Detroit Diesel Engine Updates

Dale Allemang and Rick Dziadzio

September 9, 2008

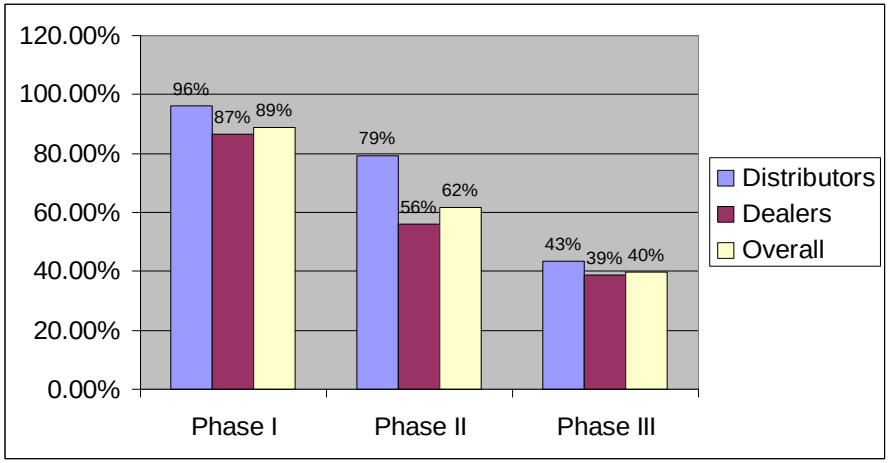
AGENDA

- Series 60 Product Updates
- MBE4000 Product Updates
- MBE900 Product Updates
- DD15 UpTime Commitment
- DD15 Field Findings
- Service Support Index (SSI)
- Electronic Tools
- Questions & Answers

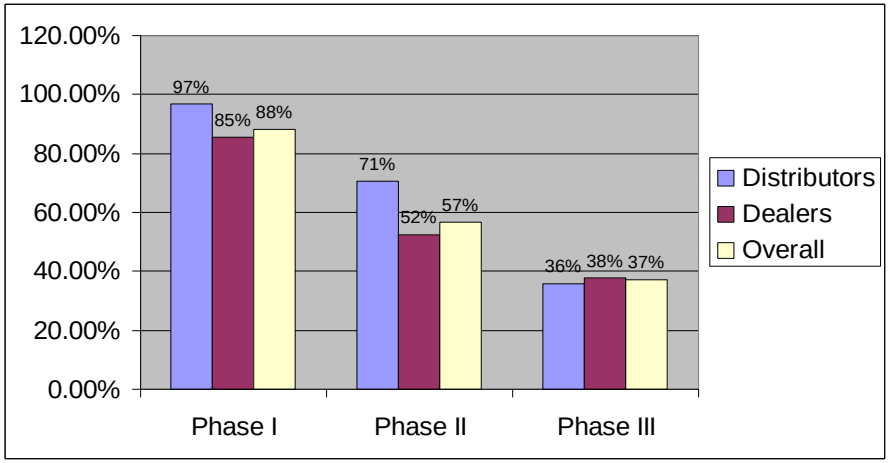
EPA 07 Service Readiness

2007 EGR Engine Certifications Current Status

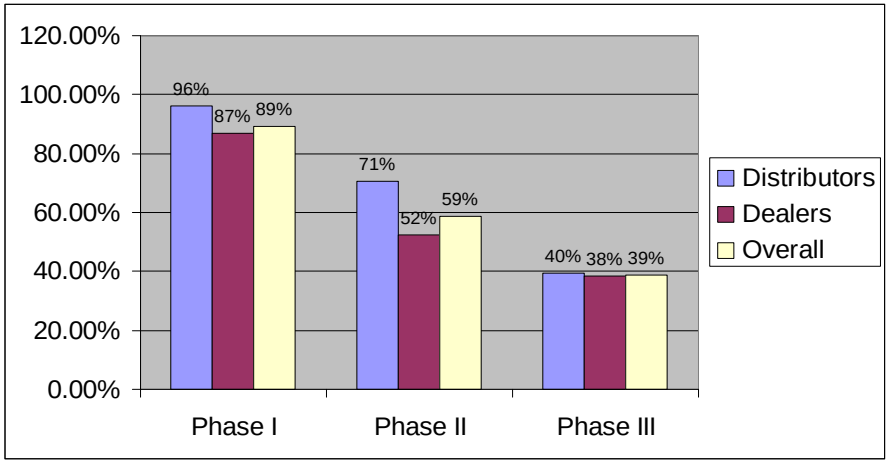
Series 60

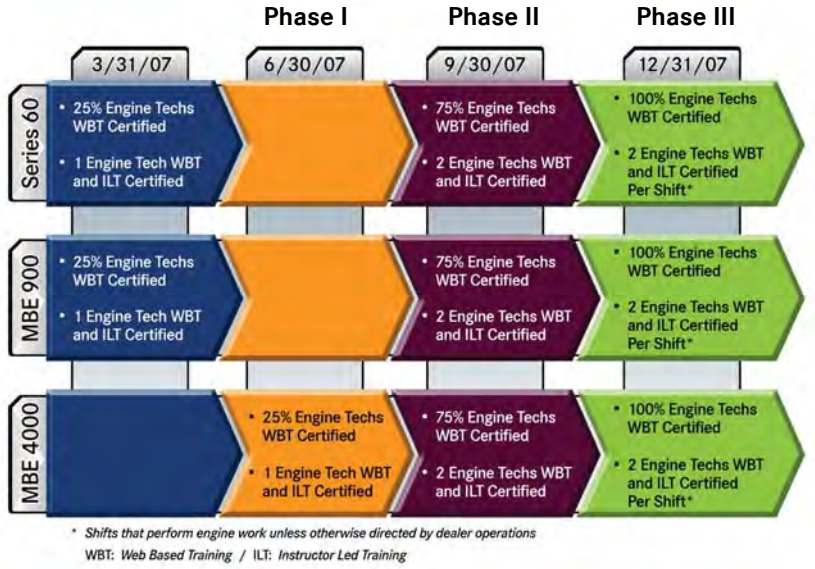


MBE 4000



MBE 900

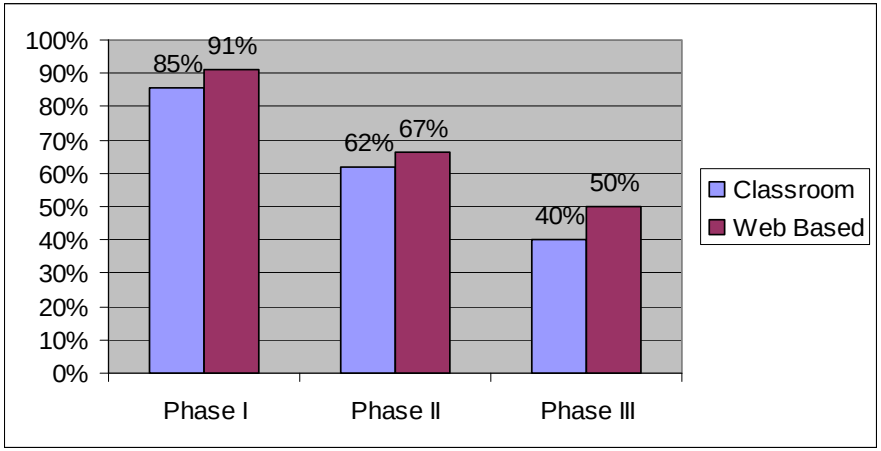




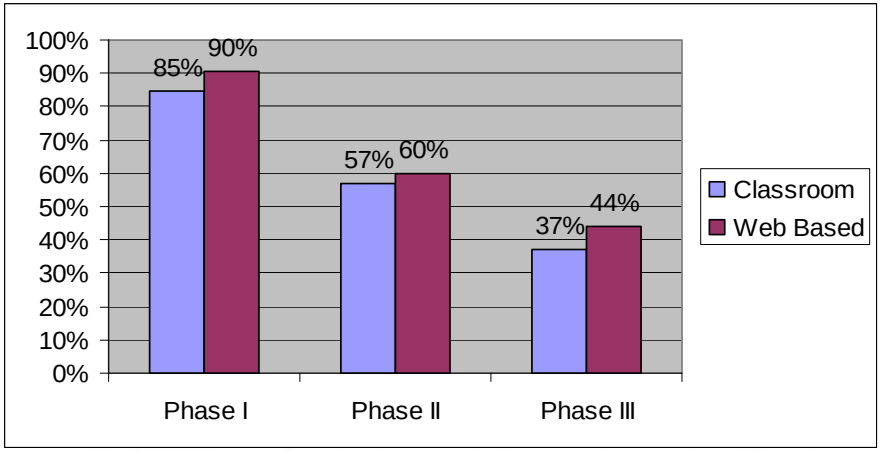
EPA 07 Service Readiness

2007 EGR Engine Training Current Status - Dealers

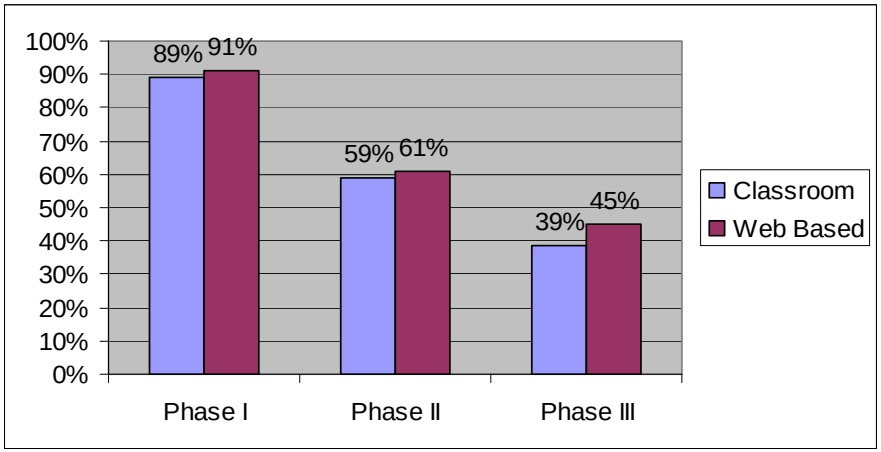
Series 60

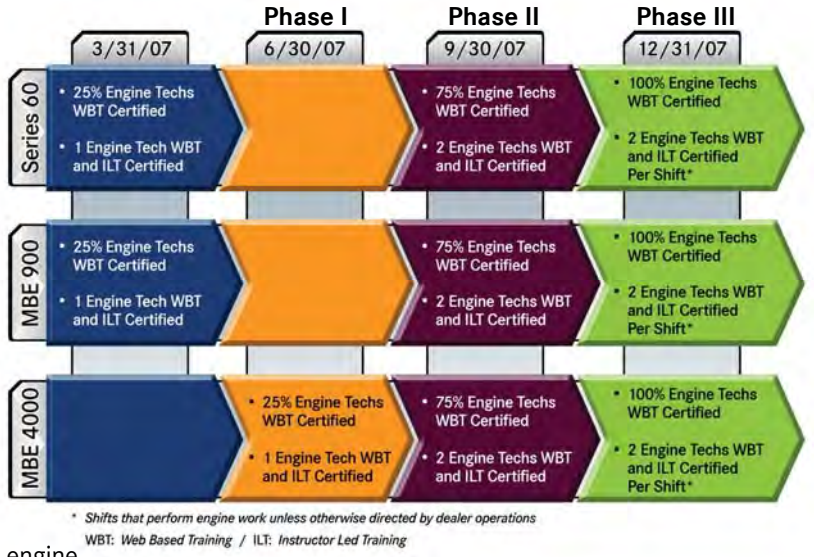


MBE 4000



MBE 900





592 eligible locations for S60 and MBE 4000 engines, 522 eligible locations for MBE 900 engine.

Series 60 – Product Update

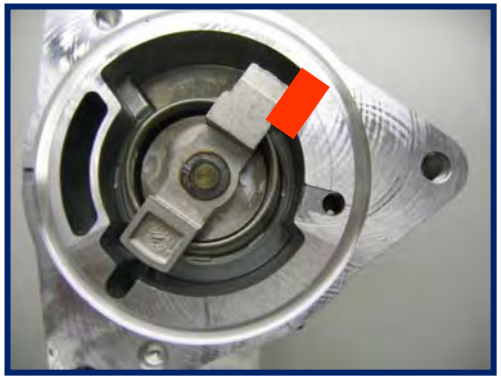
- **Series 60 EPA07**
  - **EGR Valve**
  - **Intake Throttle Valve**
  - **Delta Pressure Sensor**
  - **DDEC VI Software and Fuel Maps**
  - **After Treatment Device (ATD)**
  - **08M-1 S60 Fuel Economy Improvement**

Source:

Series 60 EPA 07 Update

EGR Valve

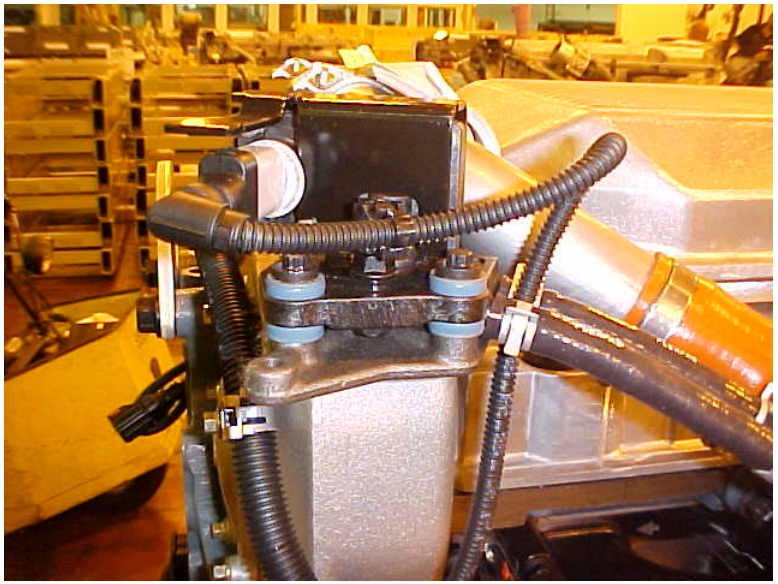
- Sticking EGR valve resulting in code:
  - SPN 2791 FMI 7 - EGR Valve Position Incorrect
  - or FMI 4 - EGR Valve Circuit Failed Low
- Inspect the Valve for White Deposits:
  - if found, evaluate for possible coolant ingestion (EGR cooler failure)
  - If no coolant loss is evident, the valve can stick as a result of corrosion, both galvanic from dissimilar metals and from the acid condensation from the exhaust. This will result in white deposits in the valve from aluminum oxide.
- New Teflon coated valve p/n 23538240 replaced former valve p/n 23535548 on 26-Nov-07 with engine s/n 06R0988932. Note new blue or black Teflon coating.
- New Internal Valve Stop Machined in Housing allows Positive Valve Stop without Butterfly Valve to Housing Contact. New internal stop valve p/n 23538928 replaced former valve p/n 23538240 on 28-Apr-08 with engine s/n 06R1003375.



Series 60 EPA 07 Update

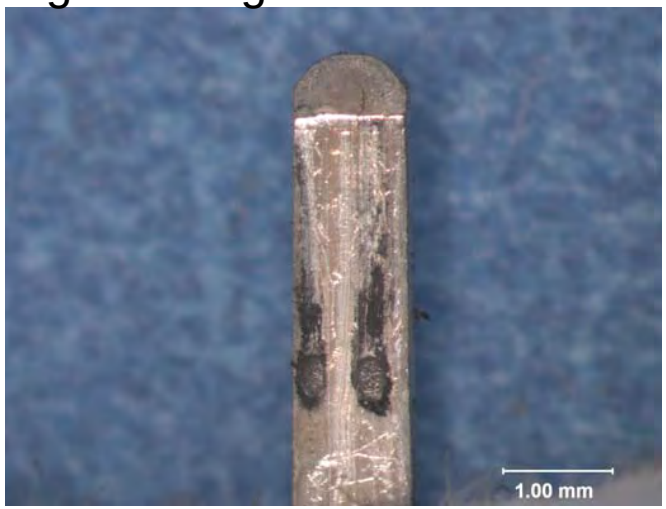
Delta P Sensor

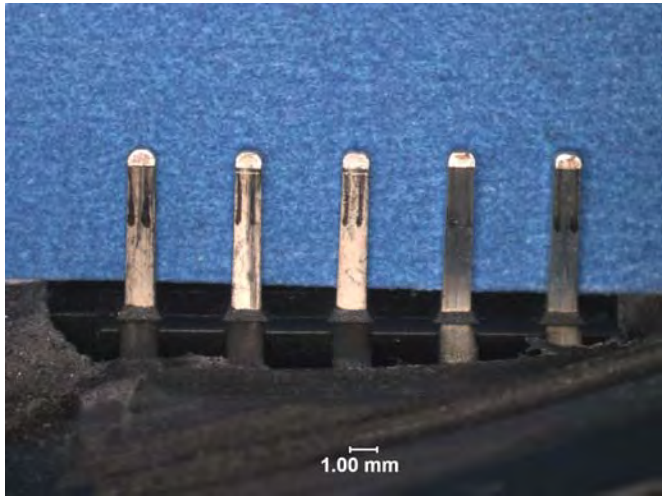
- Since SOP, Sensor was Only Used Periodically to Double Check Calculated EGR flow for EPA compliance
- Can now Remove Sensor and Rely Solely on Calculated Values
- Fuel maps updated on 10-Mar-08 with engine s/n 06R0998927 with ZGS 110 to disable the sensor
- Actual sensor removed on 13-Mar-08 with engine s/n 06R0999679
- For service:
  - Reprogram to disable sensor for electrical failures (code 411).
  - Reprogram & remove sensor & venturi for actual leaks (code 2659)
- Kit p/n 23538484 for horizontal mixer housing.
- Kit p/n 23538485 for vertical mixer housing.
- Reference 08 TS-20.
- This is for EPA07 only. The sensor will remain for earlier S60's.

