

Introduction.....	INTRO-1
Conduct.....	INTRO-4
Class Agenda.....	INTRO-5
Customer Support Information.....	INTRO-6
Warranty Information.....	INTRO-9
MCM2 - ACM2 Hardware Software	2-1
Regen and Zone Triggering.....	2-4
New Engine Brake Operation (3 and 3).....	2-5
Parked Regen.....	2-6
Fault Codes.....	2-7
Auto Elevate.....	2-12
Derate Type Parameter.....	2-13
Ambient Air Temperature Parameter.....	2-14
2010 Gateway.....	2-15
Powernet Distribution Box and Cab Load Disconnect Switch.....	2-16
Fuel System - Pressure Panel.....	2-17
Fuel System - Leakage Panel.....	2-18
Fuel System - Quantity Control Valve Adaptations.....	2-19
Fuel System - Quantity Control Valve Sticking Test.....	2-20
Total Fuel Quantity Check.....	2-21
Engine Idle Shutdown.....	2-22
Idle Speed Balance.....	2-23
Relearn EGR Actuator End Stops.....	2-24
Regen Worksheet.....	2-25
SCR System Overview.....	3-1
SCR Terms.....	3-4
What is DEF.....	3-5
Driving Range of DEF.....	3-9
Dash Gauge and Dash Lights.....	3-10
Dash Panel Reactions.....	3-11
Inducements.....	3-12
Gauge Reactions and Indicators.....	3-13
Inducements for Low DEF Level (Quantity).....	3-14
Inducements for Contaminated DEF (Quality).....	3-15
Inducements for Extended SCR Faults.....	3-16
Inducement Tree.....	3-17
Inducement Recovery - Extended Faults.....	3-18
Inducement Recovery - DEF Level (Quantity) Faults.....	3-19
Inducement Recovery - Quality Faults.....	3-20
DEF Quality Test Worksheet.....	3-21
BlueTec and Fuel Economy.....	3-22
DDEC Reports.....	3-23
SCR System Operation.....	3-24
SCR Operating Principle.....	3-25
Maintenance Intervals.....	3-26
SCR Configuration.....	4-1
ATS Configurations.....	4-4
1-Box System Schematic.....	4-5
1-Box in a Sleeper Configuration.....	4-6
1-Box Views.....	4-7
1-Box Design Details.....	4-8
1-Box Flow.....	4-9
Sensor Box (1-Box System).....	4-10
NOx Sensor.....	4-11
NOx Sensor Behavior and Conversion.....	4-12
1-Box Worksheet.....	4-13

TABLE OF CONTENTS

DEF Air System	5-1
Pressure Limiting Unit	5-4
DEF Air System Parameters	5-5
Positive or No Battery Shut Off	5-6
DD13 VPOD Air Ports	5-7
Negative Battery Shut off	5-8
DEF Air System Flow	5-9
DEF Fluid System	6-1
DEF Tank	6-4
Integrated Header	6-5
DEF Pickup	6-6
DEF Tank Filling and Freezing	6-7
DEF Lines	6-8
VOSS Connectors	6-9
Failed Connector and DEF Line	6-10
DEF Pump	6-11
DEF Pump Module	6-12
DEF Pressure Parameters	6-15
DEF Pump Current Parameter	6-16
DEF Pump Module Worksheet	6-17
DEF Metering Unit	6-18
DEF Metering Unit Cutaway	6-19
DEF Dosing (Low and High RPM)	6-20
DEF Nozzle	6-21
DEF System Purge Cycles	6-22
DEF Pressure Line Routing	6-24
DEF Flow	6-25
DEF Metering Unit Worksheet	6-26
DEF Coolant System	7-1
DEF Coolant Valve	7-4
DEF Coolant Line Identification	7-5
DEF Tank Components	7-6
Complete System Overview	7-7
Electronics and Diagnostic Software	8-1
Electronic Controls	8-4
Modules	8-5
ACM2	8-6
ACM2 Communications	8-8
Powernet Wiring	8-9
ACM2 Electrical Limits	8-10
DDDL Opening Screen	8-11
DDDL Fault Code Window	8-12
SCR Service Routines - Actions Tab	8-13
DEF Quantity Test	8-14
SCR Air Pressure System Check	8-15
SCR Efficiency Test	8-16
DEF Coolant Valve Control	8-17
Output Component Check	8-18
DPF Ash Accumulator	8-20
SCR Replacement	8-21
Voltage Service Routine	8-23
1-Box and Metering Unit Harness Connections	8-24
Complete System Review Worksheet	8-27
Guided Fault Diagnostics	9-1
Guided Diagnostics - Exercise 1	9-4
Guided Diagnostics - Exercise 2	9-5

