30
UREA_TANKLVL_EMPTY_INDUCE_ERR	31

V_UIM_bs_DiagStatus **C_UIM_bs_DiagStat_StartUp_Mask** **C_UID_bs_DoserErr_DoserTSR_Mask** **C_UIM_FT_bs_AirSolTest_Mask** **C_UIM_FT_bs_DoserErr_DOT_Mask** **C_SCD_bs_Doser_NM_DitherMask** **C_SCD_bs_Doser_NM_IRMotMask**	**C_UIM_bs_UreaDoserErr_Mask** **C_SCD_bs_Doser_UreaQuaMask** **C_SCD_bs_Doser_CatEffMonMask** **C_SCD_bs_Doser_NOxMonitorMask** **C_ATM_SCR_bs_Tamp_Indm_UreaDos** **C_ATM_SCR_AECD_bs_13_4a_UreaDos** **C_SCD_bs_NXRT_Doser_SR_Mask** **C_SCD_bs_NXGR_Doser_SR_Mask**
State	**Bit**
UREA_DOSER_ECU_ERR	0
UREA_DOSER_TMPTR_SENSOR_OOR_ERR	1
RSRVD_ERR226	2
UREA_DOSER_PUMP_FROZEN	3
UREA_DOSER_SOL_HIGH_ERR	4
UREA_DOSER_SOL_LOW_ERR	5
UREA_DOSER_INCORRECT_STATE_ERR	6
UREA_DOSER_DOSING_RATE_ERR	7
RSRVD_ERR232	8
RSRVD_ERR233	9
RSRVD_ERR234	10
UREA_DOSER_PRIME_TIMEOUT_ERR	11
UREA_DOSER_SW_ID_ERR	12
RSRVD_ERR237	13
RSRVD_ERR238	14
RSRVD_ERR239	15
UREA_DOSER_MOTOR_ERR	16
UREA_DOSER_LOW_AIR_UREA_ERR	17
UREA_DOSER_RETURN_LINE_ERR	18
UREA_DOSER_TMPTR_IR_ERR	19
RSRVD_ERR244	20
RSRVD_ERR245	21
UREA_DOSER_INIT_TIMEOUT_ERROR	22
UREA_DOSER_TIMEOUT_ERROR	23
UIMB_INVALID_DATASET_ACK_ERR	24
RSRVD_ERR249	25
RSRVD_ERR250	26
RSRVD_ERR251	27
RSRVD_ERR252	28
RSRVD_ERR253	29
RSRVD_ERR254	30
RSRVD_ERR255	31

V_UID_bs_DosingSysFaultStat_1	**C_UID_bs_SysFalseFault_1**
State	**Bit**
DB_UREA_INJ_VALVE_LSS_SCGOL_ERR	0
N/A	1
DB_UREA_INJ_VALVE_LSS_SCB_ERR	2
DB_UREA_INJ_VALVE_HSS_SCB_ERR	3
DB_UHC_SHUTOFF_WITH_EMPTY_ERR	4
DB_UREA_INJ_VALVE_HSS_SCG_ERR	5
N/A	6
DB_EXH_T_MSG_SIGNAL_ERR	7
DB_DFS_RQST_UNEXPECTED_VAL_ERR	8
DB_RQIR_RQST_UNEXPECTED_VAL_ERR	9
DB_UREA_TANKLVL_OOR_HIGH_ERR	10
DB_UREA_TANKLVL_OOR_LOW_ERR	11
DB_RQST_RQI_UNEXPECTED_VAL_ERR	12
DB_REAGENT_Q_UNEXPECTED_VAL_ERR	13
DB_RQSTSTATE_UNEXPECTED_VAL_ERR	14
DB_SCR_OUT_T_UNEXPECTED_VAL_ERR	15
DB_SCR_IN_T_UNEXPECTED_VAL_ERR	16
DB_BL_HTR_UNEXPECTED_RQST_ERR	17
DB_UREA_TANKT_OOR_HIGH_ERR	18
DB_UREA_TANKT_OOR_LOW_ERR	19
DB_UREA_TANKT_IR_HIGH_ERR	20

DB_UREA_TANKT_IR_LOW_ERR	21
DB_DOSER_RVV_STUCK_CLOSED_ERR	22
DB_PL_HTR_UNEXPECTED_RQST_ERR	23
DB_UREA_DOSER_HTR_T_DCINVLD_ERR	24
DB_UREA_DOSER_TMPTR_PER_PWM_ERR	25
DB_UREA_DOSER_TMPTR_DCINVLD_ERR	26
DB_SM_HEATERT_IR_COLD_START_ERR	27
DB_SM_HEATERT_IR_ERR	28
DB_SM_TMPTR_IR_COLD_START_ERR	29
DB_SM_TMPTR_IR_ERR	30
DB_UREA_DOSER_PRESS_OOR_HI_ERR	31

V_UID_bs_DosingSysFaultStat_2	**C_UID_bs_SysFalseFault_2**
State	**Bit**
DB_UREA_DOSER_PRESS_OOR_LO_ERR	0
DB_UREA_DOSER_HTR_OPEN_LOAD_ERR	1
DB_UREA_DOSER_HTR_SHORT_HI_ERR	2
DB_UREA_DOSER_HTR_SHORT_LOW_ERR	3
DB_RSRVD_ERR021	4
DB_UREA_DOSER_MTR_OPEN_LOAD_ERR	5
DB_RSRVD_ERR018	6
DB_UREA_DOSER_MTR_SHORT_HI_ERR	7
DB_UREA_DOSER_MTR_SHORT_LOW_ERR	8
DB_VAR_DS_RQ_UNEXPECTED_VAL_ERR	9
DB_UREA_DOSER_PRESS_IR_HI_ERR	10
DB_UREA_DOSER_PRESS_IR_LO_ERR	11
DB_UREA_DOSER_RVV_OPEN_LOAD_ERR	12
DB_UREA_DOSER_RVV_SHORT_HI_ERR	13
DB_UREA_DOSER_RVV_SHORT_LOW_ERR	14
DB_UREA_TANKHTR1_OPEN_LOAD_ERR	15
DB_UREA_TANKHTR1_SHORT_HIGH_ERR	16
DB_UREA_TANKHTR1_SHORT_LOW_ERR	17
N/A	18
DB_UREA_PL_HTR_OPEN_LOAD_ERR	19
DB_UREA_PL_HTR_SHORT_HIGH_ERR	20
DB_UREA_PL_HTR_SHORT_LOW_ERR	21
DB_UREA_SL_HTR_OPEN_LOAD_ERR	22
DB_UREA_SL_HTR_SHORT_HIGH_ERR	23
DB_UREA_SL_HTR_SHORT_LOW_ERR	24
DB_UREA_BL_HTR_OPEN_LOAD_ERR	25
DB_UREA_BL_HTR_SHORT_HIGH_ERR	26
DB_UREA_BL_HTR_SHORT_LOW_ERR	27
DB_BATTERY_VOLTAGE_OOR_HI_ERR	28
DB_BATTERY_VOLTAGE_OOR_LO_ERR	29
DB_TRP_RESET_UNEXPECTED_VAL_ERR	30
DB_SYSTEM_FILLED_IN_INIT_ERR	31

V_UID_bs_DosingSysFaultStat_3	**C_UID_bs_SysFalseFault_3**
State	**Bit**
DB_METERING_CTL_UNDER_PRESS_ERR	0
DB_UREA_DOSER_OVER_PRESSURE_ERR	1
DB_UREA_DOSER_PRESS_BUILDUP_ERR	2
DB_MNTR_PRESSURE_REDUCTION_ERR	3
DB_UREA_TANKHTR1_STUCK_ON_ERR	4
DB_UREA_INJ_VALVE_PLAUS_ERR	5
DB_UREA_PRESS_LINE_BLOCKED_ERR	6
DB_RSRVD_ERR020	7
DB_MAIN_RELAY_STUCK_ERR	8
DB_DIAG_OVR_MSG_LENGTH_ERR	9
DB_DIAG_OVR_MSG_TIMEOUT_ERR	10
DB_DCU_RELAY2_SHORT_LOW_ERR	11
DB_DCU_RELAY2_SHORT_HIGH_ERR	12
DB_DCU_RELAY3_SHORT_LOW_ERR	13
DB_DCU_RELAY3_SHORT_HIGH_ERR	14
DB_DCU_RELAY4_SHORT_LOW_ERR	15

DB_DCU_RELAY4_SHORT_HIGH_ERR	16
DB_SL_HTR_UNEXPECTED_RQST_ERR	17
N/A	18
DB_DCU_OVER_TMPTR_ERR	19
DB_SM_HTR_UNEXPECTED_RQST_ERR	20
DB_DCU_RELAY_UH_SHORT_HI_ERR	21
DB_ADC0_CAL_POWERUP_TIMEOUT_ERR	22
DB_SCR_MON_PRESSURE_CHECK_ERR	23
DB_UREA_DOSER_TMPTR_DC_PWM_ERR	24
DB_PRESSURE_STABILISATION_ERR	25
DB_UREA_DOSER_HTR_T_DYCFAIL_ERR	26
DB_SUPPLY_MODULE_T_DYCFAIL_ERR	27
DB_RSRVD_ERR026	28
DB_RSRVD_ERR027	29
DB_METERING_CTL_OVER_PRESS_ERR	30
DB_UREA_DOSER_TMPTR_NO_AVL_ERR	31

V_UID_bs_DosingSysFaultStat_4	**C_UID_bs_SysFalseFault_4**
State	**Bit**
DB_COM_CIL_BUS_OFF_NODE_A_ERR	0
DB_RSRVD_ERR016	1
DB_COM_CIL_ERR_PAS_NODE_A_ERR	2
DB_RSRVD_ERR017	3
DB_DCU_EEP_ERASE_ERR	4
DB_DCU_EEP_READ_ERR	5
DB_DCU_EEP_WRITE_ERR	6
N/A	7
N/A	8
DB_MOC_COM_ERR_CNT_ERR	9
DB_MOC_COM_INTERRUPTED_SPI_ERR	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15
DB_MON_OVER_VOLTAGE_SUPPLY1_ERR	16
DB_MON_UNDR_VOLTAGE_SUPPLY1_ERR	17
DB_CS_RDY_UNEXPECTED_VAL_ERR	18
DB_DCU_SENSOR_SUPPLY_2_OOR_ERR	19
DB_DCU_SENSOR_SUPPLY_3_OOR_ERR	20
DB_DCU_INVALID_DATASET_ID_ERR	21
DB_DCU_VAR_DATASET_SWITCH_ERR	22
DB_DCU_VAR_MNG_EEP_ERR	23
DB_CS_FLAG_UNEXPECTED_VAL_ERR	24
DB_DCU_SOFTWARE_RESET_0_ERR	25
DB_DCU_SOFTWARE_RESET_1_ERR	26
DB_DCU_SOFTWARE_RESET_2_ERR	27
DB_SM_TMPTR_SENSORS_PLAUS_ERR	28
DB_AMBIENT_T_MSG_LENGTH_ERR	29
DB_AMBIENT_T_MSG_TIMEOUT_ERR	30
DB_ADC0_CONVERSION_TIMEOUT_ERR	31

V_UID_bs_DosingSysFaultStat_5	**C_UID_bs_SysFalseFault_5**
State	**Bit**
N/A	0
N/A	1
N/A	2
DB_COOLANT_T_UNEXPECTED_VAL_ERR	3
DB_UREA_HTR_RELAY_OPEN_LOAD_ERR	4
DB_EEC1_MSG_LENGTH_ERR	5
DB_EEC1_MSG_TIMEOUT_ERR	6
DB_RSRVD_ERR022	7
DB_UREA_HTR_RELAY_SHORT_HI_ERR	8
DB_UREA_HTR_RELAY_SHORT_LO_ERR	9
DB_UREA_DOSER_MTR_NOT_AVAIL_ERR	10

DB_AMBIENT_P_UNEXPECTED_VAL_ERR	11
DB_AMBIENT_T_UNEXPECTED_VAL_ERR	12
DB_ENGINETMPTR1_MSG_LENGTH_ERR	13
DB_ENGINETMPTR1_MSG_TIMEOUT_ERR	14
DB_RSRVD_ERR019	15
DB_RSRVD_ERR023	16
DB_ENG_SPD_UNEXPECTED_VAL_ERR	17
DB_RSRVD_ERR024	18
DB_ATISCR_DSR1_MSG_LENGTH_ERR	19
DB_ATISCR_DSR1_MSG_TIMEOUT_ERR	20
DB_ATISCR_DSR2_MSG_LENGTH_ERR	21
DB_ATISCR_DSR2_MSG_TIMEOUT_ERR	22
DB_ATISCR_EXH_T_MSG_LENGTH_ERR	23
DB_ATISCR_EXH_T_MSG_TIMEOUT_ERR	24
DB_UREA_DOSER_HTR_FUNC_RESP_ERR	25
DB_RSRVD_ERR025	26
DB_DCU_TMPTR_0_OOR_HI_ERR	27
DB_DCU_TMPTR_0_OOR_LO_ERR	28
DB_DCU_TMPTR_1_OOR_HI_ERR	29
DB_DCU_TMPTR_1_OOR_LO_ERR	30
N/A	31

V_UIM_UreaPumpState	
State	**Bit**
PUMP_STATE_STANDBY	0
PUMP_STATE_REFILL	1
PUMP_STATE_PRESSUREBUILDUP	2
PUMP_STATE_VENTILATION	3
PUMP_STATE_METERINGCONTROL	4
PUMP_STATE_TEMPWAIT	5
PUMP_STATE_EMPTYING	6
PUMP_STATE_WAITFORSHUTOFF	7
PUMP_STATE_PRESSUREREDUCTION	8
PUMP_STATE_DETECTIONMODE	9
PUMP_STATE_NOTAVAILABLE	10
PUMP_STATE_REFILL	11

V_UIM_ECM_DoserState	
State	**Bit**
UIM_STATE_DORMANT	0
UIM_STATE_PREPAREFORDOSING	1
UIM_STATE_NORMALDOSING	2
UIM_STATE_SYSTEMERRORPENDING	3
RESERVED	4
UIM_STATE_PROTAGAINSTHEAT	5
UIM_STATE_PROTAGAINSTCOLD	6
UIM_STATE_SHUTOFF	7
UIM_STATE_DIAGNOSIS	8
UIM_STATE_SERVICEDOSING	9
UIM_STATE_SERVICENODOSING	10
UIM_STATE_OFF	11
UIM_STATE_LOSSOFCOMMUNICATIONS	12

V_ATM_AECD_07_6_State **V_ATM_AECD_10_1_State** **V_ATM_AECD_10_2_State** **V_ATM_AECD_10_3_State** **V_ATM_AECD_10_4_State** **V_ATM_AECD_10_6a_State** **V_ATM_AECD_10_6b_State** **V_ATM_AECD_10_7_State** **C_ATM_AECD_07_6G1_Enbl**	**C_ATM_AECD_07_6G2_Enbl** **C_ATM_AECD_10_1_Enbl** **C_ATM_AECD_10_2_Enbl** **C_ATM_AECD_10_3_Enbl** **C_ATM_AECD_10_4_Enbl** **C_ATM_AECD_10_6a_Enbl** **C_ATM_AECD_10_6bG1_Enbl** **C_ATM_AECD_10_6bG2_Enbl** **C_ATM_AECD_10_7_Enbl**
State	**Decimal Value**
Active	1
Emissions Increase	2
Hi Emissions Increase	4

Protection	8
Deficiency	16
Maintenance Derate	32

V_UIM_PL_Heater_StateMachine **V_UIM_RL_Heater_StateMachine** **V_UIM_SL_Heater_StateMachine** **V_UIM_SM_Heater_StateMachine** **V_UIM_Tank_Heater_StateMachine**	**V_UTM_PL_Heater_State** **V_UTM_RL_Heater_State** **V_UTM_SL_Heater_State** **V_UTM_SM_Heater_State** **V_UTM_UreaTank_Heater_State**
State	**Decimal Value**
Heating Off	0
Defrost	1
Maintenance Heat	2

V_UIM_pc_Tank_Heater_State **V_UIM_PL_Heater_State** **V_UIM_RL_Heater_State**	**V_UIM_SL_Heater_State** **V_UIM_SM_Heater_State**
State	**Decimal Value**
Off	0
On	1

EXM_ATM_Exhaust_Data **EXM_ATM_Exhaust_Data_Status** **V_ATM_Exhaust_Data_From_Eng** **V_ATM_Exhaust_Status_From_Eng** **V_ATM_Exhaust_Data_From_PFS** **V_ATM_Exhaust_Status_From_PFS** **V_ATM_Exhaust_Data_To_PFS** **V_ATM_Exhaust_Status_To_PFS** **V_ATM_Exhaust_Data_To_SCR**	**V_ATM_Exhaust_Status_To_SCR** **V_ATP_Exhaust_Data_From_CCM** **V_ATP_Exhaust_Data_From_OCM** **V_ATP_Exhaust_Data_From_SFM** **V_ATP_Exhaust_Data_To_CCM** **V_ATP_Exhaust_Data_To_OCM** **V_ATP_Exhaust_Data_To_SCM** **V_ATP_Exhaust_Data_To_SFM**
State	**Bit**
Tmptr	0
Exh Flow	1
Press	2
NOx	3
O2	4
HC Dosing Rate	5
NO2	6
PM	7
Sox	8
HC Residual	9

H_OCL_bs_HC_CtrlLimits	
State	**Bit**
O2 Limited	5
Rate Limited	7
Overall Efficiency Limited	10
Inlet Temp Too Low	11
Face Plugged	12
Flow Not OK	13

EXM_NonMissionRegenProhibitState	
State	**Bit**
non-mission regen allowed	0
Reserved	1
Reserved	2
Reserved	3
Reserved	4
CLUTCH_BRAKE (clutch or service brake pressed)	5
PARKING_BRAKE (not engaged)	6
THROTTLE (position over threshold)	7
OUT_OF_GEAR (transmission in gear or DL Control preventing regen)	8
PTO (is active and controlling engine speed)	9
OEM (Pressure and/or Temprature check over/under threshold(s))	10
VSS (speed over threshold)	11
RETARDER (DL request to disengage thermal management)	12

AIR_HANDLING (EGR or VGT system failure)	13
GOVERNOR (engine is not in allowed control state)	14
ENG PROTECTION (one or more engine protection channel is active or engine shutdow approaching, accompanied by a fault code.)	15
WARMUP (engine is not warmed up)	16

ACCELERATOR GOVERNOR:

Selected_Governor	
State	**Decimal Value**
ABT	0
ABS	1

ACCELERATOR INTERLOCK:

Accelerator_Interlock_State	
State	**Decimal Value**
UNLOCKED	0
LOCKED	1

AFTERTREATMENT:

EXM_ATM_Oper_Mode_Rqst **H_OCM_Oper_Mode** **V_ATM_Oper_Mode** **V_ATR_Final_Oper_Mode** **V_ATR_Oper_Mode_to_OCM**	**V_ATR_Oper_Mode_to_PFS** **V_ATR_Oper_Mode_to_SFM** **V_SFM_Oper_Mode_In** **V_ATR_PFS_OperMode_toATM** **V_ATR_SFM_OperModeRqst**
State	**Decimal Value**
RPF_NONE_MODE	0
RPF_NORM_MODE	1
RPF_MISSION_DESOOT_MODE	3
RPF_H2O_DESORB_MODE	6
RPF_HC_DESORB_MODE	7
RPF_NON_MISSION_DESOOT_MODE	8
RPF_SCR_TM_MODE	9

PTM_DPF_DL_Lamp_Status **V_ATD_DPF_DL_Lamp_Status** **V_ATD_DPF_Lamp_Test_State**	**PTM_HET_Lamp_State** **V_ATM_HET_Status** **V_ATD_HET_Lamp_Test_State**
State	**Decimal Value**
Solid	0
Blink	2
Off	3

V_ATD_DPF_Lamp_State	
State	**Decimal Value**
Solid	1
Off	3

V_ATM_HET_Status	
State	**Decimal Value**
Temperature Only	0
Temperature Or Active Regen	1

P_SFR_Regen_Trigger_State	
State	**Bit**
Soot	1
Delta P Limit	2
Override	4
Timed	8
Ineff Regen	16
Forced Regen	32
Deep Clean	64
Conditioning	128

PTM_Allow_Regen_State **V_ATP_Allow_Regen_State**	
State	**Decimal Value**

Permit Regen	1
Inhibit Regen	2
No Switch Signal	3

V_ATD_DeltaT_State **V_ATD_DPF_dP_Keyon_State** **V_ATD_DPF_OutP_Keyon_State** **V_ATD_DPFOutP_SIR_OBDState** **V_CCD_CCC_Presence_State**	**V_CCD_CCC_Reverse_State** **V_CCD_DeltaT_State** **V_OCD_DOC_Presence_State** **V_OCD_DOC_Reverse_State** **V_SFD_DPFdP_SIR_OBDState**
State	**Decimal Value**
DIAG_FAIL	
DIAG_Run	
DIAG_Not_Run	
DIAG_RESET	
DIAG_ABORT	
DIAG_PASS	
DIAG_COMPLETE_PASS	
DIAG_COMPLETE_FAIL	

V_ATP_EngineState	
State	**Bit**
Stopped	0
Starting	1
Running	2
Stopping	3
Braking	4

V_AIM_fg_Turbo_Out_HC_Status **V_AIM_fg_Turbo_Out_NO2_Status** **V_AIM_fg_Turbo_Out_O2_Status** **V_AIM_fg_Turbo_Out_NOx_Status** **V_AIM_fg_Turbo_Out_Status** **V_AIM_gph_Turbo_Out_PM_Status** **V_AIM_pr_DPF_DeltaP_Status** **V_AIM_pr_HC_DoserP_Status** **V_AIM_prg_DPF_OutP_Status** **V_AIM_trc_CCC_In_Status**	**V_AIM_trc_CCC_Out_Status** **V_AIM_trc_DOC_In_Status** **V_AIM_trc_DOC_Out_Status** **V_AIM_trc_DPF_Out_Status** **V_AIM_trc_PFS_CCC_In_Status** **V_AIM_trc_PFS_CCC_Out_Status** **V_ATP_pr_DPF_DeltaP_Status** **V_ATP_trc_Ambient_Air_Status**
State	**Decimal Value**
Data Valid	1
Data Not Available	-1
Data Suspect	-2
Data Error High Confidence	-3
Data Error Medium Confidence	-4
Data Error Default	-5
Data Error No Value	-6
Data Error Timeout	-7

V_ATD_bs_PFS_SysIO_Errs **C_AIM_bs_SysIO_StartUp_Mask**	**C_OCD_bs_DOCD_Eff_Enable**
State	**Bit**
CCC_IN_OOR_HI_ERR	0
CCC_IN_OOR_LO_ERR	1
CCC_IN_IR_DELTAT_ERR	2
CCC_OUT_OOR_HI_ERR	3
CCC_OUT_OOR_LO_ERR	4
CCC_OUT_IR_DELTAT_ERR	5
DOC_IN_OOR_HI_ERR	6
DOC_IN_OOR_LO_ERR	7
DOC_IN_IR_DELTAT_ERR	8
DOC_OUT_OOR_HI_ERR	9
DOC_OUT_OOR_LO_ERR	10
DOC_OUT_IR_DELTAT_ERR	11
DPF_OUT_OOR_HI_ERR	12
DPF_OUT_OOR_LO_ERR	13
DPF_OUT_IR_DELTAT_ERR	14

DPF_DELTAP_OOR_HI_ERR	18
DPF_DELTAP_OOR_LO_ERR	19
DPF_DELTAP_KEYON_ERR	20
DPF_DELTAP_DITHER_ERR	21
DPF_OUTP_OOR_HI_ERR	22
DPF_OUTP_OOR_LO_ERR	23
DPF_OUTP_KEYON_ERR	24
DPF_OUTP_DITHER_ERR	25

V_ATD_bs_PFS_SysPerf1_Errs **C_AIM_bs_SysPerf1_StartUp_Mask** **C_ATD_FT_bs_DOC_Reset_Mask** **C_ATD_FT_bs_Doser_Reset_Mask** **C_ATD_bs_ProtMode_BySysPerf1**	**C_ATD_bs_StopDosing_BySysPerf1** **C_HIM_bs_PFS_SysPerf1_Mask** **C_ATP_bs_FacePlug_Enbl** **C_ATD_bs_OT_EngSD_SysPerf1Mask** **P_ATD_bs_PFS_SysPerf1_Errs**
State	**Bit**
CATALYST_LOW_EFF_ERR	0
CATALYST_INSUFF_EXOTHERM_ERR	1
DOSING_LOW_EFF_NOLAMP_ERR	2
DOC_INSUFF_EXOTHERM_ERR	3
DOC_NOT_PRESENT_ERR	4
DOC_THERM_REVERSED_ERR	5
DOC_OUT_OVERTEMP_ERR	6
DOC_SEVERE_TMPTR_ERR	7
DOC_DELTA_SEVERE_TMPTR_ERR	8
DOC_IN_NR_SEVERE_TMPTR_ERR	9
DOC_OUT_NR_SEVERE_TMPTR_ERR	10
DOC_DELTA_NR_SEVERE_TMPTR_ERR	11
DOC_FACE_PLUGGED_ERR	12
DOSING_LOW_EFF_LAMP_ERR	13
DOC_DET_PERSIST_ERR	14
DOC_OUT_HI_TMPTR_ERR	15
CCC_LOW_EFFICIENCY_ERR	16
CCC_INSUFF_EXOTHERM_ERR	17
CCC_NOT_PRESENT_ERR	18
CCC_THERM_REVERSED_ERR	19
CCC_OUT_OVERTMPTR_ERR	20
CCC_SEVERE_TMPTR_ERR	21
CCC_DELTA_SEVERE_TMPTR_ERR	22
CCC_IN_NR_SEVERE_TMPTR_ERR	23
CCC_OUT_NR_SEVERE_TMPTR_ERR	24
CCC_DELTA_NR_SEVERE_TMPTR_ERR	25
CCC_OUT_HI_TMPTR_ERR	26

V_ATD_bs_PFS_SysPerf2_Errs **C_AIM_bs_SysPerf2_StartUp_Mask** **C_ATD_FT_bs_Filter_Reset_Mask** **C_ATD_bs_ProtMode_BySysPerf2**	**C_ATD_bs_StopDosing_BySysPerf2** **C_HIM_bs_PFS_SysPerf2_Mask** **C_ATD_bs_OT_EngSD_SysPerf2Mask** **P_ATD_bs_PFS_SysPerf2_Errs**
State	**Bit**
DPF_FILTER_PM_PERF_ERR	0
DPF_FILTER_HC_EFFICIENCY_ERR	1
DPF_NOT_PRESENT_ERR	2
DPF_TOO_FREQUENT_REGEN_ERR	3
DPF_OUT_OVERTEMP_ERR	4
DPF_SEVERE_TMPTR_ERR	5
DPF_OUT_NR_SEVERE_TMPTR_ERR	6
DPF_DELTAP_HIGH_ERR	7
DPF_DELTA_NR_SEVERE_TMPTR_ERR	8
DPF_MBPE_HIGH_ERR	9
DPF_SOOT_LOAD_SEVERE_ERR	10
DPF_SOOT_LOAD_MEDIUM_ERR	11
DPF_SOOT_LOAD_HI_ERR	12
DPF_PRESS_TUBE_DISCONNECT_ERR	13
DPF_FEEDBACK_USED_UP_ERR	14
DPF_INCOMPLETE_REGEN_ERR	15
SOOT_LOAD_PROTECTION	16
INHIBIT_SWITCH_HI_SOOT_ERR	17

DPF_OUT_HI_TMPTR_ERR	18
REVERSED_THERMISTOR_DIAGNOSTIC_ERR	28
SFM_INEFF_DOSING_ERR	30
INEFF_STAT_REGEN_ERR	31

V_ATD_bs_PFS_Sensor_Status **C_ATD_bs_ProtMode_BySensor** **C_ATD_bs_StopDosing_BySensor** **C_SFP_bs_Sensor_MBSLR_Mask** **C_OCD_bs_PFS_Sensor_Eff_Enbl** **C_ATD_bs_NR_OT_SensorStat_Mask**	**C_ATP_bs_CCC_Prs_Default_Enbl** **C_ATP_bs_CCC_Prs_Model_Enbl** **C_ATP_bs_DOC_Prs_Default_Enbl** **C_ATP_bs_DOC_Prs_Model_Enbl** **C_ATP_bs_Pipe_Prs_Default_Enbl** **C_ATP_bs_Pipe_Prs_Model_Enbl** **C_CCD_bs_NR_OT_Sensor_Mask**
State	**Bit**
CCC_In_Tmptr (Modeled)	0
CCC_Out_Tmptr (Modeled)	1
DOC_In_Tmptr (Modeled)	2
DOC_Out_Tmptr (Modeled)	3
DPF_Out_Tmptr (Modeled)	4
DPF_deltaP (Modeled)	6
DPF_Out_Gauge_Press (Modeled)	7
HC_Ext_Doser (Modeled)	8
CCC_In_Tmptr (Defaulted)	16
CCC_Out_Tmptr (Defaulted)	17
DOC_In_Tmptr (Defaulted)	18
DOC_Out_Tmptr (Defaulted)	19
DPF_Out_Tmptr (Defaulted)	20
DPF_deltaP (Defaulted)	22
DPF_Out_Gauge_Press (Defaulted)	23
HC_Ext_Doser (Defaulted)	24