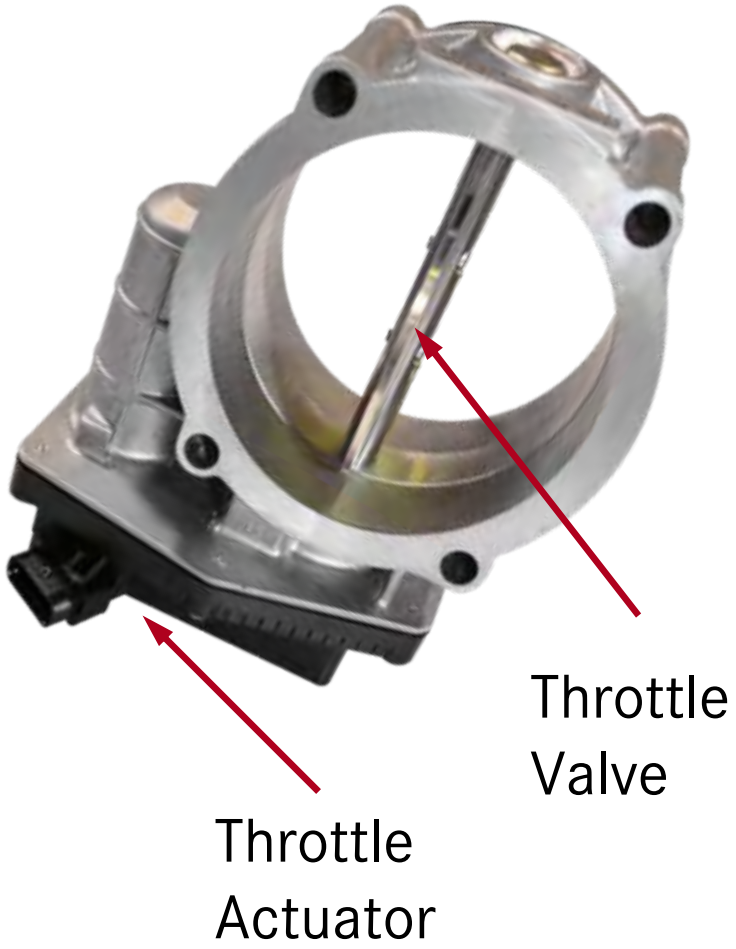


Intake Throttle Valve

- Failed ITV is from connector pin fretting resulting in code SPN 51.



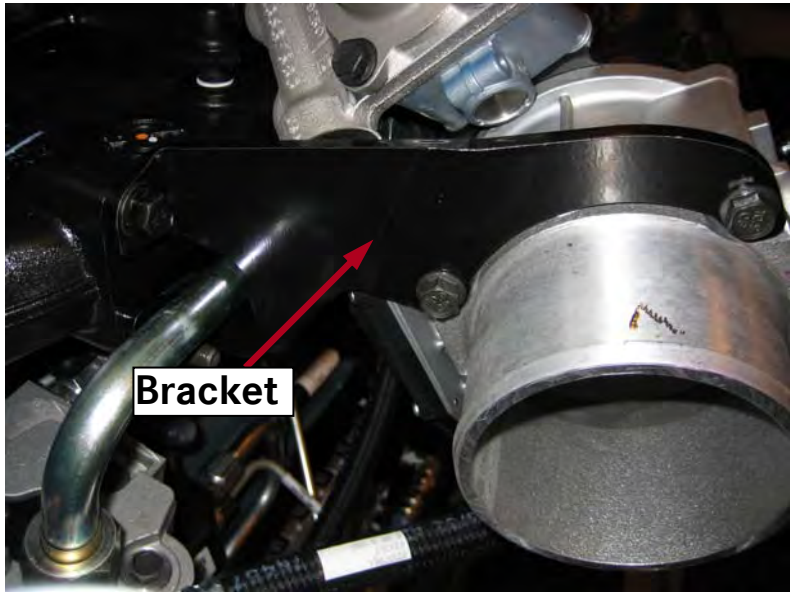


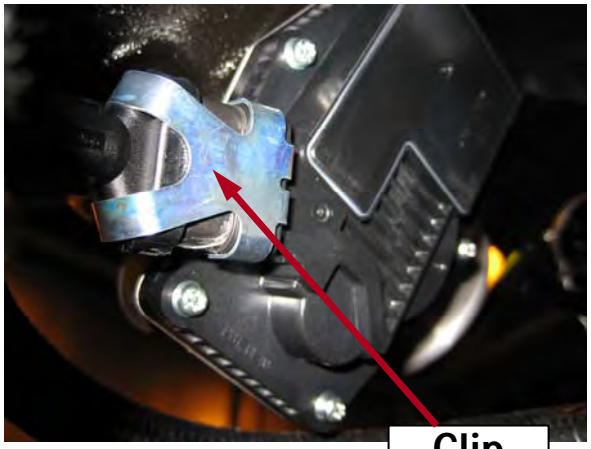


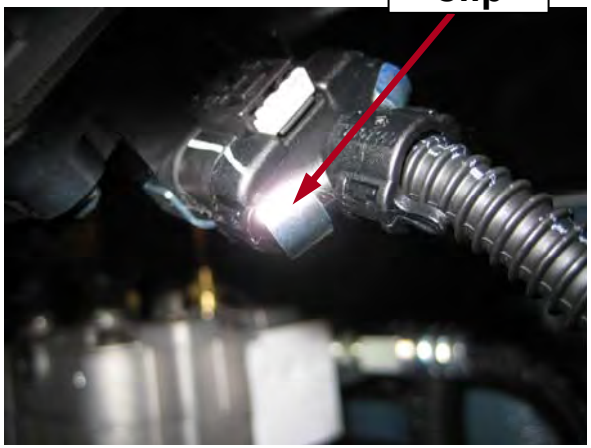
Series 60 EPA 07 Update

Intake Throttle Valve

- Terminal lube became effective on 7-Nov-07 with approximate engine s/n 06R0988524.
- New clip & o-ring seal became effective on 14-Nov-07 with engine s/n 06R0988726.
- New ITV support bracket became effective on 28-Nov-07 with approximate engine s/n 06R0989102.



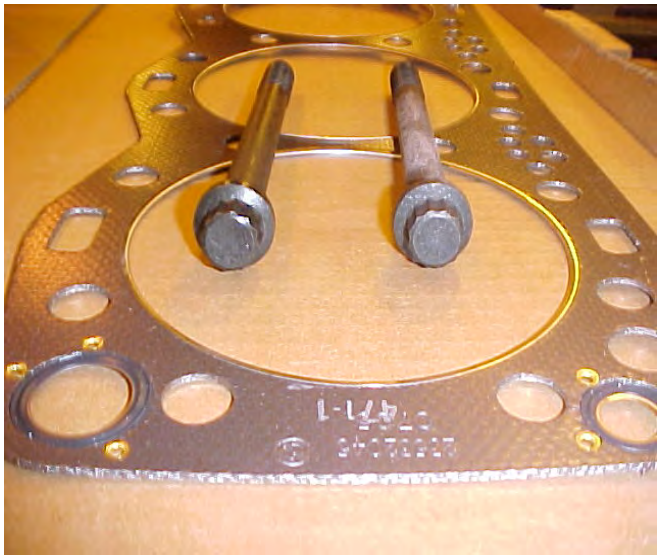




Intake Throttle Valve

- Check Wiring for ITV
- If Wiring Test Passes:
  - Replace ITV with Service Kit p/n 23538241 which includes 18SP649
- Service Kit contains:
  - ITV, terminal grease, clip, support bracket (horizontal mixer housing only), pigtail and two different kinds of harness splices (crimp and soldier).
- If using the kit on an engine with a vertical mixer housing, discard the new support bracket that comes in the kit and re-use the existing bracket on the engine.

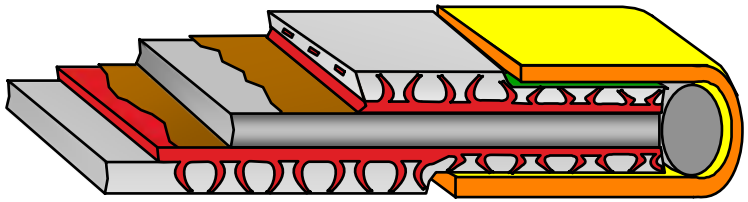
Cylinder Head Gasket



- Head gasket being updated.
- Current gasket is made by Federal Mogul.
- New gasket is from Dana-Victor Reinz.
- New gasket p/n 23538406 replaced former gasket p/n 23532045 on 1-Aug-08 with engine s/n 06R1012531.

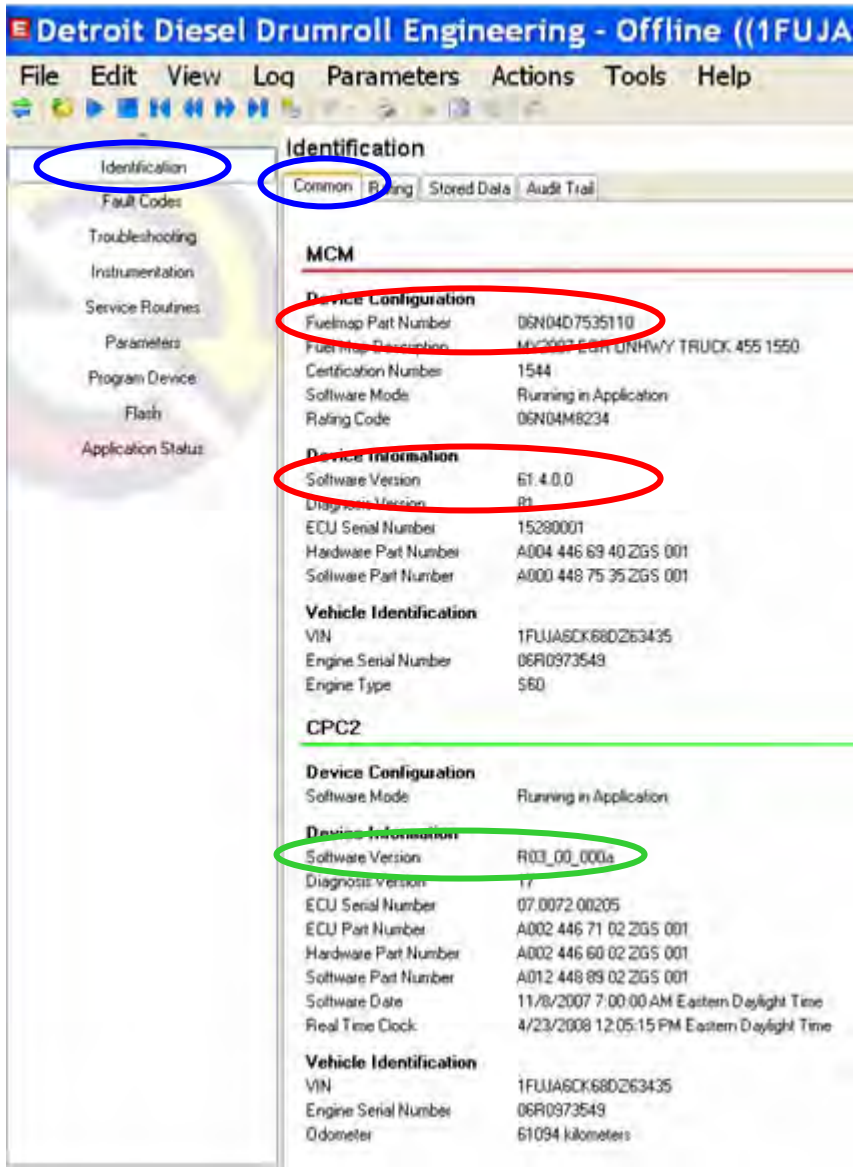
- 0.008” ss armor
- Solid steel core
- (2) Graphite layers
- (4) Silicone grommets

Victocor 500



DDEC VI SOFTWARE & FUEL MAPS

- All DDEC VI Information can be Viewed with DDDL or DDRS 7.X by Clicking on the "Identification" bar & selecting the "Common" tab.
- MCM Information:
  - MCM fuel map part number. Fuel map version (or "ZGS") is the last 3 digits – in this example it is "110".
  - MCM software version or level
- CPC Information:
  - Software version or level



Source:

DDEC VI Software and Fuel Map Changes

- **V61.4 MCM & R3.00 CPC Software – ZGS 100**
  - CARB Idle Shutdown
  - VORAD capability
  - Inhibit function for regeneration
  - Improved EGR valve control
  - Corrects issue where road speed limiting may not work correctly if the clutch pedal switch is activated.
  - Effective with engine s/n 06R0990779 built on December 13, 2007
- **V61.4 Fuel Map Update – ZGS 110**
  - Disables delta P sensor
  - Disables EGR flow during parked regeneration
  - Small adjustments for operation of the intake throttle valve during parked regeneration for better DOC temps.
  - Effective on 10-Mar-08 with engine s/n 06R0998927.
- **MCM software v61.4.0.0 NOT compatible with CPC r4.00 ... Use r3.00**

Motor Control Module - MCM

Common Powertrain Controller – CPC2

DDEC VI SOFTWARE & FUEL MAP CHANGES

- MCM software v62.4.0.0, fuel map ZGS 111, & CPC software r4.0
  - Reduction of SPN 412, FMI 3 - EGR Temp Sensor Circuit Failed High. New delivery pipes for 4Q08 also have relocated EGR Temp Sensor boss to prevent wire pulling.
  - Fuel map change for EGR valve with internal stop, but not required with new valve.
  - Reduction of SPN 2791, FMI 7 - EGR Valve Position Incorrect
  - Proper functioning of Progressive Shift.
  - HC storage function.
  - Improved DPF diagnostics by splitting the following codes into High & Low pressure codes:
    - SPN 4077, FMI 14 - Doser Fuel Line Pressure Sensor Failed Self Test
    - SPN 3480, FMI 1 - Doser Fuel Supply Pressure Abnormal
    - SPN 3480, FMI 2 - Doser Fuel Line Pressure Abnormal
  - Intake Throttle Valve start-up diagnostics.
  - Soft Cruise.
  - Customer driver rewards.
  - Higher Cruise Max Speed Over Road Speed Limit
  - Filtered Fuel Economy Fix
  - Aux Engine Shutdown Input configurable
  - Fan settings for Crane applications.
  - Freezes timer in zone 1 instead of zone 2 – timer will stop in zone 1 if soot in DPF is being burned by either passive or active over-the-road regeneration.