TABLE OF CONTENTS

Guided Diagnostics - Exercise 3	9-6
Guided Diagnostics - Exercise 4	9-7
Guided Diagnostics - Exercise 5	9-8
Guided Diagnostics - Exercise 6	9-9
Guided Diagnostics - Exercise 7	9-10
Guided Diagnostics - Exercise 8	9-11
Guided Diagnostics - Exercise 9	9-12
Guided Diagnostics - Exercise 10	9-13
Guided Diagnostics - Exercise 11	9-14
Guided Diagnostics - Exercise 12	9-15
Guided Diagnostics - Exercise 13	9-16
OBD Diagnostics	10-1
Elements Of OBD.....	10-4
Monitors	10-5
Malfunction Indicator Lamp and Drive Cycle	10-6
1 Cycle Fault Reaction - Confirmed, Active	10-7
2 Cycle Fault Reaction - Pending, Active Code	10-8
2 Cycle Fault Reaction - Confirmed, Active Code	10-9
2 Cycle Fault Reaction - Confirmed, Previously Active Code	10-10
2 Cycle Fault Reaction - Previously Confirmed, Previously Active Code	10-11
Fault Clearing - Drive Cycles.....	10-12
Freeze Frame Data	10-13
CEL, MIL, and SEL Parameters.....	10-14
Diagnostic Code Worksheet	10-15
Diagnostic Sheets.....	11-1
Exercise Sheets.....	11-4
Appendix.....	APPENDIX-1
DEF Flow Diagram	APPENDIX-2
Test Report	APPENDIX-5

INTRODUCTION

NOTES

Lined area for notes, consisting of 30 horizontal lines.

INTRODUCTION

CONDUCT

Detroit Diesel prohibits the use of jokes, cartoons or pictures that are directly or indirectly derogatory toward race, religion, national origin, gender, age, disability, height, weight or marital status. All employees, visitors, vendors or trainees must be sensitive to the diversity of all employees within our workforce and treat each other with dignity and mutual respect at all times.

Undermining the dignity of others through inappropriate use of printed material, comments or conduct and utilizing such available communication methods such as email, facsimile, and copier will not be tolerated.

Computers that are used in the classroom are for instructional purposes only. Do not use them for personal use.

CLASS AGENDA

- Introduction
 - Class Starts
 - Break
 - Lunch
 - Break
 - End of Day
- Review “MCM2 / ACM2 Software Overview”
 - This information is a review of the new software changes related to the MCM2 or ACM2. These are current features that you may already know, but have changed for 2010.
 - An example would be auto elevate. This is not a feature for the 2010 SCR system, so we choose to talk about it in this section.
- Review “SCR System Overview”
 - This information is a review of the Web Based Training material
- Review each SCR system and understand how they function
 - DEF air system, DEF coolant system, and DEF fluid system
- Review “Guided Fault Diagnostics” information
 - These are faults that would require a large amount of drive time and are difficult to demonstrate in a class room environment
- Review “OBD Diagnostics” information
 - This section will target areas in which diagnostics have changed due to EPA 2010.
- Technicians must be able to demonstrate, understand, and perform the following:
 - Analyze a good running SCR system
 - Determine when a system is not performing correctly
 - Identify components of the SCR system
 - Properly test DEF fluid
 - Follow diagnostic routines related to the SCR system
 - Understand OBD information for EPA 2010

CUSTOMER SUPPORT INFORMATION

DDCSN
DETROIT DIESEL CUSTOMER SUPPORT NETWORK

Welcome Shawn Hinson
Service Locator | Log Out

LITERATURE | PARTS | SUPPORT | TOOLS | TRAINING | WARRANTY | LINKS | SEARCH [] WEBSITE ENGINE SERIAL NUMBER

Home | Support | Customer Support Center

CUSTOMER SUPPORT CENTER

- Fault Codes
- CSC Newsletter
- Contacts
- Backdoor Password Request
- Mainframe Change Request
- DD Platform Product Report
- General Assistance Request

CUSTOMER SUPPORT CENTER

EFFECTIVE FEBRUARY 1, 2009 HOURS OF OPERATION:

8:00 AM – 7:00 PM MONDAY – FRIDAY (EST)
9:00 AM – 3:00 PM SATURDAY (EST)
CLOSED ON SUNDAY

PHONE: 313-592-5800 / FAX: 313-592-5888

PLEASE HAVE THE FOLLOWING AVAILABLE WHEN YOU CALL:

- Dealer/Distributor Location Name and Code
- Contact Name and Email Address
- Phone Number
- Fleet or Owner Name
- Fleet Unit Number
- Engine Serial Number
- Last 6 Digits of the VIN
- Mileage
- Complaint Detail and Codes
- Troubleshooting Completed

THE CUSTOMER SUPPORT CENTER PROVIDES:

- Express Forms:
 - Backdoor Password Request
 - Mainframe Change Request
 - DD13 / DD15 Product Report
 - General Assistance Request
- Technical Service / Diagnostic Assistance
- DDEC Modifications
- DRS, DDRS, DDDL (To purchase or register DDDL, call Nexiq-Snap On 877-974-3539)
- Parts and Technical Support/Freightliner Wiring Diagrams

- Other useful information located within this page is the “Fault Codes” link which is an Excel file of the most common fault codes by engine type along with the CSC response to these codes.
- The “CSC Newsletter” is information related to engine, software, and CSC.
- Technicians can also use the “General Assistance Request” and “DD Platform Product Report” to let the CSC know of any engine issues. After all information is filled in, these links will automatically generate a REMEDY ticket for the CSC.
- Note: You must be logged into DDCSN to view the fault codes and CSC newsletter links.

Customer Support Information (continued)

No.: 10 TS-1
January 6, 2010

TO: Service Locations

FROM: Technical Support Development

SUBJECT: **Repair Facility Input on EPA10 Engine Issues**

NOTE: THIS DOCUMENT SUPERSEDES 09 TS-36.

ISSUE

In an effort to effectively respond to any emerging issues involving the new EPA10 engines, Detroit Diesel and Daimler Trucks North America must rely on communication from service facilities. This communication will help early detection and resolution of engine issues in the field. It will ultimately help to insure successful support of the EPA10 engines.

The Detroit Diesel and Daimler Trucks North America technical assistance lines are available for help in diagnosing any engine or vehicle issue; however, service locations are asked to contact the applicable technical assistance line whenever performing repairs on one of the new EPA10 engines. This input is very important and will be instrumental in identifying the root cause as quickly as possible.

REQUIRED ACTION

If you have performed a repair on an EPA10 engine, but do not need actual consultation, please call and leave a message with the following information:

- Your name, phone number, company name and location
- Engine Serial Number
- The last six digits of the VIN
- A description of the issue, and if applicable, the solution

Using email (csc@daimler.com), or our on-line product report forms on DDCCSN under the Customer Support Center heading are another option to report.

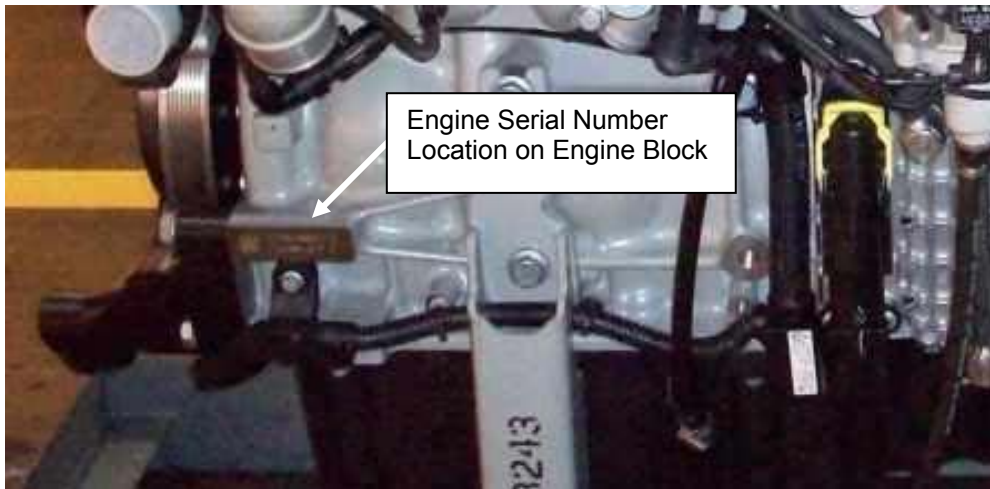
The technical assistance numbers are as follows:

- Detroit Diesel Customer Support Center - 800-445-1980 (for all EPA10 engines and engine components)
- Daimler Trucks North America Technical Help Line – 888-587-6753 (for any Freightliner or Western Star vehicle interface issue)

INTRODUCTION

Customer Support Information (continued)

How to identify an EPA10 engine:



The Engine Serial Number will be 14 digits long and can be identified as follows:

DD15 for Freightliner will be model D472903, serial number will be 472903S00xxxxx.
DD15 for Western Star will be model D472904, serial number will be 472904S00xxxxx.

DD13 for Freightliner will be model D471903, serial number will be 471903S00xxxxx.
DD13 for Western Star will be model D471911, serial number will be 471911S00xxxxx.
DD13 for Freightliner M2 will be model D471913, serial number will be 471913S00xxxxx.

DD16 for Freightliner will be model D473901, serial number will be 473901S00xxxxx.
DD16 for Western Star will be model D473902, serial number will be 473902S00xxxxx.

CONTACT INFORMATION

Please contact the Detroit Diesel Customer Support Center at 313-592-5800 or email csc@daimler.com if you have any questions.

WARRANTY INFORMATION



10WO-2
January 6, 2009

To: **All Service Locations
General, Service, Parts Managers and Warranty Administrators**

From: D. P. Dole – Sr. Manager, DTNA Warranty Operations

SUBJECT: **2010 After Treatment System Component Responsibility**

Emission year 2010 will add additional complexity to the overall Truck and Bus platform. This letter will simplify the warranty responsibility between Detroit Diesel and the Chassis Original Equipment Manufacturer (OEM).

The After Treatment System (ATS) is installed by the Truck or Bus OEM. Installation issues are the responsibility of the OEM.

The following items are supplied and warranted by the Truck or Bus Manufacturer.

- **Diesel Exhaust Fluid (DEF) Tank and Mounting**
- **DEF Coolant Supply Valve and associated Coolant lines**
- **DEF System Air Pressure Regulator and associated Air lines**
- **Electrically-Heated DEF Lines**
- **After treatment Control Module (ACM) Mounting Bracket and Protective Cover**
- **DEF Pump Mounting and Protective Cover**
- **DEF System Chassis Interface Harness**