V_ATD_bs_PFS_EngOut_Status **C_ATD_bs_ProtMode_ByEngOut** **C_ATD_bs_StopDosing_ByEngOut**	**C_SFP_bs_EngOut_MBSLR_Mask** **C_OCD_bs_PFS_EngOut_Eff_Enbl**
State	**Bit**
Turbo_Out_Tmptr (Modeled)	0
Turbo_Out_Mass_Flow (Modeled)	1
Turbo_Out_Press (Modeled)	2
Turbo_Out_NOx (Modeled)	3
Turbo_Out_O2 (Modeled)	4
Turbo_Out_HC_Dosing (Modeled)	5
Turbo_Out_NO2 (Modeled)	6
Turbo_Out_PM (Modeled)	7
Turbo_Out_Sox (Modeled)	8
Turbo_Out_Residual_HC (Modeled)	9
Ambient_Air_Press (Modeled)	10
Engine_Speed (Modeled)	11
Turbo_Out_Tmptr (Defaulted)	16
Turbo_Out_Mass_Flow (Defaulted)	17
Turbo_Out_Press (Defaulted)	18
Turbo_Out_NOx (Defaulted)	19
Turbo_Out_O2 (Defaulted)	20
Turbo_Out_HC_Dosing (Defaulted)	21
Turbo_Out_NO2 (Defaulted)	22
Turbo_Out_PM (Defaulted)	23
Turbo_Out_Sox (Defaulted)	25
Turbo_Out_Residual_HC (Defaulted)	26
Ambient_Air_Press (Defaulted)	26
Engine_Speed (Defaulted)	27

ANTI-THEFT:

AT_Engine_Lock_State	
State	**HEX**
LOCKED	1
UNLOCKED	0

AT_Exit_Mode

State	Decimal Value
Manual (lock upon operator request)	0
Automatic (lock when key off)	1

AUXILLIARY GOVERNOR CONTROL:

T_Aux_Governor_Selector	
State	**Decimal Value**
Speed	0
Pressure	1

BATTERY:

H_AIP_Batt_Tmptr_State	H_AIP_Batt_Volt_State
State	**HEX**
DATA VALID	0
DATA NOT AVAILABLE	-1
DATA SUSPECT	-2
DATA ERROR HIGH CONFIDENCE	-3
DATA ERROR MEDIUM CONFIDENCE	-4
DATA ERROR DEFAULT	-5
DATA ERROR NO VALUE	-6
DATA ERROR TIMEOUT	-7

CHANGE LOCK:

CMGR_ChangeState	
State	**Decimal Value**
CHG_STATE_CHANGES_NOT_OK	0
CHG_STATE_CHANGES_OK	1
CHG_STATE_CANCELING	2
CHG_STATE_SAVING	3

CHARGE FLOW:

CHL_Derate_State		
State	**Text Value**	**Decimal Value**
CHL_NO_DERATE_STATE	NO_DRT	0
CHL_COT_DERATE_STATE	COT_DRT	1
CHL_TURBO_SPEED_Derate_State	TURB_DRT	2
CHL_DELTA_P_DERATE_STATE	DLTP_DRT	4
CHL_EGR_Off_DP_DERATE_STATE	DPOFFDRT	8
CHL_EMP_DERATE_STATE	EMP_DRT	16

CHP_Veff_Mode	C_CHP_Veff_With_EMP_Active
State	**Decimal Value**
IMP Only	0
EMP/IMP	1

Charge_Flow_Command_State	
State	**Decimal Value**
Normal Operation	0
COT Derate	1
Turbo Speed Derate	2
Delta P Derate	4
Delta P Near EGR Off Limit	8
Density Based MCF Limit	16
CBL MCF Command Override	32
Engine Brake	64
CBL MCF Command Increment	128
Exhaust Temperature Limit	256
Exhaust Flow Low Limit	512
Exhaust Press Limit	1024

Charge_Flow_Derate_Active_State	
State	**Decimal Value**
All Derates Inactive	0
COT Near Limit	1
Turbo Speed Near Limit	2

Delta P Near Limit	4
Delta P Near EGR Off Limit	8

COMBUSTION MANAGER:

H_CBM_O2_Out_Frac_Status **H_CBM_PM_Base_Frac_Status**	**H_CBM_PM_Out_Frac_Status** **H_CBR_NOx_Out_Frac_Status**
State	**Enumeration**
DATA_VALID	0
DATA_ERROR_HIGH_CONFIDENCE	-3

CRUISE CONTROL:

CC_CommandMode	
State	**Enumeration**
CC_OFF	0
CC_SET	1
CC_CANCEL	2
CC_RESUME	3
CC_COAST	4
CC_BDOWN	5
CC_ACCEL	6
CC_BUP	7
CC_HDWAY	8
CC_HOLD	9
CC_AUTO_RESUME	10

ACC_Mode	
State	**Enumeration**
NO_CRUISE	0
NORMAL_CRUISE	1
HEADWAY_CRUISE	2

CC_Status	
State	**Enumeration**
Inactive	0
Active	1

J39_Adaptive_Cruise_Control_Mode	
State	**Enumeration**
Off	000
Speed Contorl Active	001
Distance Control Active	010
Overtake Mode	011
Hold Mode	100
Finish Mode	101
Disabled	110
Not Valid	111

T_CC_SetAccelSwitchSelect	
State	**Enumeration**
CC_ResumeSwitch	0
CC_SetSwitch	1

CYLINDER PERFORMANCE:

FSI_s_CylCutOutBase	
State	**Enumeration**
Inactive	0
Active	1
Internal Cutout	3
Prohibit	4

FSI_s_CylCutOutToolStatus	
State	**Enumeration**
Inactive	0
Active	1

Prohibit	4

FSI_s_CylindersCutOut	**FSI_s_CylindersCutOut_T**
State	**Enumeration**
Unused	0
Norm	1
Tool Cut	2
ECM Cut	3

DATALINK:

CMGR_BroadcastState	
State	**Value**
J1939, port 1	Byte 0, bit 0 (1 = Enabled, 0 = Disabled)
J1939, port 2	Byte 0, bit 1 (1 = Enabled, 0 = Disabled)
J1939, port 3	Byte 9, bit 2 (1 = Enabled, 0 = Disabled)
J1587, port 1	Byte 1, bit 0 (1 = Enabled, 0 = Disabled)
J1587, port 2	Byte 1, bit 2 (1 = Enabled, 0 = Disabled)
J1587, port 3	Byte 1, bit 3 (1 = Enabled, 0 = Disabled)

DL_EngineControlMode	
State	**Hex**
None	0000
Speed Control	0001
Speed Limit Control	0002
Torque Control	0004
Torque Limit Control	0008

DRIVER REWARD:

DRS_Reward_State	
State	**Decimal Value**
NO_REWARD	0
REWARD_LEVEL_1	1
REWARD_LEVEL_2	2
REWARD_LEVEL_3	3
REWARD_LEVEL_4	4

ECM:

ECM_Status	
State	**HEX**
INITIAL LOAD	5EED
RECALIBRATION IN PROGRESS	1D0A
VALIDATE MEMORY	2B16
VALID PROGRAM	600D

Poweroff_Command_Ignored	
State	**HEX**
POWEROFF IGNORED	1
POWEROFF NOT IGNORED	0

Release_Status	
State	**HEX**
DEVELOPMENT_ECM	187
PRODUCTION_ECM	85

Run_Location	
State	**HEX**
Flash	1
RAM	2

Security_Key	
State	**HEX**
SECURE	0000
UNSECURE	00FF

EGR FRACTION:

EGR_Fraction_Command_State	
State	**Decimal Value**
Normal Operation	0
EMM Protection	1
CBR EGR Override	2
OFC EGR Disabled	4
CBL EGR Override	8
Low EGR Command	16
Prevent Opening Against High Delta P	32
CHL Surge Derate	64
CBL EGR Command Increment	128
CBL EGR Fraction CT Limiter	256
CBL EGR Fraction IMT Limiter	512
Bypass Mode Adjust Enable	1024

EGR Valve:

EGR_Valve_Test_Status	
State	
_INACTIVE	0
_ACTIVE	1
_ECM_FAULTS	3
_ECM_PROHIBITED	4

EMISSION MANAGER:

EMM_AECD_State		
State	**Decimal Value**	**Bit Mask**
Emission Protection	0	None
Air Handling System Protection	1	Bit 0
Extreme Ambient Overheat Protection	2	Bit 1
Condensation Protection	4	Bit 2
White Smoke / Misfire Protection	8	Bit 3
Extended Idle & PTO Protection	16	Bit 4
Engine Starting & Warmup Protection	32	Bit 5
General Engine Protection	64	Bit 6
Diagnostic Procedures	128	Bit 7
System Modulation	256	Bit 8
RPF Regeneration Protection	512	Bit 9

EMM_Protection_State **EMO_Condensation_AECD_State** **EMO_Engine_Start_AECD_State** **EMO_Extended_Idle_AECD_State**	**EMM_Gen_Protect_AECD_State** **EMO_Thermal_Mgt_AECD_State** **EMO_White_Smoke_AECD_State**	
State	**Decimal Value**	**Bit Mask**
Normal Operation	0	None
Cranking	1	Bit 0
Oscar Operation	2	Bit 1
Felix Operation	4	Bit 2
Aftertreatment Dosing	8	Bit 3
Engine Component Failure	16	Bit 4
Wet Stack Protection	32	Bit 5
Coolant Advance	64	Bit 6
Misfire Timing	128	Bit 7
OFC Gain Adjustment	256	Bit 8
Ambient Pressure Advance	512	Bit 9
Turbo Surge Protection	1024	Bit 10
UHC Advance	2048	Bit 11
Intake Condensation Protection	4096	Bit 12
BackPressure Protection	8192	Bit 13
Aftertreatment Protection Rqd	16384	Bit 14
Engine Protection Rqd	32768	Bit 15

ENGINE BRAKE:

DL_RetarderControlMode

Text Value	Hex
Speed Control	0001
Speed Limit Control	0002
Torque Control	0004
Torque Limit Control	0008

RetarderStatus	
Text Value	**Enumeration**
NONE	0
OVERRIDE_ONLY	1
OVERRIDE_AND_NON_OVERRIDE	2

Retarder_Torque_Mode	
Text Value	**Enumeration**
No Request	0000

RetarderCommand	
Text Value	**Bit**
Cylinder 1 On	0
Cylinder 2 On	1
Cylinder 3 On	2
Cylinder 4 On	3
Cylinder 5 On	4
Cylinder 6 On	5

ENGINE OPERATING CONDITION (ALPHA / Chi):

Alpha CBR_Alpha	H_CBR_Alpha
State	**Enumeration**
URBAN	0
OPEN ROAD	1

H_CBR_Chi_Value		
State	**Text Value**	**Enumeration**
Chi 1-3: Base Operation	CHI 1-3	1-3
Chi 4-6: Protection	CHI 4-6	4-6
Chi 7-9: Thermal Management Desoot	CHI 7-9	7-9
Chi 2,3,10: Extreme Ambient Overheat	CHI 2,3,10	2,3,10

CBR_Chi_Source	
State	**Enumeration**
DENSITY_CHI	1
COOLANT_CHI	2
AT_PROTECTION_CHI	3
FULL_USER_OVERRIDE_CHI	4
SINGLE_USER_OVERRIDE_CHI	5
PROTECTION_CHI	6
CORR_AMB_COND_CHI	7
THERMAL_CHI	8
REGEN_CHI	9
DPF_BACKPRESSURE_CHI	10

ENGINE PROTECTION:

CHRG_ChtPrevSevSdReq **CHRG_ChtPrevSpdSdReq** **CHRG_CotPrevSevSdReq** **CHRG_EgrPrevSevSdReq** **CHRG_EgrPrevSpdSdReq** **CHRG_EmtPrevSevSdReq** **CHRG_EmtPrevSpdSdReq**	**LUCL_ClPrevTbTrqSdReq** **LUCL_CpPrevSevSdReq** **LUCL_CtPrevSevSdReq** **LUCL_CtPrevSpdSdReq** **LUCL_OpPrevTbSpdSdReq** **LUCL_OpPrevTbTrqSdReq** **LUCL_OtPrevSdReq**
State	**Enumeration**
Shutdown w/o restart limit	0
Run	1
Shutdown approaching w/o restart limit	2
Shutdown with restart limit	4

Shutdown approaching with restart limit	8
Shutdown timer started (running)	16
Previously shutdown	32

C_EPD_CHT_Trq_Drt_Type **C_EPD_EGR_Trq_Drt_Type**	**C_EPD_EMT_Trq_Drt_Type**
State	**Enumeration**
Time	0
Severity	1

ENGN_EpdTimerState	
State	**Enumeration**
TIMER INCREMENTING	1
TIMER NOT INCREMENTING	0

EPD_Engine_State	
State	**Enumeration**
Shutdown w/o Restart Limit	0
Run	1
Shutdown Approaching w/o Restart Limit	2
Shutdown with Restart Limit	4
Shutdown Approaching with Restart limit	8
Shutdown Timer Started	16
Previously Shutdown	32

ENGINE SPEED PROCESSING (EPS):

EPS_s_MainSync **EPS_s_BkupSync**	**EPS_Main_Sync_State** **EPS_Backup_Sync_State**
State	**Enumeration**
NO_PULSE	0
HAVE_SYNC	1
NO_SYNC	2
START_SYNC	3
SYNC_STATE_UNKNOWN	4
CAM_SYNC_STATE_SIZING	256

H_SNC_s_HalfCycleState	
State	**HEX**
Not Good	0
Good	1

EPS_s_CamHalfCycle	
State	**HEX**
Unknown	0
NO_CAM	1
Determined	2

EPS_s_Status	
State	**Dec**
FAILED	0
DEGRADED	1
HEALTHY	2
EPS_STOP	3
ES_HEALTHY	255

H_EPS_s_BkupLevel	**H_EPS_s_MainLevel**
State	**Enumeration**
Triggered	0
Low	1
High	2

EPS_s_SensorSelect	
State	**Enumeration**
EPS_MAIN_SPEED_SENSOR	0
EPS_BACKUP_SPEED_SENSOR	1

EPS_EXTERNAL_SPEED_SENSOR	2
EPS_SENSOR_SELECT_SIZING	255

ENGINE STATES:

H_CBD_s_Motoring	
State	**Enumeration**
Motoring	0
Not Motoring	1

H_CBD_s_SteadyState	
State	**Enumeration**
Steady State	0
Transient	1

Engn_Actual_State	
State	**Enumeration**
STOPPED	0
STARTING	1
RUNNING	2
STOPPING	3
BRAKING	4
BRAKING_WHILE_FUELING	5

Engine_Torque_Mode	
State	**Decimal Value**
OTHER	0
ENGINE_PROTECTION_TORQUE_DERATE	1
EXHAUST_GAS_RECIRCULATION_DERATE	2
J1939_POWERTRAIN_CTRL_TRQ_DERATE	3
ROAD_SPEED_GOVERNOR	4
ENGINE_PROTECTION_SPD_DERATE	5
J1939_PWRTRN_CTRL_ENG_SPD_DERATE	6
HIGH_SPEED_IDLE_GOVERNOR	7
LIMP_HOME	8
ACCELERATOR_BASED_TRQ_CTRL	9
ACCELERATOR_BASED_SPEED_CTRL	10
ACCELERATOR_BASED_PRES_CTRL	11
ENHANCED_CRUISE_CONTROL	12
POWER_TAKE_OFF	13
LOW_SPEED_IDLE_CONTROL	14
ENGINE_RETARDER_CONTROL	15
CTRL_COLD_AMB_LIMIT	89

Tau_State	
State	**Decimal Value**
NORMAL	0
STEEP_GRADE	1
TAKE_OFF	2

ENGINE TORQUE / FUEL COMMAND:

Combustion_Control_Path_Owner **H_CBR_Prelim_Fuel_State** **Mach_Control_Path_Owner**	**Inc_Dec_Controller** **Engn_Control_Path_Owner** **CBR_Fuel_Ref_State** **CBL_Fuel_State**
State	**Enumeration**
CTRL_NONE_SELECTED	0
CTRL_JCOMM_TORQUE	1
CTRL_JCOMM_SPEED	2
CTRL_PTO	4
CTRL_LIMP_HOME_TORQUE	6
CTRL_ABS	7
CTRL_ABT	8
CTRL_CC	9
CTRL_RSC	10
CTRL_LSI	11

CTRL_HSI	12
CTRL_TURBO_OVERSPEED	15
CTRL_OFC_FUEL_LIMIT	16
CTRL_TRANSIENT_NOISE	17
CTRL_EPD_SPEED	18
CTRL_TORQUE_CURVE	19
CTRL_JCOMM_TORQUE_DERATE	20
CTRL_OOG_TORQUE_LIMIT	21
CTRL_CRANK	22
CTRL_FUEL_OVERRIDE	23
CTRL_RETARDER	24
CTRL_ENGINE_OVERSPEED	25
CTRL_STOP	26
CTRL_SHUTDOWN	27
CTRL_FSS_DERATE	28
CTRL_EPD_TORQUE_LIMIT	29
CTRL_ENGINE_START_OIL_LIMIT	33
CTRL_PTO_TORQUE_LIMIT	34
CTRL_POWERTAIN_PROTECTION	36
CTRL_ANTI_THEFT	41
CTRL_VAM	45
CTRL_AIR_DENSITY_FUEL_LIMIT	46
CTRL_CHI_FUEL_LIMIT	47
CTRL_TFC_FUEL_LIMIT	48
CTRL_GROSS_FUEL_OVERRIDE	49
CTRL_CHM_TORQUE_LIMIT	50
CTRL_JCOMM_PTP_DERATE	51
CTRL_LIMP_HOME_SPEED	52
CTRL_TIS_DYNO	53
CTRL_VSS_DIAGNOSTICS	54
CTRL_ESCC	55
CTRL_WPD	56
CTRL_TSD	57
CTRL_EWP	58
CTRL_JCOMM_SPEED_LIMIT	59
CTRL_AUX_NDOT	60
CTRL_FIW	61
CTRL_FIW_RAMP	62
CTRL_AFW	63
CTRL_REGEN	66
CTRL_RTD	67
CTRL_IRD	68
CTRL_LBSC	69
CTRL_XSC	70
CTRL_XPC	71
CTRL_TORQUE_RATE	73
CTRL_OBD	74
CTRL_JCOMM_MEO	75
CTRL_FUELING_SURGE_LIMIT	76
CTRL_CPL	77
CTRL_ESM_XWIRE	78
CTRL_IDD	202
CTRL_FSS_TRQ_DERATE	256
EPD_FUEL_TEMP	514

ETHER START:

C_EIS_TmptrSel	
State	**Enumeration**
Coolant Temperature	0
Intake Temperature	1

FAN CONTROL:

Fan_Drive_State	
State	**Bit Mask**
Fan is off	0000

Intake air temperature	0010
Engine coolant temperature	0100
manual control or datalink	1001
A/C system	1011
Timer (fan_clutch_tool_request)	1100
Engine Brake	1101
Other (Fuel Temp, OEMP,OEMT,OEMP2,OEMT2)	1110

H_FCC_Fan_Type_Selection	
State	**Enumeration**
On/Off	0
Variable Speed	1
Three Speed	2

T_FCC_Fan_Type_Selection	
State	**Enumeration**
On/Off	0
Variable Speed	1
Three Speed	2

FAST IDLE WARMUP:

FIW_State	
State	**Enumeration**
FIW_INACTIVE	0
FIW_DELAY	1
FIW_INITIALIZATION	2
FIW_ACTIVE	3

FIW_Test_Status	
State	**Enumeration**
INACTIVE	0
ACTIVE	1
ECM_FAULTS	3
ECM_PROHIBITED	4
NO_ENGINE_SPEED	7
ENGINE_SPEED_LOW	9
INITIALIZATION_STATE	12

FUEL SYSTEM:

CBM_FuelSystemStatus	
State	**Dec**
Fuel System Health	0
FSM Fuel Derate Active	1
FSM Pressure Derate Active	2
Low Pressure	3
High Pressure	4
Cylinder 1 Fired	5
Cylinder 2 Fired	6
Cylinder 3 Fired	7
Cylinder 4 Fired	8
Cylinder 5 Fired	9
Cylinder 6 Fired	10

FSO_s_DiagState_v	
State	**Dec**
Cleared	0
Peak Event	1
Supsected	2
Dump Valve Tripped	3
Clear Suspected	4
Rest	5
Manual Triggered	6
Reset Failed	7

GEAR DOWN / OUT OF GEAR PROTECTION:

RSC_GD_State	
State	**Enumeration**
INACTIVE	0
ACTIVE_HEAVY_LOAD	1
ACTIVE_LIGHT_LOAD	2

RSC_GearEvaluation	
State	**Enumeration**
LOW_GEAR	1
NEXT_GEAR	2
TOP_GEAR	3

HIGH SPEED GOVERNOR:

HSI_SwMaxRPM_Selected	
State	**Enumeration**
Speed1	1
Speed2	2

HOT SHUTDOWN:

C_TIB_GHS_EWP_Input_Type **Generic_Hot_Shutdown_EWP_Input**	
State	**Enumeration**
NONE	0
CT	1
IMT	2
OIL_TEMP	3
OIL_PRES	4

IDLE VALIDATION:

Idle_Validation_State	
State	**Decimal Value**
NOT_IDLE	0
IDLE	1
NOT_SUPPORTED	2
ERROR	3

LBSC:

LBSC_Ref_Mode	
State	**Decimal Value**
LBSC_NO_DERATE	1
LBSC_SPEED_LOW	2
LBSC_SPEED_HIGH	3
LBSC_NOT_SET	4

NDOT:

Aux_Ndot_Status	
State	**Decimal Value**
Active	0
Inactive	1

J1939_Aux_Ndot_Control_State	
State	**Decimal Value**
AUX_NDOT_CNTRL_EXIT	0
AUX_NDOT_CNTRL_REQ	1
AUX_NDOT_CNTRL_ACTIVE	2

OIL CHANGE MONITOR:

T_OCM_FaultStatus	
State	**Enumeration**
TIS_OCM_ERROR	1
TIS_OCM_NO_ERROR	0

T_OCM_Mode

State	Enumeration
AUTOMATIC	0
MANUAL_TIME	1
MANUAL_FUEL	2
MANUAL_DISTANCE	3

OXYGEN FUEL CONTROL:

C_OFC_FCEnable		
Set bit (to 1) limits equivalence ratio when associated error is active		
Error condition	**bit (hex value)**	**Fault Code**
Charge Pressure In-Range Error	0 (0x0001)	2973
EGR Valve Stuck Error	1 (0x0002)	1896
EGR Delta P In Range High Error	2 (0x0004)	2359
VGT Driver Circuit Error	3 (0x0008)	2634
Exhaust Pressure Speed Derate Error	4 (0x0010)	2764
High Engine Out Particulate Matter Rate Error	5 (0x0020)	2754
VGT Actuation Error	6 (0x0040)	2387
not used	7 (0x0080)	

PTO:

PTO_J1939_State	
State	**Enumeration**
J1939_OFF	O
J1939_HOLD	1
J1939_REMOTE_HOLD	2
J1939_DECELERATE	6
J1939_ACCELERATE	8
J1939_ACCELERATE_OVERRIDE	9
J1939_PROGRAMMED_SET_SPEED_1	10
J1939_PROGRAMMED_SET_SPEED_2	11
J1939_PROGRAMMED_SET_SPEED_3	12
J1939_PROGRAMMED_SET_SPEED_4	13
J1939_PROGRAMMED_SET_SPEED_5	14
J1939_PROGRAMMED_SET_SPEED_6	15
J1939_PROGRAMMED_SET_SPEED_7	16
J1939_PROGRAMMED_SET_SPEED_8	17

PTO_Status	
State	**Enumeration**
Inactve	0
Active	1

PTO_State	
State	**Enumeration**
Remote	1
Inactive	2
Normal	3

REMOTE THROTTLE:

T_RMT_Remote_Accelerator_Mode	
State	**Enumeration**
Remote Accelerator operationwith switch not including transition verification	0
Remote Accelerator operation with switch including transition verification	1
Maximum of Primary Accelerator or Remote Accelerator (when switch is ON)	4

SENSOR ERROR INFORMATION (IN-RANGE)::

H_Charge_Press_IR_Error	
State	**Decimal Value**
GOOD	0
SUSPECT	1
FAILED	2

SENSOR SOURCE INFORMATION (A/D SENSORS):

Crankcase_Press_Source	**VGT_Position_Source**
State	**Decimal Value**
PRIMARY	0 (0)
BACKUP	1 (-2)
DEFAULT	2 (-4)

SENSOR STATE INFORMATION (A/D SENSORS):

Crankcase_Press_State **Compressor_Inlet_Tmptr_State** **Exhaust_Press_State**	**Internal_Tmptr_State** **Turbo_Speed_State**
State	**HEX**
Good	0000
Suspect	0001
Failed	0002

SENSOR STATE INFORMATION (ESTIMATES):

Charge_Press_EStat **Charge_Tmptr_EStat** **EGR_Orifice_Estat**	**Exhaust_Press_Estat** **Turbo_Speed_EStat**
State	**Decimal Value**
GOOD	0 (0)
EST_SUSPECT	1 (64)
EST_FAILED	2 (128)

SENSOR STATUS INFORMATION (A/D SENSORS)::

Ambient_Air_Press_Status **Ambient_Air_Tmptr_Status** **Boost_Pressure_Status** **Charge_Press_Status** **Charge_Tmptr_Status** **Compressor_Inlet_Tmptr_Status** **Compressor_Inlet_Press_Status** **EGR_Delta_Press_Status**	**EGR_Orifice_Tmptr_Status** **EGR_Position_Status** **Exhaust_Press_Gage_Status** **Exhaust_Press_Status** **Turbo_Speed_Status** **V_ATP_pr_Ambient_Air _Status** **V_ATP_trc_Ambient_Air _Status**
State	**Decimal Value**
Data Valid	0
Config Error / Default	-1
Supply Error active / Default	-2
Backup	-3
Default	-5

SENSOR STATUS INFORMATION (Virtual SENSORS):

Exhaust_Flow_Status	**V_AIM_fg_Turbo_Out_Status**
State	**Decimal Value**
Data Valid	0
Config Error / Default	-1
Supply Error active / Default	-2
Backup	-3
Default	-5

SENSOR CONFIDENCE INFORMATION (A/D SENSORS):

FSI_s_FuelTempConfidence	
State	**Decimal Value**
Data Valid	0
Invalid Hardware Resource	-1
Signal OOR, but not timed out – suspect	-2
Signal OOR, timed out	-5

Sensor Type Selection:

C_Coolant_Level_Type_Select	
State	**Decimal Value**
Two-State	0
Three-State	1

SETUP FOR DYNO:

Setup_For_Dyno_Test_State

State	Decimal Value
INACTIVE	0
ACTIVE_TEST_THROTTLE	2
ACTIVE_APP_THROTTLE	3
ECM_PROHIBITED	4
ACTIVE_WITH_EPD	5
TIMER_EXPIRED	6

SMART ROAD SPEED GOVERNOR:

SRG_State	
State	**Decimal Value**
SRG_DEFAULT_OFF	0
SRG_HOLD	1
SRG_CANCEL	2
SRG_KICKDOWN	3
SRG_KICKDOWN_RESUME	4
SRG_BUMP_UP	5
SRG_BUMP_DOWN	6
SRG_ACCEL	7
SRG_DECEL	8
SRG_SET	9
SRG_SET_COAST	10
SRG_SET_ACCEL	11
MAX_ROAD_SPEED_TRIM	12
MAX_ROAD_SPEED_TRIM_2	13
NOT_AVAILABLE	14
DE_ICER	15

STARTER LOCKOUT:

SLO_RelayState	
State	**Decimal Value**
Closed	0
Open	1

Engine_Starer_Mode	
State	**Decimal Value**
STARTER_LOCKOUT_NOT_REQUESTED	0
STARTER_LOCKOUT_NOT_ZERO	1
STARTER_LOCKOUT_KEYSWITCH	3
STARTER_LOCKOUT_ENGINE_RUNNING	4
STARTER_LOCKOUT_X_BY_WIRE	5
STARTER_LOCKOUT_INTERLOCK	6
STARTER_LOCKOUT_ANTI-THEFT	7
STARTER_LOCKOUT_ERROR_CONDITION_EXIST	12
STARTER_LOCKOUT_IN ERROR	14
STARTER_LOCKOUT_NOT AVAILABLE	15