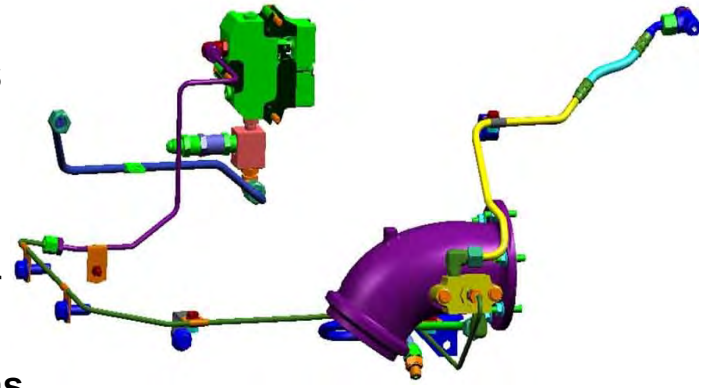
Source:

DDEC VI SOFTWARE & FUEL MAP CHANGES

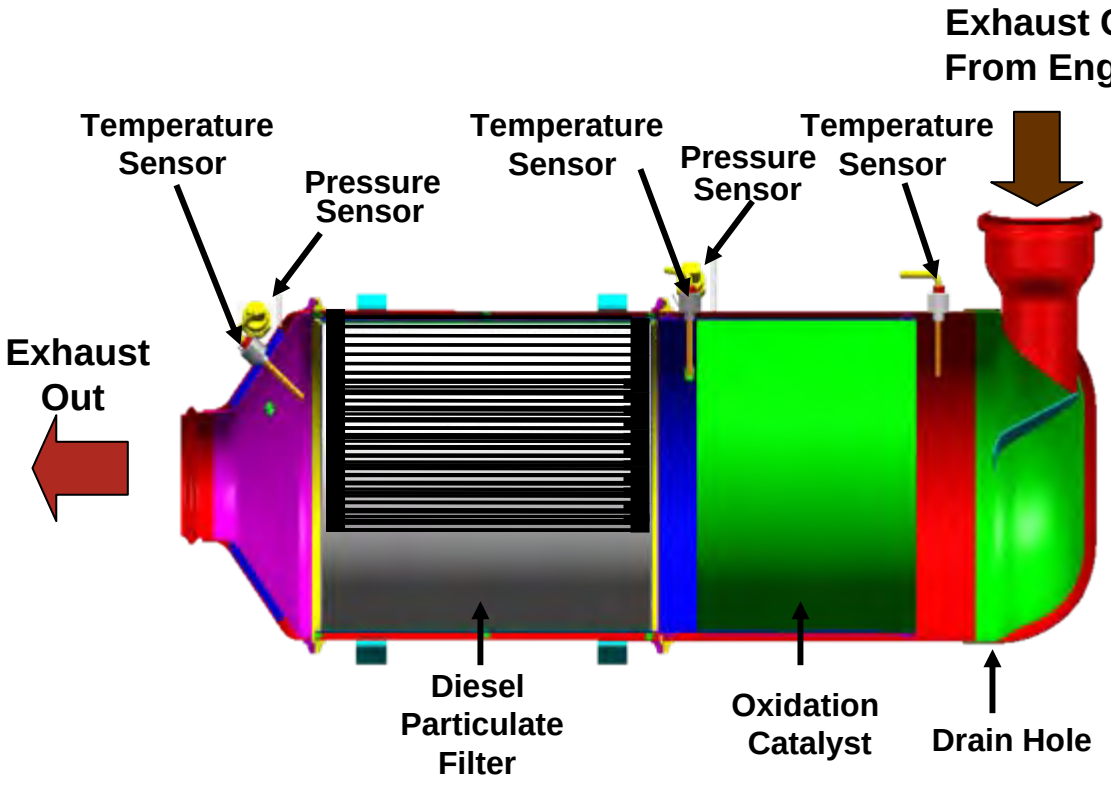
- MCM software v62.4.0.0, fuel map ZGS 111, & CPC software r4.0 (continued)
  - Reduction of SPN 3610, FMI 20 – DPF Outlet Pressure Sensor Drifted High In Range Fault (Low Box) & SPN 3609, FMI 20 - DPF Inlet Pressure Sensor Drifted High In Range Fault (Low Box) due to freezing of the sensor & pressure lines in cold ambient temperatures.
  - Approximately 150 changes from the last software/fuel map update.
  - Up to 2.5% fuel economy improvement
  - Improved injector diagnostics (cylinder cutout).
  - Must have DDRS 7.03 SP2 to program. Reference 08 CSA-23rev.
  - Became effective with engine s/n 06R1009799 built on July 1, 2008.
  - Reference TS letter 08 TS-18 dated 1-Jul-08.
  - Subject to Modification 08M-1.

After Treatment Device (ATD)

- Fuel Doser Supply Pressure Critical to Performing Successful “Over the Road” and Stationary Regenerations
- Fuel Filter Restriction has a Significant Impact on Successfully Performing a Regeneration
- If OTR Regen NOT occurring, No codes and Stationary Regen Successful; Change the Fuel Filter(s) … remember the Secondary Filter at the Exit of the MCM Fuel Cooler



HC Fuel Doser System



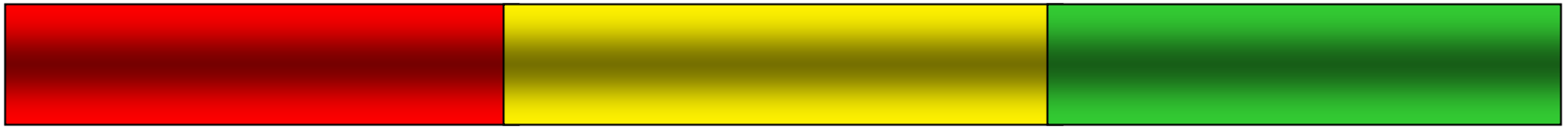
- Review DDEC Reports for Average Load Factor
  - If Average Load Factor is > 50%, OTR Regeneration should be Occurring

Fuel Pressure Impact on After Treatment Device Regeneration

Code logged for low fuel pressure and regeneration disabled

Potential for extended high idle regen or incomplete regen

Successful high idle regeneration

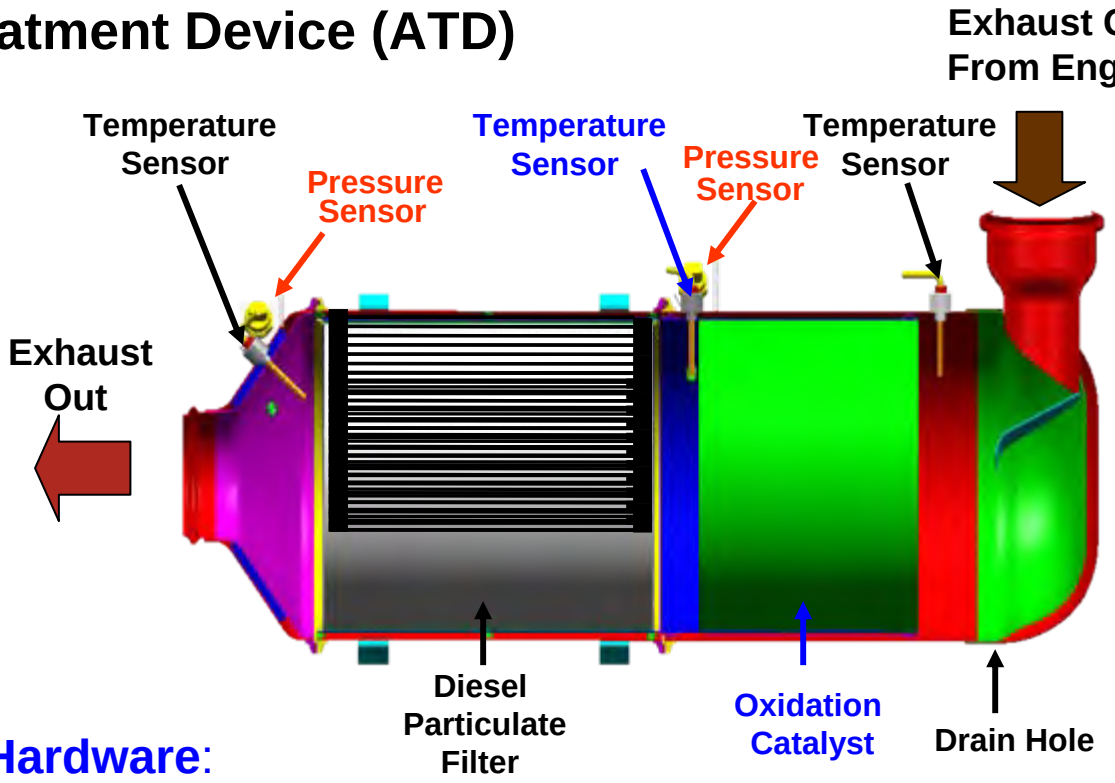


66.7 psi **72.5 psi**

Fuel Supply Pressure

Series 60 EPA 07 Update

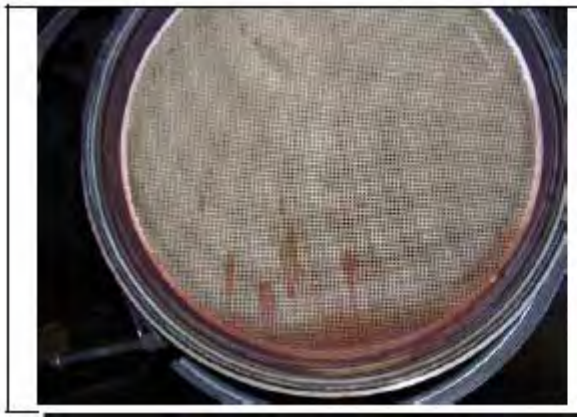
After Treatment Device (ATD)



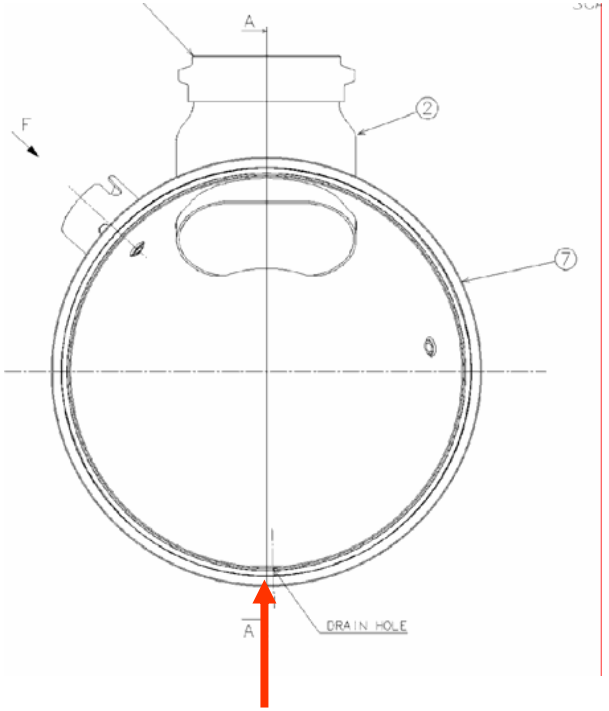
- **ATD Hardware**:
  - – Oxidation Catalyst Movement resulted in ATD Temp Sensor Failures … Ring Added to ATD Can to Prevent Movement
  - – Drain Hole Plugging resulting in Trapped Water in ATD … Service Procedure Established
- **ATD Software:**
  - – Pressure Sensor Freeze Up resulting in Sensor Codes and Inactive OTR or Stationary Regeneration … New Software

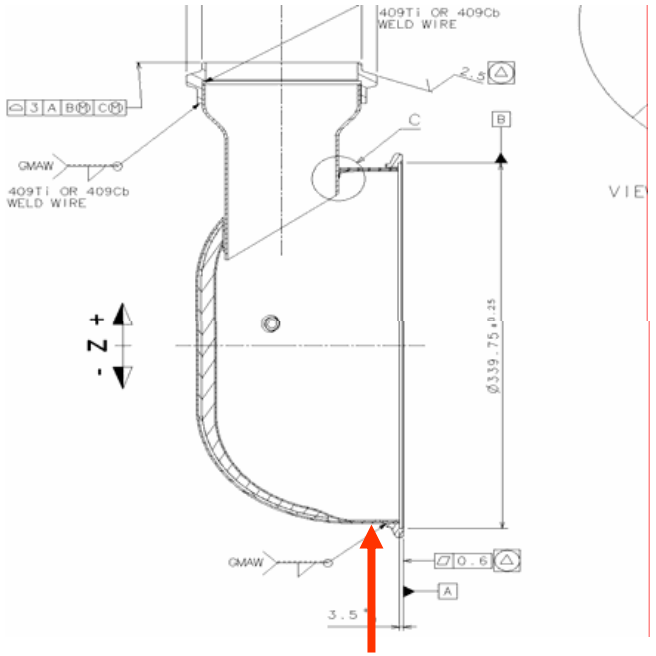
Horizontal ATD Drain Hole Plugging

- Horizontal ATD Drain Holes can Sometimes get Plugged with Rust
- Traps Water in the ATD
- When this Occurs and the Engine is Throttled Up:
  - Water gets blown up the stacks and down the outside
  - It stains the finish on chrome pipes
  - Non-chrome stainless steel stacks are not staining
- FTL is Following Up with the Vendor on the Exhaust Stack Material Specification
- Drain Hole has been Enlarged to 0.25” on the Blueprint and current ATD Assemblies
- DPF pictured is functional and should NOT be replaced



ATD Drain Hole Plugged – Service Procedure





- Drain Hole should be 0.25" from the rear V-band clamp at the very bottom of the outlet module
  - Drill through both canning layers with a 0.25" drill bit
  - Make sure you do not angle the drill towards the filter
- Depending on the amount of water collected from the ATD, it may be necessary to run the engine to completely dry the ATD
- Reference F/L bulletin 49-25.

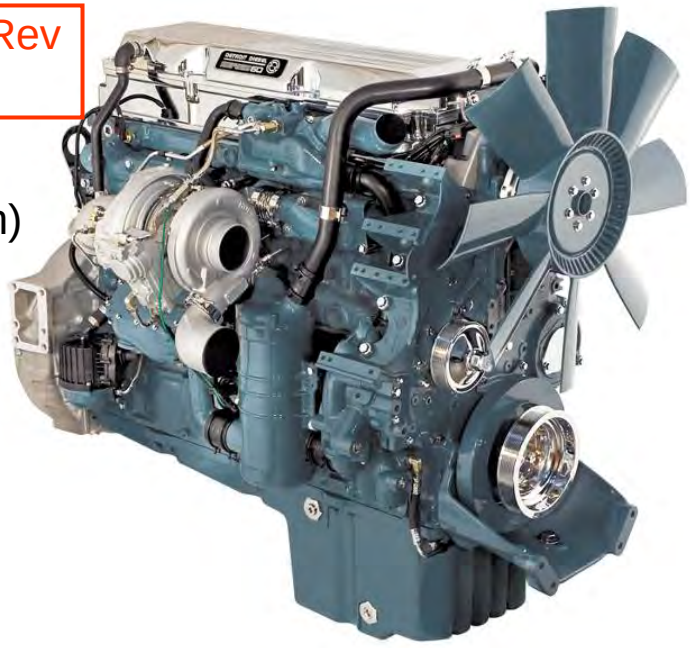
Series 60 EPA07 – Modification 08M-1

Fuel Economy Improvement – DDEC VI MCM & CPC Programming

MCM Software v62.4.0.0, Fuel Map ZGS 111 and CPC Software r4.0

- Up to 2.5% Fuel Economy Improvement:
  - Zone 1 Regeneration Timer Increased from 250 to 325 miles
  - Less Fuel Consumed During the Regeneration Event
- Diagnostic Enhancements:
  - EGR Valve
  - EGR Temp Sensor
  - Intake Throttle Valve
  - ATD Pressure Sensor
  - ATD Doser Fuel Supply Pressure (Low and High)
  - Cylinder Cut Out (Injectors)
  - ATD HC Storage Function
- New Features:
  - Progressive Shift
  - “Soft” Cruise
  - Cruise Max MPH > RSG Max MPH
  - Auxiliary Engine Shutdown
  - Customer Driver Rewards
- Became effective with engine s/n 06R1009799 built on July 1, 2008

Reference 08 TS-18Rev
For Further Detail



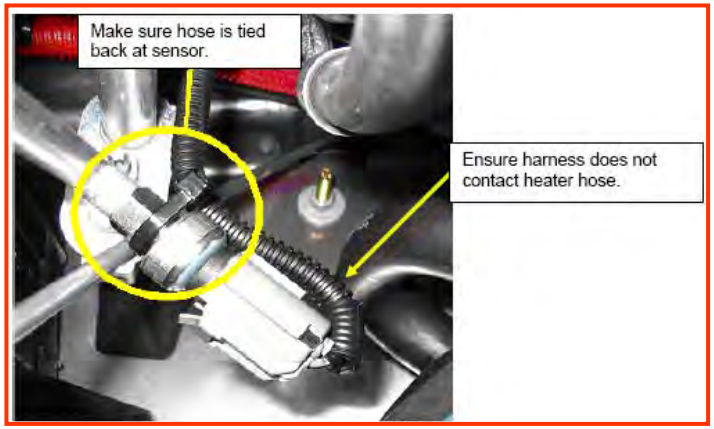
Series 60 EPA 07 – Modification 08M-1

Fuel Economy Improvement – DDEC VI MCM & CPC Programming

MCM Software v62.4.0.0, Fuel Map ZGS 111 and CPC Software r4.0

Series 60 Powered Cascadia Chassis:

- Two Issues found After the Release:
  - Experiencing difficulty with cooling fan operation.
  - Experiencing performance issues associated with noise control.
  - Root Cause was CPC Software r4.00
- New CPC Software r4.01 Released to Address these Two Issues
  - Reference 08 TS-18Rev3
- Routing of the A/C Pressure Sensor Harness has also been a Source of Excessive Fan On Time
  - Heater Hose rubs thru the Harness and Shorts the Wires Locking Fan On



Series 60 EPA 07 – Modification 08M-1

Fuel Economy Improvement – DDEC VI MCM & CPC Programming

MCM Software v62.4.0.0, Fuel Map ZGS 111 and CPC Software r4.01

- Some Issues with Automatic Transmissions:
  - Eaton Automatic Transmissions Require Reprogramming of the ECU
  - 08 TS-1Rev4 published on 8-18-08
- ZF and Allison Automatic Transmissions still Experiencing Shift Problems
  - Working with both Manufacturers to Identify Cause and Solutions
  - Watch for 08 TS-18Rev5 for the Cause and Solutions to the Shifting Issues

Source:

Service Update – Series 60 EPA07

- MCM software v62.4.0.0 fuel map update – ZGS 112
  - 30g NOX (Clean Idle)
  - Became Effective with Engine s/n 06R1012372 Built on 1-Aug-08.
- MCM software v62.6.0.0, fuel map ZGS 113 & CPC software r4.01
  - No Trouble Found EGR Valve Diagnostic Fix
  - Starter Control Logic Improvement
  - Intake Throttle Valve Control Changes - to standardize with 900, 4000, and DD15 engines
  - Fan Control Improvements with All Fan Types (except 4).
  - Became Effective with Engine s/n 06R1014512 Built on 26-Aug-08.
- Must have DDRS 7.03 SP2 to program. Reference 08 CSA-23rev.

