INSTALLER/FLEET TRAINING #2

Q & A on Ultra Low Sulphur Fuel

Diagnostic Equipment

Tool List

Frequently Asked Questions Regarding the Implementation of ULSD (Ultra Low Sulfur Diesel Fuel)

What is new about the fuel (ULSD) for 2007?

- ULSD will have no more than 15ppm (parts per million) sulfur compared to a maximum of 500ppm sulfur in on-road diesel fuel currently available. In general, it will have slightly lower aromatics* and gravity and slightly higher cetane**.

Will the new fuel work in old engines?

- Yes, We do not anticipate seal elasticity issues with this fuel change because large aromatic changes are not expected. Older engines will achieve small but significant environmental advantages with this new fuel.

Will ULSD change any of my existing service practices or service intervals?

- Yes – low ash engine oil will be required on PM (Particulate Matter) trap-equipped vehicles.

Will the fuel issues we face today (gelling, water in fuel, lubricity/friction…) be the same with ULSD or are there new issues?

- Yes, maintenance of fuel will remain important to prevent common problems such as gelling and water contamination.

Will ULSD affect the filters on my trucks?

- No

What happens if you use the old fuel in vehicles with 2007 engines?

- It could potentially poison the catalysts and PM traps causing them to be ineffective in reducing targeted emissions.

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* Aromatics, so called because of their distinctive perfumed smell, are substances derived from crude oil and, in small quantities, from coal. Aromatics are hydrocarbons, organic compounds that consist exclusively of the elements carbon and hydrogen. The main aromatics are benzene, , toluene, and the xylenes; they are used as starting materials for a wide range of consumer products.

** Cetane Number is a measure of the ignition quality of a diesel fuel. It is often mistaken as a measure of fuel quality. Cetane number is actually a measure of a fuel's ignition delay. This is the time period between the start of injection and start of combustion (ignition) of the fuel. In a particular diesel engine, higher cetane fuels will have shorter ignition delay periods than lower cetane fuels.

Frequently Asked Questions Regarding the Implementation of ULSD (Ultra Low Sulfur Diesel Fuel)

Why will the old fuel still be available?

- Regulations allow limited quantities (less than 20%) of 500 ppm fuel to be available for on-road use up to 2010. The 500 ppm fuel will be required for off-road equipment after 2007, while 15 ppm fuel will be required for non-road application in 2010. All diesel applications including marine and locomotive will be 15 ppm in 2012.

Will truck stops carry both new and old diesel fuel types?

- Some truck stops will likely carry both fuels for a limited time, possibly till 2010.

Do I need to buy new storage tanks for ULSD?

- No, existing diesel fuel storage tanks would be acceptable for storing ULSD.

How do I convert my existing diesel storage tanks to the new diesel fuel?

- Drain, remove any sediment, clean well & refill with ULSD.

Where is ULSD fuel available today?

- ULSD is available in the states of Washington and California where municipalities and school districts are the primary users. It is also available in metropolitan Chicago, Detroit, Washington D.C., and in New Jersey, New York and some parts of Texas. ULSD is not currently available at truck stops. However, if a fleet has a central fueling point in one of these areas, ULSD would be an option.

How soon will it be available in the areas that I operate my fleet in?

- Eighty percent of the on-road diesel will be ULSD fuel by September 2006. In many areas it is available today.

Will there be a winter blend of the new fuel?

- Yes.

Can I still use additives for low temperature stability and performance?

- Yes, as long as they are limited in sulfur content.

Are there plans to create low sulfur kerosene?

- Yes – Any kerosene or No.1 diesel fuel used for blending in the on-road market will have a 15 ppm or less sulfur content.

Frequently Asked Questions Regarding the Implementation of ULSD (Ultra Low Sulfur Diesel Fuel)

Will the new fuel have any effect on other parts of the truck such as gaskets or fittings?

- No – for newer engines, as the engine manufacturers have designed for compatibility. Further, seal issues caused by lower aromatic content are not expected, as the processing used to make the ULSD will only have a minor impact on the fuel's aromatic level.

Is there a way to test the new fuel to insure that I'm operating on fuel that isn't above the acceptable sulfur levels?

- Standardized sulfur tests can be run by most reputable fuel laboratories. However, no simple field test is currently available. Regulations instituting ULSD require significant quality control measures throughout the fuel distribution system.

When will this fuel be available in Canada?

- The Canadian government currently requires all on-road diesel fuel to be ULSD by September 2006.

When will this fuel be available in Mexico?

- Future fuel and emissions regulations in Mexico are undecided.

How will my drivers know that a truck stop has the right fuel?

- Regulations provide for fuel pump labeling at the retail level.

How will my drivers know that truck needs the new fuel?

- The vehicle's owner manual and engine manual will confirm what fuel is needed. Also, vehicles requiring ULSD will have a decal in the area of the fuel fill and on the vehicle dash.