THERMAL MANAGEMENT:

C_EMO_CT_TMProtectMask **C_EMO_ECC_TMProtectMask** **C_EMO_EI_TMProtectMask**	**C_EMO_IC_TMProtectMask** **C_EMO_UHC_TMProtectMask** **C_EMO_WS_TMProtectMask**
State	**Decimal Value**
None	0
Oscar	1
Felix	2
Oscar or Felix	3

TRIP INFORMATION:

TIB_Trip_Info_State		
State	**Word**	**Bit**
TI_EPF_DERATE	0	0
TI_AIR_COMPRESSOR	0	1
TI_BATTERY_AUTO_START	0	2
TI_BLOCK_AUTO_START	0	3
TI_BUNK_AUTO_START	0	4

TI_ENGINE_ESP	0	5
TI_DRIVER_REWARD_1	0	6
TI_DRIVER_REWARD_2	0	7
TI_DRIVER_REWARD_3	0	8
TI_VEHICLE_ESP	0	9
TI_FAN_DUE_TO_EXT	0	10
TI_FAN_DUE_TO_AC	0	11
TI_FAN_DUE_TO_ENGINE	0	12
TI_FAN_1_WITH_MPH	0	13
TI_FAN_1_WITHOUT_MPH	0	14
TI_VEHICLE_OUT_OF_GEAR	0	15
TI_ENGINE_DRIVE	1	0
TI_ENGINE_IDLE	1	1
TI_FAST_ENGINE_IDLE	1	2
TI_ENGINE_PTO	1	3
TI_HOT_SHUTDOWN	1	4
TI_WARMUP_VIOLATION	1	5
TI_IDLE_SHUTDOWN	1	6
TI_IDLE_SHUTDOWN_OVERRIDE	1	7
TI_ENGINE_REVVING	1	8
TI_ENGINE_OVERREV	1	9
TI_VEHICLE_DRIVE	1	10
TI_VEHICLE_PTO	1	11
TI_CRUISE	1	12
TI_RSG	1	13
TI_VEHICLE_COAST	1	14
TI_VEHICLE_ABOVE_SWEET_SPOT	1	15
TI_VEHICLE_BELOW_SWEET_SPOT	2	0
TI_VEHICLE_BRAKE	2	1
TI_TOP_GEAR	2	2
TI_GEAR_DOWN	2	3
TI_ENGINE_BRAKES	2	4
TI_VEHICLE_OVERSPEED_1	2	5
TI_VEHICLE_OVERSPEED_2	2	6
TI_VEHICLE_DECELERATION	2	7
TI_ECM	2	8
TI_FAN_2_ON	2	9
TI_ENGINE_ON	2	10
TI_VEHICLE_PTO_LOADED_AND_NOT_MOVING	2	11
TI_VEHICLE_PTO_LOADED_AND_MOVING	2	12
TI_AUTO_START	2	13
TI_ENGINE_SLEEP_IDLE	2	14
TI_EPF_TORQUE_DERATE	2	15
TI_EPF_RPM_DERATE	3	0
TI_EPD_SHUTDOWN	3	1
TI_EPD_SHUTDOWN_OVERRIDE	3	2

TI_Vehi_Trip_Data_Fault_Status	**TI_Base_Trip_Data_Fault_Status**
State	**Enumeration**
False	0
True	1

TURBO CONTROL:

T_TGC_Spd_Drt_Mode	
State	**Enumeration**
turbo speed close loop control	0
turbo speed derate method	1

VEHICLE SPEED SENSOR:

T_TSP_SensorType	
State	**Enumeration**
No Sensor	0
Inductance Vehicle_Speed Sensor	1
Tachograph Sensor	2
Datalink Tailshaft Speed	3

Datalink Road Speed	4
Pulses Per Mile	5

OOG_ProtectionState	
State	**Enumeration**
Ramping Up	0
Ramping Down	1
Steady State Inactive	2
Steady State Active	3

T_GEAR_VSSTransmission	
State	**Enumeration**
Manual	0
Automatic	1
FULL_AMT	2
PART_AMT	3
AUTO_WITHOUT_CLUTCH	4

H_TSP_VSSResolutionStatus **H_VSP_TghResolutionStatus**	
State	**Enumeration**
Low	0
High	1

H_VSP_TghConfigurationStatus	
State	**Enumeration**
Configured	0
Waiting for configuration	1
Unconfigured	2

TSP_VSSConfigurationStatus	
State	**Enumeration**
Configured	0
Unconfigured	1

VGT:

J39_VGT_Actuator_State	**J39_VGT_Commanded_State**
State	**Enumeration**
Not Used	0
Position Control	1
Self Calibration	2
Learn	3
Hysterisis Test	4
Step Response	5
Override	6
Loss of Communication	7
Motor Off Diagnostic	8

J39_VGT_Actuator_Status	**J39_VGT_System_Error_Status**	
State	**HEX**	**Fault Code**
ACTUATOR_OVER_TEMPERATURE	0001	1962
ACTUATOR_CLOSING_ERROR	0003	2387
ACTUATOR_RESPONSE_ERROR	0004	2387
ACTUATOR_ELECTRICAL_ERROR	0005	2634
ACTUATOR_CMD_SOURCE_TIMEOUT	0008	2198
ACTUATOR_SPAN_TOO_LARGE	0009	2387
ACTUATOR_OUT_OF_TOLERANCE	000A	2387
ACTUATOR_NO_CMD_SOURCE	000B	2198
ACTUATOR_VOLTAGE_SUPPLY_ERROR	000F	1938
ACTUATOR_LIMITED_EFFORT	0016	2387
ACTUATOR_NO_REF_FOUND	0017	2449
COMM_TIMEOUT_ERROR_BIT	0100	2636
SW_ID_ERROR_BIT	0200	2635
SW_ID_TIMEOUT_ERROR_BIT	0400	2636
CUSTOMER_ID_MISMATCH_ERROR	0800	2635

SYSTEM_VOLT_MISMATCH_ERROR	1000	2635
CONFIG_MESS_TIMEOUT_ERROR	2000	2636

C_VGA_DL_StatusLB_Fault_Enable		
State	**HEX**	**Fault Code**
ACTUATOR_CMD_SOURCE_TIMEOUT	0010	2198
ACTUATOR_NO_CMD_SOURCE	0020	2198
ACTUATOR_VOLTAGE_SUPPLY_ERROR	0040	1938
not used	0080	
ACTUATOR_OVER_TEMPERATURE	0100	1962
ACTUATOR_LIMITED_EFFORT	0200	2387
ACTUATOR_OUT_OF_TOLERANCE	0400	2387
ACTUATOR_CLOSING_ERROR	0800	2387
ACTUATOR_NO_REF_FOUND	1000	2449
ACTUATOR_SPAN_TOO_LARGE	2000	2387
ACTUATOR_RESPONSE_ERROR	4000	2387
ACTUATOR_ELECTRICAL_ERROR	8000	2634

C_VGA_DL_StatusUB_Fault_Enable		
State	**HEX**	**Fault Code**
COMM_TIMEOUT_ERROR	0100	2636
SW_ID_ERROR	0200	2635
SW_ID_TIMEOUT_ERROR	0400	2636
CUSTOMER_ID_MISMATCH_ERROR	0800	2635
SYSTEM_VOLT_MISMATCH_ERROR	1000	2635
CONFIG_MESS_TIMEOUT_ERROR	2000	2636

VGA_DL_Mode_Command	
State	**HEX**
ACTUATOR_POWER_ON	8000
ACTUATOR_POSITION_CONTROL_STATE	0001
ACTUATOR_CALIBRATE_STATE	0002
ACTUATOR_LEARN_STATE	0003
ACTUATOR_HYSTERESIS_TEST_STATE	0004
ACTUATOR_STEP_RESP_TEST_STATE	0005
ACTUATOR_OVERRIDE_STATE	0006
ACTUATOR_MOTOR_OFF_STATE	0008
ACTUATOR_INSTALL_STATE	0016
ACTUATOR_CLEAR_STOPS	0017
ACTUATOR_CLER_CODES	0018

VGT_Actuator_Error_Status	
State	**Enumeration**
DEVICE_OK	0
DEVICE_INOPERABLE	1

VGA_DL_Service_State	
State	**Enumeration**
SERVICE_VGT_NONE	0
SERVICE_VGT_SELF_CAL	2
SERVICE_VGT_LEARN	3
SERVICE_VGT_HYSTERESIS_TEST	4
SERVICE_VGT_STEP_RESP_TEST	5
SERVICE_VGT_OVERRIDE	6
SERVICE_VGT_INSTALL	16
SERVICE_VGT_CLEAR STOPS	17
SERVICE_VGT_CLEAR CODES	18
SERVICE_VGT_TIS_FAILED	99
SERVICE_VGT_CYCLE_POWER0	100
SERVICE_VGT_CYCLE_POWER1	101
SERVICE_VGT_CALIBRATING	102
SERVICE_VGT_OVERRIDE2	106
INSTALLING	116
SERVICE_VGT_CLEAR STOPS	117

WATER-IN-FUEL (WIF):

EEM_WIFState	
State	**Decimal Value**
NO_WATER_DETECTED	0
WATER_DETECTED	1

296. Tool Trimmables – Standard Feature Enables and Settings

Acclerator Interlock	Enable	T_Accelerator_Interlock_Enable
Acceleration Noise	Enable	T_ANC_Speed_Algorithm_En
Adaptive Cruise	Enable	T_Adaptive_Cruise_Enable
	Adaptive Cruise Recovery	T_Adaptive_Cruise_Recovery
Adjustable Low Idle Speed	Low Idle Speed	T_LSI_Breakpoint_Speed
	Low Idle Speed Adjustment Switch	T_LSI_Incrt_Decrt_Select_En
Battery Voltage Monitor	Enable	T_AFW_Enable
	Idle Speedup	T_AFW_IdleSpeedup_Enable
Cruise Control	Enable	T_CC_Enable
	Auto-Resume	T_CC_AR_Enable
	Lower Droop	T_CC_BottomDroopWidth
	Max Cruise Control Speed	T_CC_MaxRoadSpeed
	Upper Droop	T_CC_TopDroopWidth
	Save Set Speed	T_CC_SavePoweroffSpeedEnable
Cruise Control Switch Setup	Cruise Switch Setup	T_CC_SetAccelSwitchSelect
Engine Brake Control	Enable	T_ERC_Enable
	Cruise Control Activation	T_CC_EB_Enable
	Engine Brake Delay Time	T_ERC_ServiceBrkDelay
	Engine Brake Minimum Vehicle Speed	T_ERC_MinEngageVehSpd
	Engine Brake Type	T_ERC_RetarderType
	Service Brake Activation	T_ERC_ServiceBrkActivateEn
	Start Maximum EB in Cruise	T_CC_EB_MaxBrakingSpeedDelta
	Start Minimum EB in Cruise	T_CC_EB_StartBrakingSpeedDelta
Engine Coolant Level Sensor	Enable	T_CoolantLevelSensorEnable
Engine Protection	Engine Protection Limited Restart	T_EPD_Restart_En
	Engine Protection Shutdown	T_EPD_Shutdown_En
	Engine Protection Sutdown Manual Override	T_EPD_Shutdown_Override_En
Fan Control	Enable	T_FCC_Fan_Clutch_En
	Fan Control Logic	
	Fan Control Switch	T_FCC_Manual_Input_En
	Fan on with Engine Braking	T_FCC_Engine_Brake_En
	Vehicle Speed Interaction	T_FCC_AC_VS_Interaction_En
	A/C Pressure Switch Input	T_FCC_AC_Pressure_En
	Minimum Fan On Time for A/C Pressure Switch	T_FCC_AC_Time
	Fan Type	T_FCC_Fan_Type_Selection
Gear-Down Protection	Enable	T_RSC_GD_ProtectionEnable
	GD Max Vehicle Speed (Heavy Load)	T_RSC_HighLoadSpeed
	GD Max Vehicle Speed (Light Load)	T_RSC_LightLoadSpeed
Governor Type	Governor Type	T_ABT_User_Selected_Acctr_Ctrl
	Governor Type Switch	T_SwitchableGovernorEnable
HET Lamp Activation	Enabled with Regen	T_ATD_HET_Active_Regen_Enable
	Activation Temp Thd	T_ATD_FT_HET_DPF_Out_High_Thd
	Low Temp Disable Thd (Hysteresis)	T_ATD_FT_HET_DPF_Out_Low_Thd
	Vehicle Speed Activation Thd	T_ATD_vl_HET_Veh_Spd_Thd

Idle Shutdown	Enable	T_ISD_Enable
	Manual Override	T_ISD_Ovrd_Enable
	Shutdown Accessory Relay	T_ISD_Relay_Enable
	Time Before Shutdown	T_ISD_Period
	Ambient Temperature Override	T_ISD_Tmptr_Enable
	Cold Ambient Air Temperature	T_ISD_MinAmbAir_Tmptr
	Hot Ambient Air Temperature	T_ISD_NoOvrdHigh_Thd
	Intermediate Ambient Air Temperature	T_ISD_NoOvrdLow_Thd
	Shutdown in PTO	T_ISD_ShutdownDuringPTOEn
	Shutdown Percent Engine Load	T_ISD_Loading_Thd
Limp Home Torque	Enable	T_LMP_En
LBSC	Enable	T_LBSC_Enable
PTO	Max Vehicle Speed in PTO	T_PTO_Max_VS_Thd
	Service Brake Override in PTO	T_PTO_Disable_With_Brake_Switch
	PTO Enable	T_PTOA_En
	Alternate PTO	T_PTO_Alternate_En
	Clutch Override in PTO	T_PTO_Disable_With_Clutch_Switch
	Max Engine Load in PTO	T_PTO_Max_Engine_Load
	Max PTO Speed	T_PTO_Max_Ref_ES
	Min PTO Speed	T_PTO_Min_Ref_ES
	PTO Ramp Rate	T_PTO_Transient_Accel
	PTO Resume Switch Speed	T_PTO_Resume_ES
	PTO Set Switch Speed	T_PTO_Set_ES
	PTO Zero VSS Limit	T_PTO_ZeroVSSLimit_Enable
	Accelerator Override in PTO	T_PTO_Acctr_Override_En
	PTO Accelerator Override Max Engine Speed	T_PTO_Acctr_Override_Max_ES
	Remote PTO Enable	T_PTO_Remote_En
	Number of Remote PTO Set Speeds	T_PTO_Remote_Count_Lim
	Remote Set Speed 1	T_PTO_Remote_ES_1
	Remote Set Speed 2	T_PTO_Remote_ES_2
	Remote Set Speed 3	T_PTO_Remote_ES_3
	Remote Set Speed 4	T_PTO_Remote_ES_4
	Remote Set Speed 5	T_PTO_Remote_ES_5
Regeneration	Minimum Vehicle Speed	T_EXM_MobileRegenVehSpdDisThd
	Stay Warm Enable	T_EXM_Stay_Warm_Enable
	Parking Brake Enable	T_EXM_ParkingBrakeEnCond
Remote Accelerator	Enable	T_RMT_Remote_Accel_Enable
	Remote Accelerator Override	T_DIP_RMT_Switch_User_Ovrd_En
Road Speed Governor	Enable	T_RSC_Enable
	Maximum Accelerator Vehicle Speed	T_RSC_MaxRoadSpeed
	Maximum Vehicle Speed	T_RSC_FinalMaxRoadSpeed
	Road Speed Governor Lower Droop	T_RSC_BottomDroopWidth
	Road Speed Governor Upper Droop	T_RSC_TopDroopWidth
	Smart Road Speed Governor	T_SRG_Enable
Smart RSG	Enable	T_SRG_Enable
Starter Lockout	Enable	T_SLO_Enable
	Starter Lockout Relay Type	T_SLO_RelayType
Transmission Setup	Clutch Pedal Position Switch	T_ClutchSwitchEnable
	Gear Down Transmission Ratio	T_RSC_GD_GearRatio
	Top Gear Transmission Ratio	T_RSC_TopGearRatio
	Transmission Type	T_GEAR_VSSTransmission
Vehicle Electrical System Voltage	Vehicle Electrical System Voltage	T_Electrical_System_Voltage
Vehicle Speed Source	Maximum Engine Speed without VSS	T_MaxEngSpd_With_Zero_Vss
	Number of Transmission Tailshaft Gear Teeth	T_TSP_TeethPerRev

	Rear Axle Ratio	T_RAR_RearAxleRatioHigh & T_RAR_RearAxleRatioLow
	Tire Size	T_RAR_TireSize
	Vehicle Speed Sensor Type	T_TSP_SensorType
Water in Fuel Sensor	Enable	T_EEM_WIFEnable

297. Monarch CM2250 FAULT CODE LIST

Comment [BJO18]: Updated

Fault Code	Lamp	Number of Trips To Set the Fault	Service Description
111	Red Stop + MIL	1	Engine Control Module Critical Internal Failure - Bad intelligent device or compon internal to the ECM related to memory hardware failures or internal ECM voltage circuits.
115	Red Stop + MIL	1	Engine Magnetic Speed/Position Lost Both of Two Signals - Data erratic; intermitt incorrect. The ECM has detected that the primary and backup speed sensor signa connected backwards.
122	MIL	1	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal; or shorted to h High signal voltage detected at the intake manifold pressure circuit.
123	MIL	1	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal; or shorted to l Low signal voltage or open circuit detected at the intake manifold pressure circuit
124	MIL	2	Intake Manifold 1 Pressure - Data Valid But Above Normal Operating Range - Mo Severe Level.
125	MIL	2	Intake Manifold 1 Pressure - Data Valid But Below Normal Operating Range - Mo Severe Level. Intake manifold pressure is below the minimum operating limit.
131	Red Stop + MIL	1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal; or sh high source. High voltage detected at accelerator pedal position #1 signal circuit.
132	Red Stop + MIL	1	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal; or sh low source. Low voltage detected at accelerator pedal position #1 signal circuit.
133	Red Stop	1	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above norm shorted to high source. High signal voltage detected at remote accelerator positio circuit.
134	Red Stop	1	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below norm shorted to low source. Low signal voltage detected at remote accelerator positior circuit.
135	MIL	1	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage above normal; or shorted to h High signal voltage detected at the engine oil pressure circuit.
141	MIL	1	Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage below normal; or shorted to l Low signal voltage or open circuit detected at engine oil pressure circuit.
143	Amber Warning Lamp	1	Engine Oil Rifle Pressure - Data Valid But Below Normal Operating Range - Mode Severe Level. Engine oil pressure signal indicates engine oil pressure is below the protection warning limit.
144	MIL	1	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal; or shorted source. High signal voltage or open circuit detected at engine coolant temperatu
145	MIL	1	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal; or shorted source. Low signal voltage detected at engine coolant temperature circuit.
146	Amber Warning Lamp	1	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - M Severe Level. Engine coolant temperature is above engine protection warning lim

151	Red Stop	1	Engine Coolant Temperature - Data valid but above normal operational range - M Level. Engine coolant temperature signal indicates engine coolant temperature al protection critical limit.
153	MIL	1	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal; or shortec source. High signal voltage detected at intake manifold air temperature circuit.
154	MIL	1	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal; or shortec source. Low signal voltage detected at intake manifold air temperature circuit.
155	Red Stop	1	Intake Manifold 1 Temperature - Data valid but above normal operational range Severe Level. Intake manifold air temperature signal indicates intake manifold air temperature above engine protection critical limit.
187	MIL	1	Sensor Supply 2 Circuit - Voltage below normal; or shorted to low source. Low vc detected at the sensor supply number 2 circuit.
195	MIL	1	Coolant Level Sensor 1 Circuit - Voltage above normal; or shorted to high source. voltage detected at engine coolant level circuit.
196	MIL	1	Coolant Level Sensor 1 Circuit - Voltage below normal; or shorted to low source. voltage detected at engine coolant level circuit.
197	Amber Warning Lamp	1	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Seve Low engine coolant level detected.
212	MIL	1	Engine Oil Temperature Sensor 1 Circuit - Voltage above normal; or shorted to hi High signal voltage or open circuit detected at engine oil temperature circuit.
213	MIL	1	Engine Oil Temperature Sensor 1 Circuit - Voltage below normal; or shorted to lo Low signal voltage detected at engine oil temperature circuit.
214	Red Stop	1	Engine Oil Temperature - Data valid but above normal operational range - Most S Level. Engine oil temperature signal indicates engine oil temperature above engir critical limit.
221	MIL	1	Barometric Pressure Sensor Circuit - Voltage above normal; or shorted to high so signal voltage detected at barometric pressure circuit.
222	MIL	1	Barometric Pressure Sensor Circuit - Voltage below normal; or shorted to low sou signal voltage detected at barometric pressure circuit.
227	MIL	1	Sensor Supply 2 Circuit - Voltage above normal; or shorted to high source. High detected at sensor supply number 2 circuit.
234	Red Stop	1	Engine Crankshaft Speed/Position - Data valid but above normal operational ranc Severe Level. Engine speed signal indicates engine speed above engine protectio
235	Red Stop	1	
238	MIL	1	Sensor Supply 3 Circuit - Voltage below normal; or shorted to low source. Low vc detected on the +5 volt sensor supply circuit to the engine speed sensor.
239	MIL	1	Sensor Supply 3 Circuit - Voltage above normal; or shorted to high source. High detected at sensor supply number 3 circuit.
241	MIL	1	Wheel-Based Vehicle Speed - Data erratic; intermittent or incorrect. The ECM lost speed signal.
242	Amber Warning Lamp	1	Wheel-Based Vehicle Speed Sensor Circuit tampering has been detected - Abnorr change. Signal indicates an intermittent connection or VSS tampering.
245	Amber Warning Lamp	1	Fan Control Circuit - Voltage below normal; or shorted to low source. Low signal detected at the fan control circuit when commanded on.

249	MIL	1	Ambient Air Temperature Sensor 1 Circuit - Voltage above normal; or shorted to
256	MIL	1	Ambient Air Temperature Sensor 1 Circuit - Voltage below normal; or shorted to
271	MIL	1	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal; or shc source. Low signal voltage detected at the fuel pump actuator circuit.
272	MIL	1	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal; or shc source. High signal voltage or open circuit detected at the fuel pump actuator cir
285	Amber Warning Lamp	1	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate. The ECM exp information from a multiplexed device but did not receive it soon enough or did r at all.
286	Amber Warning Lamp	1	SAE J1939 Multiplexing Configuration Error - Out of Calibration. The ECM expecte information from a multiplexed device but only received a portion of the necessai information.
288	Red Stop	1	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor Syster Network Data In Error. The OEM vehicle electronic control unit (VECU) detected a the remote accelerator.
295	MIL	1	Barometric Pressure - Data erratic; intermittent or incorrect. An error in the baro pressure sensor signal was detected by the ECM.
319	MIL	1	Real Time Clock - Data erratic; intermittent or incorrect.
322	MIL	1	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit. the injector circuit has been detected.
323	MIL	1	Injector Solenoid Driver Cylinder 5 Circuit - Current below normal or open circuit. the injector circuit has been detected.
324	MIL	1	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit. the injector circuit has been detected.
325	MIL	1	Injector Solenoid Driver Cylinder 6 Circuit - Current below normal or open circuit. the injector circuit has been detected.
331	MIL	1	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit. the injector circuit has been detected.
332	MIL	1	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit. the injector circuit has been detected.
334	MIL	2	Engine Coolant Temperature - Data erratic; intermittent or incorrect.
338	Amber Warning Lamp	1	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage above normal; o high source. Open circuit or short to voltage source detected at the idle shutdow accessory/ignition bus relay circuit.
339	Amber Warning Lamp	1	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage below normal; o low source. Low voltage detected at the idle shutdown vehicle accessory or igniti circuit when commanded on.
343	MIL	1	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device component. ECM power supply errors have been detected.
346	Amber Warning Lamp	1	Engine Control Module Calibration Memory Software - Bad intelligent device or cc Invalid switch configuration adjustable parameter setting have been detected by
351	MIL	1	Injector Power Supply - Bad intelligent device or component. The ECM measured boost voltage is low.
352	MIL	1	Sensor Supply 1 Circuit - Voltage below normal; or shorted to low source. Low vc detected at sensor supply number 1 circuit.

386	MIL	1	Sensor Supply 1 Circuit - Voltage above normal; or shorted to high source. High v detected at sensor supply number 1 circuit.
415	Red Stop	1	Engine Oil Rifle Pressure - Data valid but below normal operational range - Most Level. Oil pressure signal indicates oil pressure below the engine protection critic
418	MIL	1	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Least S Water has been detected in the fuel filter.
421	Amber Warning Lamp	1	Engine Oil Temperature - Data Valid But Above Normal Operating Range - Moder Level.
425	MIL	2	Engine Oil Temperature - Data erratic; intermittent or incorrect.
427	None	1	SAE J1939 Datalink - Abnormal update rate. Communication between the electro module (ECM) and another device on the SAE J1939 data link has been lost.
428	Amber Warning Lamp	1	Water in Fuel Indicator Sensor Circuit - Voltage above normal; or shorted to high High voltage detected at the water in fuel circuit.
429	Amber Warning Lamp	1	Water in Fuel Indicator Sensor Circuit - Voltage below normal; or shorted to low voltage detected at the water in fuel circuit.
435	MIL	2	Engine Oil Rifle Pressure - Data erratic; intermittent or incorrect. The engine oil p sensor is reading an erratic value at initial key-on.
436	MIL	1	Intake Manifold 1 Temperature - Data erratic; intermittent or incorrect.
441	Amber Warning Lamp	1	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately S ECM supply voltage is below the minimum system voltage level.
442	Amber Warning Lamp	1	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately S ECM supply voltage is above the maximum system voltage level.
451	MIL	1	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal; or short source. High signal voltage detected at the rail fuel pressure sensor circuit.
452	MIL	1	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal; or short source. Low signal voltage detected at the rail fuel pressure sensor circuit.
477	MIL	1	Battery 2 Voltage - Data Valid But Below Normal Operating Range - Moderately S
478	MIL	1	Battery 2 Voltage - Data Valid But Above Normal Operating Range - Moderately S
515	MIL	1	Sensor Supply 6 Circuit - Voltage above normal; or shorted to high source.
516	MIL	1	Sensor Supply 6 Circuit - Voltage below normal; or shorted to low source.
553	MIL	1	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range Moderately Severe Level. The ECM has detected that fuel pressure is higher than commanded pressure.
555	Amber Warning Lamp	1	Crankcase Pressure - Data Valid But Above Normal Operating Range - Moderately Level. The crankcase breather filter requires maintenance.
556	Red Stop	1	Crankcase Pressure - Data valid but above normal operational range - Most Severe The crankcase breather filter requires maintenance.
559	MIL	1	Injector Metering Rail 1 Pressure - Data Valid But Below Normal Operating Range Moderately Severe Level. An unexpectedly low fuel delivery was detected at the f pressure sensor.
584	Amber Warning Lamp	1	Starter Relay Driver Circuit - Voltage above normal; or shorted to high source. Op or high voltage detected at starter lockout circuit.