California Clean Idle

- In order for trucks to idle for extended periods in California, engines built in 2008 and later are limited to a 30 gram NOx level.
- Clean Idle calibrations are available for the DDC Engines. These new calibrations allow a unit to idle at reduced speeds (most are limited to 900 rpm).
- Changes to the current engines built to the 2007/2008 model year emissions will not automatically update to the clean idle version when the MCM/CPC is programmed.
- All engines desired to be 30 gram compliant will require the mainframe to be changed by DDC prior to programming. Refer to 08 CSA-21
- All vehicles will also require a “Clean Idle” vehicle label which has a unique serial number on each label and must be applied to the hood or door on the driver’s side and a supplemental engine emissions label. Some engines will require the emissions label to be replaced.
- If a replacement Vehicle label is required due to vehicle damage, contact the DDC Customer Support Center. This label is available only from the CSC

California Clean Idle

- MCM/CPC programming for Clean Idle can be done as part of any open Modifications or Campaigns. If a warrantable failure occurs that mandates that the MCM/CPC be reprogrammed, Clean Idle can be enabled at that time. You cannot charge warranty for only programming for clean idle.
- DDC will waive all clean idle programming fees up to December 31, 2008 at any time for programming.
- Requests to enable Clean Idle must come to the CSC preferably via email at csc@detroitdiesel.com (form available in 08CSA-21). The CSC will change the DDC mainframe and ship the labels that are required. Make every effort to schedule this work as you must have the new labels applied at the time a unit is reprogrammed.
- Please note that some difficulty has been experienced with labels that were left sitting in the sun for a short time before installation. Keep the labels out of the sun, preferably in a cool and dry location such as a refrigerator, until ready for installation.

MBE4000 – Product Update

- **MBE4000 EPA 07**
  - DDEC VI Codes
  - EGR Valves
  - Fuel Map Changes
  - Intake Air Temperature Sensor
  - DDEC VI Software and Fuel Maps
  - Fuel Primer Pump
- **MBE4000 EPA 04**
  - High Pressure Fuel Line Campaign

MBE4000 EPA 07 Update

DDEC VI Codes

- Software level is MCM v9.6.1.0 and CPC software r3.00
- Effective late Feb-08.
- Recently experienced ATD codes in severe cold:
  - SPN 3610, FMI 20 – DPF Outlet Pressure Sensor Drifted High In Range Fault (Low Box)
  - SPN 3609, FMI 20 - DPF Inlet Pressure Sensor Drifted High In Range Fault (Low Box)
  - Water/condensation is freezing in the pressure sensor lines
  - Test cals created to disable the codes while a permanent fix is created.
- Code SPN 615, FMI 14 for Turbo Boost Performance
  - Found boost too high.
  - Incorrect VPOD assembled – Correct PN A0001531259
  - Added to TS manual, Corrected in Brazil.
  - Reference TS letter 07 TS-60.
  - Reassigned to SPN 2631, FMI 2 with software v9.6.1.0.

MBE4000 EPA 07 Update

EGR Valve

- Sticking EGR valve resulting in code SPN 2971 FMI 7 or 4 for EGR Valve Circuit or Position Problem.
- Same as Series 60 EGR Valve
- Inspect the valve for white deposits:
  - If found, evaluate for possible coolant ingestion (EGR Cooler)
  - If no coolant loss is evident, the valve can stick as a result of corrosion, both galvanic from dissimilar metals and from the acid condensation from the exhaust. This will result in white deposits in the valve from aluminum oxide.
- New Teflon coated valve was implemented on 29-Feb-08 with engine s/n 0460911568 (p/n A4601420619 did NOT change).
- Became effective at Canton on 12-Jun-08. All parts are Teflon (p/n's RA4601420619 and EA4601420619).
- Non-Teflon stock at F/L PDC's and on dealer/distributors shelves is NOT to be returned.

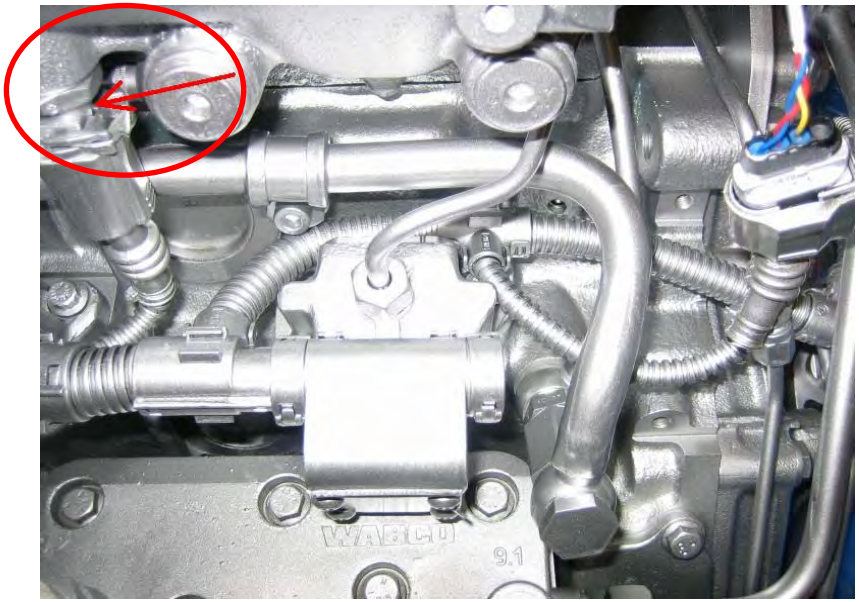
MBE4000 EPA 07 Update

DDEC VI Fuel Map Changes

- **MCM Software v9.6.1.0 Fuel Map Update – ZGS 003**
  - Code SPN 132, FMI 14 Air mass auto calibration exceed limit“ deactivated.
  - Code SPN 615, FMI 14, or SPN 2631, FMI 2 "Turbocharger/supercharger boost system performance" deactivated for ratings 350hp/370hp.
  - Code SPN 1323, FMI 14 "Misfire detect“ deactivated. Only cylinder selective misfire detection will be used.
  - Reduced logging of codes SPN 3598, FMI 3 "Proportional Valve Bank 1 Circuit Failed High" and SPN 3598, FMI 3 "Proportional Valve Bank 2 Circuit Failed High“
  - Reduced logging of code SPN 3719, FMI 0 "Soot level very high”
  - Reduced logging of code SPN 3563, FMI 20 "Intake Manifold Pressure Plausibility”
- **Effective 1-Apr-08**

Intake Air Temperature Sensor

- Corrosion issues have been noted on the charge air temperature sensor that is installed in the intake manifold underneath the beauty cover between cylinders 5 and 6
- This usually results in a code SPN 1636
- Can also affect the combustion process due to inaccurate readings & cause the cooling fan to run excessively
- A sealing resin was added to prevent the intrusion of corrosive gases. New sensor p/n A0071533928 replaced former sensor p/n A0061535228 on April 10th with engine s/n 0460915165.
- Besides changing the sensor, note that the engine sensor harness p/n A4601501833 & the MCM should be replaced if heavy corrosion is present in the 120-pin connection.



MBE4000 EPA 07 Update

DDEC VI Software & Fuel Map Changes

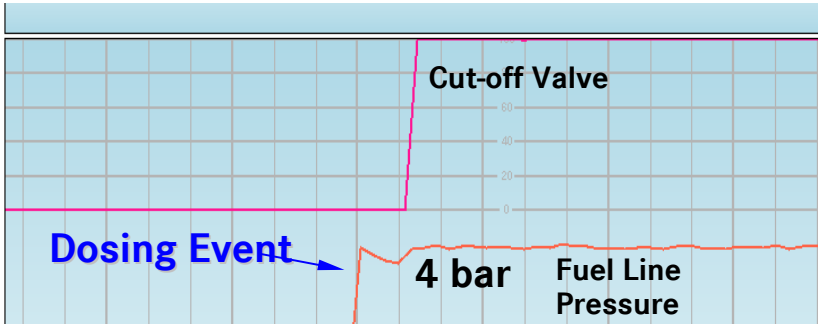
- **MCM Software v9.6.1.0 Fuel Map Update – ZGS 004**
  - Code SPN 2631, FMI 2 (v9.6.1.0 or later MCM software) for Turbo Boost Performance - Reduced logging of the code for vehicles with automated manuals or full automatic transmissions.
  - Effective 11-Jun-08
- **v9.6.1.0 is Compatible with CPC r4.00**
- **MCM Software v11.4.1.0 And Fuel Map ZGS 001**
  - Diagnostic Enhancements Same as Series 60 MCM Software v62.4
  - New/Enhanced Features Same as Series 60 MCM Software v62.4
  - Effective 27-Aug-08.
  - Must have DDRS 7.03 SP2 to program. Reference 08 CSA-23rev

Motor Control Module - MCM

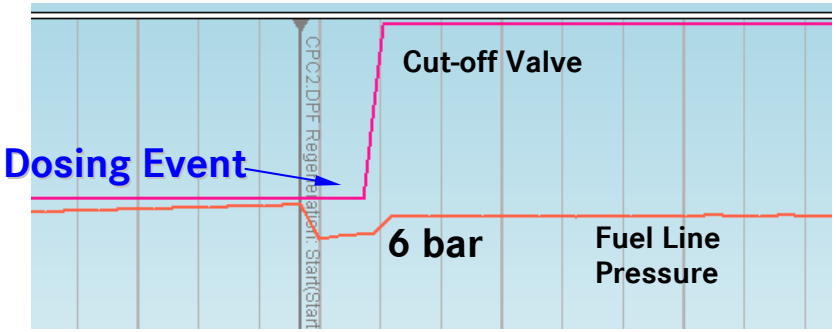
Common Powertrain Controller – CPC2

Fuel Priming Pump

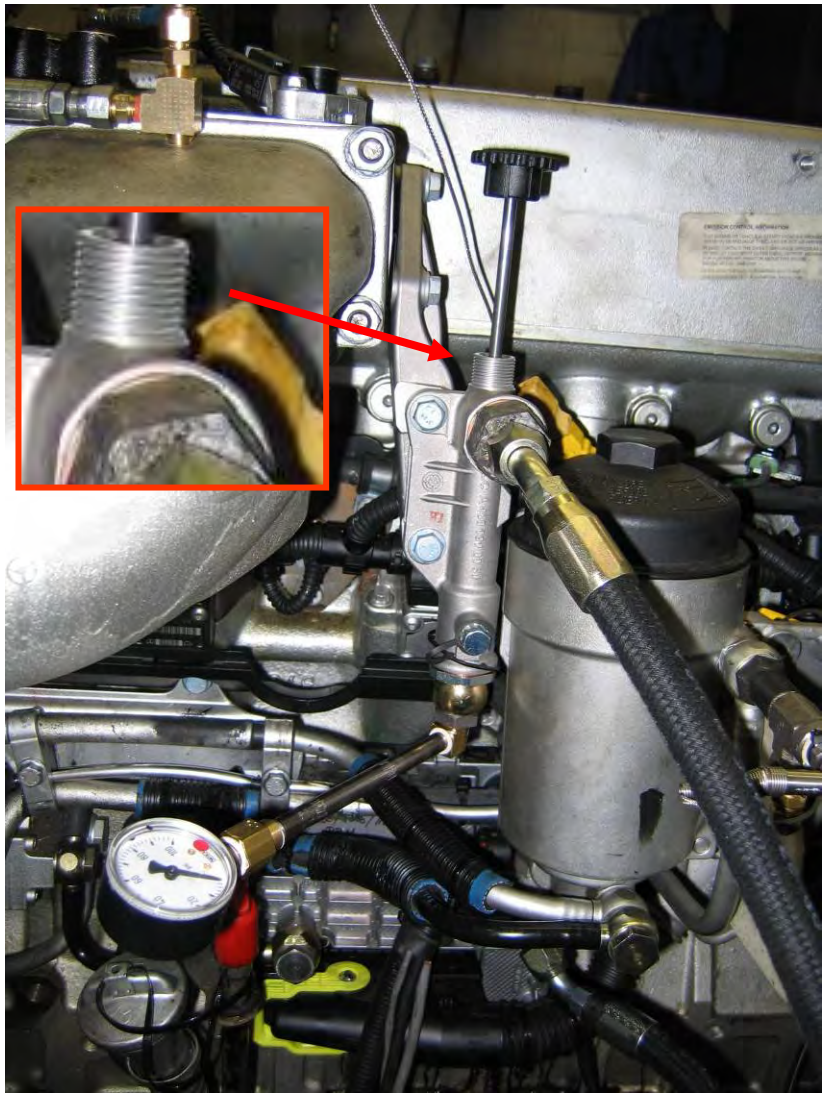
- Designed to Prime the Fuel System
- Designed to hold 4 Bar of Pressure
- When handle is not stowed air is drawn into fuel system and lowering fuel pressure
- Fuel pressure reduction can impact particulate filter regeneration



Fuel Priming Pump Un-stowed Position

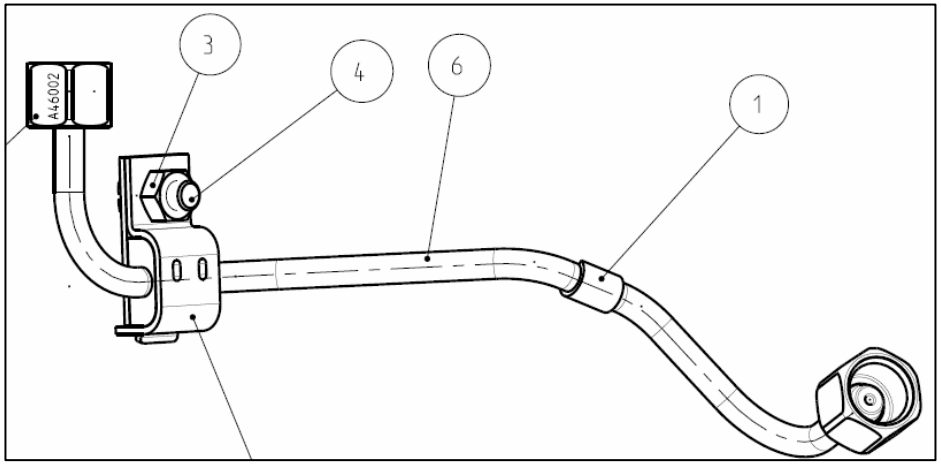


Fuel Priming Pump Stowed Position



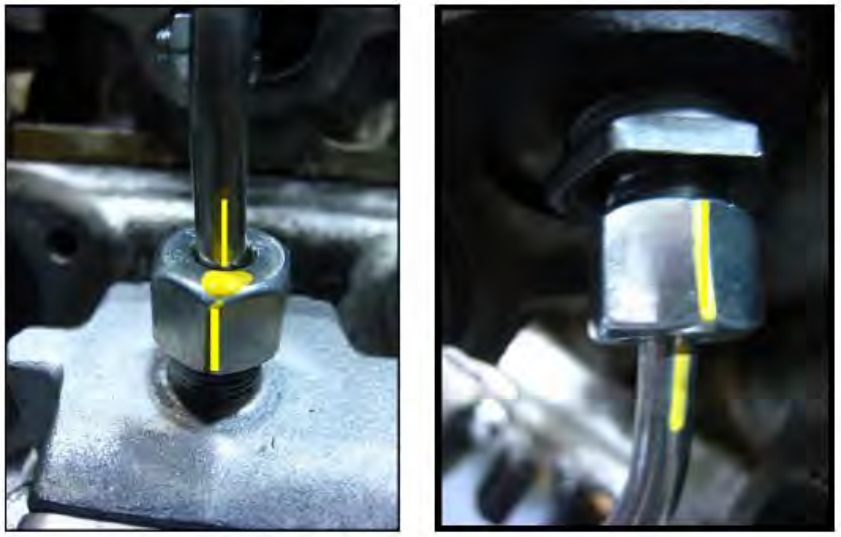
A Campaign (08C-1) to Replace HPFLs and Transfer Tubes on EPA04 MBE4000 Engines has been Released to Service (70,000 units).

- New High Pressure Fuel Lines:
  - HPFL Material (st70) more Resistant to Overtorque (used on EPA07 engines)
  - Improved Nipple Radius Geometry to Interface with Unit Pump and Transfer Tube
  - Vibration Damper added to Reduce Vibration Frequency and Magnitude
- Current Transfer Tube (P/N A9060170524) will be used in Conjunction with the New HPFL
- New HPFL Installation Method – Hand tight and 120 degrees. Please mark the lines so you know have turned them 120 degrees.
- Service Kit (P/N A460700135) established that includes 18SP653 installation instructions, six HFPLs assemblies, six Transfer Tubes, six intake manifold gaskets, six rocker cover gaskets, two EGR cold pipe gaskets and two mixer pipe gaskets.



HPFL CAMPAIGN (08C-1)

- **New HPFL Installation Procedure**
  - Service Manuals Updated
  - HPFL Installation Video on DDCSN
- **Service Kit Availability:**
  - Parts for 40,000 Service Kits Received at Canton (1 kit satisfies 1 truck)
  - Canton has Assembled and Shipped over 30,000 Kits
  - 13,000 Claims Received to Date
- **Labor Times:**
  - Truck Models 4.0 hours
  - Car Haulers 5.7 hours



Electronic Unit Pump End — Transfer Tube End

Figure 4 Marking Of High Pressure Fuel Injector Line And Nuts

6. Using a 17mm wrench, tighten the high pressure fuel line nut at the unit pump end by turning the nut through 120 degrees. 120 degrees can be measured by turning the nut so that the nut edge which had been marked has been turned through 1/3 of a full turn, or through two bolt flats. Lack of space in some engine configurations may mean that the 120 degree turn will have to be completed in two turns of 60 degrees, or one bolt flat each. See Figure 5.