How will my drivers know that a truck can operate on the old fuel?

- Again, the owner and engine manuals will determine if 15ppm sulfur fuel should be used. If 15ppm sulfur fuel is not specified, then 500ppm sulfur fuel can be used.

What are the best web links to stay informed on ULSD and the coming changes?

- http://www.epa.gov/otaq/.

What International bulk tanker customers deliver ULSD?

- Amoco/BP, Conoco/Phillips, Valero and others

Ford's New VCM Service Tools

SST-VCM
Small Service Tool
Vehicle Comm's Module

Previous Service Tools

Today

Custom devices containing:
1, Computer processor
2, Vehicle Communications
3, Instrumentation
4, Custom diagnostic software

NGS

(DLM)

WDS

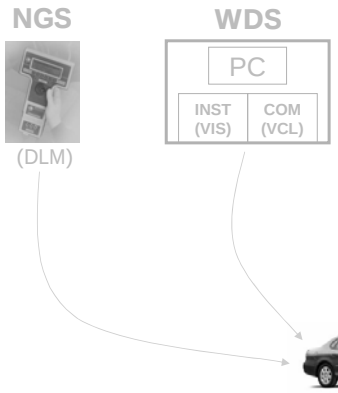
PC

INST (VIS)	COM (VCL)

Modular Service Tools

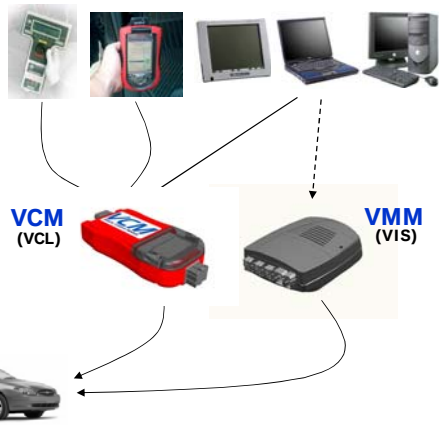
Today

Custom devices containing:
1, Computer processor
2, Vehicle Communications
3, Instrumentation
4, Custom diagnostic software



Future

Flexible component based architecture:
1, Users select appropriate computer platform
2, Separate Vehicle communications HW (VCM)
3, Separate Instrumentation HW (VMM)
4, Different SW packages for computer platforms



Modular Tool Parts

- **Vehicle Communication Module (VCM)**
  - The "heart" of all new & future Ford diagnostic tools
    (NGS+, SST, WDS Next Gen)
  - Designed for "off-the-shelf" PC's and Pocket PC's

- **Vehicle Measurement Module (VMM)**
  - Has the hardware needed to make electronic & transducer measurements like WDS
    (e.g., Fuel, Ignition, DMM, etc.)
  - Design underway for launch in 4th Qtr. 2005

VCM

- Covers all protocols from MY '96 forward including CAN which was implemented in 2003
- Must be used on all 2005 and up vehicles plus 2003 Lincoln LS, Ford T-Bird, 6.0L Diesel equipped vehicles, 2004 and up F-150, Explorer/Mountaineer, Taurus/Sable and Ranger.
- Connects via Ethernet, RS232, or USB to PC computers
- PCMCIA slot for Wireless or Memory expansion **(under clear cover)**
- 32MB RAM/8MB ROM for storing vehicle calibrations
- Standard PCMCIA slot for added memory **(exploring wireless functions)**
- Rugged high-visibility magnesium case w/5 status lights
- Mounting points for future attachments

VCM
Vehicle Comm's Module

Future Service Tools

1, NGS+ & VCM
- **August 2003**

2, SST
- **April 2004**

3, WDS Next Gen
- **Q2 2005**
- **WDS extended thru Dec 31st 2005**

or

All future tools will use the VCM for communicating with the vehicle

VCM

VMM

Complex WDS tests need the VMM for measurements & transducers
(e.g., Fuel, Ignition, DMM, etc.)

SST Toolset

Tool set that meets over 80% of typical WDS usage

Basic Tool Set (SST & NGS+):

- Vehicle ID/Network Test
- Self Test
- Data Logger/Recorder
  (PID Read & Active Commands)
- Recording Playback
- Module Configuration & Reprogramming
- PATS Key Functions
- ABS Brake Bleed
- EVAP Test

Note: Depending on technician feedback, additional tools may be added later (e.g., Power Balance, etc.)

NGS+

NGS+ Bundle:

- **SW:** New NGS+ Basic Tools that actually run on the VCM
- **Ford HW:** New "Caddy" mates the VCM into the T-Handle via RS232 replacing the DLM
- **VCM** updated with data & SW by PCs or WDS via Ethernet
  (i.e., no more thin cards)
- **Computer:** Existing NGS T-Handle used for display & input

SST

SST
Small Service Tool

SST Bundle:

- **SW:** New WDS Tools moved to Pocket-PC & CE devices
- **Ford HW:** VCM connects to the computer via RS232, Ethernet or USB
- **VCM** Wireless connectivity to the computer planned in near future
- **Computer:** Color, portable, outdoor readable, touch screen based Pocket-PCs & Windows CE devices (e.g. Dell Axim, HP iPAQ, etc.)