585	Amber Warning Lamp	1	Starter Relay Driver Circuit - Voltage below normal; or shorted to low source. Lov detected at starter lockout circuit.
595	MIL	1	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Modera Level.
596	Amber Warning Lamp	1	Electrical Charging System Voltage - Data Valid But Above Normal Operating Ran Moderately Severe Level. High battery voltage detected by the battery voltage m feature.
597	Amber Warning Lamp	1	Electrical Charging System Voltage - Data Valid But Below Normal Operating Ran Moderately Severe Level. Low battery voltage detected by the battery voltage mo feature.
598	Red Stop	1	Electrical Charging System Voltage - Data valid but below normal operational ran Severe Level. Very low battery voltage detected by the battery voltage monitor fe
629	Amber Warning Lamp	1	Turbocharger 1 Compressor Intake Pressure - Data Valid But Below Normal Oper - Moderately Severe Level.
649	MIL	1	Engine Oil Change Interval - Condition Exists. Change engine oil and filter.
687	MIL	1	Turbocharger 1 Speed - Data Valid But Below Normal Operating Range - Moderat Level. Low turbocharger speed detected by the ECM.
689	MIL	1	Engine Crankshaft Speed/Position - Data erratic; intermittent or incorrect. Loss o crankshaft sensor.
691	MIL	1	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal; to high source. High signal voltage detected at turbocharger compressor inlet air temperature circuit.
692	MIL	1	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal; to low source. Low signal voltage detected at turbocharger compressor inlet air t circuit.
693	MIL	1	Turbocharger 1 Compressor Intake Temperature - Data erratic; intermittent or in
731	MIL	1	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical syst responding or out of adjustment. Engine position signal from the engine speed se camshaft position sensor do not match.
778	MIL	1	Engine Camshaft Speed / Position Sensor - Data erratic; intermittent or incorrect. has detected a loss of signal from the camshaft position sensor.
784	None	1	Adaptive Cruise Control Mode - Data erratic; intermittent or incorrect. Loss of cor with adaptive cruise control.
1117	None	1	Power Supply Lost With Ignition On - Data erratic; intermittent or incorrect. Supp to the ECM fell below 6.2 volts momentarily; or the ECM was not allowed to pow correctly (retain battery voltage for 30 seconds after key OFF).
1139	MIL	2	Injector Solenoid Driver Cylinder 1 - Mechanical system not responding or out of
1141	MIL	2	Injector Solenoid Driver Cylinder 2 - Mechanical system not responding or out of
1142	MIL	2	Injector Solenoid Driver Cylinder 3 - Mechanical system not responding or out of
1143	MIL	2	Injector Solenoid Driver Cylinder 4 - Mechanical system not responding or out of
1144	MIL	2	Injector Solenoid Driver Cylinder 5 - Mechanical system not responding or out of

1145	MIL	2	Injector Solenoid Driver Cylinder 6 - Mechanical system not responding or out of
1228	MIL	1	EGR Valve Position - Data erratic; intermittent or incorrect.
1239	MIL	1	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal; or sl high source. High voltage detected at accelerator pedal position #2 signal circuit.
1241	MIL	1	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal; or sl low source. Low voltage detected at accelerator pedal position #2 signal circuit.
1242	Red Stop + MIL	1	Accelerator Pedal or Lever Position Sensor 1 - Data erratic; intermittent or incorre Accelerator position sensors #1 and #2 are reading different values.
1515	Red Stop + MIL	1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Netv Error.
1654	MIL	2	Engine Misfire Cylinder 1 - Condition Exists.
1655	MIL	2	Engine Misfire Cylinder 2 - Condition Exists.
1656	MIL	2	Engine Misfire Cylinder 3 - Condition Exists.
1657	MIL	2	Engine Misfire Cylinder 4 - Condition Exists.
1658	MIL	2	Engine Misfire Cylinder 5 - Condition Exists.
1659	MIL	2	Engine Misfire Cylinder 6 - Condition Exists.
1664	MIL	2	Aftertreatment Diesel Oxidation Catalyst Missing - Condition Exists. The aftertrea oxidation catalyst is not present in the exhaust system.
1668	Amber Warning Lamp	1	Aftertreatment Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage below no shorted to low source.
1669	Amber Warning Lamp	1	Aftertreatment Diesel Exhaust Fluid Tank Level Sensor Circuit - Voltage above no shorted to high source.
1673	Amber Warning Lamp	1	Aftertreatment Diesel Exhaust Fluid Tank Level - Data valid but below normal ope range - Most Severe Level.
1677	MIL	1	Aftertreatment Diesel Exhaust Fluid Tank Temperature Sensor - Voltage below nc shorted to low source.
1678	MIL	1	Aftertreatment Diesel Exhaust Fluid Tank Temperature Sensor - Voltage above nc shorted to high source.
1679	MIL	2	Aftertreatment Diesel Exhaust Fluid Tank Temperature - Data erratic; intermitten incorrect.
1681	MIL	2	Aftertreatment Diesel Exhaust Fluid Dosing Unit - Bad intelligent device or compc
1682	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Unit Input Lines - Condition Exists.
1683	MIL	1	Aftertreatment Diesel Exhaust Fluid Tank Heater - Voltage above normal; or shor source.
1684	MIL	1	Aftertreatment Diesel Exhaust Fluid Tank Heater - Voltage below normal; or shor source.
1688	MIL	1	Aftertreatment Diesel Exhaust Fluid Controller - Bad intelligent device or compon
1691	MIL	1	Aftertreatment Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Be Operating Range - Moderately Severe Level. The temperature increase across the aftertreatment catalyst is lower than expected.
1695	MIL	1	Sensor Supply 5 - Voltage above normal; or shorted to high source. High voltage sensor supply number 5 circuit in the OEM harness;

1696	MIL	1	Sensor Supply 5 - Voltage below normal; or shorted to low source. Low voltage c sensor supply number 5 circuit in the OEM harness;
1712	MIL	2	Aftertreatment Diesel Exhaust Fluid Tank Heater - Data Valid But Below Normal (Range - Moderately Severe Level.
1713	MIL	2	Aftertreatment Diesel Exhaust Fluid Tank Heater - Data Valid But Above Normal (Range - Moderately Severe Level.
1718	MIL	2	Engine Misfire for Multiple Cylinders - Condition Exists.
1843	MIL	1	Crankcase Pressure Circuit - Voltage above normal; or shorted to high source. Hi voltage detected at the crankcase pressure circuit.
1844	MIL	1	Crankcase Pressure Circuit - Voltage below normal; or shorted to low source. Lov voltage or open circuit detected at the crankcase pressure circuit.
1852	Amber Warning Lamp	1	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Moderz Level.
1866	MIL	1	Exhaust Gas Recirculation Differential Pressure - Data erratic; intermittent or incc error in the EGR delta pressure signal was detected at initial key-on or the senso autozero test.
1867	MIL	1	Exhaust Gas Recirculation Temperature - Data erratic; intermittent or incorrect.
1879	MIL	1	Aftertreatment Diesel Particulate Filter Differential Pressure Sensor Circuit - Volta normal; or shorted to high source. High signal voltage detected at the aftertreatr differential pressure sensor circuit.
1881	MIL	1	Aftertreatment Diesel Particulate Filter Differential Pressure Sensor Circuit - Volta normal; or shorted to low source. Low signal voltage or open circuit detected at t aftertreatment differential pressure sensor circuit.
1883	MIL	2	Aftertreatment Diesel Particulate Filter Differential Pressure Sensor - Data erratic, intermittent or incorrect. The aftertreatment diesel particulate filter differential pr sensor is reading an erratic value at initial key-on or during engine operation.
1885	MIL	1	Aftertreatment Intake NOx Sensor Circuit - Voltage below normal; or shorted to l
1887	MIL	1	Aftertreatment Outlet NOx Sensor Circuit - Voltage below normal; or shorted to l
1896	MIL	1	EGR Valve Controller - Out of Calibration. The EGR valve has failed the automatic procedure at initial key-on.
1898	MIL	2	VGT Actuator Controller - Out of Calibration.
1911	MIL	1	Injector Metering Rail 1 Pressure - Data valid but above normal operational range Severe Level. Fuel pressure signal indicates that fuel pressure has exceeded the limit for the given engine rating.
1921	Amber Warning Lamp	1	Aftertreatment Diesel Particulate Filter Differential Pressure - Data Valid But Abov Operating Range - Moderately Severe Level. The soot load of the aftertreatment particulate filter has exceeded the recommended limits.
1922	Red Stop	1	Aftertreatment Diesel Particulate Filter Differential Pressure - Data valid but abov operational range - Most Severe Level. The soot load of the aftertreatment diesel filter has exceeded the recommended limits. Engine protection detrate is enablec
1923	MIL	1	Aftertreatment Fuel Shutoff Valve 1 Circuit - Voltage above normal; or shorted to source. High signal voltage detected at the aftertreatment fuel shutoff valve circu

1924	MIL	1	Aftertreatment Fuel Shutoff Valve 1 Circuit - Voltage below normal; or shorted to Low signal voltage detected at the aftertreatment fuel shutoff valve circuit.
1925	MIL	1	Aftertreatment Fuel Shutoff Valve 1 - Data erratic; intermittent or incorrect. An e been detected in the aftertreatment fuel shutoff valve or the aftertreatment fuel system.
1926	MIL	1	Aftertreatment Fuel Pressure Sensor - Data erratic; intermittent or incorrect. The detected that the aftertreatment fuel pressure signal is not changing with engine conditions.
1927	MIL	1	Aftertreatment Fuel Pressure Sensor Circuit - Voltage above normal; or shorted t source. High signal voltage detected at the aftertreatment fuel pressure sensor c
1928	MIL	1	Aftertreatment Fuel Pressure Sensor Circuit - Voltage below normal; or shorted t source. Low signal voltage or open circuit detected at the aftertreatment fuel pre sensor circuit.
1932	MIL	1	Aftertreatment Doser - Data erratic; intermittent or incorrect.
1938	MIL	1	ECU Power Output Supply Voltage 1 - Data Valid But Below Normal Operating Ra Moderately Severe Level. Low battery voltage detected by the VGT actuator.
1942	MIL	2	Crankcase Pressure - Data erratic; intermittent or incorrect. The ECM has detecte crankcase pressure signal is not changing with engine operating conditions.
1943	None	1	Ambient Air Density - Data Valid But Below Normal Operating Range - Least Seve Engine torque has been reduced because the vehicle was operating at a high alti condition.
1961	MIL	1	EGR Valve Control Circuit Over Temperature - Data Valid But Above Normal Oper - Least Severe Level.
1962	Amber Warning Lamp	1	VGT Actuator Driver Over Temperature (Calculated) - Data Valid But Above Norm Operating Range - Least Severe Level. High internal VGT actuator temperature h detected.
1963	MIL	1	Aftertreatment Fuel Shutoff Valve 1 - Mechanical system not responding or out o adjustment. The aftertreatment fuel shutoff valve has been detected to be stuck
1977	MIL	1	Aftertreatment Doser Circuit - Current below normal or open circuit.. High resista circuit; or open circuit detected on the aftertreatment fuel injector circuit.
1981	MIL	1	Aftertreatment Diesel Particulate Filter System - Data Valid But Above Normal Op Range - Least Severe Level. The aftertreatment differential pressure has exceede maximum operating limits or the diesel particulate filter is plugged.
2182	Amber Warning Lamp	1	Engine Brake Actuator Driver 1 Circuit - Voltage above normal; or shorted to high High voltage or open circuit detected at the engine brake solenoid number 1 sign
2183	Amber Warning Lamp	1	Engine Brake Actuator Driver 1 Circuit - Voltage below normal; or shorted to low voltage detected at the engine brake solenoid number 1 signal circuit.
2185	MIL	1	Sensor Supply 4 Circuit - Voltage above normal; or shorted to high source. High detected at 5 volt sensor supply circuit to the accelerator pedal position sensor.

2186	MIL	1	Sensor Supply 4 Circuit - Voltage below normal; or shorted to low source. Low vc detected at 5 volt sensor supply circuit to the accelerator pedal position sensor.
2198	MIL	1	VGT Actuator Driver Circuit - Root Cause Not Known. Intermittent communicatior the smart VGT controller and the ECM and been detected. The VGT controller is r interpreting the J1939 message from the ECM correctly.
2265	Amber Warning Lamp	1	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage above normal; or short source. High voltage or open detected at the fuel lift pump signal circuit.
2266	Amber Warning Lamp	1	Electric Lift Pump for Engine Fuel Supply Circuit - Voltage below normal; or short source. Low signal voltage detected at the fuel lift pump circuit.
2272	MIL	1	EGR Valve Position Circuit - Voltage below normal; or shorted to low source. Low voltage has been detected at the EGR position sensor circuit.
2273	MIL	1	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above no shorted to high source. High signal voltage detected at EGR differential pressure circuit.
2274	MIL	1	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below nor shorted to low source.
2288	None	1	Turbocharger 1 Speed - Data Valid But Above Normal Operating Range - Least Sc High turbocharger speed has been detected by the ECM.
2311	MIL	1	Electronic Fuel Injection Control Valve Circuit - Condition Exists. An error has bee on fuel pump actuator circuit.
2321	None	1	Engine Crankshaft Speed/Position - Data erratic; intermittent or incorrect. Cranks speed sensor intermittent synchronization.
2322	None	1	Engine Camshaft Speed / Position Sensor - Data erratic; intermittent or incorrect. engine speed sensor intermittent synchronization.
2346	None	1	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operat Least Severe Level. Turbocharger turbine inlet temperature has exceeded the en protection limit.
2347	None	1	Turbocharger Compressor Outlet Temperature (Calculated) - Data Valid But Abov Operating Range - Least Severe Level. High turbocharger compressor outlet air t has been calculated by the electronic control module (ECM).
2349	MIL	1	EGR Valve Control Circuit - Current below normal or open circuit.
2353	MIL	1	EGR Valve Control Circuit - Current above normal or grounded circuit.
2363	Amber Warning Lamp	1	Engine Brake Actuator Driver Output 2 Circuit - Voltage below normal; or shortec source. Low voltage detected at the engine brake solenoid number 2 signal circu
2367	Amber Warning Lamp	1	Engine Brake Actuator Driver Output 2 Circuit - Voltage above normal; or shortec source. Open circuit or high voltage detected at the engine brake solenoid numb circuit.
2372	Amber Warning Lamp	1	Fuel Filter Differential Pressure - Data Valid But Above Normal Operating Range - Severe Level.
2373	MIL	1	Exhaust Gas Pressure Sensor Circuit - Voltage above normal; or shorted to high s signal voltage detected at exhaust gas pressure circuit.

2374	MIL	1	Exhaust Gas Pressure Sensor Circuit - Voltage below normal; or shorted to low sc signal voltage detected at exhaust gas pressure circuit.
2375	MIL	1	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal; o high source. High signal voltage detected at EGR temperature circuit.
2376	MIL	1	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal; o low source. Low signal voltage detected at EGR temperature circuit.
2377	Amber Warning Lamp	1	Fan Control Circuit - Voltage above normal; or shorted to high source. Open circu voltage detected at the fan control circuit.
2387	MIL	2	VGT Actuator Driver Circuit (Motor) - Mechanical system not responding or out of adjustment. The smart VGT controller has detected incorrect stop limits or the VG to move to the closed position.
2398	MIL	1	Ambient Air Temperature - Data erratic; intermittent or incorrect.
2448	MIL	1	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Lev engine coolant level detected.
2449	Red Stop + MIL	1	VGT Actuator Controller - Out of Calibration. The VGT has failed the automatic ca procedure at initial key-on. VGT will be in the open position.
2451	None	1	Turbocharger Turbine Intake Temperature - Data Valid But Above Normal Operat Moderately Severe Level. Turbocharger turbine inlet temperature has exceeded t protection limit.
2468	Amber Warning Lamp	1	Engine Crankshaft Speed/Position - Data Valid But Above Normal Operating Rang Moderately Severe Level.
2554	MIL	1	Exhaust Gas Pressure - Data erratic; intermittent or incorrect. The exhaust gas p sensor is reading an erratic value at initial key-on.
2634	Red Stop + MIL	1	VGT Actuator Controller - Bad intelligent device or component. An internal error h detected by the smart VGT controller.
2635	Red Stop + MIL	1	VGT Actuator Driver Circuit - Condition Exists. A calibration mismatch between VG and the ECM has been detected.
2636	Red Stop + MIL	1	VGT Actuator Driver Circuit - Abnormal update rate. No communications on the J datalink between the engine ECM and the smart VGT controller.
2638	None	2	Aftertreatment Diesel Oxidation Catalyst Conversion Efficiency - Data Valid But Be Operating Range - Least Severe Level.
2639	None	1	Aftertreatment Diesel Particulate Filter Differential Pressure - Data Valid But Abov Operating Range - Least Severe Level. The soot load of the aftertreatment diesel filter has exceeded the recommended limits.
2646	Amber Warning Lamp	1	Engine Coolant Temperature - Condition Exists. The EGR valve was closed to red coolant temperatures.
2738	Amber Warning Lamp	1	Start Enable Device 1 Circuit (Ether Injection) - Voltage above normal; or shorted source. High signal voltage or open circuit detected at the ether start solenoid cir
2739	Amber Warning Lamp	1	Start Enable Device 1Circuit (Ether Injection) - Voltage below normal; or shorted source. Low signal voltage detected at the ether start solenoid circuit.
2764	Amber Warning Lamp	1	Exhaust Gas Pressure - Data Valid But Above Normal Operating Range - Moderat Level. High exhaust gas pressure has been detected by the exhaust gas pressure
2765	None	1	Engine Injector Bank 1 Barcodes - Out of Calibration. Invalid injector barcode inf has been entered.

2771	MIL	1	Aftertreatment Outlet NOx Sensor - Abnormal update rate.
2777	None	1	Particulate Trap Active Regeneration Inhibited Due to Inhibit Switch - Condition E Regeneration of the diesel particulate filter has been prevented due to the inhibit being activated.
2789	Amber Warning Lamp	1	Engine Coolant Temperature - Data Valid But Below Normal Operating Range - M Severe Level. Engine coolant temperature is below normal operating temperature
2881	MIL	1	Aftertreatment Fuel Pressure Sensor - Data Valid But Below Normal Operating Ra Severe Level. Low fuel pressure has been detected in the aftertreatment fuel sys
2961	None	1	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Least Severe Level. EGR temperature has exceeded the engine protection limit.
2962	Amber Warning Lamp	1	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Moderately Severe Level. EGR temperature has exceeded the engine protection li
2963	None	1	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - L Level. Engine coolant temperature is above engine protection warning limit.
2964	None	1	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Severe Level. Intake manifold air temperature signal indicates intake manifold ai temperature is above the engine protection warning limit.
2973	MIL	1	Intake Manifold 1 Pressure - Data erratic; intermittent or incorrect. The ECM has intake manifold pressure signal that is too high or low for current engine operatir conditions.
2976	MIL	2	Aftertreatment Diesel Exhaust Fluid Dosing Unit Temperature - Data erratic; inter incorrect.
3133	MIL	1	Aftertreatment Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage al normal; or shorted to high source.
3134	MIL	1	Aftertreatment Diesel Particulate Filter Outlet Pressure Sensor Circuit - Voltage be normal; or shorted to low source.
3135	MIL	2	Aftertreatment Diesel Particulate Filter Outlet Pressure - Data erratic; intermitten incorrect.
3136	MIL	1	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage above shorted to high source.
3137	MIL	1	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage below shorted to low source.
3138	MIL	1	Engine Exhaust Gas Recirculation Outlet Pressure - Data erratic; intermittent or ir
3139	Amber Warning Lamp	1	Engine Air Shutoff Circuit - Voltage above normal; or shorted to high source.
3141	Amber Warning Lamp	1	Engine Air Shutoff Circuit - Voltage below normal; or shorted to low source.
3142	MIL	1	Aftertreatment SCR Intake Temperature Sensor Circuit - Voltage above normal; c high source.
3143	MIL	1	Aftertreatment SCR Intake Temperature Sensor Circuit - Voltage below normal; c low source.
3144	MIL	2	Aftertreatment SCR Intake Temperature Sensor - Data erratic; intermittent or inc
3145	MIL	2	Aftertreatment SCR Intake Temperature Sensor - Abnormal rate of change.

3146	MIL	1	Aftertreatment SCR Outlet Temperature Sensor Circuit - Voltage above normal; o high source.
3147	MIL	1	Aftertreatment SCR Outlet Temperature Sensor Circuit - Voltage below normal; o low source.
3148	MIL	2	Aftertreatment SCR Outlet Temperature Sensor - Data erratic; intermittent or inc
3149	MIL	2	Aftertreatment SCR Outlet Temperature Sensor - Abnormal rate of change.
3151	MIL	2	Aftertreatment SCR Catalyst System Missing - Condition Exists.
3165	Red Stop	1	Aftertreatment SCR Outlet Temperature - Data valid but above normal operationa Most Severe Level.
3167	MIL	1	Aftertreatment Doser - Data Valid But Below Normal Operating Range - Moderate Level.
3168	MIL	2	Aftertreatment Diesel Particulate Filter System - Data Valid But Above Normal Op Range - Moderately Severe Level.
3223	MIL	1	Aftertreatment Purge Air Actuator Circuit - Voltage below normal; or shorted to l
3224	MIL	1	Aftertreatment Purge Air Actuator Circuit - Voltage above normal; or shorted to h .
3225	MIL	1	Aftertreatment Purge Air Actuator - Mechanical system not responding or out of a
3228	MIL	2	Aftertreatment Intake NOx Sensor - Data erratic; intermittent or incorrect.
3229	Red Stop	1	Aftertreatment SCR Intake Temperature - Data valid but above normal operation Most Severe Level.
3231	Red Stop	1	Aftertreatment SCR Intake Temperature - Data Valid But Above Normal Operatin Moderately Severe Level.
3232	MIL	1	Aftertreatment Intake NOx Sensor - Abnormal update rate.
3235	Red Stop	1	Aftertreatment SCR Outlet Temperature - Data Valid But Above Normal Operating Moderately Severe Level.
3237	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 1 Circuit - Voltage above normal, to high source.
3239	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 2 Circuit - Voltage above normal, to high source.
3242	MIL	2	Aftertreatment Diesel Exhaust Fluid Tank Heater - Mechanical system not respon of adjustment.
3243	MIL	2	Engine Cooling System Monitor - Data Valid But Below Normal Operating Range - Severe Level.
3245	Amber Warning Lamp	1	Aftertreatment Diesel Particulate Filter System - Mechanical system not respondir adjustment.
3251	Red Stop	1	Aftertreatment Diesel Oxidation Catalyst Intake Temperature - Data Valid But Ab Operating Range - Moderately Severe Level.
3253	Red Stop	1	Aftertreatment Diesel Particulate Filter Intake Temperature - Data Valid But Abov Operating Range - Moderately Severe Level.
3254	MIL	1	Aftertreatment Diesel Particulate Filter Intake Temperature - Data Valid But Abov Operating Range - Least Severe Level.
3255	Red Stop	1	Aftertreatment Diesel Particulate Filter Outlet Temperature - Data Valid But Abov Operating Range - Moderately Severe Level.
3256	MIL	1	Aftertreatment Diesel Particulate Filter Outlet Temperature - Data Valid But Abov Operating Range - Least Severe Level.
3258	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 1 Circuit - Current below normal circuit.

3261	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 2 Circuit - Current below normal circuit.
3311	Red Stop	1	Aftertreatment Diesel Particulate Filter Intake Temperature - Data valid but abov operational range - Most Severe Level. The exhaust gas temperature 2 sensor re exceeded the maximum engine protection temperature limit.
3312	Red Stop	1	Aftertreatment Diesel Particulate Filter Outlet Temperature - Data valid but above operational range - Most Severe Level. The exhaust gas temperature 3 sensor re exceeded the maximum engine protection temperature limit.
3313	MIL	1	Aftertreatment Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voll normal; or shorted to low source. Low signal voltage detected at the catalyst inle circuit.
3314	MIL	1	Aftertreatment Diesel Oxidation Catalyst Intake Temperature Sensor Circuit - Voll normal; or shorted to high source. High signal voltage or open circuit detected at inlet sensor circuit.
3315	MIL	2	Aftertreatment Diesel Oxidation Catalyst Intake Temperature - Data erratic; inter incorrect. The aftertreatment diesel oxidation catalyst inlet temperature is not ch engine operating conditions.
3316	MIL	1	Aftertreatment Diesel Particulate Filter Intake Temperature Sensor Circuit - Volta normal; or shorted to low source. Low signal voltage detected at the aftertreatm particulate filter inlet temperature sensor circuit.
3317	MIL	1	Aftertreatment Diesel Particulate Filter Intake Temperature Sensor Circuit - Volta normal; or shorted to high source. High signal voltage or open circuit detected at aftertreatment diesel particulate filter inlet temperature sensor circuit.
3318	MIL	2	Aftertreatment Diesel Particulate Filter Intake Temperature - Data erratic; interm incorrect. The aftertreatment diesel particulate filter inlet temperature is not char engine operating conditions.
3319	MIL	1	Aftertreatment Diesel Particulate Filter Outlet Temperature Sensor Circuit - Volta normal; or shorted to high source. High signal voltage or open circuit detected at aftertreatment diesel particulate filter outlet temperature sensor circuit.
3321	MIL	1	Aftertreatment Diesel Particulate Filter Outlet Temperature Sensor Circuit - Volta normal; or shorted to low source. Low signal voltage detected at the aftertreatm particulate filter outlet temperature sensor circuit.
3322	MIL	2	Aftertreatment Diesel Particulate Filter Outlet Temperature - Data erratic; intermi incorrect. The aftertreatment diesel particulate filter outlet temperature is not ch engine operating conditions.
3326	Red Stop + MIL	1	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal upd
3328	MIL	1	Transmission Output Shaft Speed - Abnormal update rate.
3342	MIL	2	Engine Exhaust Gas Recirculation Cooler Efficiency - Data Valid But Below Norma Range - Moderately Severe Level.
3343	MIL	2	Engine Charge Air Cooler Efficiency - Data Valid But Below Normal Operating Rar Moderately Severe Level.
3348	Red Stop	1	Turbocharger 1 Compressor Intake Pressure - Data valid but below normal opera - Most Severe Level.
3361	MIL	2	Intake Manifold 1 Pressure - Abnormal rate of change.

3366	None	3	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Seve
3374	None	1	Roll Over Protection Brake Control Active - Condition Exists.
3375	MIL	2	Aftertreatment Diesel Particulate Filter Regeneration too Frequent - Condition Exi
3376	MIL	2	Aftertreatment Diesel Particulate Filter Incomplete Regeneration - Condition Exis
3382	MIL	2	Engine Exhaust Gas Recirculation (EGR) System - Data Valid But Below Normal C Range - Moderately Severe Level.
3383	MIL	2	Engine Exhaust Gas Recirculation (EGR) System - Data Valid But Above Normal C Range - Moderately Severe Level.
3385	Amber Warning Lamp	1	Intake Manifold 1 Temperature - Data Valid But Below Normal Operating Range - Severe Level.
3389	MIL	2	Engine Exhaust Gas Recirculation (EGR) System - Abnormal rate of change.
3418	MIL	1	Transmission Output Shaft Speed - Received Network Data In Error.
3422	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Voltage above normal, to high source.
3425	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 3 Circuit - Current below normal circuit.
3426	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 4 Circuit - Voltage above normal, to high source.
3429	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater 4 Circuit - Current below normal circuit.
3488	Amber Warning Lamp	1	Anti-Lock Braking (ABS) Controller - Abnormal update rate.
3492	MIL	2	Real Time Clock - Abnormal rate of change.
3495	MIL	2	Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Gas Te Condition Exists.
3497	None	1	Aftertreatment Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Op Range - Least Severe Level.
3498	None	1	Aftertreatment Diesel Exhaust Fluid Tank Level - Data Valid But Below Normal Op Range - Moderately Severe Level.
3525	MIL	1	Wheel-Based Vehicle Speed - Received Network Data In Error.
3526	MIL	1	Wheel-Based Vehicle Speed - Abnormal update rate.
3527	Red Stop + MIL	1	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data In Erro
3528	Red Stop + MIL	1	Accelerator Pedal or Lever Idle Validation Switch - Abnormal update rate.
3531	MIL	1	Ambient Air Temperature - Abnormal update rate.
3532	Amber Warning Lamp	1	Ambient Air Temperature - Received Network Data In Error.
3535	MIL	1	Malfunction Indicator Lamp - Abnormal update rate.
3543	Amber Warning Lamp	1	NOx limits exceeded due to Insufficient Reagent Quality - Condition Exists.
3547	None	1	Aftertreatment Diesel Exhaust Fluid Tank Empty - Condition Exists.
3557	MIL	1	Aftertreatment Diesel Exhaust Fluid Controller - Data erratic; intermittent or inco
3558	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Unit - Voltage above normal; or short source.
3559	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Unit - Voltage below normal; or short source.
3561	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Unit - Current below normal or open

3562	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage above normal; c high source.
3563	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Voltage below normal; o low source.
3564	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Current below normal or circuit.
3565	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Voltage above normal; or sho source.
3566	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Voltage below normal; or sho source.
3567	MIL	1	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Current below normal or ope
3568	MIL	2	Aftertreatment Diesel Exhaust Fluid Dosing Valve - Mechanical system not respor of adjustment.
3569	MIL	2	Aftertreatment Diesel Exhaust Fluid Dosing Unit Input Lines - Mechanical system responding or out of adjustment.
3571	MIL	1	Aftertreatment Diesel Exhaust Fluid Pressure Sensor - Voltage above normal; or s high source.
3572	MIL	1	Aftertreatment Diesel Exhaust Fluid Pressure Sensor - Voltage below normal; or s low source.
3574	MIL	1	Aftertreatment Diesel Exhaust Fluid Pressure Sensor - Data Valid But Below Norm Operating Range - Moderately Severe Level.
3575	MIL	2	Aftertreatment Diesel Exhaust Fluid Pressure Sensor - Data Valid But Above Norn Operating Range - Moderately Severe Level.
3576	MIL	1	Aftertreatment Diesel Exhaust Fluid Tank Heater - Current below normal or oper
3577	MIL	1	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage above normal; or sho source.
3578	MIL	1	Aftertreatment Diesel Exhaust Fluid Return Valve - Voltage below normal; or sho source.
3579	MIL	1	Aftertreatment Diesel Exhaust Fluid Return Valve - Current below normal or oper
3582	MIL	1	Aftertreatment SCR Catalyst Conversion Efficiency - Data Valid But Below Normal Range - Moderately Severe Level.
3583	MIL	2	Aftertreatment Outlet NOx Sensor Heater - Abnormal rate of change.
3596	MIL	2	Aftertreatment Diesel Exhaust Fluid Pressure Sensor - Data erratic; intermittent c
3597	MIL	1	Aftertreatment Diesel Exhaust Fluid Controller - Abnormal update rate.
3598	MIL	2	Aftertreatment Diesel Exhaust Fluid Controller - Received Network Data In Error.
3616	None	1	Engine VGT Nozzle Position - Mechanical system not responding or out of adjustr
3648	MIL	2	Aftertreatment Diesel Exhaust Fluid Controller Temperature - Data Valid But Abo Operating Range - Moderately Severe Level.
3649	MIL	2	Aftertreatment Intake NOx Sensor Heater - Abnormal rate of change.
3651	MIL	2	Aftertreatment Diesel Exhaust Fluid Tank Temperature - Data Valid But Below Nc Operating Range - Moderately Severe Level.
3679	MIL	2	Aftertreatment Diesel Exhaust Fluid Dosing Unit - Root Cause Not Known.
3681	MIL	2	Aftertreatment Outlet NOx Sensor Power Supply - Data erratic; intermittent or in

3682	MIL	2	Aftertreatment Intake NOx Sensor Power Supply - Data erratic; intermittent or in
3697	Red Stop + MIL	1	Engine Control Module Calibration Memory - Bad intelligent device or component
3712	Red Stop	1	Aftertreatment SCR Operator Inducement - Data valid but above normal operatio Most Severe Level.
3713	MIL	1	Aftertreatment Diesel Exhaust Fluid Line Heater Relay - Mechanical system not re out of adjustment.
3714	Amber Warning Lamp	1	Engine Protection Torque Derate - Condition Exists.
3715	MIL	2	Engine Speed At Idle - Data Valid But Above Normal Operating Range - Moderate Level.
3716	MIL	2	Engine Speed At Idle - Data Valid But Below Normal Operating Range - Moderate Level.
3724	MIL	1	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe
3726	MIL	2	Aftertreatment Intake NOx - Data Valid But Above Normal Operating Range - Mo Severe Level.
3727	None	1	High Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not r or out of adjustment.
3733	Amber Warning Lamp	1	Crankcase Breather Filter Heater Circuit - Voltage above normal; or shorted to hi
3734	Amber Warning Lamp	1	Crankcase Breather Filter Heater Circuit - Voltage below normal; or shorted to lo
3736	MIL	2	Aftertreatment Diesel Exhaust Fluid Controller - Root Cause Not Known.
3748	MIL	2	Aftertreatment Intake NOx Sensor - Data not Rational - Drifted High.
3749	MIL	2	Aftertreatment Outlet NOx Sensor - Data not Rational - Drifted High.
3751	None	1	Aftertreatment SCR Catalyst System - Mechanical system not responding or out c adjustment.
3753	None	1	Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout - C Exists.