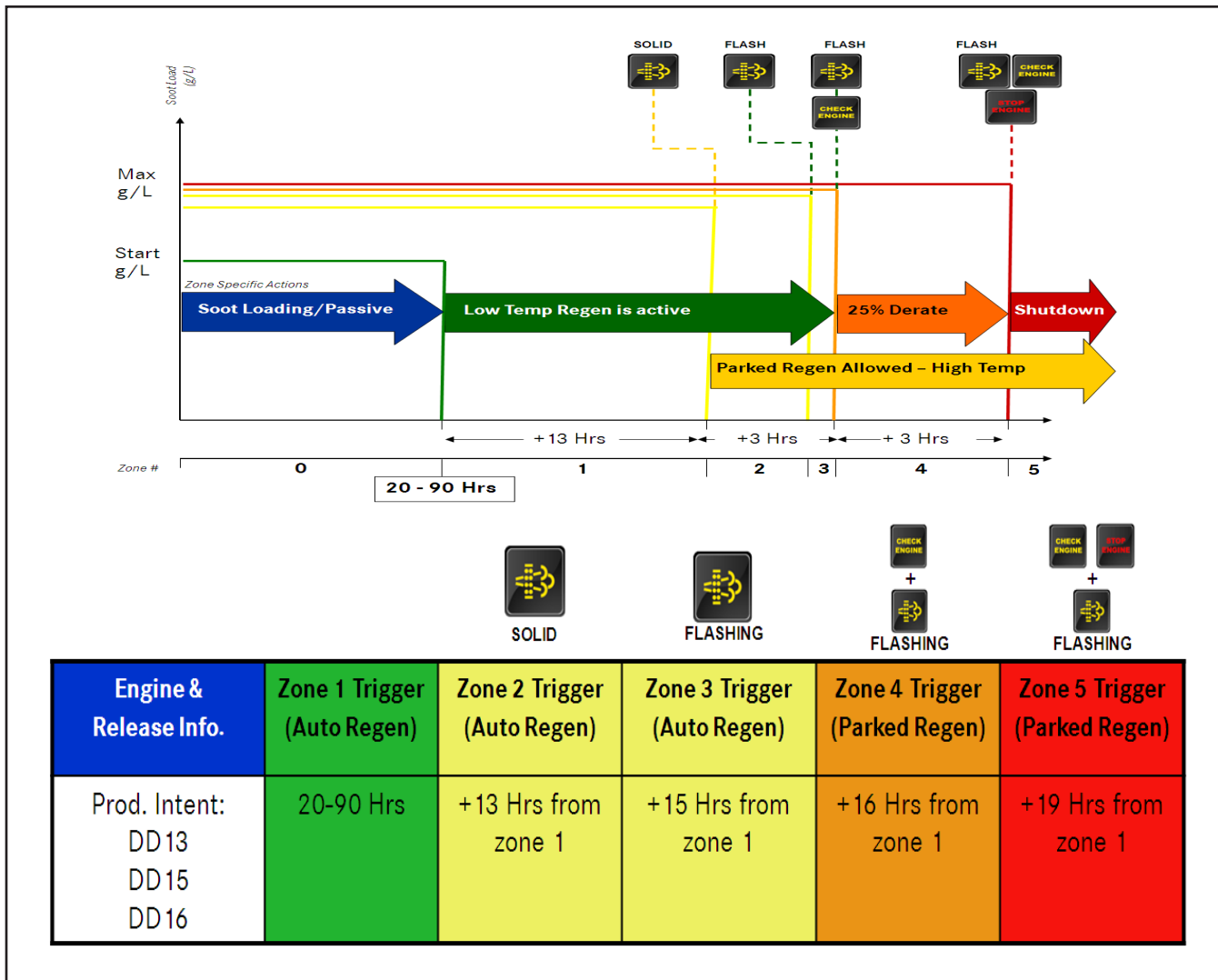
The following items are supplied and warranted by the Detroit Diesel.

- **ATS Unit(s)**
- **Sensor Box for ATS Unit(s)**
- **Sensors (Temperature, Pressure, NOx)**
- **DEF Dosing Unit**
- **DEF Injector**
- **DEF Pump**
- **After treatment Control Module (ACM)**
- **ATS Harnesses (Diesel Particulate Filters , Diesel Oxidation Catalyst, Selective Catalytic Reduction)**