NGS+ vs. PDA vs. Non-Ford PDA Tools

	Ford NGS+	Ford PDS	Typical non-Ford
	with VCM	with VCM	PDA-based tools
Self Test/CMDTCs	X	X	X
Live Data Display/Active Commands	All	All	Limited
Non Powertrain Modules	All	All	Limited
PATS Keys/FOB Programming	X	X	
CAN Vehicle Protocal	X	X	X
UBP Vehicle Protocol	X	X	
Service Functions/Calibrations	13	13+	
ABS Brake Bleed	X	X	
Module Configuration	X	X	
Module Reprogramming		X	
Vehicle Sessions		X	
Power Balance		X*	
Wireless Capable		X*	

* Future Planned Content

Vehicle Name	Component	Global Tool Number	NA Number	Description
F-250, 350 Super Duty	6.0L Diesel	100-001	T50T-100-A	Slide Hammer
F-250, 350 Super Duty	6.0L Diesel	100-002	TOOL-4201-C	Dial Indicator Gauge with Holding Fixture
F-250, 350 Super Duty	6.0L Diesel	303-017	T65L-6250-A	Service Set, Camshaft
F-250, 350 Super Duty	6.0L Diesel	303-050	T70P-6000	Lifting Bracket, Engine
F-250, 350 Super Duty	6.0L Diesel	303-477	T94T-6002-AH	Gauge, Keystone Piston Ring
F-250, 350 Super Duty	6.0L Diesel	303-591	303-591	Wrench, Fan Clutch Nut
F-250, 350 Super Duty	6.0L Diesel	303-625	303-625	Quick Disconnect Tool
F-250, 350 Super Duty	6.0L Diesel	303-755	303-755	Disconnect Tool, Quick-Release Coupling
F-250, 350 Super Duty	6.0L Diesel	303-756	303-756	Adapter, Oil Pressure Leak Test
F-250, 350 Super Duty	6.0L Diesel	303-757	303-757	Adapter, Compression Test
F-250, 350 Super Duty	6.0L Diesel	303-758	303-758	Adapter, Crankcase Pressure Test
F-250, 350 Super Duty	6.0L Diesel	303-759	303-759	Lifting Bracket, Cylinder Head
F-250, 350 Super Duty	6.0L Diesel	303-760	303-760	Remover, EGR Valve
F-250, 350 Super Duty	6.0L Diesel	303-761	303-761	Installer, Crankshaft Front Seal and Wear Ring
F-250, 350 Super Duty	6.0L Diesel	303-762	303-762	Remover, Crankshaft Front Wear Ring
F-250, 350 Super Duty	6.0L Diesel	303-763	303-763	Installer, Glow Plug Sleeve
F-250, 350 Super Duty	6.0L Diesel	303-764	303-764	Remover, Glow Plug Sleeve
F-250, 350 Super Duty	6.0L Diesel	303-765	303-765	Adapter, High-Pressure Pump Test
F-250, 350 Super Duty	6.0L Diesel	303-766	303-766	Adapter, High-Pressure Rail Test
F-250, 350 Super Duty	6.0L Diesel	303-767	303-767	Installer, Fuel Injector Sleeve
F-250, 350 Super Duty	6.0L Diesel	303-768	303-768	Remover, Fuel Injector Sleeve
F-250, 350 Super Duty	6.0L Diesel	303-769	303-769	Socket, Fuel Injector Pressure Regulator Valve
F-250, 350 Super Duty	6.0L Diesel	303-770	303-770	Installer, Crankshaft Rear Seal and Wear Ring
F-250, 350 Super Duty	6.0L Diesel	303-771	303-771	Remover, Crankshaft Rear Wear Ring
F-250, 350 Super Duty	6.0L Diesel	303-772	303-772	Alignment Tool, Camshaft
F-250, 350 Super Duty	6.0L Diesel	303-D027	D81L-4201-A	Feeler Gauge Set
F-250, 350 Super Duty	6.0L Diesel	303-D032	D81L-6002-C	Compressor, Piston Ring
F-250, 350 Super Duty	6.0L Diesel	303-D043	D83T-6000-B	Lifting Attachment, Engine
F-250, 350 Super Duty	6.0L Diesel	303-D043-01	303-D043-01	Adapter for 303-D043
F-250, 350 Super Duty	6.0L Diesel	303-D043-02	303-D043-02	Adapter for 303-D043
F-250, 350 Super Duty	6.0L Diesel	303-D060	D86T-6701-B	Remover, Oil Seal
F-250, 350 Super Duty	6.0L Diesel	310-S039	T90T-9550-S	Disconnect Tool, Spring Lock Coupling