Figure 5 Turning Fuel Line Nut 120 Degrees at Unit Pump End

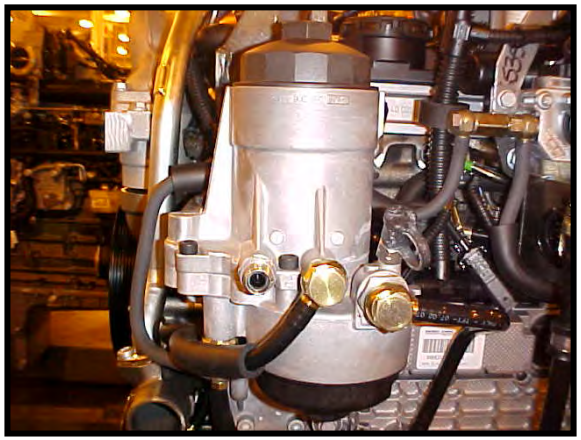
MBE900 – Product Update

- **MBE900 EPA 07**
  - **Failed Regeneration for Fuel Pressure**
  - **DDEC VI MCM and CPC Software**
  - **Smart Actuator on Hydraulic Brake Apps**
  - **High Oil Consumption**

MBE900 EPA 07 Update

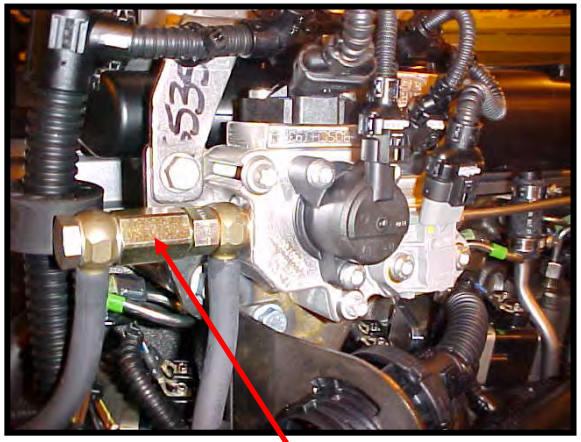
DETROIT DIESEL

Secondary Fuel Filter



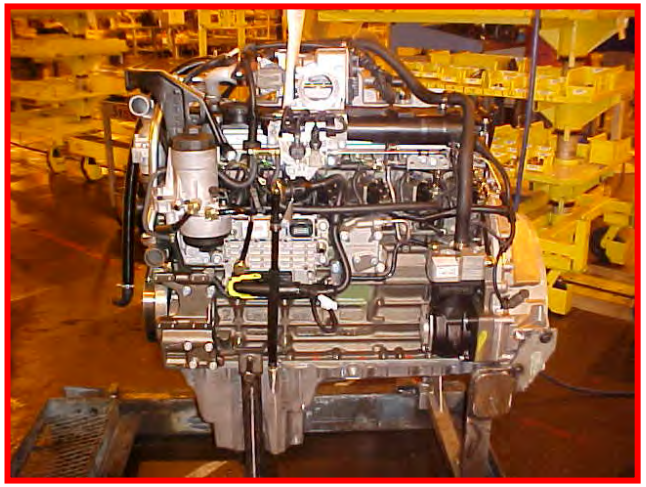
Step #1 – Reseat or Replace Fuel Filter p/n A0000902751

Pressure Regulator Valve

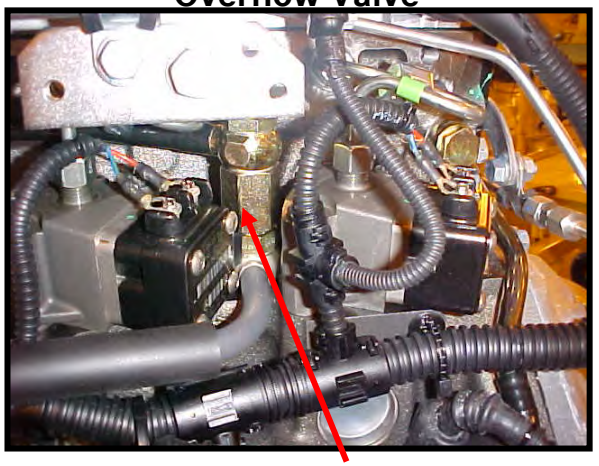


Step #2 – Replace Pressure Regulator Valve p/n A9260920110

- **If the fuel pressure is found to be below the recommended level (70-80 psi) or regeneration fails due to low fuel pressure, perform steps 1-4**

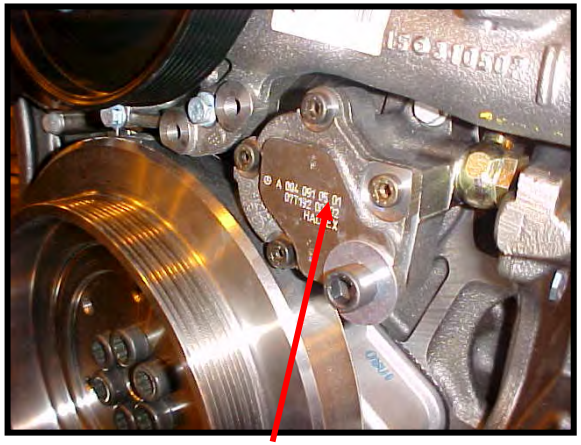


Overflow Valve



Step #3 – Replace Overflow Valve p/n A9060920810

Fuel Pump & Gasket



Step #4 – Replace Fuel Pump p/n R004091050 and Gasket p/n 9060910580

MBE900 EPA 07 Update

DDEC VI MCM V9.6.1.0 and CPC r3.00 Software

- MCM software v9.6.1.0, Associated Fuel Maps and CPC Software r3.00 have been Released to reduce the logging of these fault codes
  - SPN 1636, FMI 2 - Intake Manifold Temperature Plausibility Error. Related to use of a block heater or Webasto.
  - SPN 3597, FMI 3 - Proportional Valve Bank 1 Circuit Failed High. This fault is logged when the starter is active prior to the proportional valve bank 1 being powered up in the MCM. The starter back-feeds voltage through the grid heater into the proportional valve bank 1 output of the MCM, which then logs this fault code.
  - SPN 615, FMI 14 – Turbocharger/Supercharger Boost System Performance. Related to the actual inlet manifold pressure (turbocharger boost) compared to a desired value in the fuel map. When the difference between the two pressures is large OR small enough, this fault code is logged. Leaks in the air inlet and exhaust system can also cause this code.
  - SPN 3719, FMI 16, 0, 31, and 15 – Relating to high soot levels and/or DPF Zone 2 or 3 conditions. Related to operation in cold ambient temperatures. The coolant temperature does not get high enough for the engine to enter Thermal Management mode (operation of the intake throttle valve and exhaust flap).
  - SPN 132, FMI 14 - HC Doser Fuel Pressure Not Plausible or Air Mass Calibration Exceeded Range Limit. Related to the Air Mass Adaptation.
- Effective January 28, 2008:
- Reference Technical Service letter 08 TS-3 published 28-Jan-08.

MBE900 EPA 07 Update

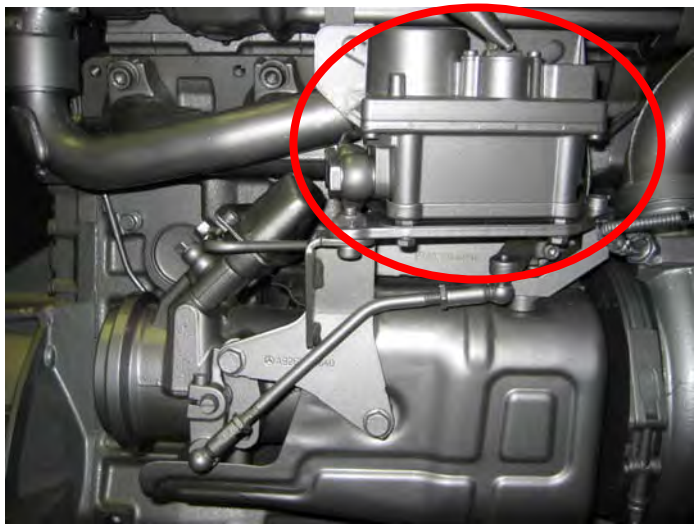
DDEC VI Code SPN 615, FMI 14, 9, & 7

•Certain EPA07 MBE 900 engines are equipped with an electronic Smart Remote Actuator (SRA2) for the exhaust gate instead of being pneumatically controlled. This system sometimes experiences low power and the above fault code.

•Problems traced to rusting of ball joints at end of actuator linkage & rusting/seizing of exhaust flap inside exhaust housing.

•Look for upcoming revision to 07 TS-57rev to show new corrective procedures:

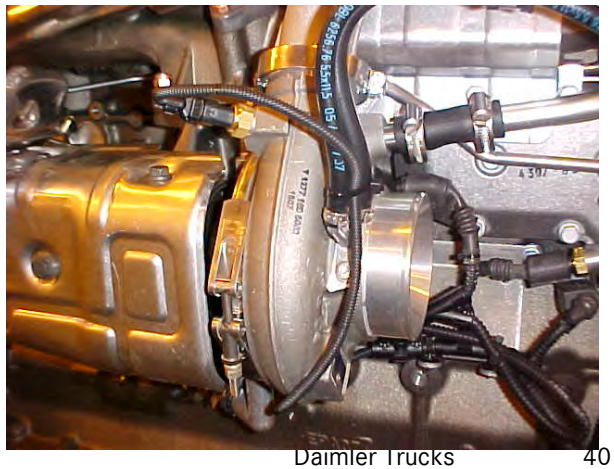
- •For fault code SPN 615/FMI 9 - Smart Remote Actuator 2, Failsafe Mode, Motor Off: replace actuator linkage.
- •For fault codes SPN 615/FMI 7 - Smart Remote Actuator 2, Failsafe Mode, Motor On and SPN 615/FMI 14 - Smart Remote Actuator 2; No Failsafe Mode; Motor Off: replace actuator linkage & replace exhaust flap housing.



MBE900 EPA 07 Update

High Oil Consumption

- Lots of complaints on using oil. Particularly affects school buses, which are lightly loaded and don't accumulate miles very fast.
- Get a copy of DDEC Reports if possible to see idle time, engine load & speed bands, etc.
- Verify there are no external oil leaks such as a bad oil pan gasket, leaking cam/crank sensors, etc.
- Verify the customer understands how to read the dipstick & is not overfilling the engine. See 07 TS-61.
- Check to make sure the Electronic Oil Separator (p/n A926010530) is working properly.
  - Any SPN 4227 codes?
  - Remove clean air hose from turbo compressor housing & look for the presence of oil. Some oil droplets are OK, & does not mean to replace the EOS.
- Note mileage on unit. Oil consumption should decrease at higher miles (> 20,000) as the engine breaks in.
- Running the vehicle on a chassis dyno (if the bus fits) will clean up the oil in the exhaust system but will not necessarily break in the engine.



MBE900 EPA 07 Update

High Oil Consumption

- Letters sent earlier this year to all Thomas Built Bus (TBB) dealers and their customers.
- We gave the customer two options:

  Option 1: DD will pay for the extra oil used up to 20,000 miles at which point the consumption should be reduced.

  Option 2: DD will repair the engine.
- Customer submitted their choice to Scott Frederickson (DD sales manager to TBB) Scott is maintaining a list of those customers who have chosen option 2.
- **If the customer is not on the list, dealer/distributor cannot order parts.**
- There are two kits – one for the C2 & one for the HDX. The kits contain new pistons, rings and dipstick/guide tube assembly plus the associated gaskets. Only difference between the two kits is the dipstick/guide tube assembly.
- 18SP657 comes in the kit to describe the following:
  - –Follow service manual for installing the pistons, except do NOT remove the engine.
  - –Install the new dipstick/guide tube assembly.
  - –New installation procedure for the high pressure fuel line. Finger tight + 120 degrees (two bolt flats). SIB to be issued to formally update the Service Manual.
- Will NOT be posted to the extranet.
- 08 CSA-15 issued for parts & warranty information.

MBE900 EPA 07 Update

DETROIT DIESEL
DEMAND PERFORMANCE

No.: 08 TS-17
June 24, 2008

TO: Distributors

FROM: Technical Support Development

SUBJECT: **Oil Consumption of EPA07 MBE 900 Engines**

On February 28, 2008 Detroit Diesel sent information to the Thomas Bus Dealer organization to help customers address concerns with oil consumption on EPA07 MBE 900 engines built January 1, 2007 and later. The letter outlined two options and a response was requested no later than May 1, 2008. We have received relatively few responses to date. Please work with your customers to gather the necessary feedback requested. Please have all responses forwarded to Detroit Diesel, c/o Scott Fredricksen by mail, fax or email.

Detroit Diesel
Attn: Scott Fredricksen
1408 Courtesy Rd.
High Point, NC 27260
Fax: 336-881-7221
Email: scott.fredricksen@detroitdiesel.com

A new cylinder piston and ring kit is being released into production as our permanent corrective action. This change will be effective June 1st for all engines leaving Detroit Diesel for assembly into school bus chassis with an engine serial number 926.961-S0-013420 or higher. All engines prior to this engine serial number are eligible for the two options made available in the February 28th correspondence.

For engines in the field that require repair to improve the oil consumption, we are pleased to announce that a new piston and ring kit has been identified as the corrective action to repair these engines. Parts availability to begin work on engines requiring field updates will be available to repair locations in June.

The following is additional information to explain how Detroit Diesel will administer disbursements and/or the repair of engines identified for option 1 or 2 from customer responses.

Option 1:
This option was offered for the owner of a bus getting less than 1,000 miles per quart to continue to run the bus for a minimum of 20,000 miles with the expectation the oil consumption would improve to at least 1,000 miles per quart by that time. The owner would be compensated for incremental oil consumption greater than 1,000 miles per quart up front within approximately 60 days of Detroit Diesel receiving the paper work submitted that confirms the oil consumption. The disbursement amount under this option will be based on the following schedule:

< 500 miles per quart = compensation for 60 quarts of oil = $220.65
500 – 750 miles per quart = compensation for 30 quarts of oil = $110.32
750 – 1000 miles per quart = compensation for 20 quarts of oil = $73.55

If at the end of the 20,000 mile period the oil consumption is still less than 1,000 miles per quart, the engine will be eligible for a field repair modification free of charge to the owner. At that time, the customer can contact their nearest Detroit Diesel authorized repair facility to schedule the repair. The repaired engine will assume the remainder of the original warranty and not the additional one year base warranty.

Option 2:
This option was offered for those customers with oil consumption less than 1000 miles per quart who did not wish to participate in option 1. Customers requesting option 2 may begin contacting their nearest authorized Detroit Diesel repair facility in June to schedule repairs of their units. These repairs will include the new piston and ring kits and will be made at no cost to the owner. The engine will assume the remainder of the original warranty.

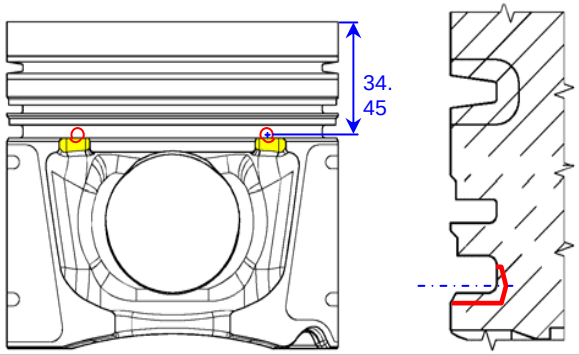
Detroit Diesel will notify both customers and repair facilities as soon as the parts are available, in order to begin the engine updates.

Detroit Diesel remains committed to working with you and your customers to ensure your satisfaction.

Sincerely,

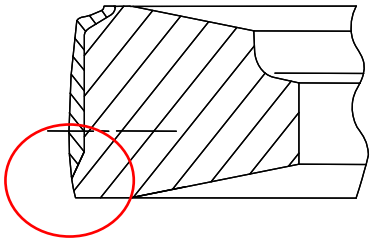
Timothy Tindall
Director of Sales
Detroit Diesel

Cylinder Kit Upgrade

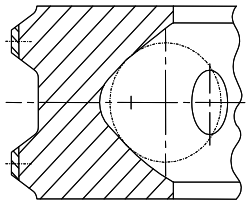


Piston – Oil Drain Holes

- The upgraded cylinder kit contains three elements to reduce oil consumption:
  1. Added drain holes to the Piston oil ring groove
  2. Sharp bottom scraping edge added to the top piston ring
  3. Increased spring tension added to the oil ring
- Became effective with engine s/n 926961S0013420.