298. Interpreting the Output of the Fault Handler

Comment [BJO19]: Updated

Terminology:

1 Operation Cycle: An operation cycle occurs when at least one of the following is true:
- Key switch transitions from ON to OFF
- The engine is started for the cumulative duration of 4 hours in the current operation cycle

Trip: Trip is a term used within Cummins to denote 1 operation cycle

The flow of the Fault Handler

Any given diagnostic that triggers a Fault Code will go through a series of steps before an actual Lamp is lit on the dash of the truck. This flow proceeds as follows:

1. Any given diagnostic can send either a Set error or a Clear error to the fault handler. Each diagnostic is given a unique System Error to identify it to the fault handler. The system error that we typically read is a text string that is descriptive of the error, however, in the ECM, the text string that identifies this system error is converted into a number that will be used in place of the text name. The SET or CLEAR error that is received by the ECM will be accompanied by this System Error Number (SEN).
2. Each error has been calibrated to define its behavior in the ECM once it receives a Set or Clear error. This calibration will define what lamp is turned on, how many operation cycles with Set errors are needed to activate the lamp, how long the lamp will stay on after the error is cleared, and other additional information. Once the Set error is received, the fault handler will set the Pending Flag for that error.
3. After the Pending Flag has been set for a system error, the fault handler will then begin to count the number of operation cycles that have passed in which a fail decision has been made and then will set the Permanent and Confirmed flags. For a 1 trip fault, the pending, permanent, and confirmed flag come on with the first set error.
4. When the Permanent and Confirmed Flags are on, the associated lamp will be turned on as well.
5. Once the fault is fixed, the algorithm will begin to send only Clear errors to the fault handler. The number of trips required to clear an error is a calibrateable for each fault. Once the number of operation cycles has passed in which only clear errors are made, the Permanent flag will go off and the Lamp will turn off.

Important Tables for diagnosis

When a Faults Code shows active in the CalTerm windows, it is indicating that the last decision that the fault handler received was a set error. *This does not necessarily correspond to the actual Lamp status.* To see the status of any given lamps use the following parameters:

Malfunction_Indicator_Lamp	none
Stop_Fault_Lamp	none
Warning_Fault_Lamp	none

The Fault Code number and the Fault code description will be available in the CalTerm window, however, if the underlying system error that triggered this Fault Code is needed, the following tables should be used:

ECM_Active_Error_Index	none
ECM_Inactive_Error_Index	none

Each of the above tables is system error number based. (See below for a process to find the system error number for a given system error). These tables are ranked in the order they came into the fault handler. The 0 position will be the first of the current errors that was received.

Finally, the OBD status of any system error can be seen in the following OBD tables. Each of these tables is system error number based and shows the OBD status of each system error.

OBD_Pending_ErrorIndex	none
OBD_Permanent_ErrorIndex	none
OBD_Confirmed_ErrorIndex	none

Finding the System Error Number from a System Error

Each build, the list of system error number will change. This is true for all system errors and one should never assume that the system error number for a given system error is the same from build to build. In order to find the correct System Error Number (SEN), you will need to look into the Error_Table for a given build. This table is located in the Build_Files/Code directory of each software build. Inside of

this table, the system errors are listed in order. SEN 1 will be listed first and so on. By pulling up a text editor you can determine the SEN. Additionally, there have been some programs written to aid this process. The Fault Code Translator can help you with this process.

It is possible to log and monitor each of these tables, but it will be necessary to use an individual table location. For instance: If you wanted to log the OBD_Pending_ErrorIndex, you would need to monitor OBD_Pending_ErrorIndex[0].

Determing the Readiness Status of a System Error – Has a given diagnostic run and made decisions?

Find the System Error Number for the diagnostic of interest using the method described above. The table that can be used to determine the readiness status of each system error is listed below:

OBD_ReadinessStatus_CurOprCyc
This is a one dimensional array whose index is the same as the SEN. This indicates whether every System Error is ready for performance check in the current Operation Cycle.

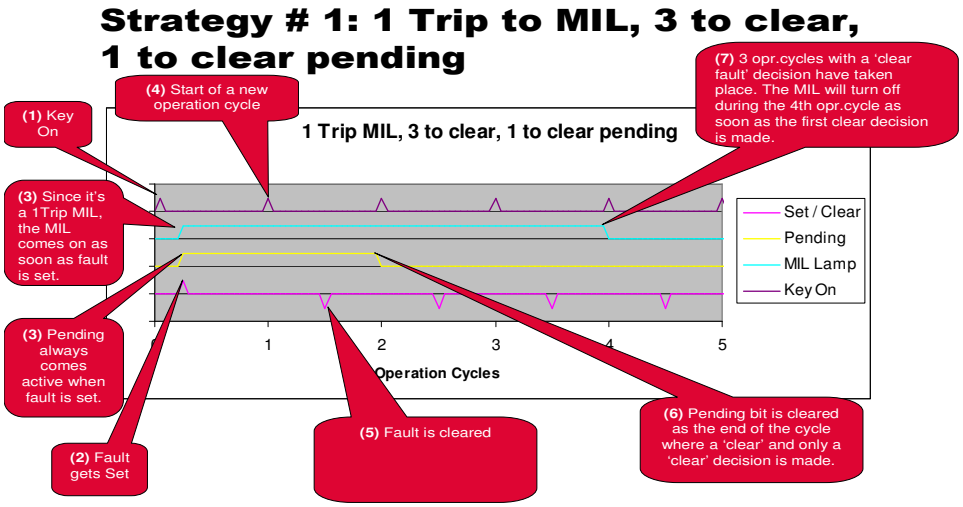
Possible values are:
0 - NOT_READY (Diagnostic has not run)
1 – READY (Diagnostic has run)

Fault Handler Lamp Behavior

In addition to the AWL and the RSL used in the 2007 calibration release, a Malfunction Indicator Lamp (MIL) is now present. Please see below under 'Proper MIL lamp response' to better understand the correct way to respond to a MIL lamp.

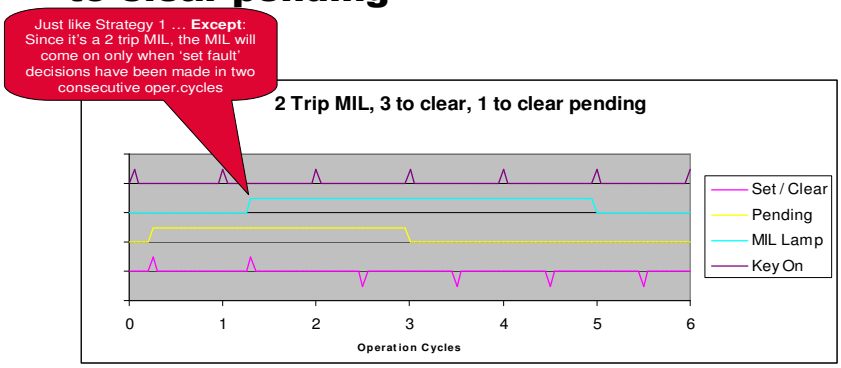
Below you will find all the standard Lamp configurations and their behavior. It should be noted that the MIL lamp will not behave as the AWL did. Regulations require that this lamp stay on for a set period of time even after the fault has been corrected. Sending a clear all faults command from the service tool can override this waiting period to clear a fault.

One additional note: With many of the new OBD faults, certain conditions must be met before the algorithm will run. Care should be taken to understand a particular fault in order to know when and if it has made a decision.



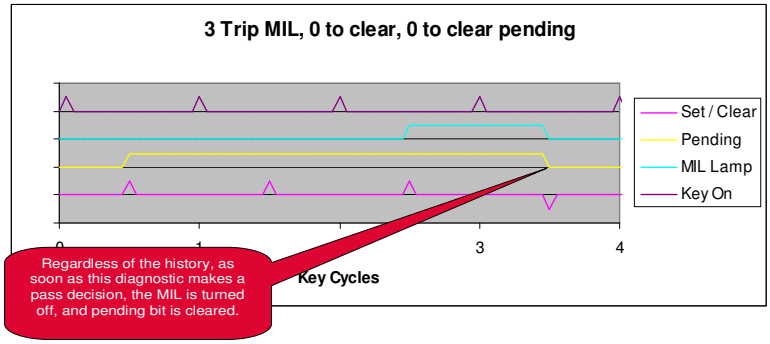
1-3-1 MIL Lamp

Strategy # 2: 2 Trip MIL, 3 to clear, 1 to clear pending



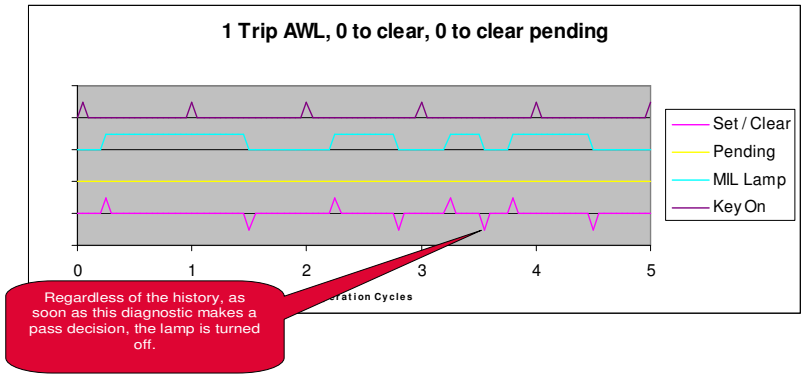
2-3-1 MIL Lamp

Strategy # 3: 3 Trip MIL, 0 to clear, 0 to clear pending



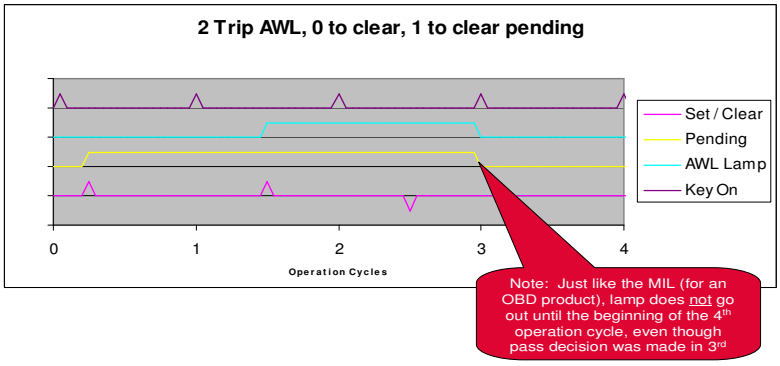
3-0-0 MIL Lamp

Strategy # 4: 1 Trip AWL, 0 to clear, 0 to clear pending (same as pre 2010)



Standard AWL

Strategy # 5: 2 Trip AWL, 0 to clear, 1 to clear pending



2 Trip AWL – Only available on EMD+ Products.

Proper MIL Lamp Response

Malfunction Indicator Lamp:

With the launch of the 2010 ISX engine, a new lamp with be on the dash. This lamp, the MIL (Malfunction Indicator Lamp) will be similar to the AWL (Amber Warning Lamp). The MIL lamp should be reacted to in the same way you respond to the AWL. Both indicate a malfunction of some vehicle component and service should be sought at the first opportunity.

HD 2010 COMMON APPROACH TO CONTROL SYSTEM DIAGNOSTICS

The MIL lamp is a special lamp that indicates a problem with a component on your vehicle that is related to emissions. This means that when the MIL lamp is on, some component has been diagnosed as failed that can adversely affect tailpipe emissions. This problem should be repaired.

The AWL will now exclusively be used to indicate problems with non-emissions related components. Both lamps indicate a problem and your vehicle should be taken to an authorized Cummins service center for diagnosis at your first opportunity.

The AWL has historically come on as soon as there was an active fault code. Once that fault code went inactive, the AWL was turned off. This is still the case for the AWL.

However, once the MIL is illuminated, it will stay on until the diagnostic that turned it on has made only pass decisions for three consecutive operation cycles. Thus, even if the problem is repaired, the MIL will stay on for three operation cycles. This delay can be eliminated if, after fixing the problem, a clear all faults command is given by Calterm / Insite.

Two Trip Faults:

Along with OBD comes the concept of "two-trip faults". Two-trip faults are used when we require that a diagnostic make two consecutive "fail" decisions before turning on the MIL.

Example: If a particular diagnostic makes a "fail" decision on one trip, this results in an active fault code that is visible via Calterm or Insite. However, no lamp or electronic dash message should be visible at this point. Only after experiencing two consecutive drive cycles where the diagnostic ran and made a "fail" decision would the MIL be turned on.

Three Trip Faults:

There is only one 3 trip fault in this product. This fault code is 3366 (Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level.). While this fault takes 3 operation cycles where the diagnostic makes a fail decision to set, once the problem is fixed, it clears immediately. This is an exception to all other MIL faults that take 3 trips to clear the lamp.

Red Stop Lamp and MIL faults:

In OBD products (X1), there are a handful of fault codes which along with lighting a Red Stop Lamp (RSL) will also light a MIL. These are listed below.

111
115
131
132
1242
1515
2449
2634
2635
2636
3326
3527
3528
3697

For all the above faults, the MIL and RSL will both come ON simultaneously after 1 trip where a fail decision has occurred. However, instead of taking 3 trips to clear the lamps, these faults will clear the fault and both the lamps immediately after a pass decision occurs.

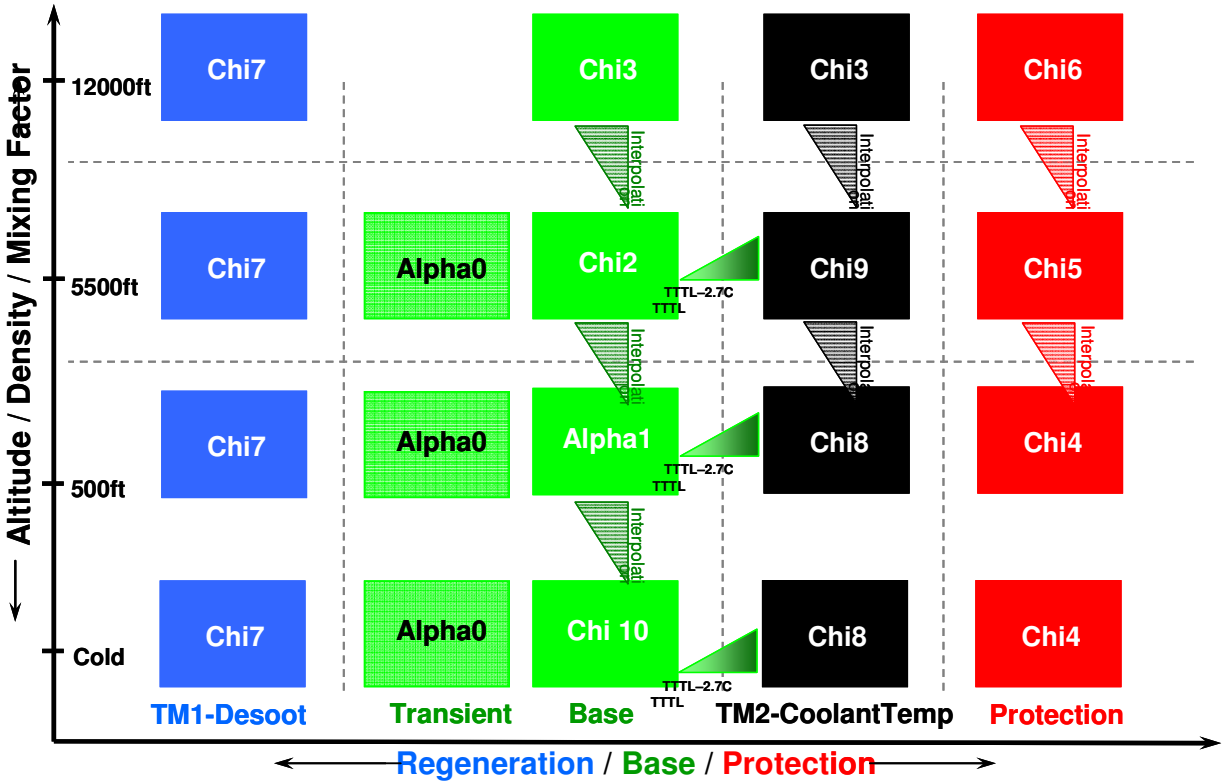
On EMD+ products (X2, X3, and Black), these faults behave as regular non-obd Red Stop Lamps similar to 2007 products. NOTE: All faults and lamps on EMD+ products, be it 1 or 2 trips, be it AWL or RSL, will clear immediately when a pass decision occurs.

EPA Certification Information

299. AECD List

AECD 1 – Air Handling System
AECD 4 – Cold Intake Manifold Temperature Protection
AECD 5 – Extended Idle and PTO Protection
AECD 6 – Engine Starting and Warmup
AECD 7.1 – Electronic Sensor and Actuator Failures
AECD 7.3 – Cooling System Protection
AECD 7.6 – DPF Protection
AECD 8.8 – Fueling Quantity and Timing (ISX1 Only)
AECD 9.1 – Transient and Steady State Operations
AECD 9.2 – Ambient Conditions
AECD 9.3 – Transient Acceleration
AECD 9.4 – Automated Transmission Shift Modulation
AECD 9.5 – Coolant Temperature Overheat Protection
AECD 10.1 – DPF Regeneration Aftertreatment Modulation
AECD 10.2 – Ineffective Dosing
AECD 10.3 – High Soot Load Aftertreatment Protection
AECD 10.6 – Manual Requests: Non-Mission Regeneration
AECD 10.7 – Aftertreatment Protection
AECD 13.1 – SCR System Modulation
AECD 13.1b – SCR Low Temperature Operation
AECD 13.3 – DEF Thawing Protection
AECD 13.4 – SCR System Malfunction

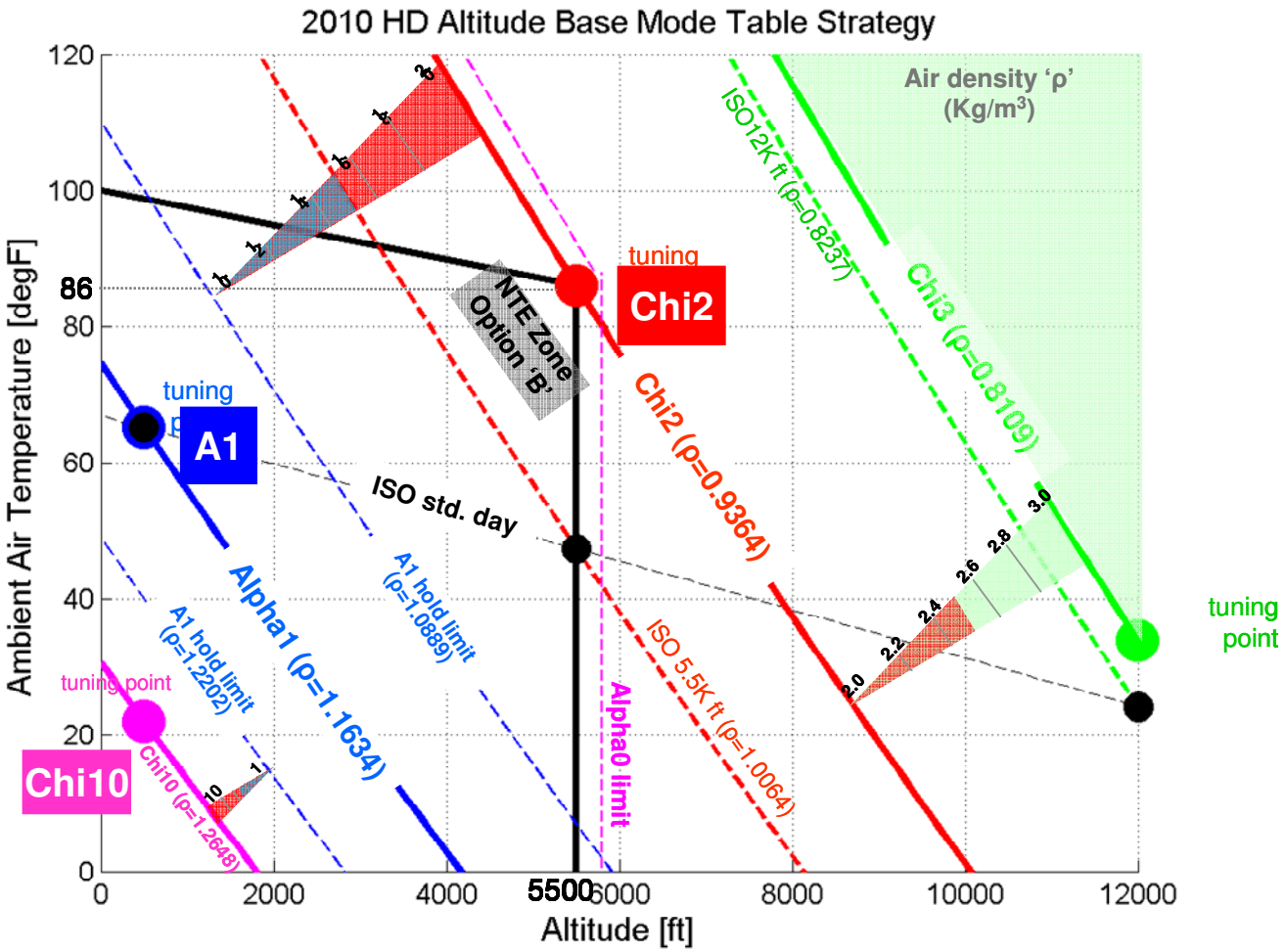
300. Inlet Density Chi Interpolation



The Chi states referenced above are used to determine the application and interaction of Command Tables to meet current engine control requirements. Multiple tables may be used when interpolation occurs between Chi states. The next page shows the relative priorities between Chi states.

301. AECD 1 – Air Handling System

Ambient Operating Conditions Chi Value Determination



302. AECD 4 – Unburned Hydrocarbons / Misfire

Intake Manifold Temperature based Protection

- Intake Manifold Temperature : measured, modifies injection events to ensure adequate conditions for combustion when IMT is below a threshold (-6.67 deg C)

Misfire Protection

- Ambient Air Pressure : measured, used to establish injection timing correction based on ambient air pressure (altitude operation)

The model based unburned hydrocarbon (UHC) algorithm used in 2007 products has been obsoleted by the multiple pulse fuel system.

303. AECD 5 – Extended Idle and PTO Protection - Cold

When the engine is idling (determined based on fueling less than a calibrated curve) and the temperatures are cold, deposits can form in the engine. To prevent this, if the Coolant Temperature is less than 60 degC for 1 hour, then the EGR Valve will be shut to reduce the chance for deposits. Also, if the Charge Temperature is less than 20 degC for 10 minutes, then the EGR Valve will be shut. To prevent the valve from staying closed, every 4 hours the protection commands will be removed (allowing non-zero EGR valve commands) to see if the engine is warm enough to operate without the need for further protection.