NOTES

MCM2 - ACM2 HARDWARE SOFTWARE

REGEN AND ZONE TRIGGERING



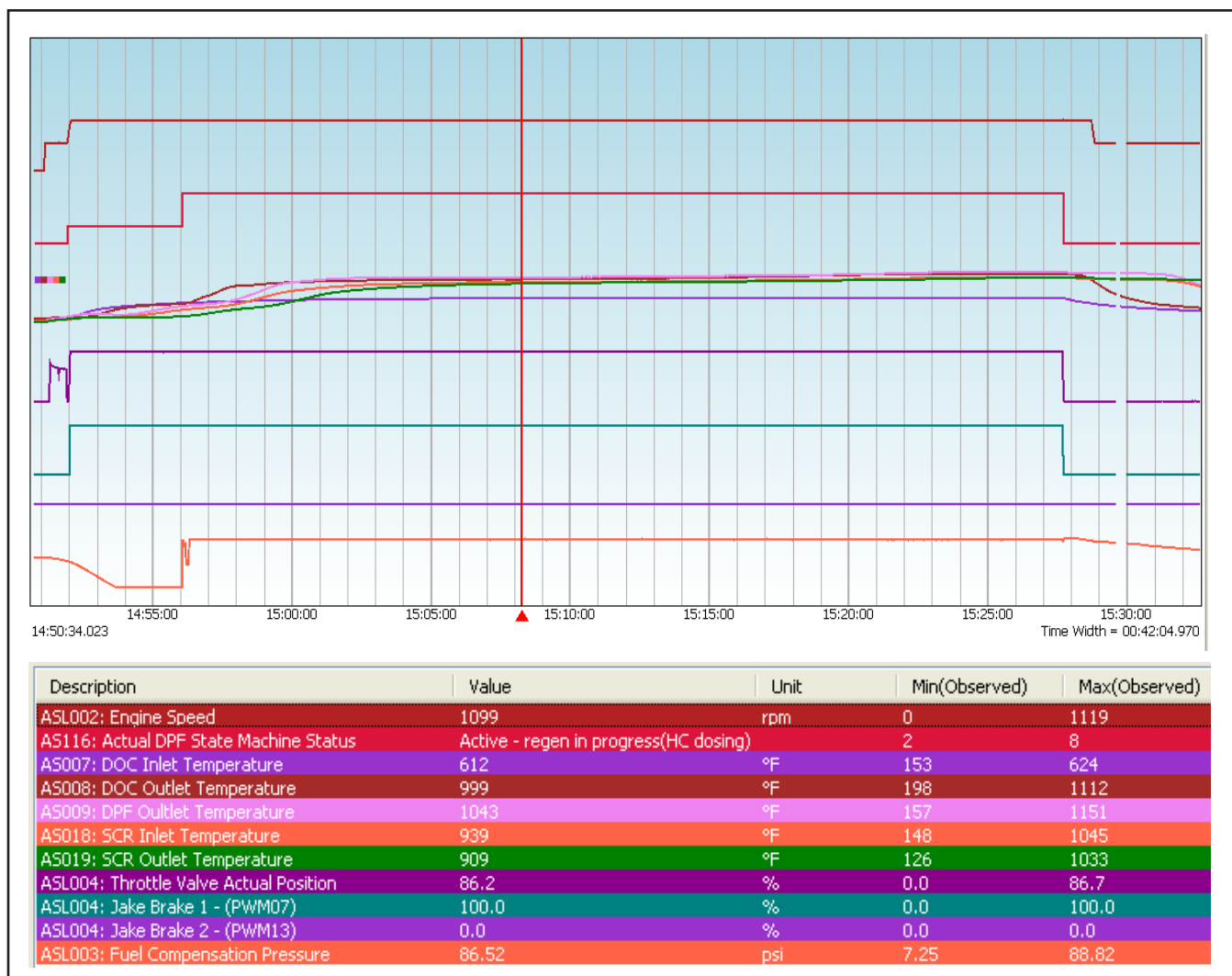
The regen strategy for 2010 has changed.

- Regen cycles 1 through 4 are low temperature regens: Approximately 3 hours in duration at lower temperature 797 °F (425 °C) target temperature.
- Every Fifth Regen:
 - Starts as a low temperature regen for 2 hours in duration 797 °F (425 °C) target temperature.
 - Immediately followed by a high temperature regen for 35 minutes. Target temperature ranges from 977 °F (525 °C) to 1112 °F (600 °C).
- After 5th, repeat cycle above.
- Average over the road fuel usage is 2.0-2.5 gallons. This does not include fuel to run the engine.

NEW ENGINE BRAKE OPERATION (3 AND 3)

New “3/3” exhaust rocker shafts.

- In 2010, a switch from “2/4” shafts for jake brake control occurred. Parked regeneration control logic and the “auto-elevate” feature (to burn off HC during extreme extended engine idling) will use “mixed mode” operation where the front 3 cylinders operate in engine brake mode while firing the rear 3 cylinders. This raises engine load and exhaust temperature, resulting in lowered engine RPM for parked regens and the auto-elevate feature.
- 2010 engine calibrations will only be compatible with 3/3 shafts for enhanced exhaust brake control. “Low” position on the exhaust brake dash switch will activate jake brakes in 3 cylinders, “Medium” position is 6 cylinders, “High” will be 6 cylinders with enhanced turbocharger and airflow control.
- The rocker arm shafts are not backwards compatible to 2007.

PARKED REGEN

- Currently, a parked regen will operate at 1100 RPM and approximately 40 minutes.

NOTE: A Tool Requested regen is being setup to support a low temperature regen.

- During thermal management, the intake throttle will close along with turning off cylinders 1, 2 and 3. With the cylinders off, the MCM2 activates the Jake brake solenoid for those cylinders to help increase load and thus exhaust temperature. Note the “Jake Brake #1-(PWM07)” parameter at 100% in the above screen shot.
- A new parameter “Actual DPF State Machine Status” shows more detailed information on how the regen is progressing. Below are examples from a high idle regen.
 - » Base Mode - No Regen Request
 - » Regen Request Active (no dosing)
 - » Active - Regen in progress (HC dosing)
- Note: Not all fault code reporting parameters are monitored during a regen. Also, some fault code reporting parameters are not monitored for 5 minutes after a regen and some up to 2 hours after.