Top Ring – Sharp Corner

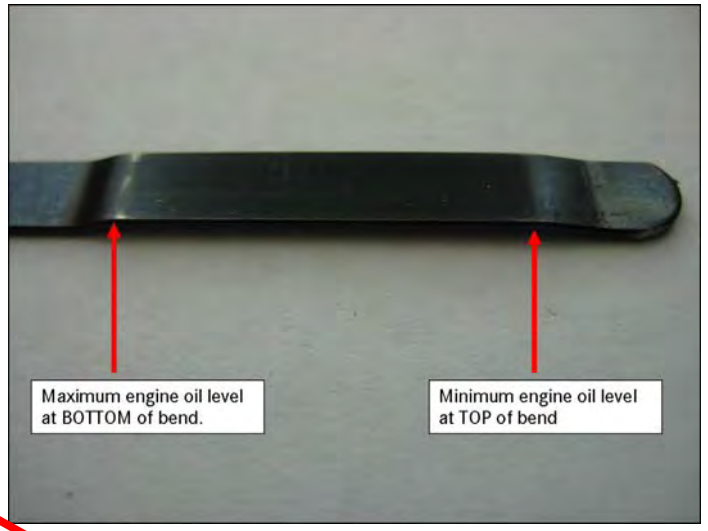


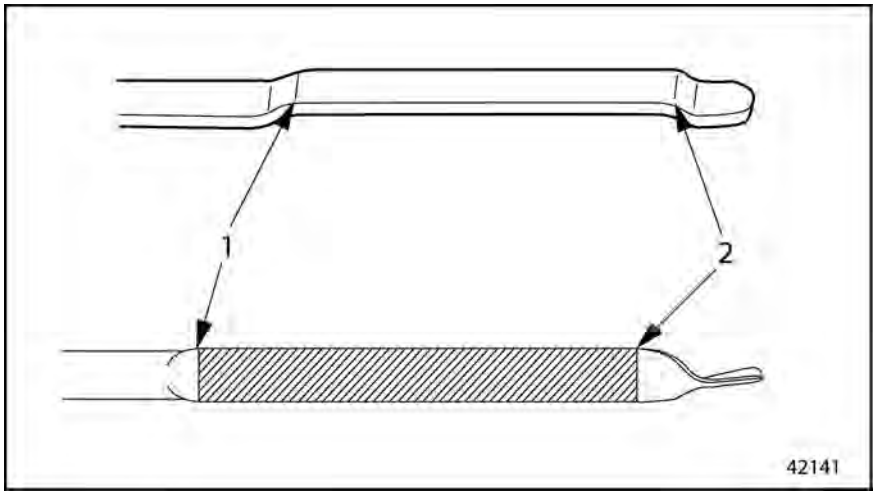
Oil Ring – Increased Tension

MBE900 EPA 07 Update

Incorrect Oil Level Measurements

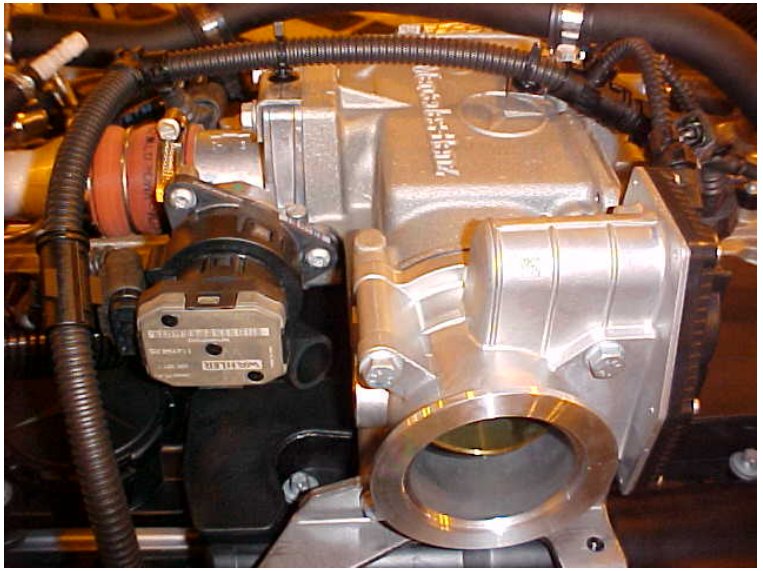
- Original dipstick was non-vented & bends created confusion (Reference 07 TS-61)
- Reworked in Jan-08 with vent & cross hatch pattern (no part number change).
- New twist lock design released is also vented and has cross hatch
- Included in the oil consumption Service kits.





EGR Valves

- Sticking EGR valve resulting in code SPN 2791 FMI 7 - EGR Valve Position Incorrect or FMI 4 - EGR Valve Circuit Failed Low.
- Vehicles sitting for extended periods can encounter a sticking EGR valve.
- Inspect the valve for white deposits and if found, evaluate for possible coolant ingestion (EGR cooler failure).
- If no coolant loss is evident, the valve can stick as a result of corrosion, both galvanic from dissimilar metals and from the acid condensation from the exhaust. This will result in white deposits in the valve from aluminum oxide.
- New Teflon coated valve p/n A9261420419 replaced former valve p/n A9261420219 on 26-Mar-08 with engine s/n 926961S0012409. Available for Service in Aug-08.



MBE900 EPA 07 Update

FCCC Exhaust S-Pipe

- Leaks at both ends of the vehicle exhaust pipe joining the turbo outlet & ATD.
- Created a graphite gasket to be used on both ends of the pipe.
- FCCC began using the gasket on 14-Apr-08 with VIN AJ4981.
- Reference 08 TS-19.

DD15 – Demand it All

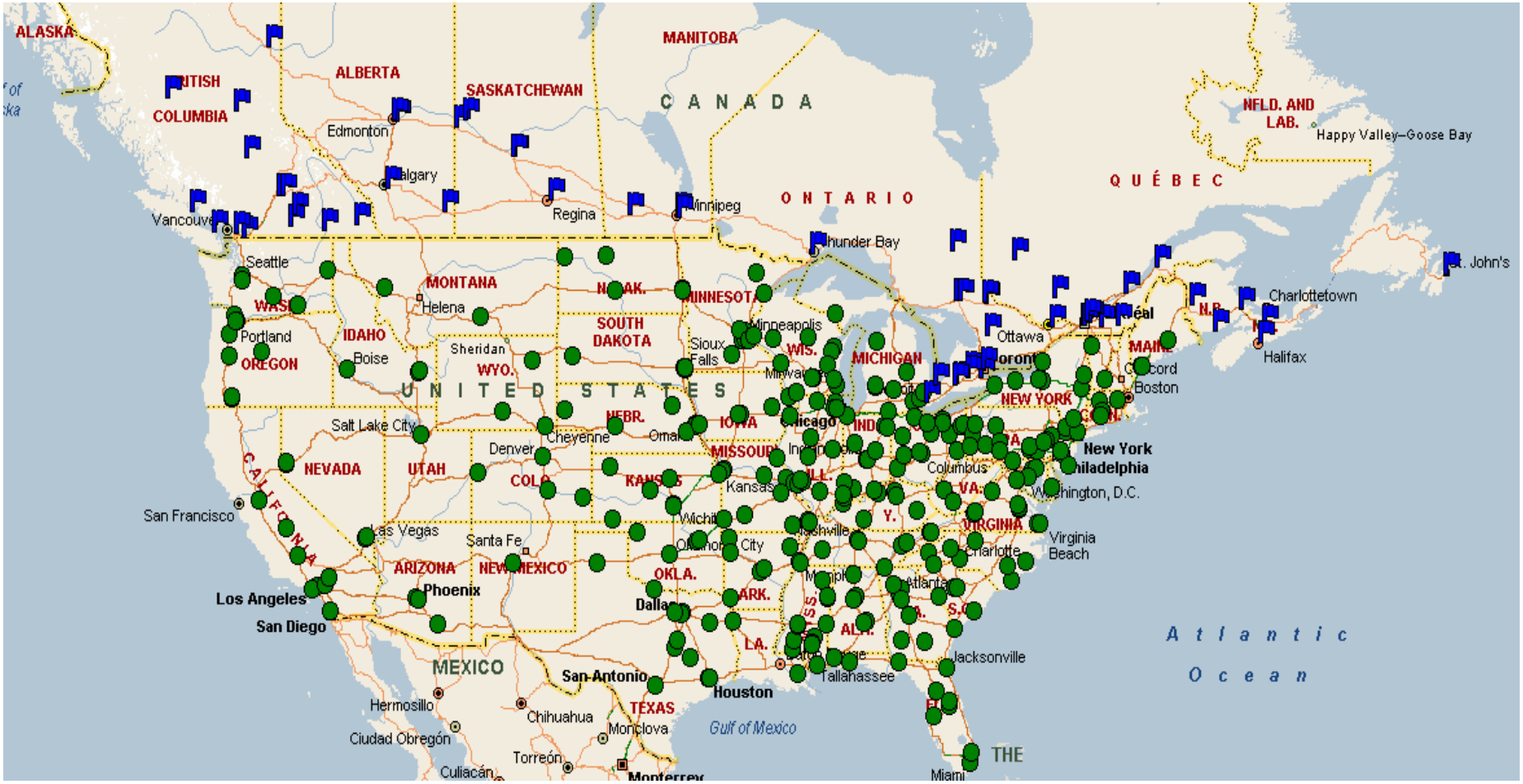
DD15 – Product Update

- **Service Readiness**
- **DD15 UpTime Commitment**
  - **Launch Team Update**
  - **Preferred Service Network**
  - **Express Assessment**
  - **Electronic Web Clock**
  - **Summary**

Source:

DD15 SERVICE READINESS

DD15 Phase I Certified Repair Locations



Overall – 459 up from 426 on August 11

Top 200 – 180 up from 175 on August 11

Source:

DD15 Service Facility Certification

- **Service Locator**

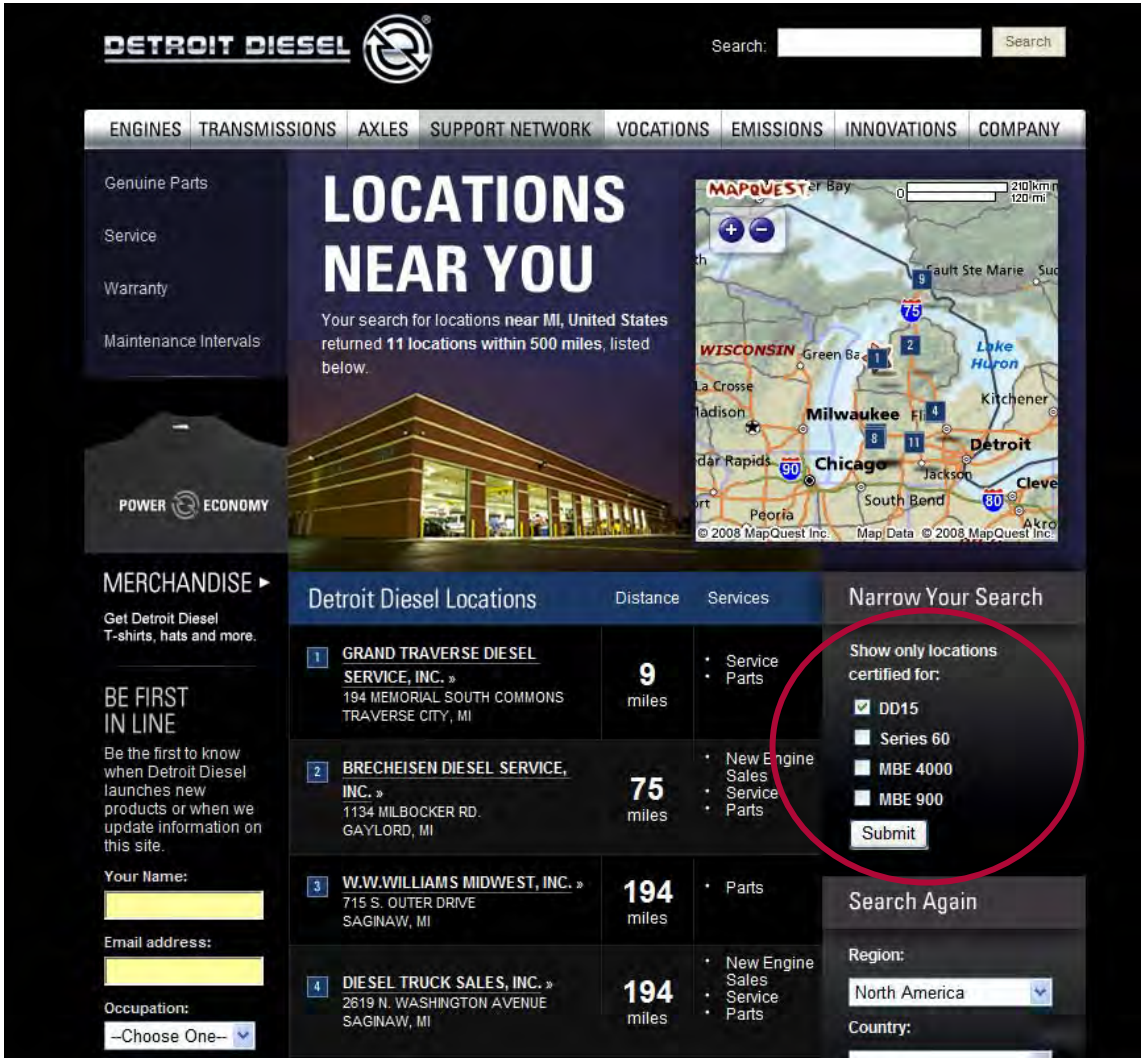
Service Support Index (SSI) Tracks DD15 Repair Facility Certification Progress by Linking with the G2 Training Data Base and the Parts and Tools Web Site

Upon Completion of the DD15 Certification Requirements:

- Trained Technicians
- Essential Tools
- Required Stocking Inventory

Repair Facility is added to the DD15 Service Locator

Repair Facility is Eligible to Participate in the DD15 UpTime Commitment Program



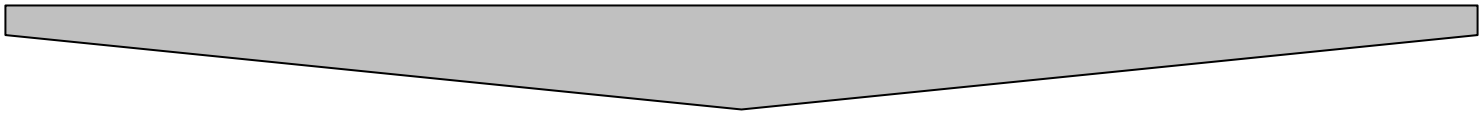
DD15 UpTime COMMITMENT

- Priority Service Throughout Service Network With Emphasis On 24 Hour Repair Turn Times
- Program is Applicable to DD-15 Engines in-service in calendar year 2008
- Dedicated 24x7/365 CSC and CAC Service Support
- Factory Launch Team 100% Dedicated to Field Issues
- Electronic Clock Web Site for Tracking Out of Service Time
- Express Assessment and Fast Lane Diagnostics for DD15 repairs
- Up and Running Plus Program for DD15 parts
- Spare Electronic Components and “Swing “ Engines Available
- Follow Up Survey for Customers Having UpTime Services Performed
- Long Term Telematics Solution for Fault Code Reporting and On Board Call Center Support

DD15 UpTime COMMITMENT

Two Critical Parts to The UpTime Commitment

DD-15 Engine UpTime Commitment Will Require Multiple Components To Enable Success

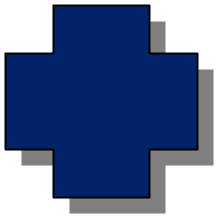


Infant Care Program

Detroit Diesel & FLLC

Improve Problem Solving Capability

- Review of EPA 07 Engine Service History
  68% completed in < 24 hours
- Need to Reduce Out-of-Service Time
- Differentiate DD-15 Service
- DD-15 Service Workshop
- DD-15 Launch Team Activities



Preferred Service Network

Dealers & Distributors

Expedient Service Repairs Required

- Review of Average Customer Service Experience; Time Out of Service
  2.5 days average
- Two-Hour Service Repair Assessment
- Up Time Electronic Clock Web Site
- Develop an Incentive for Service Repair Turn Around

DD15 UpTime COMMITMENT

Infant Care Program

Internal Support of DD15:

- Separate CSC Queue for DD-15 Service Events
- Service Locator that Identifies ONLY Certified Repair Facilities
- Immediate CSC Call Escalation to DD-15 Experts
- Formation of a Launch Team:
  - -Service, Component Engineering, Vehicle Performance, Fuel System, Electronics and Aftertreatment Expertise
  - -100% Dedicated to Field Service Issues
  - - Focused on Root Cause and Containment or ICA/PCA
  - -Launch Team to Initiate and Complete 8D to Root Cause
  - - Establish Containment to Return Vehicle to the Road
  - - Feedback to CSC and Field Service
- Publish Technical Information to Guide Service Repairs
- Telematics with System to Monitor Breakdowns and Transmit Data to Launch Team
  - - GPS position, altitude and J1939 data bus information
  - - Capture data log with DDEC VI code event

Formation of the Launch Team

- CSC/Tech Service
- Service Development
- Engineering
- Electronics
- Aftertreatment
- Reliability
- Parts
- Procurement/PDCs
- Quality
- Plant
- Supplier Management