304. AECD 6 – Engine Starting and Warm-up

a. Sensors used to directly measure parameter or operating conditions for which limits may be exceeded
Engine Speed
Engine Fueling
Charge Temperature
Coolant Temperature

Parameters sensed as surrogates to estimate the parameter for which limits may be exceeded
EGR Off Coolant Temperature Threshold
EGR Off Charge Temperature Threshold

After the engine is started from cold conditions, appropriate action is taken with EGR and Fuel System Parameters to protect the engine - If the coolant temperature is below a threshold (15.5 deg C), charge temperature is below a threshold (-6.7 degC) and the injection timing is advanced due to the the unburned hydrocarbon protection AECD, the EGR valve is closed to avoid fouling of the intake manifold by unburned fuel in the exhaust which can then be recirculated which results in lacquered intake and egr cooler deposits. (Parameters Controlled: Injection Timing, EGR Fraction)

305. AECD 7 – Extreme Conditions / Malfunction

Part 1 – Electronic Sensor and Actuator Failures

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
Ambient Air Temperature	Sensor	AIR_TMPTR_IR_HIGH_ERROR	No	No	No	N/A	2398	MIL / Yellow	No
		AIR_TMPTR_KEYON_ERROR					2398	MIL / Yellow	No
		AIR_TMPTR_OOR_HIGH_ERROR					249	MIL / Yellow	No
		AIR_TMPTR_OOR_LOW_ERROR					256	MIL / Yellow	No
Ambient Air Pressure	Sensor	AMBIENT_AIR_PRESS_IR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	295	MIL / Yellow	No
		AMBIENT_AIR_PRESS_IR_LOW_ERROR					295	MIL / Yellow	No
		AMBIENT_AIR_PRESSURE_HIGH_ERROR					221	MIL / Yellow	No
		AMBIENT_AIR_PRESSURE_LOW_ERROR					222	MIL / Yellow	No
Charge Pressure	Sensor	CHARGE_PRESS_IR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	2973	MIL / Yellow	No
		CHARGE_PRESS_IR_LOW_ERROR					2973	MIL / Yellow	No
		OFC_EQUIV_RATIO_LOWER_LIMIT_ERROR					125	MIL / Yellow	Yes
		CHARGE_PRESS_KEYOFF_ERROR					2973	MIL / Yellow	No
		CHARGE_PRESS_OOR_HIGH_ERROR					122	MIL / Yellow	No
		CHARGE_PRESS_OOR_LOW_ERROR					123	MIL / Yellow	No
Charge Temperature	Sensor	CHARGE_TMPTR_IR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	436	MIL / Yellow	No
		CHARGE_TMPTR_IR_LOW_ERROR					436	MIL / Yellow	No
		CHARGE_TMPTR_KEYON_ERROR					436	MIL / Yellow	No
		CHARGE_TMPTR_OOR_HIGH_ERROR					153	MIL / Yellow	No
		CHARGE_TMPTR_OOR_LOW_ERROR					154	MIL / Yellow	No
Compressor Inlet Temperature	Sensor	COMP_IN_TMPTR_IR_HIGH_ERROR	No	No	No	N/A	693	MIL / Yellow	No
		COMP_IN_TMPTR_IR_STUCK_ERROR					693	MIL / Yellow	No
		COMP_IN_TMPTR_KEYON_ERROR					693	MIL / Yellow	No
		COMP_IN_TMPTR_OOR_HIGH_ERROR					691	MIL / Yellow	No
		COMP_IN_TMPTR_OOR_LOW_ERROR					692	MIL / Yellow	No
Crankcase Pressure	Sensor	BEYOND_THD_AZ_ERROR	No	No	No	N/A	1942	MIL / Yellow	Yes
		CCP_DITHER_ERROR					1942	MIL / Yellow	Yes
		CRANKCASE_PRESS_OOR_HIGH_ERROR					1843	MIL / Yellow	No
		CRANKCASE_PRESS_OOR_LOW_ERROR					1844	MIL / Yellow	No
		CRANKCASE_PRESSURE_MOD_HIGH					555	Yellow	No
		CRANKCASE_PRESSURE_SEV_HIGH					556	Red	No

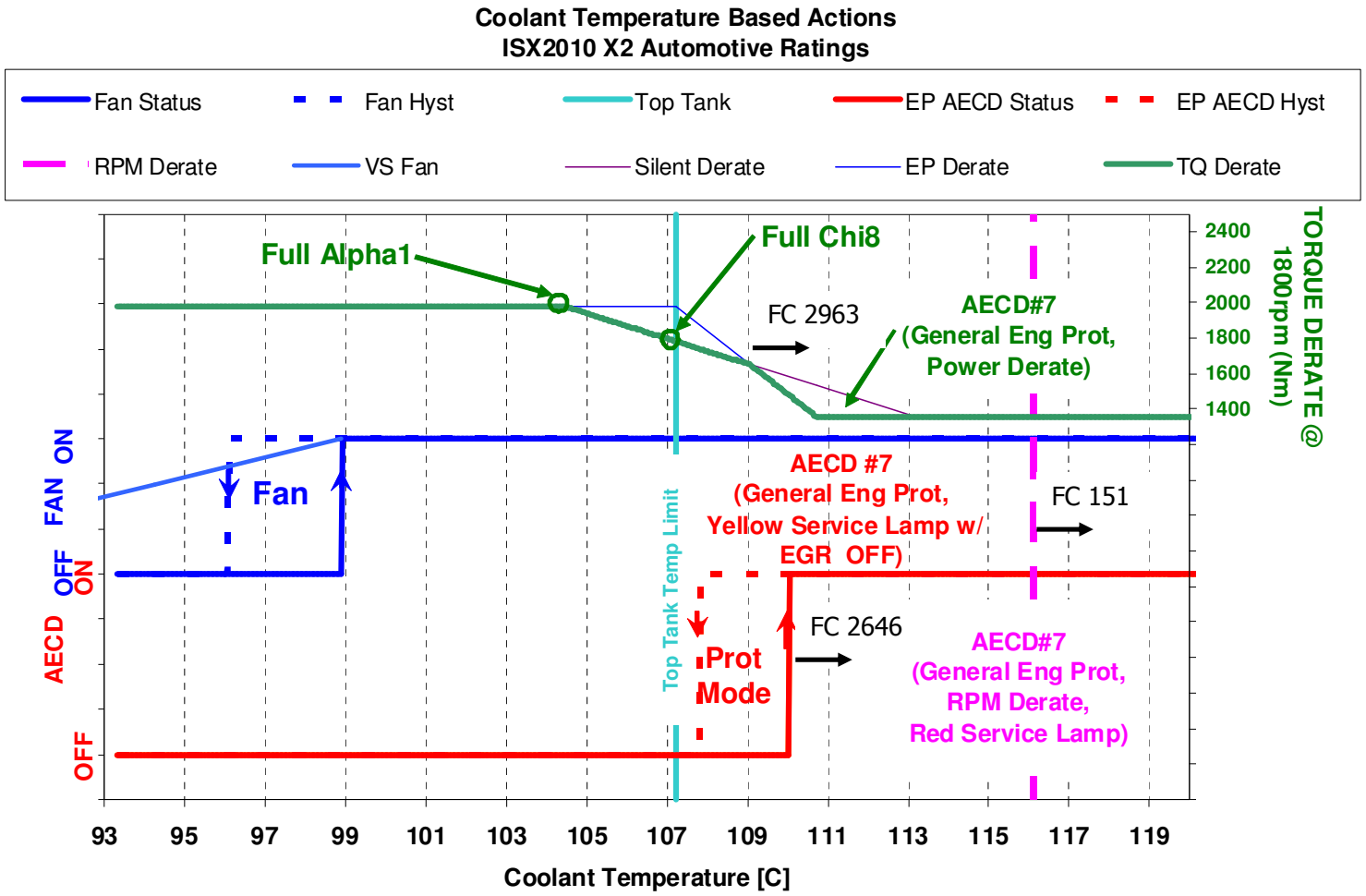
Part 1 – Electronic Sensor and Actuator Failures (continued)

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
EGR Delta Pressure	Sensor	EGR_DELTA_P_OOR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	2273	MIL / Yellow	No
		EGR_DELTA_P_OOR_LOW_ERROR					2274	MIL / Yellow	No
		EGR_DP_AUTOZERO_ERROR					1866	MIL / Yellow	No
EGR Orifice Pressure	Sensor	EGR_ORIF_PRESS_IR_HIGH_ERROR	Yes	No	No	Maintenance Derate	3138	MIL / Yellow	No
		EGR_ORIF_PRESS_IR_LOW_ERROR					3138	MIL / Yellow	No
		EGR_ORIFICE_PRESS_KEYOFF_ERROR					3138	MIL / Yellow	No
		EGR_ORIFICE_PRESS_OOR_HIGH_ERROR					3136	MIL / Yellow	No
		EGR_ORIFICE_PRESS_OOR_LOW_ERROR					3137	MIL / Yellow	No
EGR Cooler Outlet Temperature (aka EGR Orifice Temperature)	Sensor	EGR_ORIFICE_TMPTR_IR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	1867	MIL / Yellow	No
		EGR_ORIFICE_TMPTR_IR_LOW_ERROR					1867	MIL / Yellow	No
		EGR_ORIFICE_TMPTR_IR_STUCK_ERROR					1867	MIL / Yellow	No
		EGR_ORIFICE_TMPTR_KEYON_ERROR					1867	MIL / Yellow	No
		EGR_ORIFICE_TMPTR_OOR_HIGH_ERROR					2375	MIL / Yellow	No
		EGR_ORIFICE_TMPTR_OOR_LOW_ERROR					2376	MIL / Yellow	No
Engine Out NOx	Sensor	EONOX_SENSOR_HTR_ERR	No	No	Yes	Maintenance Derate	1885	MIL / Yellow	No
		EONOX_SENSOR_PWR_ERR					3682	MIL / Yellow	Yes
		EONOX_SENSOR_SIGNAL_ERR					1885	MIL / Yellow	No
		J39_ATI1_TIMEOUT_ERROR					3232	MIL / Yellow	No
Exhaust Pressure	Sensor	EXHAUST_PRESS_IR_HIGH_ERROR	Yes	No	Yes	Maintenance Derate	2554	MIL / Yellow	No
		EXHAUST_PRESS_IR_LOW_ERROR					2554	MIL / Yellow	No
		EXHAUST_PRESS_KEYOFF_ERROR					2554	MIL / Yellow	No
		EXHAUST_PRESS_OOR_HIGH_ERROR					2373	MIL / Yellow	No
		EXHAUST_PRESS_OOR_LOW_ERROR					2374	MIL / Yellow	No
Turbo Speed	Sensor	TURBO_SPEED_OOR_HIGH_ERROR	No	No	No	N/A	595	MIL / Yellow	No
		TURBO_SPEED_OOR_LOW_ERROR					687	MIL / Yellow	No

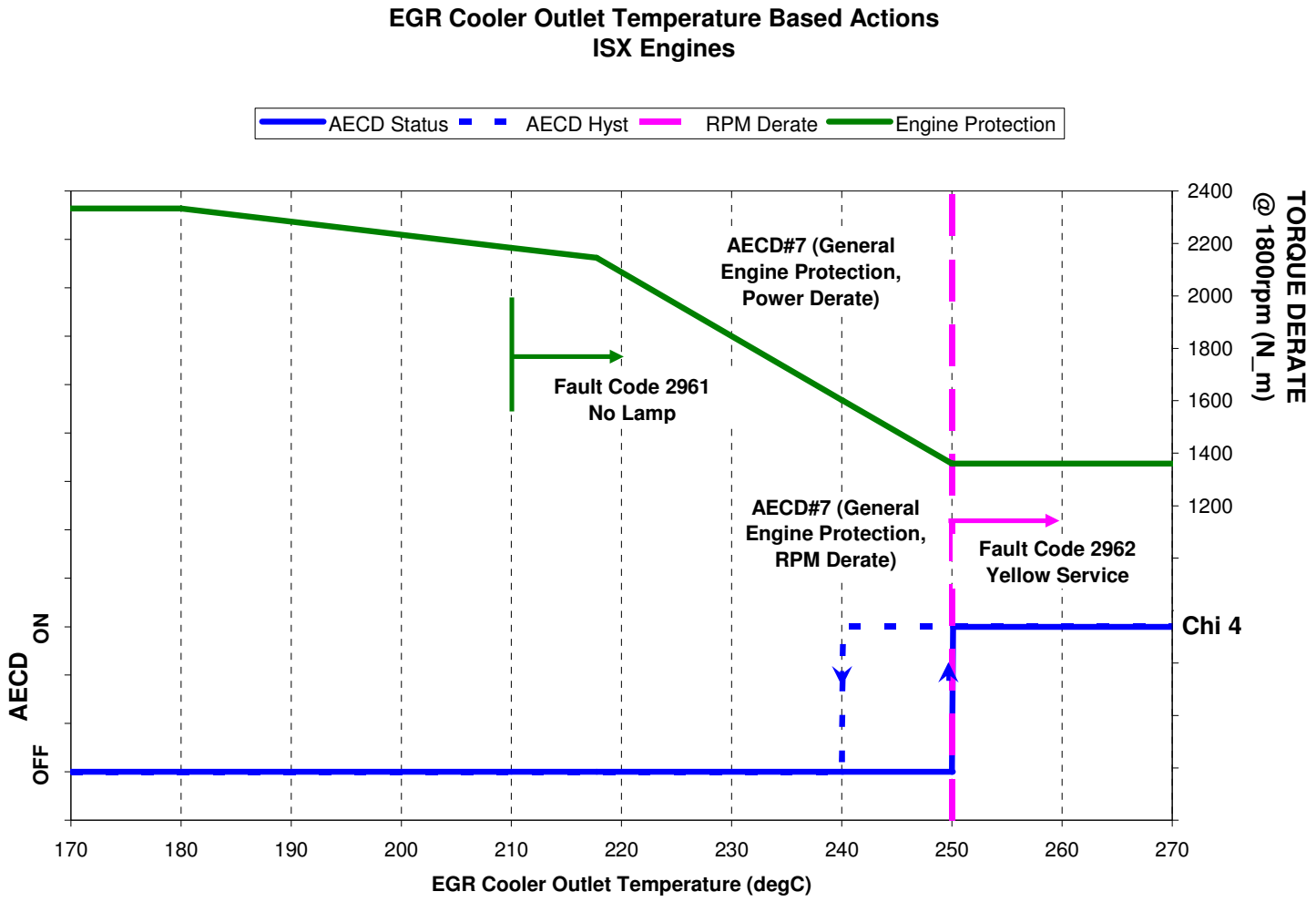
Part 1 – Electronic Sensor and Actuator Failures (continued)

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
Fuel System Driver	Actuator	APC_IMV_SHORT_ERROR	Yes	No	No	EGR-Off Maintenance	271	MIL / Yellow	No
		APC_IMV_OPEN_ERROR					272	MIL / Yellow	No
		APC_DIESEL_PRS_OOR_HIGH_ERROR					451	MIL / Yellow	No
		APC_DIESEL_PRS_OOR_LOW_ERROR					452	MIL / Yellow	No
		APC_DIESEL_LOW_PRS_ERROR					559	MIL / Yellow	No
		APC_2S_MDV_TRIP_ERROR					1911	MIL / Yellow	No
		PRS_FUEL_FILTER_CLOGGED_ERROR					2372	Yellow	No
EGR Driver	Actuator	EGA_DRIVER_IC_OVER_TMPTR_ERROR	Yes	No	No	Maintenance Derate	1961	MIL / Yellow	No
		EGA_DRIVER_OPEN_CIRCUIT_ERROR					2349	MIL / Yellow	No
		EGA_DRIVER_POWER_LOW_ERROR					3724	MIL / Yellow	No
		EGA_DRIVER_SHORT_CIRCUIT_ERROR					2353	MIL / Yellow	No
		EGA_VALVE_POSITION_ERROR					2272	MIL / Yellow	No
		EGA_VALVE_POSITION_IRH_ERROR					1228	MIL / Yellow	No
		EGA_VALVE_POSITION_IRL_ERROR					1228	MIL / Yellow	No
		EGA_VALVE_STUCK_ERROR					1896	MIL / Yellow	No
VGT Driver	Actuator	J39_VGT_COMM_TIMEOUT_ERROR	Yes	No	No	Maintenance Derate	2636	Red	No
		VGA_DL_ACTUATION_ERROR					2387	MIL / Yellow	No
		VGA_DL_COMMAND_SOURCE_ERROR					2198	MIL / Yellow	No
		VGA_DL_DRIVER_CIRCUIT_ERROR					2634	Red	No
		VGA_DL_LEARNED_CAL_ERROR					2449	Red	No
		VGA_DL_MISMATCH_ERROR					2635	Red	No

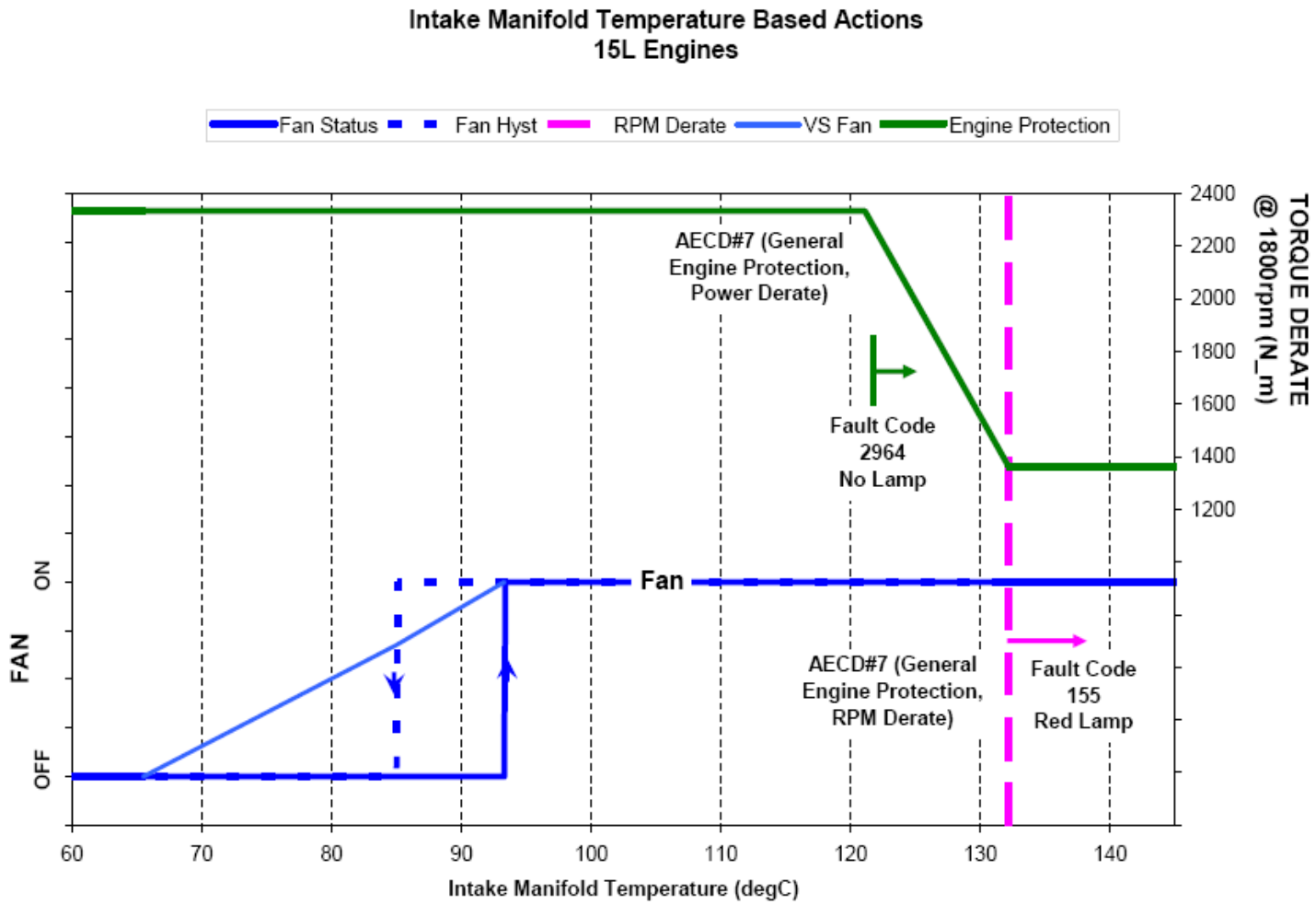
Part 3 – Cooling System Protection



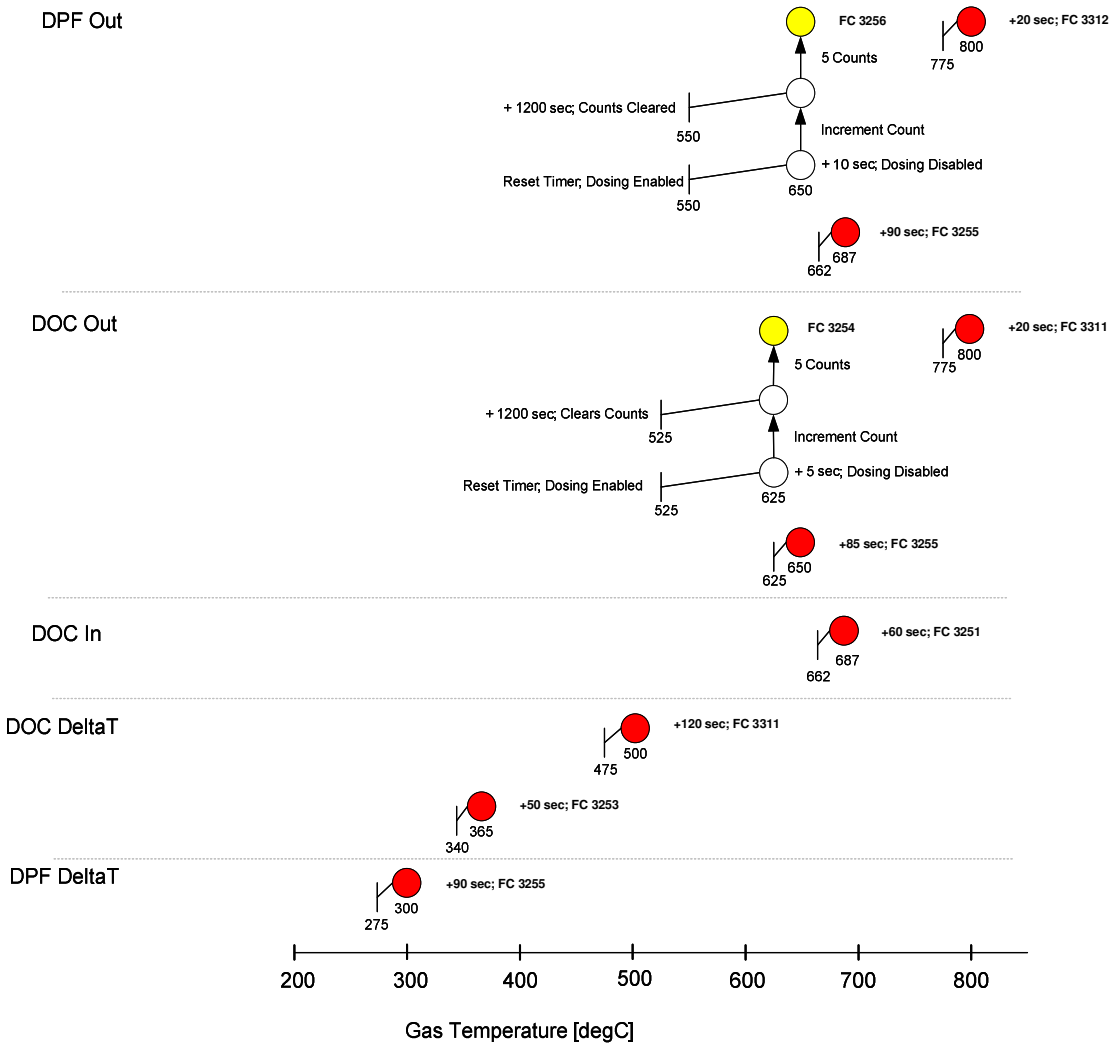
Part 3 – Cooling System Protection



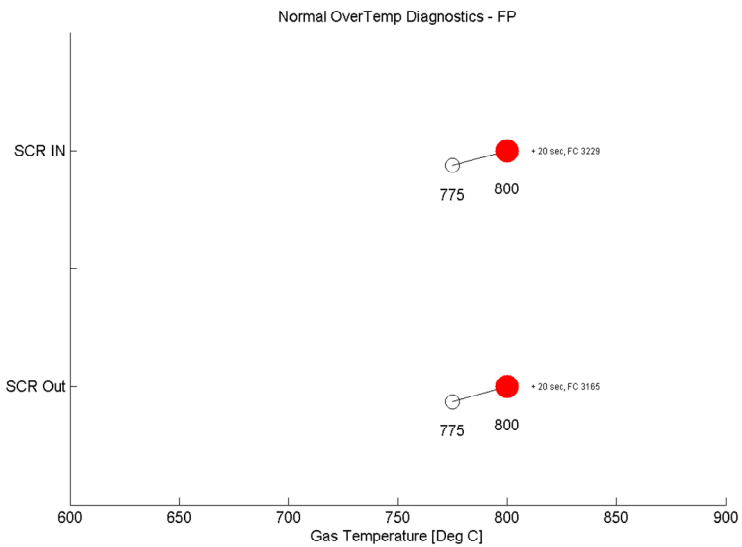
Part 3 – Cooling System Protection

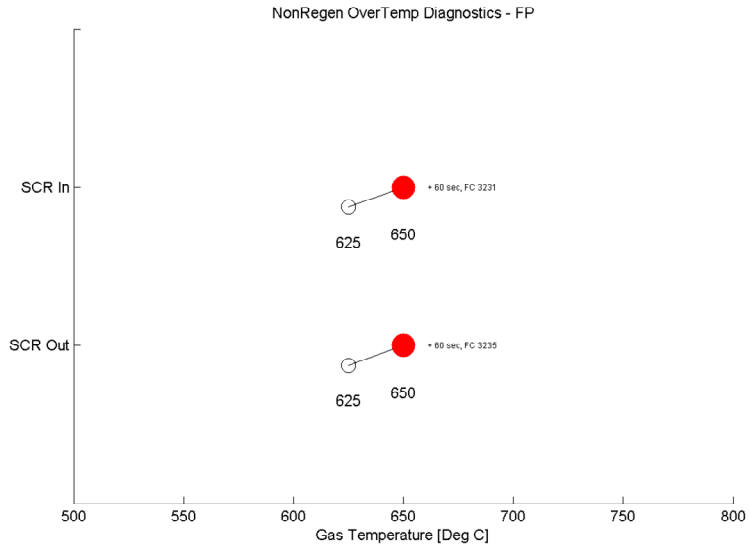


Part 6 – Aftertreatement Protection



Part 6 – Aftertreatement Protection





306. AECD 10 – Aftertreatment Regeneration

Part 1 – Regeneration Strategy

Exhaust fuel dosing is permitted once satisfactory aftertreatment temperatures have been achieved, requiring the following conditions

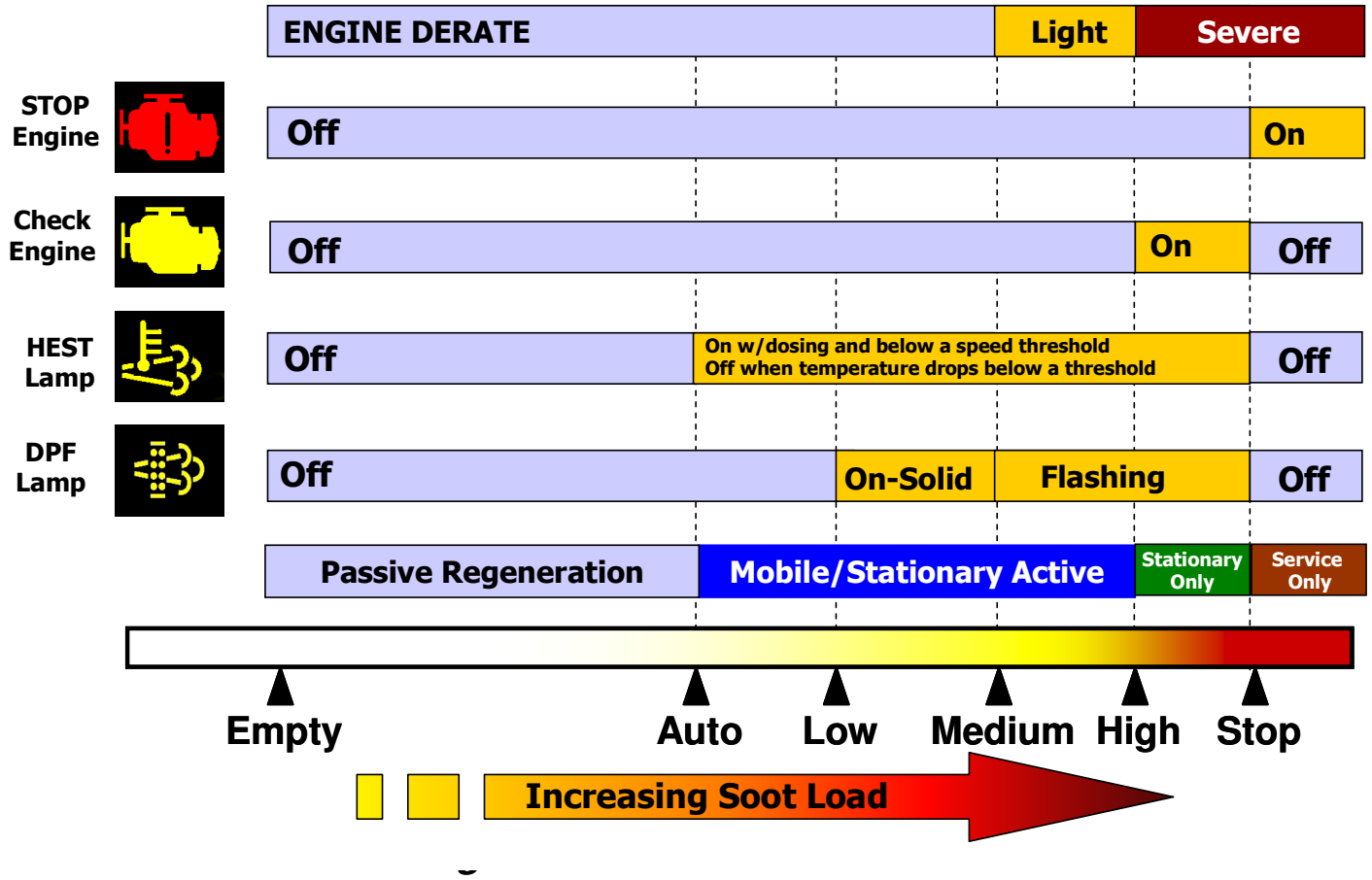
1. DOC inlet temperature > 250 C
2. DOC bed temperature > 250 C
3. Exhaust mass flow > 90 g/sec
4. Vehicle Speed > threshold (default = 0 MPH, max trim to 25, 0.62 MPH hysteresis)

Dosing is interrupted during active regeneration when the vehicle speed falls below an OEM trimmable value. This characteristic was requested by our OEM's. The purpose of this interruption is to limit thermal output from the exhaust while operating at low speeds. The OEM's may set any speed in the range of 0-25mph. Cummins has chosen to additionally limit the lower speed to be at least 5mph, resulting in a practical range of 5-25mph. Dosing resumes when the vehicle returns to a speed 2mph than the dosing inhibit setpoint. No other control actions are altered by this change. For example, if thermal management was operating prior to the interruption, it continues to act during the interruption.