DD15 UpTime COMMITMENT

Preferred Service Network

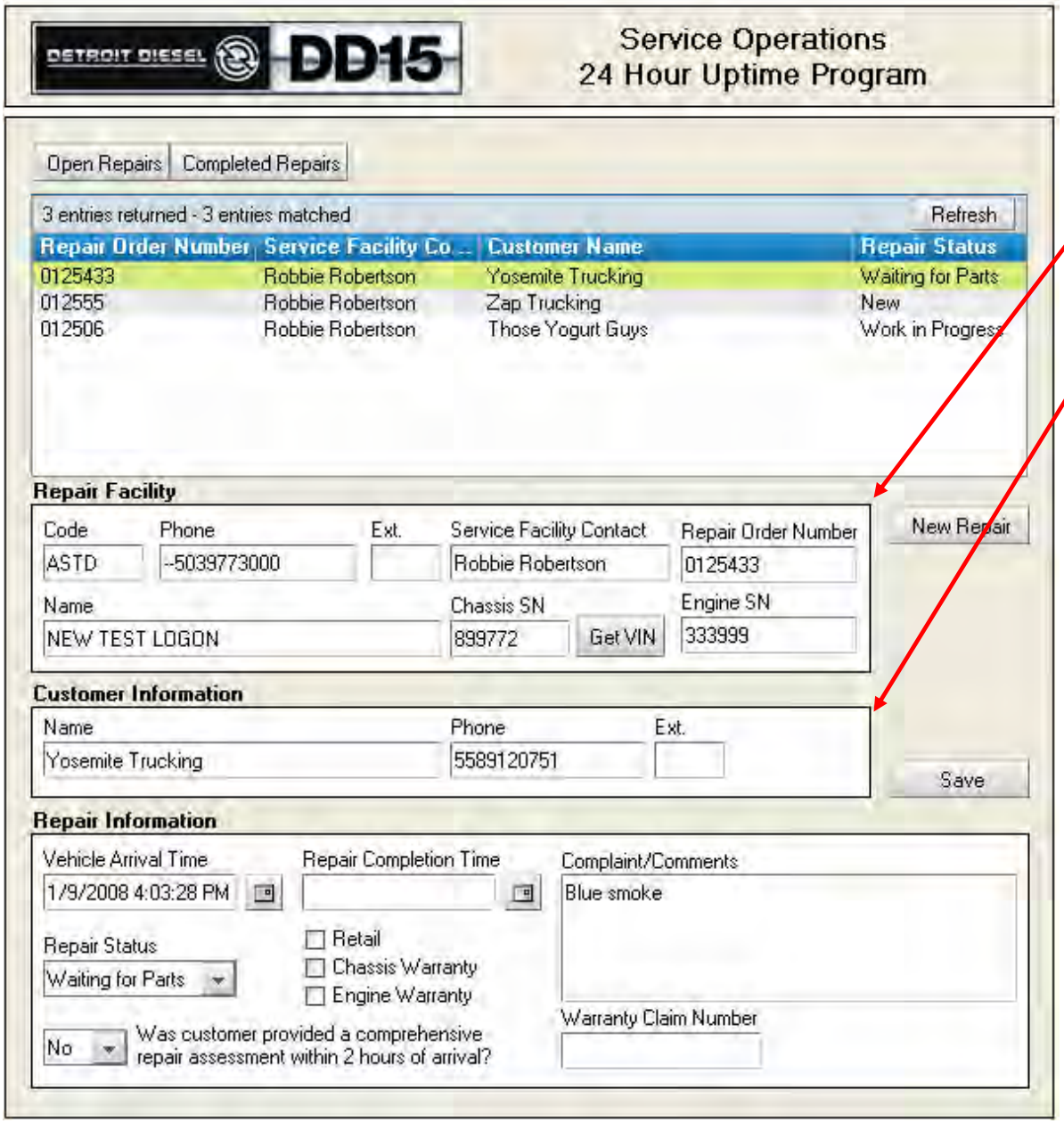
- Priority Service Throughout Service Network With Emphasis On 24 Hour Turn Times (Up Time Commitment)
- DTNA created an incentive for the service repair facilities to alter their shop throughput process to reduce idle wait time and improve the customer's service experience
- Uptime Commitment was announced on June 9, 2008 on 08SO-6 through DDC Warranty
- One hour labor **FREE** for a successful 24 hour repair of DD15 engines is the incentive for moving the network into two hour assessment and fast lane repairs to eliminate customer wait time
- Tracking of DD15 engine repairs at repairing facilities is critical to the incentive to ensure that the repair was:
  1) completed in 24 hours
  2) with a two hour assessment
  3) and a positive customer service experience
- DD15 Electronic Clock Web Site
- DD15 Up and Running Plus Parts Program
- Telematics with System to Monitor Service Repair Success

Express Assessment

Key Elements

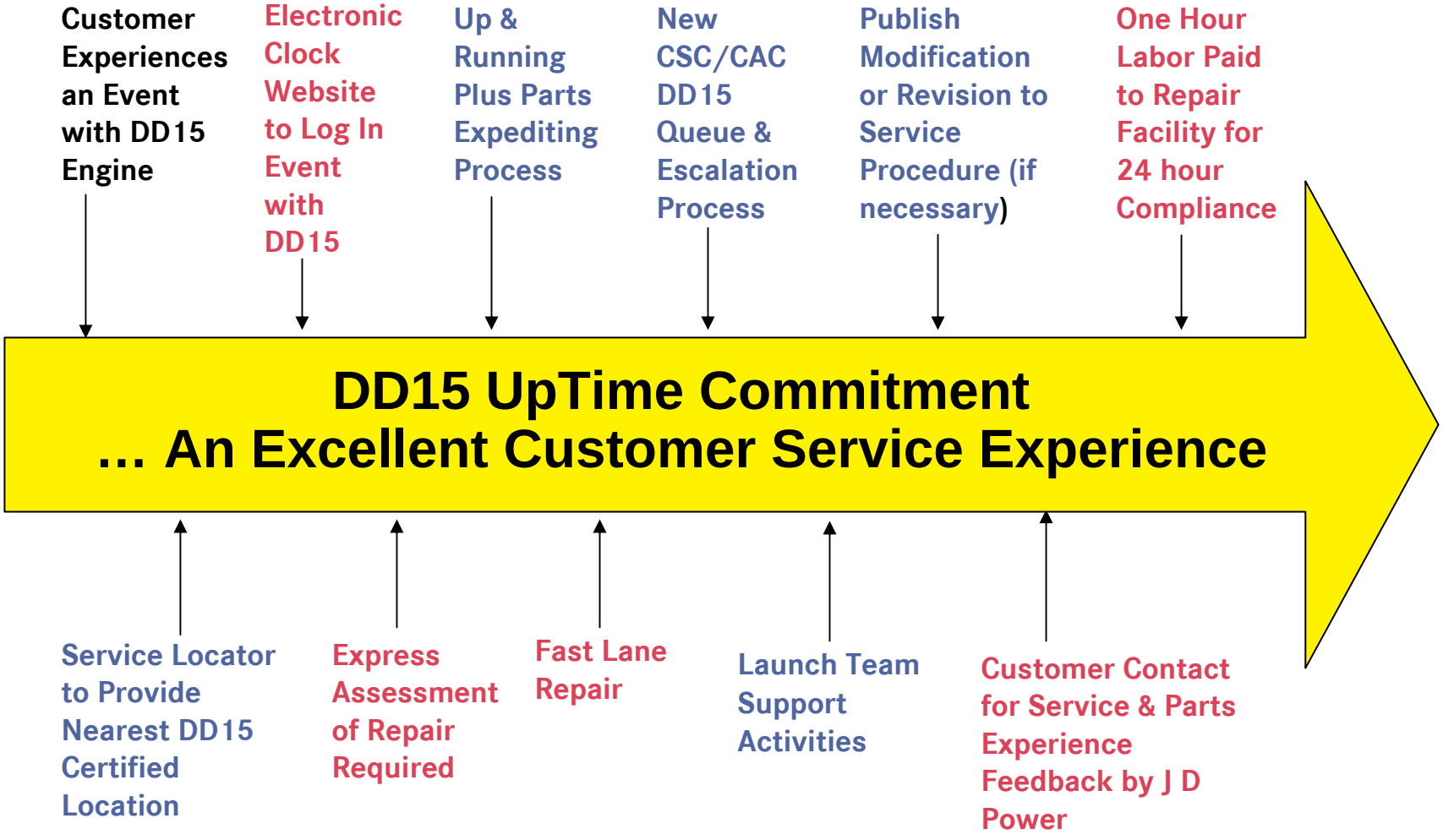
- Express Assessment is a process, not a program. It is intended to become part of the way a Service Department performs its day-to-day work. The major elements of the process include:
  - Timely assessment of every incoming truck that requires diagnosis – within two hours of write-up
  - Dedicated diagnostic technician(s) to perform the diagnosis
  - Information on truck status provided to the customer within two hours
  - Parts availability for needed parts confirmed by the diagnostic technician
  - Parts available prior to dispatching work to shop technicians
  - Dispatched to the most appropriate technician based on diagnosis
  - Quality control managed by the diagnostic technician
  - Rapid communication among the service team and customers

DD15 UpTime COMMITMENT



DD15 Electronic Clock Web Site

- New Repair
  - service writer repair facility
- Customer Info
  - service writer customer contact information … not company info
- Repair Info
  - service writer enters customer arrival time
- Info Updates
  - Two Hour Assessment
  - Complaint/Comments
  - Repair Status
  - Repair Completion Time
  - Warranty Claim Number
- Contact info sent to JD Power when completed

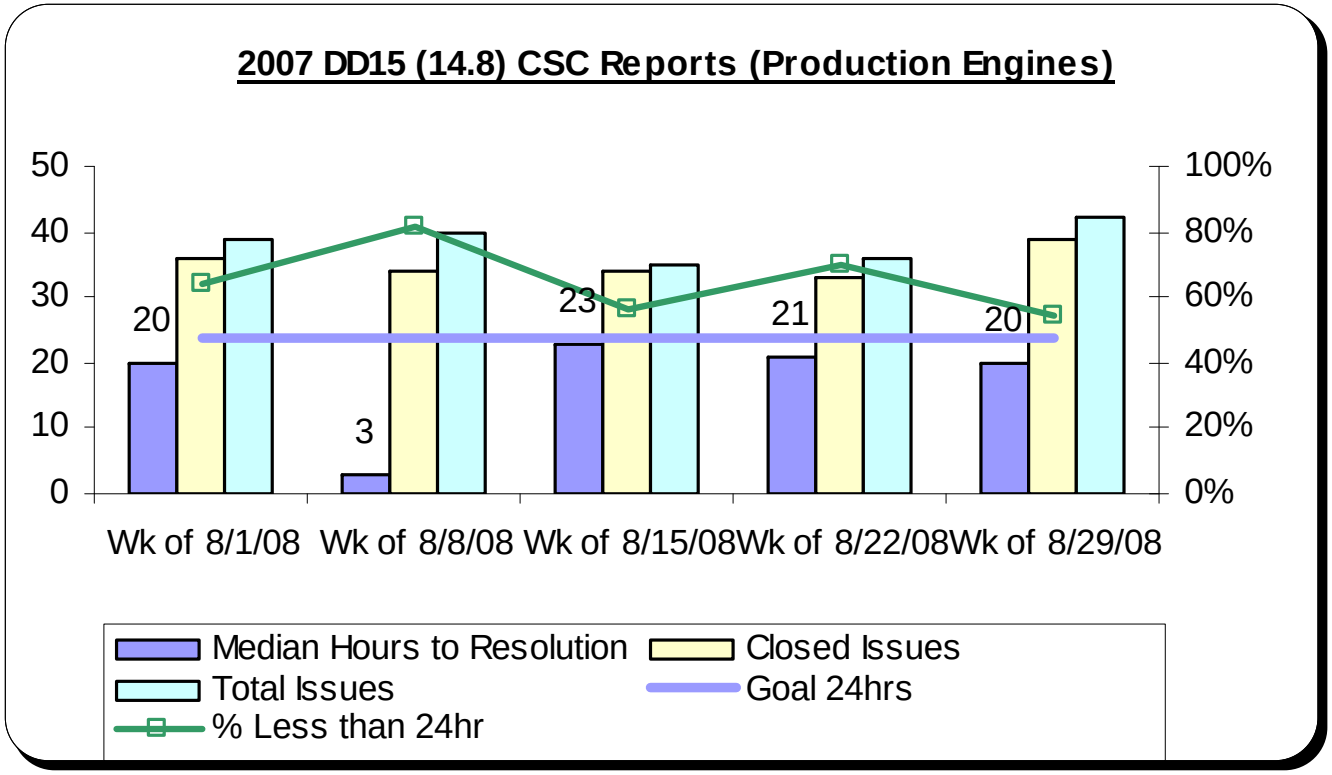


Infant Care Program

Preferred Service Network

DD15 UpTime COMMITMENT

DD15 Weekly Performance



June 2008 Info:

- 121 Tickets
- 71% < 24 hr
- 12 Web Clock Entries

July 2008 Info:

- 190 Tickets
- 67% < 24 hr
- 23 Web Clock Entries

August 2008 Info:

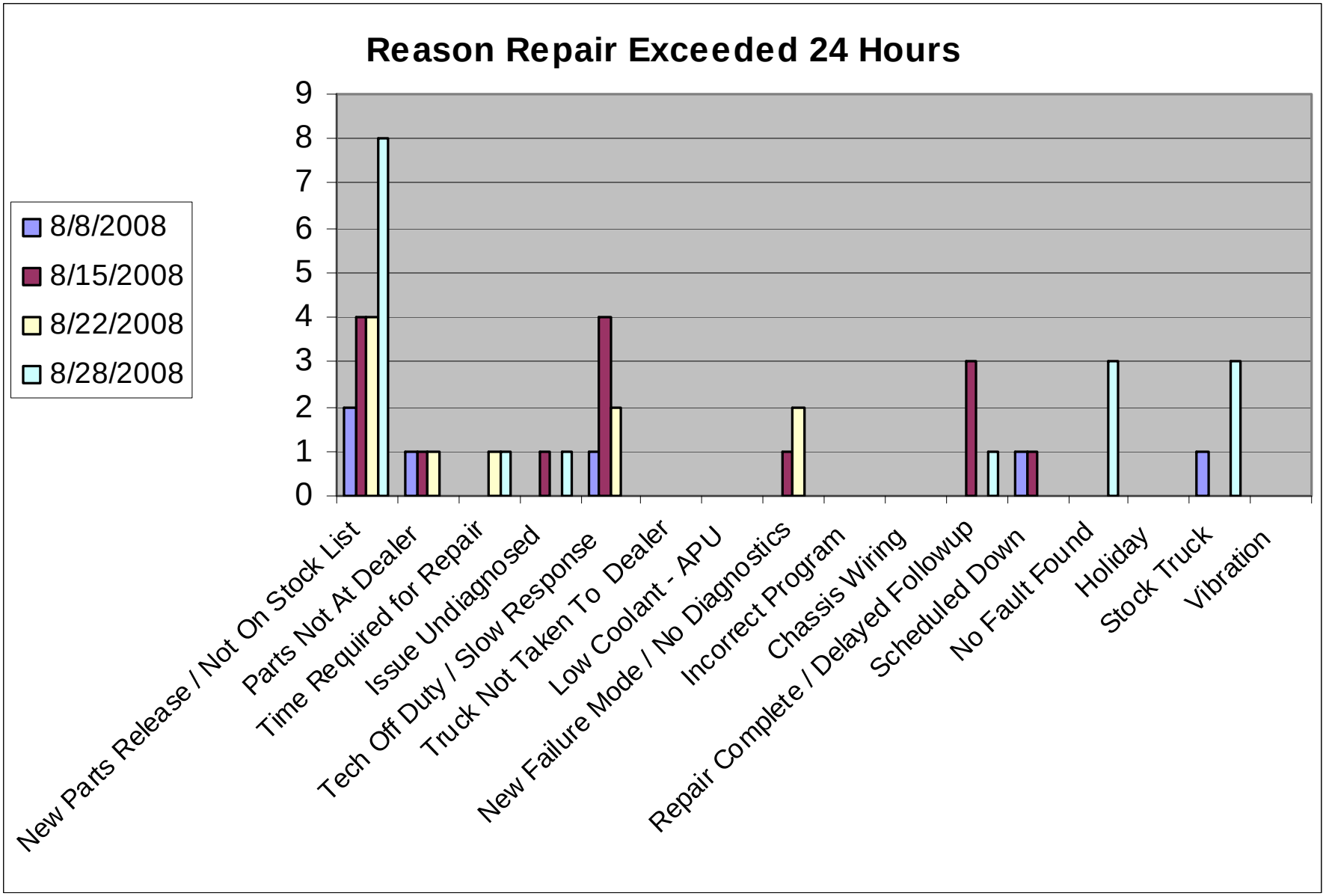
- 186 Tickets
- 69% < 24 hr
- 27 Web Clock Entries

DD15 Engines thru the End of August 2008

- 4,006 Engines Built … 40 / Day Moving to 50 / Day in Mid August
- About 2,460 Engines In-Service … More Units Going In Service Everyday!

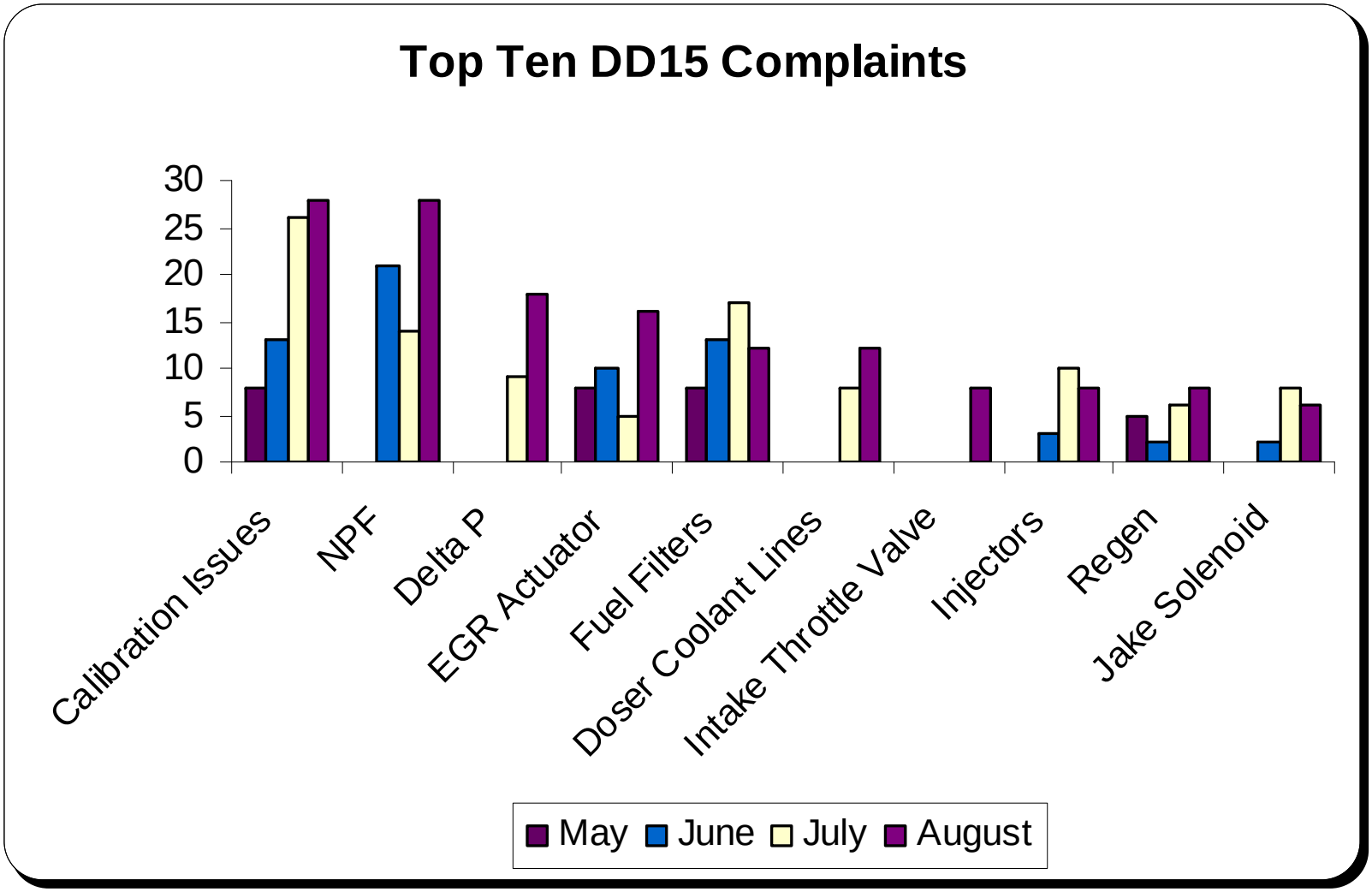
DD15 UpTime COMMITMENT

DD15 Weekly Performance



DD15 Field Findings

DD15 Complaints – August 2008



DD15 Field Findings

Top 10:

1. Calibration:

   Misfire @ 1200 RPM; Fan On and Idle Timer Parameters; HP Changes; New MCM v11.0 and CPC r4.01 Software and Associated Fuel Map was Released August 4, 2008 – Modification Pending (Late September)

2. NPF – No Problem Found:

   Removing Trapped Air in the DD15 Fuel System requires Running the Engine at High idle for 20 to 30 minutes. Decked Vehicles on Delivery to the Dealer are Experiencing Air Entrapment in the Fuel System. Also Starting, Rough Running and Low Power Complaints.

3. Delta Pressure Hard Sensors:

   Code 411 EGR Differential Pressure Sensor. Found Supplier Issue with DP Sensor. New Sensor Released to Production and Service - Modification Pending (Late September)

4. EGR Valve:

   Codes 2791 and 2659 EGR Valve. Corroding Ball Joint Linkage and Actuator Failures. Linkage Under Investigation. Actuator Change Point Established and New Parts Available.

5. Fuel Filters:

   Fuel Filter Restriction Continues to Impact the ATD Regeneration Capability … Always check the HC Doser Supply Pressure

DD15 Field Findings

Top 10 (Con't):

6. HC Doser Coolant Line:
   Clip Wearing into HC Doser Coolant Line. New line Released – Modification pending (Late September 2008)
7. Intake Throttle Valves:
   Actuator gear binding (V11 software fix) and connector pin fretting (connector service kit).
8. Injectors:
   Unstable Idle Condition … Under Investigation. The Injector Hold Down Bolt is Required with Injector Replacement. A Kit with the Injector and new Hold Down Bolt is being Released.
9. ATD Regeneration:
   Typically High Soot (Code 3179) as a Result of Fuel System Restriction or EGR Valve Codes Preventing Regeneration.
10. Jacob Brake Solenoid:
    Internal Short on the Jacobs Brake Solenoid. Supplier has Corrected Quality Process for Checking Solenoids. New parts available from Canton

Parts Added to Dealer Stock List

- Injector bolt – A0029900400
- Gasket intake throttle - A4600980180
- New DeltaP sensor – A0061537928
- Reference 08 AP-15

DD15 Engine Service Summary

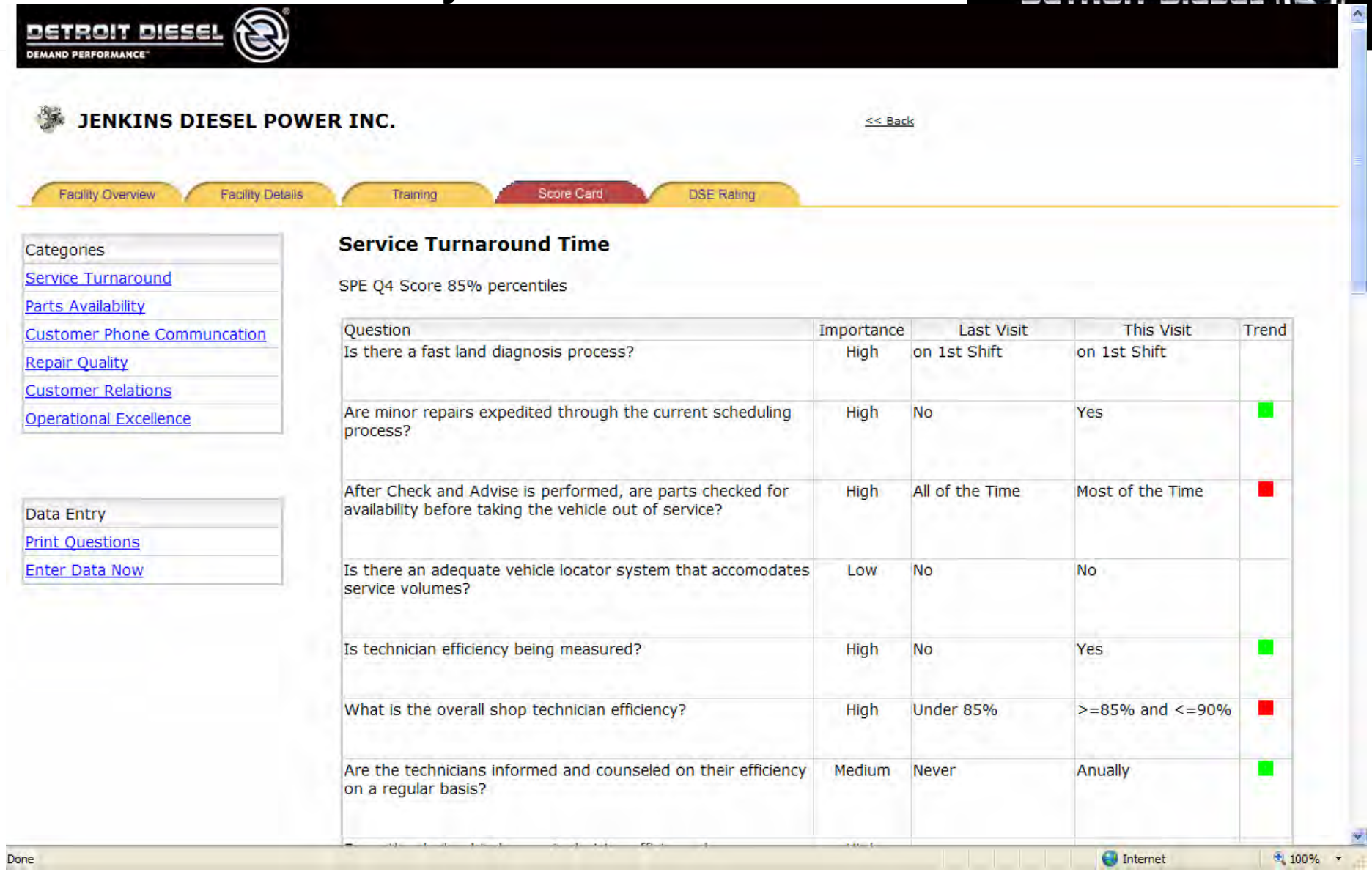
- New World Wide Heavy Duty Engine Designed to Meet Current and Future Emissions Standards … with Higher Efficiency Levels and Better MPG
- UpTime Commitment Created to Differentiate the DD15 Service Experience with Emphasis on 24 Hour Turn Around
- 100% Dedicated “Factory Expert” Launch Team to Support the DD15 Field Issues
- Continued Focus On Repair Facility Readiness is Critical to Support the DD15 UpTime Commitment
- One Hour FREE Labor for Repair Facility with:
  - Customer Turn Around in 24 hour
  - Use of the Express Assessment
  - Positive J.D. Power Survey Result
- Our Customers will “**Demand It All**” … Your Cooperation, Assistance and Diligence are Required to Ensure an Excellent DD15 Customer Service Experience

Revised SSI Survey

Integrate the Best of Both SSI/DSE Surveys

- The SSI /DSE Program has been used to identify areas of opportunity for continuous customer service improvement at the repair facilities since 2006.
- A revision to the SSI/DSE program survey questions was initiated to integrate the existing DSE and SSI audit surveys.
- The survey questions have been tested with several pilot dealers and distributors and received further review by the FACT team.
- The focus of the new survey is on the top 5 customer issues identified in SPE question 6 and on operational excellence. The top issues are:
    1. service turnaround time
    2. parts availability
    3. better phone communication
    4. repair quality
    5. customer relations
- The questions are designed to support improved customer satisfaction in each of the these areas.
- The new SSI survey will be a smarter system that will focus on areas of deficiency and exempt areas of superior performance.
- The system will also generate specific tasks in response to identified deficiencies. The DSM will work jointly with the dealership to develop an action plan based on the task list.

Revised SSI Survey



DETROIT DIESEL DEMAND PERFORMANCE

JENKINS DIESEL POWER INC.

<< Back

Facility Overview | Facility Details | Training | Score Card | DSE Rating

Categories
- Service Turnaround
- Parts Availability
- Customer Phone Communcation
- Repair Quality
- Customer Relations
- Operational Excellence

Data Entry
- Print Questions
- Enter Data Now

Service Turnaround Time

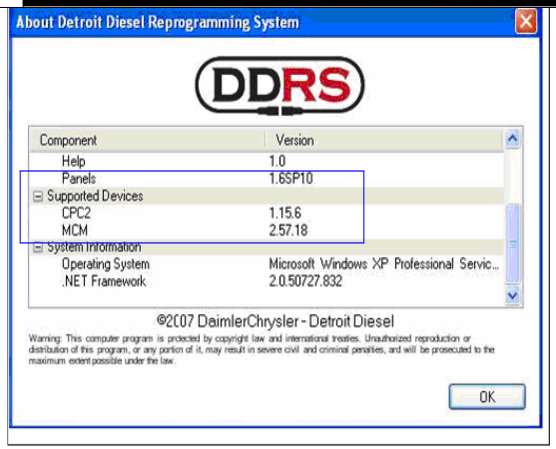
SPE Q4 Score 85% percentiles

Question	Importance	Last Visit	This Visit	Trend
Is there a fast land diagnosis process?	High	on 1st Shift	on 1st Shift	
Are minor repairs expedited through the current scheduling process?	High	No	Yes	
After Check and Advise is performed, are parts checked for availability before taking the vehicle out of service?	High	All of the Time	Most of the Time	
Is there an adequate vehicle locator system that accomodates service volumes?	Low	No	No	
Is technician efficiency being measured?	High	No	Yes	
What is the overall shop technician efficiency?	High	Under 85%	>=85% and <=90%	
Are the technicians informed and counseled on their efficiency on a regular basis?	Medium	Never	Anually	

Done | Internet | 100%

DDDL and DDRS 7.x

- A Major Part of our Success with the EPA07 and DD15 Products is in your hands!
- Make Sure Your Shops have EPA07 and DD15 trained technicians.
- EPA07 and DD15 Parts and Tools in Stock.
- Probably the Most Important Item to have are the Electronic Tools:
  - Either DDDL 7.0x and/or DDRS 7.0x loaded onto a computer and ready to go. Note that DDRS 7.0x includes the diagnostic features of DDDL 7.0x.
  - The current version of DDDL is 7.03 with Service Pack 2. Reference CSA letter 08 CSA-23rev.
  - The current version of DDRS is 7.03 with Service Pack 2. Reference CSA letter 08 CSA-23rev.
  - The current version of DDEC Reports is 6.42. Reference TS letter 07 TS-44.
  - The current version of the USB Link firmware is 4.2. It comes with the upgrade to DDDL/DDRS 7.03.



DDRS

DETROIT DIESEL
DEMAND PERFORMANCE

No.: 08 CSA-9Rev
April 23, 2008

TO: Service Locations

FROM: Technical Support Development

SUBJECT: Uprate/Derate Feature for EPA04 Engines

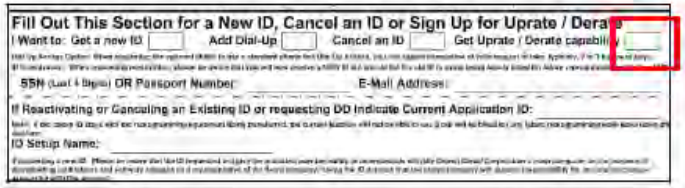
SUBJECT DETAIL

The next version of Detroit Reprogramming Software (DRS 6.14) will be released Tuesday, May 13, 2008 and will include a link to Detroit Diesel's mainframe allowing users to uprate or derate DDEC III, IV and V engines. This requires access to two new screens specifically created for this purpose.

IMPORTANT: For those users who already have the ability to make these changes, you will not have to apply for this access. You will need to review the PowerPoint presentation for instructions as your access into the IMS system will change.

In order to gain access to these screens, you will need the following:

- An active Application ID - This is the ID that was issued with your reprogramming station. If you haven't used your reprogramming station in the last 30 to 90 days, you will need to reset your password by calling a DDC Customer Support representative at 313-592-5800. If it has been more than 90 days, you will need to apply for a new application ID using the Reprogramming ID Worksheet.
- An Uprate/Derate ID
  You are required to submit a request for an Uprate/Derate ID using the Reprogramming ID Worksheet. Complete the form and check the box corresponding to the Uprate/Derate capability shown here. This form is called the MRS ID & Uprate/Derate Request Form Worksheet. It can be found on the secured area of the DDCSN website in the following location: **Tools, Electronics, Master Reprogramming System.**

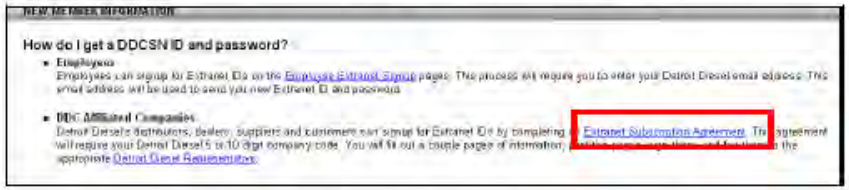


- An active Extranet ID – To request an Extranet ID, contact the administrator at your local service facility. If you are not sure who your administrator is, contact Detroit Diesel at 313-592-5800.

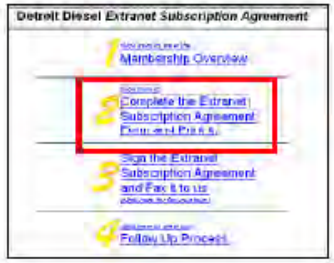
The following is the procedure for Extranet administrators to request IDs:

1) Go to www.DDCSN.com
2) On the home page, click on "**Join the Network**"

3) On the New Member Information page, select **Extranet Subscription Agreement.**



4) Select #2 – **Complete the Extranet Subscription Agreement Form.**



5) Select your Relationship.

Questions?

DETROIT DIESEL®

Thank You!!