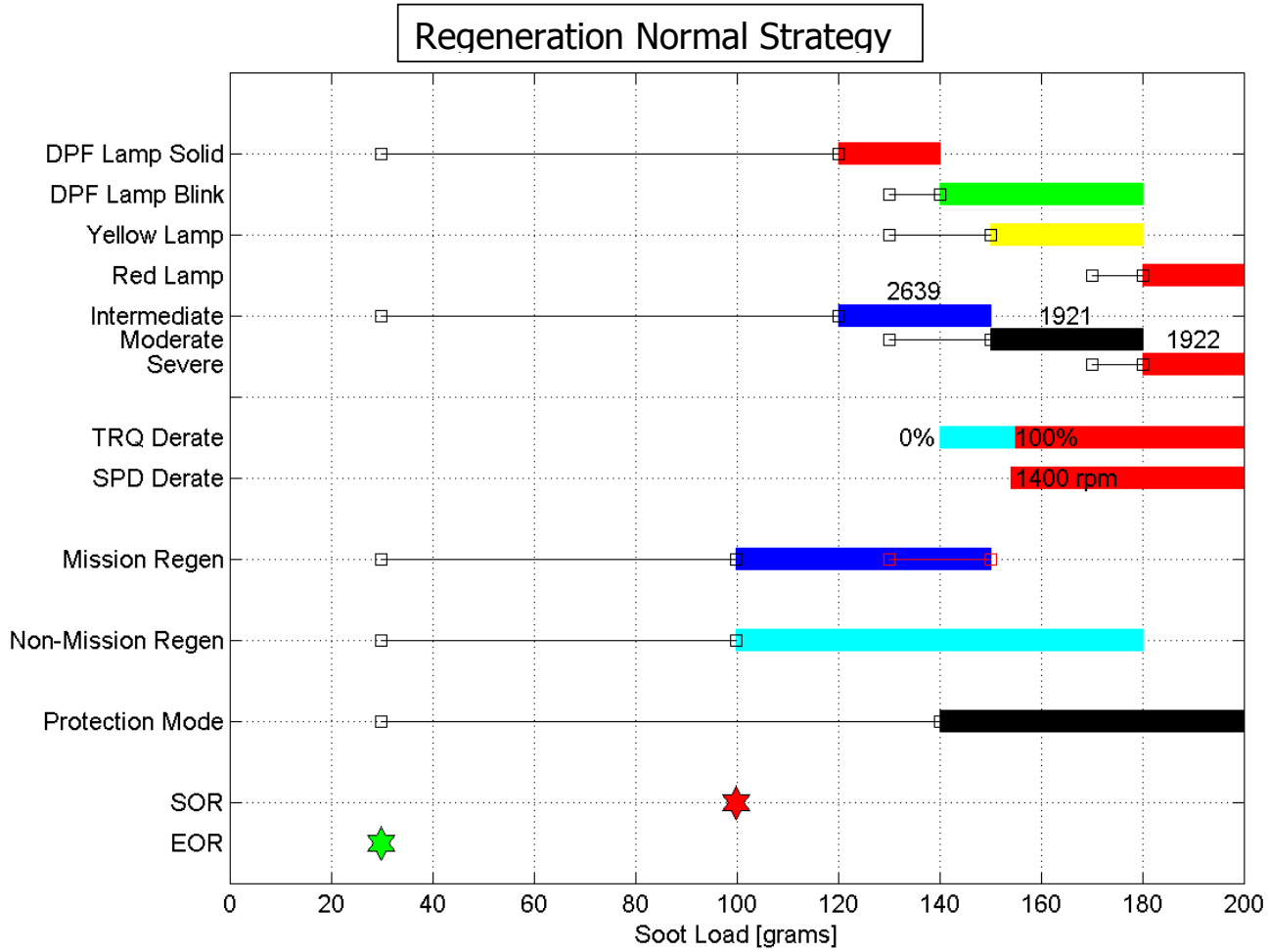
If regenerations are not triggered based on soot loading, then they will be triggered based on a timer every 36 hours.

Part 1 – Regeneration Strategy

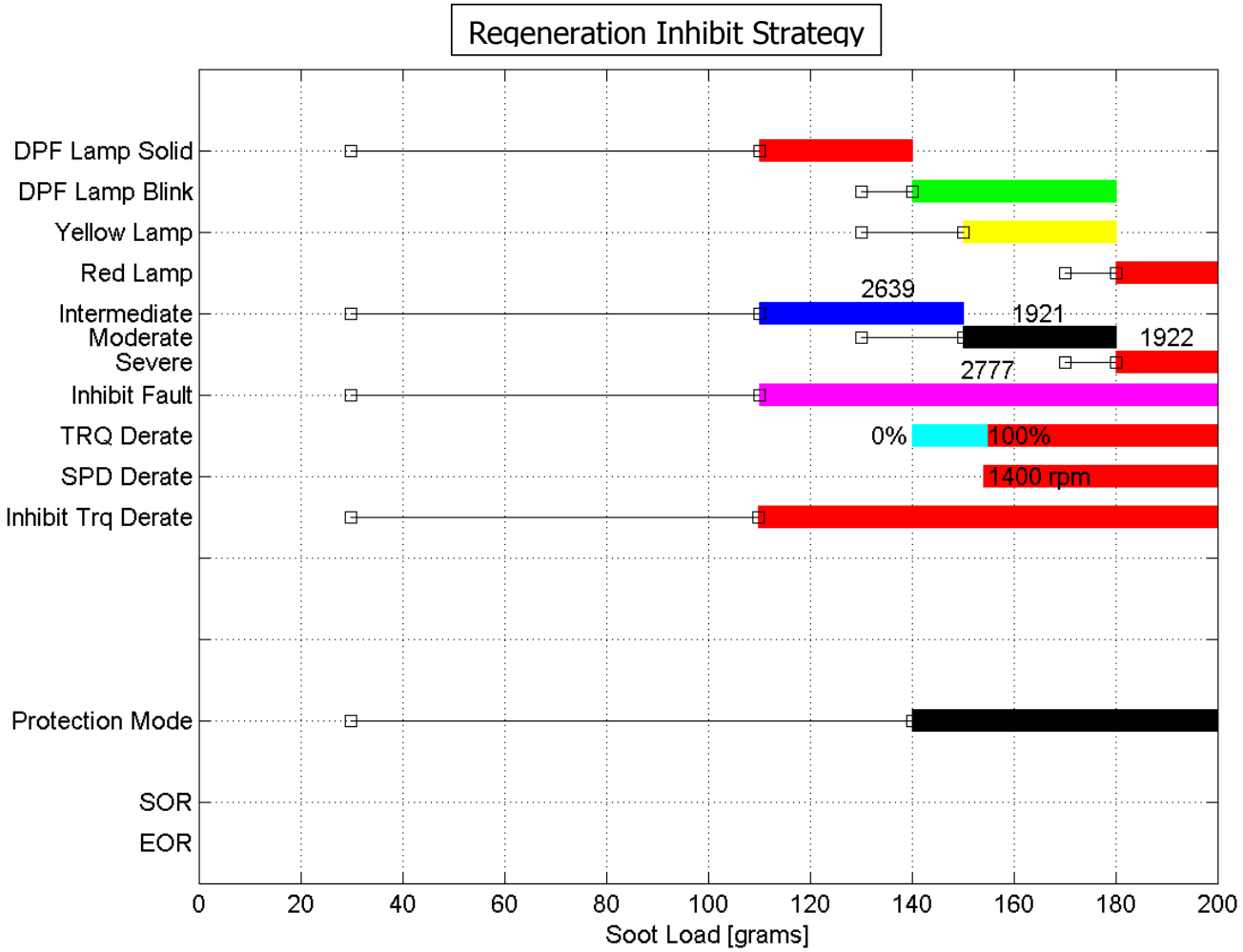
AT Regeneration Lamp Behaviors



Part 1 – Regeneration Strategy

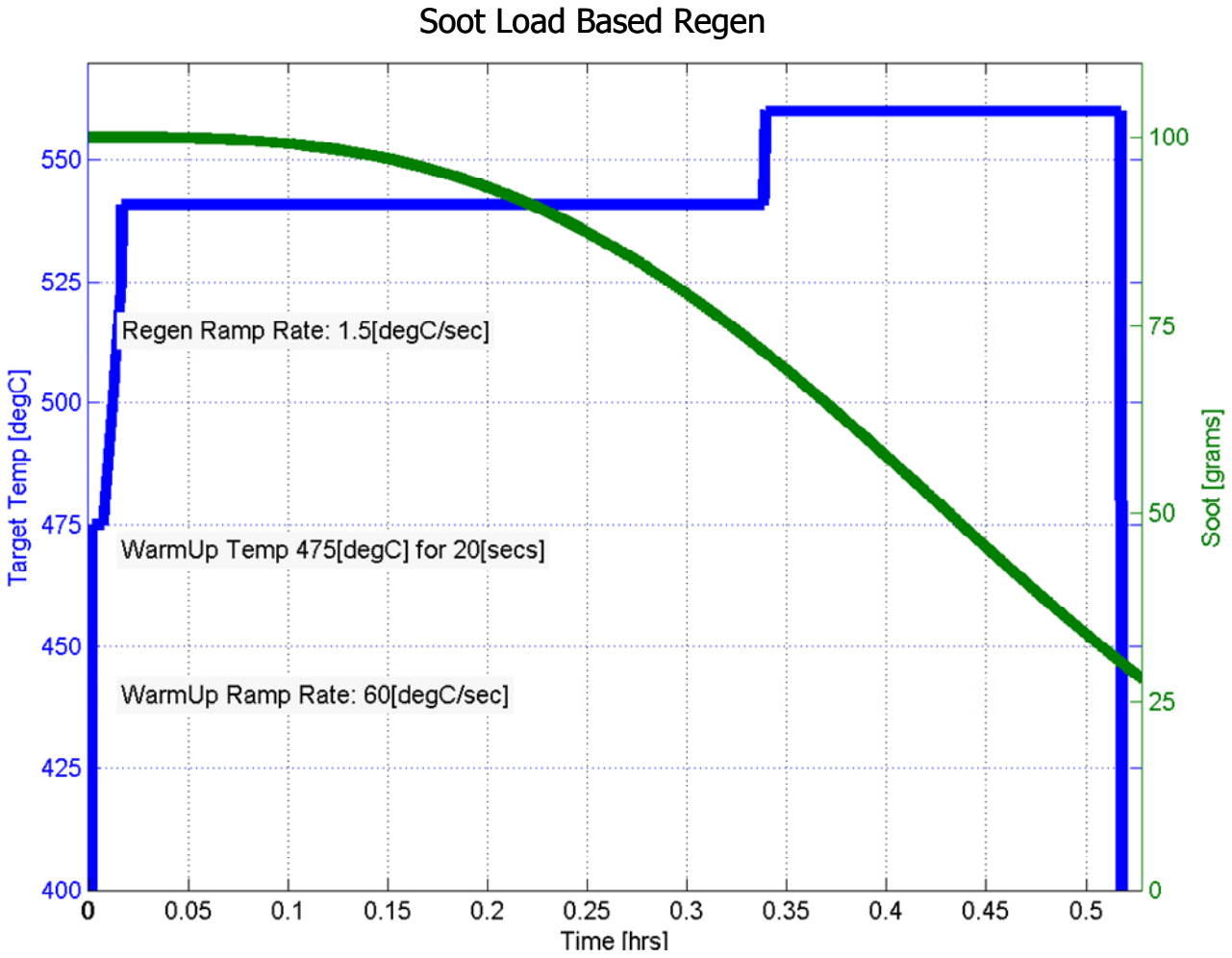


Part 1 – Regeneration Strategy



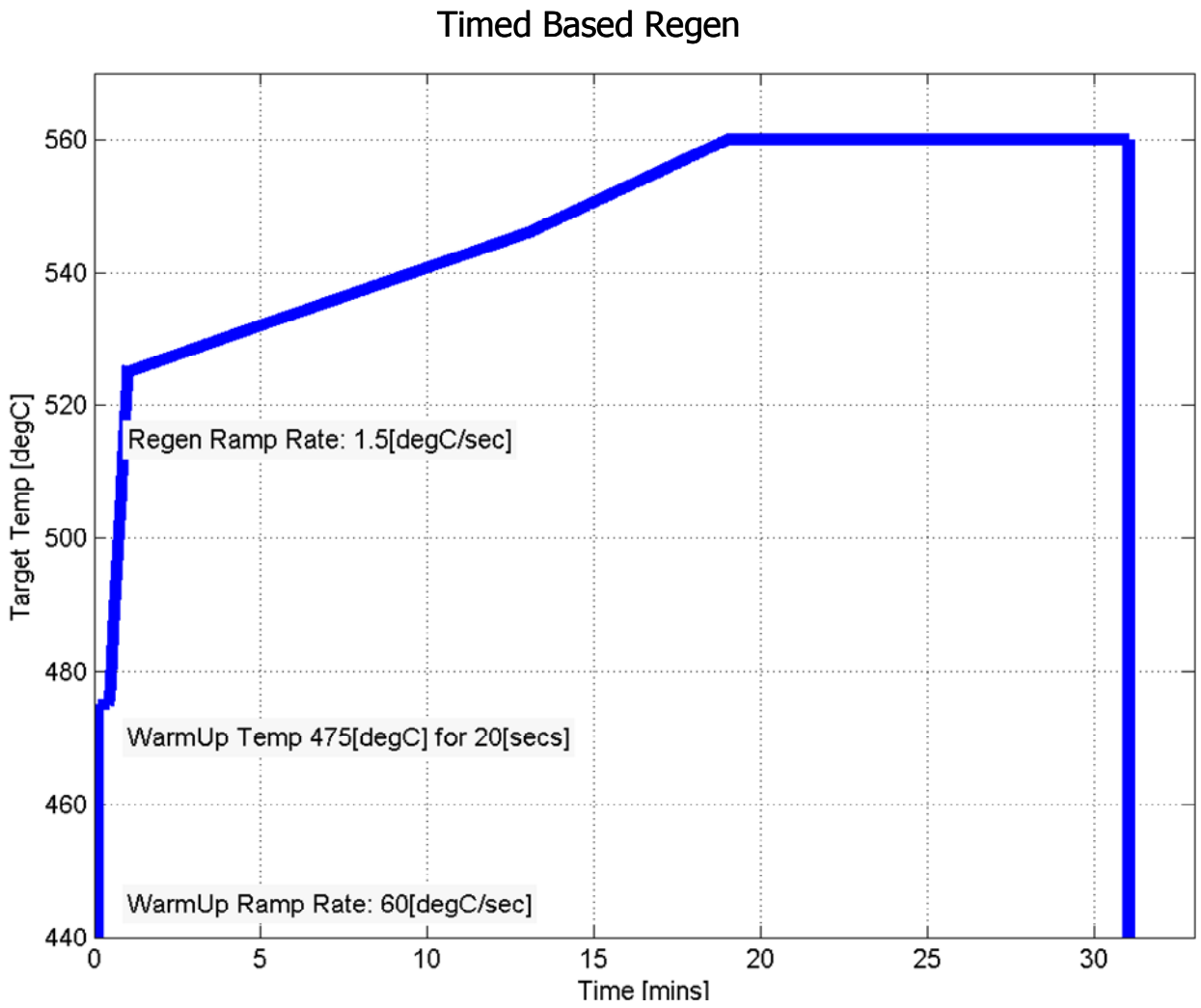
Part 1 – Regeneration Strategy

ISX10 Regen Target Temperature Trajectory Example



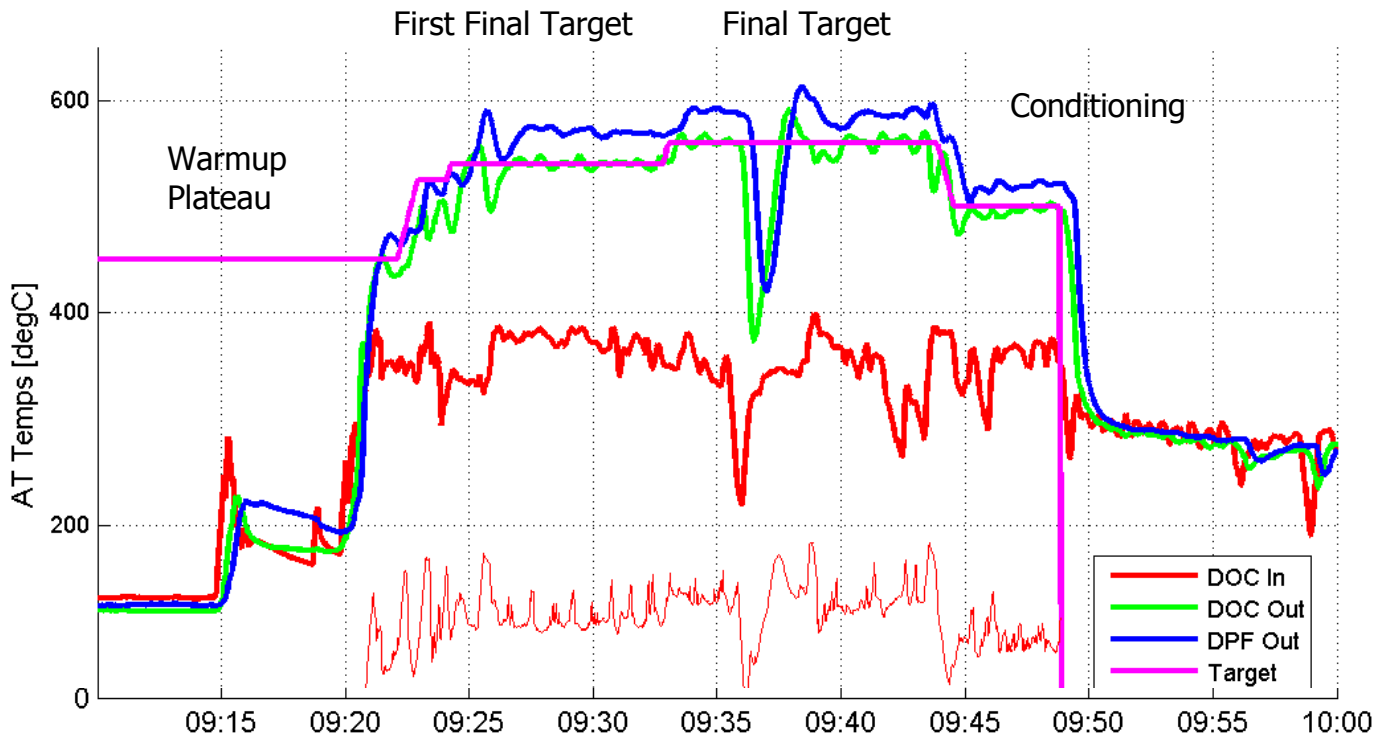
Part 1 – Regeneration Strategy

Time Based Regen Target Temperature Trajectory Example



Part 1 – Regeneration Strategy

Regen Stage



Based on 2007 data, Need 2010 version from ATI

Part 2 – Ineffective Dosing

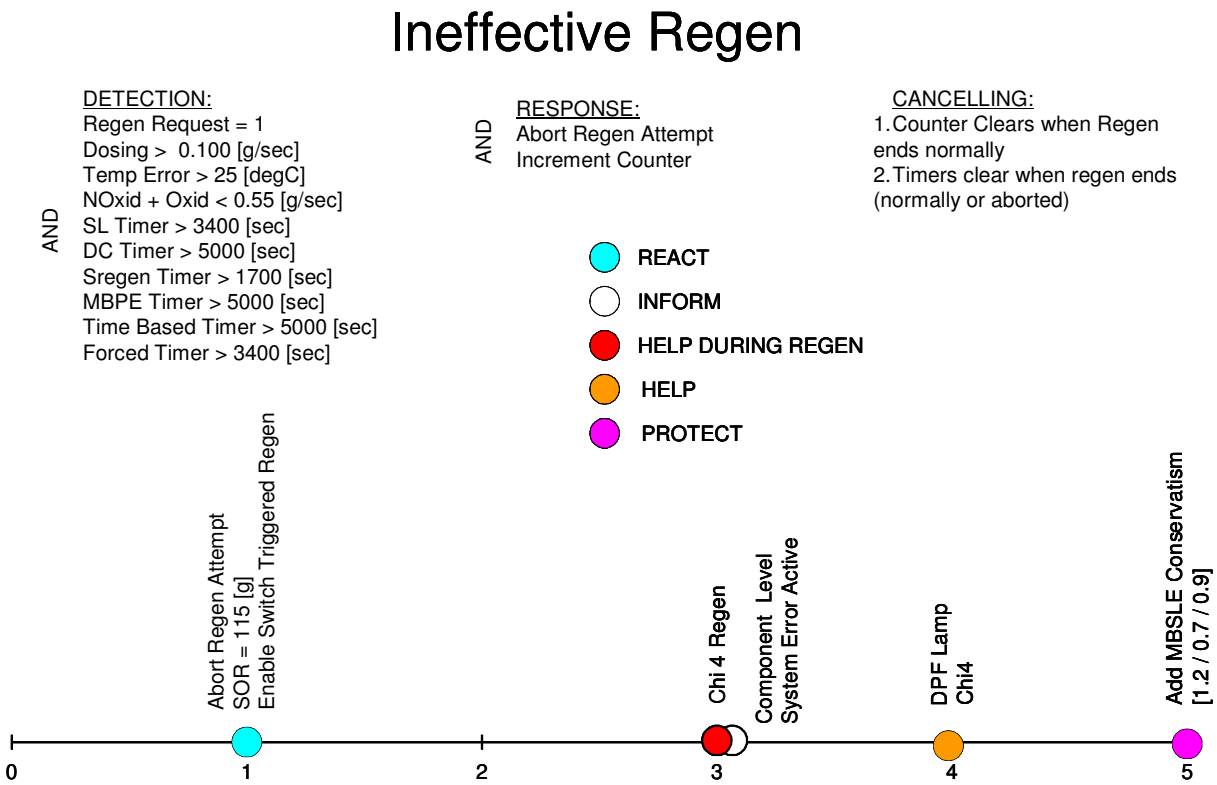
This AECD is designed to protect the aftertreatment should the DOC/doser system fail mechanically or the duty cycle be too transient that fuel is dosed but regen does not occur, thus accumulating hydrocarbons in the DPF.

Parameters sensed to activate AECD

DOC out Temperature located at DOC exit

Surrogate Estimations

Oxidation rate
Noxidation rate



Part 3 – High Soot Loading Aftertreatment Protection

The sensed parameter is the Combined Soot Load Estimate (CSLE). This is the estimate in the ECM of the filter soot load. As can be seen in the "Regeneration Normal Strategy" figure, soot load regenerations are capable at 100 grams soot load. Mobile regenerations are disabled to protection the filter at 150 grams. Prior to reaching 150 grams, if the soot load of 140 grams is reached, then a protection mode is entered where the EGR valve is closed and a lower soot loading regime is configured to help the system regenerate back to the start of regeneration condition.

AECD Purpose – Perform an aftertreatment cleaning operation when the following conditions are sensed.

1) Low engine-out soot,
2) Elevated engine-out NO2
3) Regeneration temperatures
4) Elevated Oxygen content and
5) Elevated flow.

Part 6 – Manual Regeneration Request or Manual Regeneration Inhibit

Manual Regeneration Request:
Certain driving cycles may provide for limited opportunity to accomplish effective regenerations. The electronic control module will alert the operator to the need for regeneration via a dashlamp. When the operator has the opportunity between missions to accomplish a regeneration in a stationary condition, he can initiate an automated regeneration during the out-of-service period. If the regeneration control does not estimate sufficient DPF soot loading and the need to regenerate, the request is ignored.

Manual Regeneration Inhibit:
Vehicle Manufacturers can provide a datalink request to the electronic control module to disable regeneration when in unsafe zones. This request is commanded by the vehicle in response to an operator switch, as required for operation in hazardous areas. Both Manual Regeneration Request and Manual Regeneration Inhibit are available as an option for use by the original equipment manufacturer to accomplish these functions.

The "Regeneration Inhibit Strategy" figure is shown earlier in this section. It shows that when the soot load reaches 110 grams and regenerations are being inhibited, a 25% torque derate is applied to help remind the operator that the switch is in the inhibit condition and the system needs to be allowed to regenerate.

Part 7 – Electronic Sensor and Actuator Failures

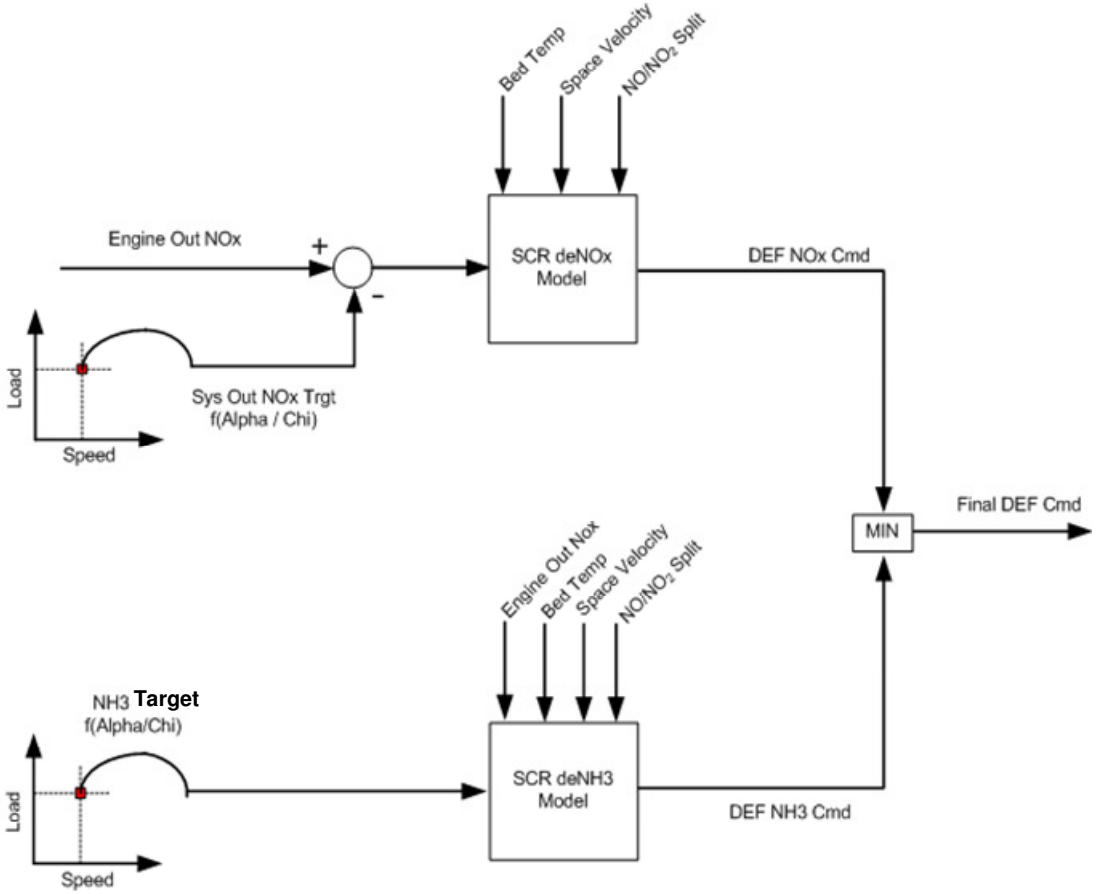
Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
Diesel Oxidation Catalyst In Temperature	Sensor	DOC_IN_IR_DELTAT_ERR	No	Yes	Yes	Maintenance Derate	3315	MIL / Yellow	Yes
		DOC_IN_OOR_HI_ERR					3314	MIL / Yellow	No
		DOC_IN_OOR_LO_ERR					3313	MIL / Yellow	No
Diesel Oxidation Catalyst Out Temperature	Sensor	DOC_OUT_IR_DELTAT_ERR	Yes	Yes	Yes	Maintenance Derate	3318	MIL / Yellow	Yes
		DOC_OUT_OOR_HI_ERR					3317	MIL / Yellow	No
		DOC_OUT_OOR_LO_ERR					3316	MIL / Yellow	No
Diesel Particulate Filter Out Temperature	Sensor	DPF_OUT_IR_DELTAT_ERR	Yes	Yes	No	Maintenance Derate	3322	MIL / Yellow	Yes
		DPF_OUT_OOR_HI_ERR					3319	MIL / Yellow	No
		DPF_OUT_OOR_LO_ERR					3321	MIL / Yellow	No
Diesel Particulate Filter Delta Pressure	Sensor	DPF_DELTAP_DITHER_ERR	Yes	No	Yes	Maintenance Derate	1883	MIL / Yellow	Yes
		DPF_DELTAP_KEYON_ERR					1883	MIL / Yellow	Yes
		DPF_DELTAP_OOR_HI_ERR					1879	MIL / Yellow	No
		DPF_DELTAP_OOR_LO_ERR					1881	MIL / Yellow	No
		DPF_PRESS_TUBE_DISCONNECT_ERR					1883	MIL / Yellow	Yes
Diesel Particulate Filter Gauge Pressure	Sensor	DPF_OUTP_DITHER_ERR	Yes	No	Yes	Maintenance Derate	3135	MIL / Yellow	Yes
		DPF_OUTP_HIGH_ERR					3135	MIL / Yellow	Yes
		DPF_OUTP_KEYON_ERR					3135	MIL / Yellow	Yes
		DPF_OUTP_OOR_HI_ERR					3133	MIL / Yellow	No
		DPF_OUTP_OOR_LO_ERR					3134	MIL / Yellow	No
Hydrocarbon Doser	Actuator	DFSOV_FTO_ERR	No	Yes	No	Maintenance Derate	1963	MIL / Yellow	No
		DFSOV_LEAK_DOSER_FTP_ERR					1925	MIL / Yellow	No
		DOSER_ASOV_PWM_HIGH_ERR					3224	MIL / Yellow	No
		DOSER_ASOV_PWM_LOW_ERR					3223	MIL / Yellow	No
		DOSER_FSOV_PWM_HIGH_ERR					1923	MIL / Yellow	No
		DOSER_FSOV_PWM_LOW_ERR					1924	MIL / Yellow	No
		DOSER_INJ_ELEC_ERR					1977	MIL / Yellow	No
		HC_DOSER_FUEL_RESTRICT_ERR					2881	MIL / Yellow	No
		HC_DOSER_SYS_LEAK_ERR					1932	MIL / Yellow	No
		HC_DOSERP_INRANGE_ERR					1926	MIL / Yellow	No
		HC_DOSERP_OOR_HI_ERR					1927	MIL / Yellow	No
		HC_DOSERP_OOR_LO_ERR					1928	MIL / Yellow	No

307. AECD 13 – Selective Catalytic Reduction

Part 1 – SCR System Modultion

The SCR System will dose DEF unless minimum exhaust flows or temperatures are exceeded. Dosing will stop if:

- Exhaust flow < 20 g/sec
- SCR inlet temperature < 170 degC
- Estimated catalyst bed temperature < 200 degC



Part 4 – Electronic Sensor, Actuator and Component Failures

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
Selective Catalytic Reduction In Temperature	Sensor	SCR_IN_IR_DELTAT_ERR	No	No	Yes	Maintenance Derate	3144	MIL / Yellow	Yes
		SCR_IN_IR_STUCK_ERR					3145	MIL / Yellow	Yes
		SCR_IN_OOR_HI_ERR					3142	MIL / Yellow	No
		SCR_IN_OOR_LO_ERR					3143	MIL / Yellow	No
		SCR_IR_DELTAT_ERR					3144	MIL / Yellow	Yes
Selective Catalytic Reduction Out Temperature	Sensor	SCR_OUT_IR_DELTAT_ERR	No	No	Yes	Maintenance Derate	3148	MIL / Yellow	Yes
		SCR_OUT_IR_STUCK_ERR					3149	MIL / Yellow	Yes
		SCR_OUT_OOR_HI_ERR					3146	MIL / Yellow	No
		SCR_OUT_OOR_LO_ERR					3147	MIL / Yellow	No
DEF Doser Pressure	Sensor	DB_UREA_DOSER_PRESS_IR_HI_ERR	No	No	Yes	Maintenance Derate	1681	MIL / Yellow	Yes
		DB_UREA_DOSER_PRESS_IR_LO_ERR					1681	MIL / Yellow	Yes
		DB_UREA_DOSER_PRESS_OOR_HI_ERR					3571	MIL / Yellow	No
		DB_UREA_DOSER_PRESS_OOR_LO_ERR					3572	MIL / Yellow	No
DEF Tank Level	Sensor	DB_UREA_TANKLVL_OOR_HIGH_ERR	No	No	Yes	Maintenance Derate	1669	Yellow	No
		DB_UREA_TANKLVL_OOR_LOW_ERR					1668	Yellow	No
DEF Tank Temperature	Sensor	DB_UREA_TANKT_IR_HIGH_ERR	No	No	Yes	Maintenance Derate	1679	MIL / Yellow	Yes
		DB_UREA_TANKT_IR_LOW_ERR					1679	MIL / Yellow	Yes
		DB_UREA_TANKT_OOR_HIGH_ERR					1678	MIL / Yellow	No
		DB_UREA_TANKT_OOR_LOW_ERR					1677	MIL / Yellow	No

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
DEF Pressure Line Heater	Heater	DB_UREA_PL_HTR_OPEN_LOAD_ERR	No	No	No	N/A	3258	MIL / Yellow	No
		DB_UREA_PL_HTR_SHORT_HIGH_ERR					3237	MIL / Yellow	No
DEF Supply Line Heater	Heater	DB_UREA_SL_HTR_OPEN_LOAD_ERR	No	No	No	N/A	3425	MIL / Yellow	No
		DB_UREA_SL_HTR_SHORT_HIGH_ERR					3422	MIL / Yellow	No
DEF Return Line Heater	Heater	DB_UREA_BL_HTR_OPEN_LOAD_ERR	No	No	No	N/A	3261	MIL / Yellow	No
		DB_UREA_BL_HTR_SHORT_HIGH_ERR					3239	MIL / Yellow	No
DEF Heater Relay	Heater	DB_DCU_RELAY_UH_SHORT_HI_ERR	No	No	Yes	Maintenance Derate	3713	MIL / Yellow	No
		DB_UREA_HTR_RELAY_OPEN_LOAD_ERR					3564	MIL / Yellow	No
		DB_UREA_HTR_RELAY_SHORT_HI_ERR					3562	MIL / Yellow	No
		DB_UREA_HTR_RELAY_SHORT_LO_ERR					3563	MIL / Yellow	No
DEF Doser Injector	Actuator	DB_UREA_INJ_VALVE_HSS_SCB_ERR	No	No	Yes	Maintenance Derate	3565	MIL / Yellow	No
		DB_UREA_INJ_VALVE_HSS_SCG_ERR					3566	MIL / Yellow	No
		DB_UREA_INJ_VALVE_LSS_SCB_ERR					3565	MIL / Yellow	No
		DB_UREA_INJ_VALVE_LSS_SCGOL_ERR					3567	MIL / Yellow	No
		DB_UREA_INJ_VALVE_PLAUS_ERR					3568	MIL / Yellow	Yes

Part 4 – Electronic Sensor, Actuator and Component Failures

Electronic Control Module	DB_ADC0_CAL_POWERUP_TIMEOUT_ERR	No	No	Yes	Maintenance Derate	1688	MIL / Yellow	No
	DB_ADC0_CONVERSION_TIMEOUT_ERR					1688	MIL / Yellow	No
	DB_ATISCR_DSR1_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
	DB_ATISCR_DSR1_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
	DB_ATISCR_EXH_T_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
	DB_ATISCR_EXH_T_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
	DB_BATTERY_VOLTAGE_OOR_HI_ERR					478	MIL / Yellow	No
	DB_BATTERY_VOLTAGE_OOR_LO_ERR					477	MIL / Yellow	No
	DB_DCU_INVALID_DATASET_ID_ERR					3598	MIL / Yellow	Yes
	DB_DCU_OVER_TMPTR_ERR					3648	MIL / Yellow	Yes
	DB_DCU_RELAY2_SHORT_LOW_ER					3559	MIL / Yellow	No
	DB_DCU_SENSOR_SUPPLY_3_OOR_ERR					3557	MIL / Yellow	No
	DB_DCU_SOFTWARE_RESET_0_ERR					1688	MIL / Yellow	No
	DB_DCU_SOFTWARE_RESET_1_ERR					1688	MIL / Yellow	No
	DB_DCU_SOFTWARE_RESET_2_ERR					1688	MIL / Yellow	No
	DB_DCU_TMPTR_0_OOR_HI_ERR					1688	MIL / Yellow	No
	DB_DCU_TMPTR_0_OOR_LO_ERR					1688	MIL / Yellow	No
	DB_DCU_TMPTR_1_OOR_HI_ERR					1688	MIL / Yellow	No
	DB_DCU_TMPTR_1_OOR_LO_ERR					1688	MIL / Yellow	No
	DB_DCU_VAR_DATASET_SWITCH_ERR					1688	MIL / Yellow	No
	DB_MOC_COM_ERR_CNT_ERR					1688	MIL / Yellow	No
	DB_MOC_COM_INTERRUPTED_SPI_ERR					1688	MIL / Yellow	No
	DB_MON_OVER_VOLTAGE_SUPPLY1_ERR					1688	MIL / Yellow	No
	DB_MON_UNDR_VOLTAGE_SUPPLY1_ERR					1688	MIL / Yellow	No
	DB_REAGENT_Q_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
	DB_RQSTSTATE_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
	DB_SCR_IN_T_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
	DB_UHC_SHUTOFF_WITH_EMPTY_ERR					3651	MIL / Yellow	Yes
	DB_UREA_DOSER_MTR_NOT_AVAIL_ERR					3679	MIL / Yellow	Yes
	DB_UREA_DOSER_MTR_OPEN_LOAD_ERR					3561	MIL / Yellow	No
	DB_UREA_DOSER_MTR_SHORT_HI_ERR					3558	MIL / Yellow	No
	DB_UREA_DOSER_MTR_SHORT_LOW_ERR					3559	MIL / Yellow	No
	DB_UREA_DOSER_RVV_SHORT_LOW_ERR					3578	MIL / Yellow	No
	DB_VAR_DS_RQ_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
	UREA_DOSER_DCU_KEYSWITCH_ERR					3597	MIL / Yellow	No
	J39_UD_SWID_ERROR					1688	MIL / Yellow	No
	J39_UD_TIMEOUT_ERROR					3597	MIL / Yellow	No
	UIMB_INVALID_DATASET_ACK_ERR					3598	MIL / Yellow	Yes

Part 4 – Electronic Sensor, Actuator and Component Failures

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
DEF Doser Control Unit Communication Error	Electronic Control Unit	DB_AMBIENT_P_UNEXPECTED_VAL_ERR	No	No	No	N/A	3598	MIL / Yellow	Yes
		DB_AMBIENT_T_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
		DB_AMBIENT_T_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
		DB_AMBIENT_T_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_ATISCR_DSR2_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
		DB_ATISCR_DSR2_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
		DB_BL_HTR_UNEXPECTED_RQST_ERR					3598	MIL / Yellow	Yes
		DB_COOLANT_T_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_CS_FLAG_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_CS_RDY_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_DIAG_OVR_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
		DB_DIAG_OVR_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
		DB_EEC1_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
		DB_EEC1_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
		DB_ENG_SPD_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_ENGINETMPTR1_MSG_LENGTH_ERR					3598	MIL / Yellow	Yes
		DB_ENGINETMPTR1_MSG_TIMEOUT_ERR					3736	MIL / Yellow	Yes
		DB_PL_HTR_UNEXPECTED_RQST_ERR					3598	MIL / Yellow	Yes
		DB_SCR_OUT_T_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes
		DB_SL_HTR_UNEXPECTED_RQST_ERR					3598	MIL / Yellow	Yes
		DB_SM_HTR_UNEXPECTED_RQST_ERR					3598	MIL / Yellow	Yes
		DB_TRP_RESET_UNEXPECTED_VAL_ERR					3598	MIL / Yellow	Yes

Part 4 – Electronic Sensor, Actuator and Component Failures

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
DEF Doser Control Unit	Electronic Control Unit	DB_DCU_EEP_ERASE_ERR	No	No	No	N/A	1688	MIL / Yellow	No
		DB_DCU_EEP_READ_ERR					1688	MIL / Yellow	No
		DB_DCU_EEP_WRITE_ERR					1688	MIL / Yellow	No
		DB_DCU_RELAY2_SHORT_HIGH_ERR					3558	MIL / Yellow	No
		DB_DCU_RELAY3_SHORT_HIGH_ERR					1683	MIL / Yellow	No
		DB_DCU_RELAY3_SHORT_LOW_ERR					1684	MIL / Yellow	No
		DB_DCU_RELAY4_SHORT_HIGH_ERR					3558	MIL / Yellow	No
		DB_DCU_RELAY4_SHORT_LOW_ERR					3559	MIL / Yellow	No
		DB_DCU_VAR_MNG_EEP_ERR					1688	MIL / Yellow	No
		DB_MAIN_RELAY_STUCK_ERR					1688	MIL / Yellow	No
DEF Supply Module	Electronic Control Unit	DB_SM_HEATERT_IR_COLD_START_ERR	No	No	No	N/A	1681	MIL / Yellow	Yes
		DB_SM_HEATERT_IR_ERR					2976	MIL / Yellow	Yes
		DB_SM_TMPTR_IR_COLD_START_ERR					1681	MIL / Yellow	Yes
		DB_SM_TMPTR_IR_ERR					2976	MIL / Yellow	Yes
		DB_SM_TMPTR_SENSORS_PLAUS_ERR					1688	MIL / Yellow	No
		DB_SUPPLY_MODULE_T_DYCFAIL_ERR					1681	MIL / Yellow	Yes
		DB_UREA_DOSER_HTR_FUNC_RESP_ERR					1681	MIL / Yellow	Yes
		DB_UREA_DOSER_HTR_OPEN_LOAD_ERR					3429	MIL / Yellow	No
		DB_UREA_DOSER_HTR_SHORT_HI_ERR					3426	MIL / Yellow	No
		DB_UREA_DOSER_HTR_T_DCINVLD_ERR					2976	MIL / Yellow	Yes
		DB_UREA_DOSER_HTR_T_DYCFAIL_ERR					1681	MIL / Yellow	Yes
		DB_UREA_DOSER_RVV_OPEN_LOAD_ERR					3579	MIL / Yellow	No
		DB_UREA_DOSER_RVV_SHORT_HI_ERR					3577	MIL / Yellow	No
		DB_UREA_DOSER_TMPTR_DC_PWM_ERR					2976	MIL / Yellow	Yes
		DB_UREA_DOSER_TMPTR_DCINVLD_ERR					2976	MIL / Yellow	Yes
		DB_UREA_DOSER_TMPTR_NO_AVL_ERR					2976	MIL / Yellow	Yes
		DB_UREA_DOSER_TMPTR_PER_PWM_ERR					2976	MIL / Yellow	Yes

308. AECD System Error and Responses

Component Name	Type	Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault
Ineffective Regeneration (AECD 10-2)	System	DOC_NMHC_LOW_EFF_ERR	Yes	No	No	Maintenance Derate	1691	MIL / Yellow	No
		PID_SLIP_USEDUP_ERR	Yes	No	No	Maintenance Derate	2638	None	Yes
High Soot Load Protection (AECD 10-3)	System	DPF_SOOT_LOAD_SEVERE_ERR	No	Yes	No	N/A	1922	Red	No
		SOOT_LOAD_PROTECTION DPF_SOOT_LOAD_MEDIUM_ERR	No	No	No	N/A	2639	None	No
		INHIBIT_SWITCH_HI_SOOT_ERR	No	Yes	No	N/A	2777	None	No
		INHIBIT_SWITCH_TIMED_REGEN_ERR	No	Yes	No	N/A	2777	None	No
		DPF_DELTAP_HIGH_ERR	Yes	Yes	No	Maintenance Derate	1981	MIL / Yellow	No
DOC, DPF, SCR Missing	Component	DOC_NOT_PRESENT_ERR	No	Yes	No	N/A	1664	MIL / Yellow	Yes
		SCR_CATALYST_SYSTEM_MISSING_ERR	No	No	Yes	Maintenance Derate	3151	MIL / Yellow	Yes
DOC, DPF, SCR Damaged	Component	DPF_DESTROYED_ERR	Yes	Yes	No	Maintenance Derate	3245	Yellow	No
		DPF_FILTRATION_EFF_ERR	Yes	No	No	Maintenance Derate	3168	MIL / Yellow	Yes
DOC & DPF System Temperatures	System	DOC_OUT_OVERTEMP_ERR	No	Yes	No	N/A	3254	MIL / Yellow	No
		DOC_SEVERE_TMPTR_LATCHED_ERR	No	Yes	No	N/A	3311	Red	No
		DPF_DELTA_NR_SEVERE_TMPTR_ERR	Yes	No	No	Maintenance Derate	3255	Red	No
		DPF_OUT_NR_SEVERE_TMPTR_ERR	Yes	No	No	Maintenance Derate	3255	Red	No
		DPF_OUT_OVERTEMP_ERR	Yes	Yes	No	Maintenance Derate	3256	MIL / Yellow	No
		DPF_SEVERE_TMPTR_LATCHED_ERR	Yes	Yes	No	Maintenance Derate	3312	Red	No
SCR System Temperatures	System	SCR_CAT_SEVERE_TMPTR_ERR	No	Yes	Yes	Maintenance Derate	3165	Red	No
		SCR_IN_SEVERE_TMPTR_ERR	No	Yes	No	N/A	3229	Red	No
		SCR_OUT_NR_SEVERE_TMPTR_ERR	No	No	Yes	Maintenance Derate	3235	Red	No
		SCR_OUT_SEVERE_TMPTR_ERR	No	Yes	Yes	Maintenance Derate	3165	Red	No
Engine Temperatures (AECD 7-3)	System	EGR_RPM_DERATE_ERROR	Yes	No	No	Maintenance Derate	2962	Yellow	No
		ENGINE_COOLANT_LEVEL_LOW	Yes	No	No	Maintenance Derate	197	Yellow	No
		HIGH_COOLANT_TEMP_AECD7_ERROR	Yes	No	No	Maintenance Derate	2646	Yellow	No
Urea Quality	Status	SCR_REDUCTANT_QUALITY_ERR	No	No	Yes	Maintenance Derate	3543	Yellow	No
Urea Tank Empty	Status	UREA_DOSER_PRIME_TIMEOUT_ERR	No	No	Yes	Maintenance Derate	1682	MIL / Yellow	No

309. SCR Tampering Error List

Error Name	EGR Off	Desoot Off	SCR Off	Inducement	Fault Code	Lamp Illumination	Two Trip Fault	Tampering
SCR_IN_OOR_HI_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3142	MIL / Yellow	No	Yes
SCR_OUT_OOR_HI_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3146	MIL / Yellow	No	Yes
NOX_OUT_SENSOR_SIGNAL_ERR	No	No	No	Torque and Vehicle Speed Inducement	1887	MIL / Yellow	No	Yes
J39_ATO1_TIMEOUT_ERROR	No	No	No	Torque and Vehicle Speed Inducement	2771	MIL / Yellow	No	Yes
DB_UREA_TANKT_OOR_HIGH_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	1678	MIL / Yellow	No	Yes
DB_UREA_TANKHTR1_OPEN_LOAD_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3576	MIL / Yellow	No	Yes
DB_UREA_PL_HTR_OPEN_LOAD_ERR	No	No	No	Torque and Vehicle Speed Inducement	3258	MIL / Yellow	No	Yes
DB_UREA_SL_HTR_OPEN_LOAD_ERR	No	No	No	Torque and Vehicle Speed Inducement	3425	MIL / Yellow	No	Yes
DB_UREA_BL_HTR_OPEN_LOAD_ERR	No	No	No	Torque and Vehicle Speed Inducement	3261	MIL / Yellow	No	Yes
DB_UREA_HTR_RELAY_OPEN_LOAD_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3564	MIL / Yellow	No	Yes
DB_UREA_INJ_VALVE_HSS_SCG_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3566	MIL / Yellow	No	Yes
EONOX_SENSOR_SIGNAL_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	1885	MIL / Yellow	No	Yes
J39_ATI1_TIMEOUT_ERROR	No	No	Yes	Torque and Vehicle Speed Inducement	3232	MIL / Yellow	No	Yes
J39_UD_TIMEOUT_ERROR	No	No	Yes	Torque and Vehicle Speed Inducement	3597	MIL / Yellow	No	Yes
UREA_DOSER_DCU_KEYSWITCH_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	3597	MIL / Yellow	No	Yes
DB_METERING_CTL_UNDER_PRESS_ERR	No	No	No	Torque and Vehicle Speed Inducement	3574	MIL / Yellow	No	Yes
DB_METERING_CTL_OVER_PRESSURE_ERR	No	No	No	Torque and Vehicle Speed Inducement	3575	MIL / Yellow	Yes	Yes
DB_UREA_DOSER_OVER_PRESSURE_ERR	No	No	No	Torque and Vehicle Speed Inducement	3575	MIL / Yellow	Yes	Yes
DB_SCR_MON_PRESSURE_CHECK_ERR	No	No	No	Torque and Vehicle Speed Inducement	3569	MIL / Yellow	Yes	Yes
UREA_DOSER_PRIME_TIMEOUT_ERR	No	No	Yes	Torque and Vehicle Speed Inducement	1682	MIL / Yellow	No	Yes
NOX_OUT_SENSOR_DITHER_ERR	No	No	No	Torque and Vehicle Speed Inducement	3749	MIL / Yellow	Yes	Yes
NOX_IN_SENSOR_DITHER_ERR	No	No	No	Torque and Vehicle Speed Inducement	3748	MIL / Yellow	Yes	Yes
				Torque and Vehicle Speed				

EMISSION MANAGER:

EMM_AECD_State		
State	**Decimal Value**	**Bit Mask**
Emission Protection	0	None
Air Handling System Protection	1	Bit 0
Extreme Ambient Overheat Protection	2	Bit 1
Extreme Ambient Conditions Protection	4	Bit 2
Cold Intake Manifold Temperature Protection	8	Bit 3
Extended Idle & PTO Protection	16	Bit 4
Engine Starting & Warmup Protection	32	Bit 5
General Engine Protection	64	Bit 6
Diagnostic Procedures	128	Bit 7
System Modulation	256	Bit 8
Aftertreatment Regeneration Protection	512	Bit 9
N/A	1024	Bit 10
N/A	2048	Bit 11
Selective Catalytic Reduction Protection	4096	Bit 12

EMM_Protection_State_1		
State	**Decimal Value**	**Bit Mask**
Normal Operation	0	None
AECD 1 – Air Handling	1	Bit 0
AECD 2 – Extreme Ambient Overheat	2	Bit 1
AECD 3.1 – Extreme Ambient Conditions – OFC Gain Adjustment	4	Bit 2
AECD 4 – Cold IMT Protection (Wet Stack)	8	Bit 3
AECD 5.1 – Extended Idle – Idle Speed Increase	16	Bit 4
AECD 5.2 – Extended Idle – EGR Valve close	32	Bit 5
AECD 5.3 – Extended Idle – SCR no dosing	64	Bit 6
AECD 6.1 – Engine Starting and Warmup	128	Bit 7
AECD 7.1 – Extreme Conditions / Malfunction – Engine Electronic Sensors and Actuators	256	Bit 8
N/A	512	Bit 9
AECD 7.3a – Extreme Conditions / Malfunction – Cooling System Protection – Coolant Temperature	1024	Bit 10

AECD 7.3b – Extreme Conditions / Malfunction – Cooling System Protection – EGR Orifice Temperature	2048	Bit 11
AECD 7.3c – Extreme Conditions / Malfunction – Cooling System Protection – Coolant Level	4096	Bit 12
AECD 7.4a – Extreme Conditions / Malfunction – Turbo Prot – Speed	8192	Bit 13
AECD 7.4b – Extreme Conditions / Malfunction – Turbo Prot – Temperature	16,384	Bit 14
AECD 7.5 – Extreme Condtions / Malfunction – Turbo Surge Prot	32,768	Bit 15
AECD 7.6 – Extreme Conditions / Malfunction – Aftertreatment System Protection	65,536	Bit 16
AECD 7.7 – Extreme Condition / Malfunction – CAC Icing	131,072	Bit 17
AECD 7.8 – Extreme Conditions / Malfunction – Disconnected Turbo Comp Protection	262,144	Bit 18
AECD 8.1 – Diagnostic Procedures – Fuel Pressure Rationality Check	524,288	Bit 19
N/A	1,048,576	Bit 20
N/A	2,097,152	Bit 21
N/A	4,194,304	Bit 22
N/A	8,388,608	Bit 23
N/A	16,777,216	Bit 24
N/A	33,554,432	Bit 25
N/A	67,108,864	Bit 26
AECD 9.3a – Modulation – Transient Acceleration – OFC	134,217,728	Bit 27
AECD 9.4 – Modulation – Automated Transmission Shift	268,435,456	Bit 28
AECD 10.1 – Aftertreatment Regeneration – Regen Control	536,870,912	Bit 29
AECD 10.2 – Aftertreatment Regeneration – Ineffective Dosing	1,073,741,824	Bit 30
AECD 10.3 – Aftertreatment Regeneration – High Soot Load Prot	2,147,483,648	Bit 31

EMM_Protection_State_2		
State	**Decimal Value**	**Bit Mask**
Normal Operation	0	None
AECD 10.4 – Aftertreatment Regeneration – DOC Face-Plugging	1	Bit 0
AECD 10.5 – Aftertreatment Regeneration – Aftertreatment Desorption	2	Bit 1
AECD 10.6a – Aftertreatment Regeneration – Manual Request – Stationary Regen	4	Bit 2
AECD 10.6b – Aftertreatment Regeneration – Manual Request – Inhibit	8	Bit 3
AECD 10.7 – Aftertreatment Regeneration – Electronic Sensors and Actuators	16	Bit 4
N/A	32	Bit 5
N/A	64	Bit 6
N/A	128	Bit 7
N/A	256	Bit 8
N/A	512	Bit 9
N/A	1024	Bit 10
N/A	2048	Bit 11
N/A	4096	Bit 12
N/A	8192	Bit 13
AECD 13.1a – SCR Operation – Exhaust Flow	16384	Bit 14
AECD 13.4a – SCR Operation – System Malfunction	32768	Bit 15
AECD 13.3 – SCR Operation – Extreme Ambient Thawing Prot	65536	Bit 16
	131,072	Bit 17
AECD 8.8 – Diagnostic Procedures – Fueling Quantity & Timing	262,144	Bit 18
N/A	524,288	Bit 19
N/A	1,048,576	Bit 20
AECD 9.3b – Modulation – Transient Acceleration – Low Boost	2,097,152	Bit 21
N/A	4,194,304	Bit 22
AECD 13.1b – SCR Operation – Low Catalyst Temp	8,388,608	Bit 23
AECD 13.2 – SCR Operation – Thermal Management	16,777,216	Bit 24
AECD 13.4b – SCR Operation – DEF Quality	33,554,432	Bit 25
AECD 13.4c – SCR Operation – DEF Empty	67,108,864	Bit 26
N/A	134,217,728	Bit 27
N/A	268,435,456	Bit 28
N/A	536,870,912	Bit 29
AECD 9.5 – Modulation – High Coolant Temp EGR Modulation	1,073,741,824	Bit 30
N/A	2,147,483,648	Bit 31

CUSTOMER / DRIVER SURVERY

Question intended to encourage feedback on engine performance. Make recod of vehicle configuration, engine model rating, transmission, axle, etc. Where possible use open ended question to solicit driver feedback.

Customer Information

DriverName:_____

Owner/Operator ☐ Yes ☐ NO Unit#:_____

Fleet Drive ☐ Yes ☐ NO Fleet Name:_____

Years of Driving Experience: _____

Other Engine(s) Driven or Familiar With:_____

Engine Model/Rating/ECM calibration (if known): _____

How Long Have You Driven With This Engine? _____

Base Location: _____

Typical Route: (Check all that apply)

☐ Local Delivery ☐ Mountainous

☐ Interstate ☐ Hilly Terrain

☐ City ☐ Flat Terrain

☐ Rural ☐ Dirt / Gravel Roads

☐ Off-Road ☐ Snow / Ice Covered Roads

Approx. Gross Vehicle Weight: _____

Truck Model / Year: _____

Transmission Make and Model: _____

Number of Gears: _____ Automatic / Automated Transmission?_____

Power Train Data: Rear Axle Ratio: _____

Tire Size: _____

Clutch Make / Model: _____

Auxiliary Devices: _____

Typical Driving Techniques

Do you normally use the clutch when shifting?_____

What engine speed do you normally use to upshift? _____

Do you maintain To Gear? Gear-Down? _____

What type of throttle control do you prefer to use? ☐Automotive (Min/Max) Governor☐ All-Speed Governor (CAT Throttle)

When do you use Cruise Control? _____

If not, do you run on the road speed governor? _____

Do you use the Smart Road Speed Governor Feature? _____

When climbing a grade do you:
Resume Cruise Control after a downshift?_____

Keep your foot on the throttle? _____

With Engine Brakes, what engine speed do you typically maintain on steep grades:
☐ 1600 -1700 RPM ☐ 1700 – 1800 RPM ☐ 1800 -1900 RPM

☐ 1900 -2000 RPM ☐ 2000 – 2100 RPM ☐ Other Specify _____ RPM

Engine Start

Is engine cranking time acceptable? Cold Start ☐ Yes ☐ No Crank Secs _____

Hot Start ☐ Yes ☐ No Crank Secs _____

Does engine start acceptably?

Comments? _____

How long does the engine crank before it fires? _____

Does engine speed overshoot at startup? ☐ Yes ☐ No

Comments? _____

How soon does engine speed settle after the engine starts? _____

Does the engine smoke at startup? ☐ Yes ☐ No

If yes, is smoke: ☐ Blue ☐ White

Ambient Temp _____ deg Fehrenheit

How does the engine exhaust appear? _____

Is throttle response noticed after startup? Cold Start? ☐ Yes ☐ No

Hot Start? ☐ Yes ☐ No

How well does the engine speed to throttle motion after startup? _____

Comments? _____

Engine Idle

Idle speed setting used _____ RPM Idle Time (Driver Estimate) _____ % ECM Idle Time _____ %

Does the engine idle smoothly? ☐ Yes ☐ No

Does the engine surge at idle? ☐ Yes ☐ No

Does the idle increment/decrement Switch operate acceptably? ☐ Yes ☐ No