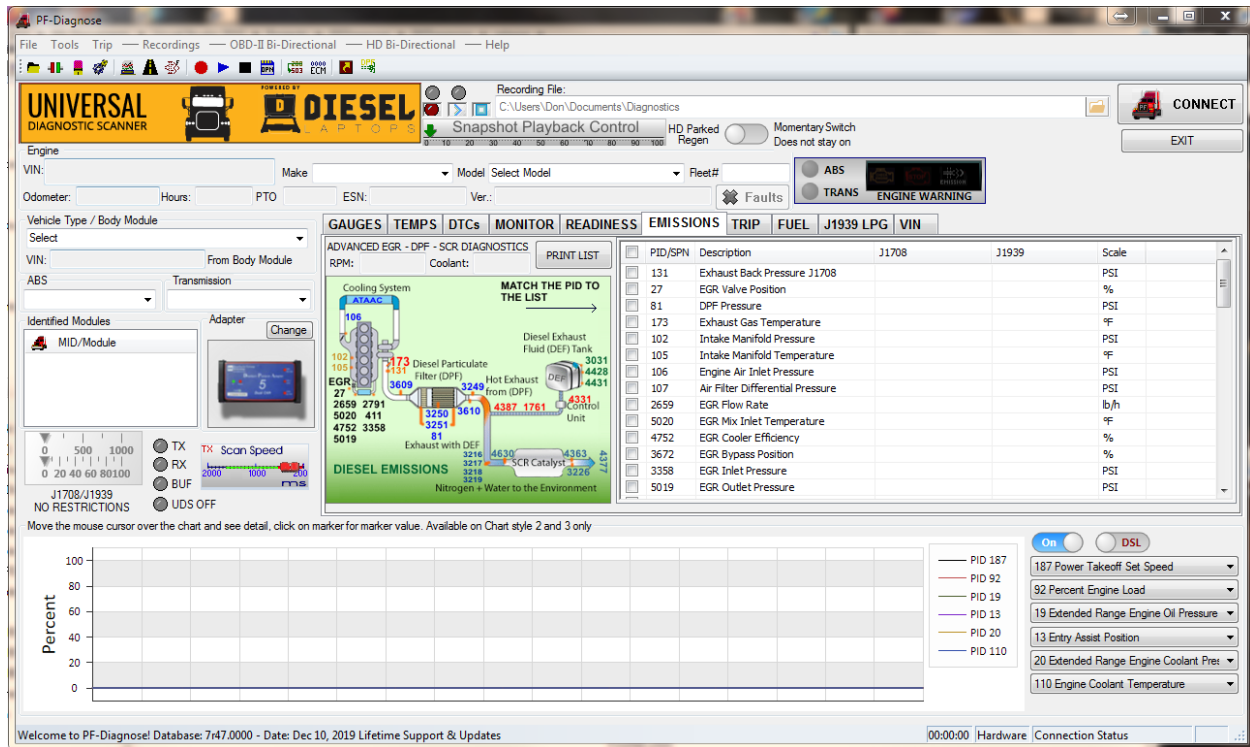


# PF-Diagnose 8

## INSTRUCTION MANUAL



## PF-DIAGNOSE

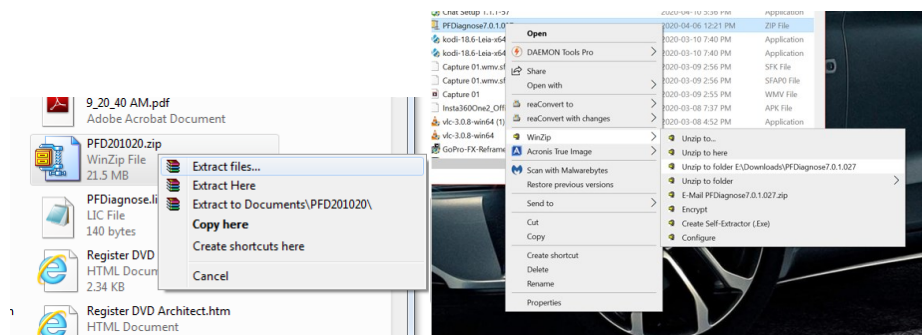
## INSTALLATION

If you purchased a Laptop Bundle, PF-Diagnose should be pre-installed and registered to you.

FROM DOWNLOAD: Download the latest version,

If you do not have the link, email [support@diesellaptops.com](mailto:support@diesellaptops.com) for that latest version link. Or call the help line at 888 983-1975

Select: **Save As** for the download option then save to your User Documents folder. Do not try to install from inside a compressed ZIP folder.



Right click on the folder and select EXTRACT, Unzip to folder or whatever option your PC provides to extract the Zipped folder into a regular folder, you should end up with a folder by the same name without the ZIP extension and that is uncompressed.

Open that folder and select SETUP.EXE

Follow the instructions in the installer. Select all defaults, **do not change the folder location** or any other setting unless you are very familiar with your version of Windows.

When you get to the destination folder, For Windows XP, Select Next leaving this line the same For Windows Vista or Windows 7 and up.

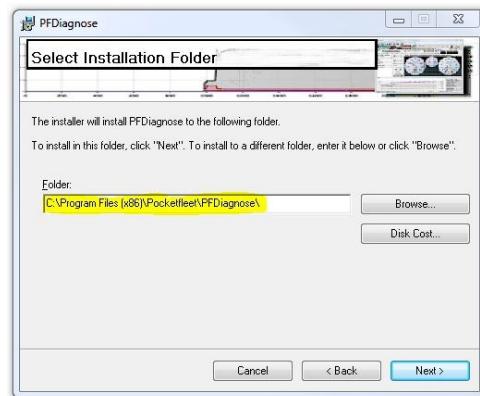


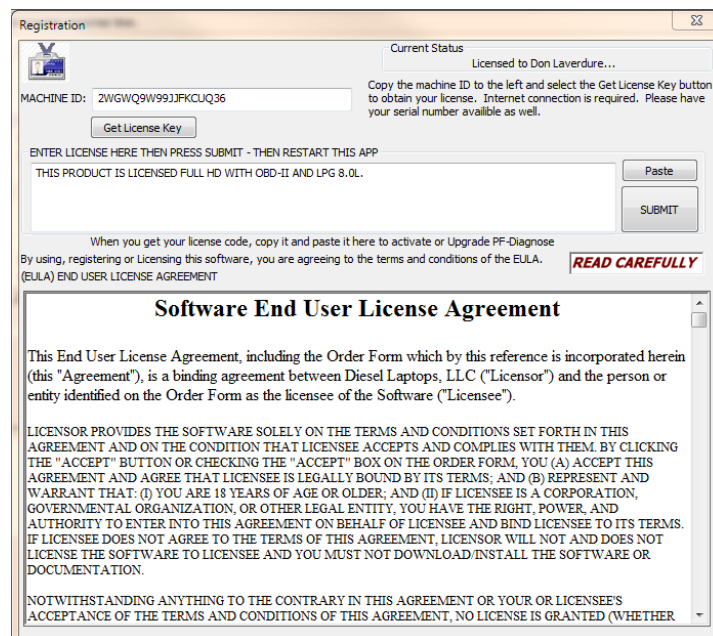
Fig 1

If you get any errors or have difficulty installing, email [support](#) for assistance.

Make sure to install any Adapter Drivers you have such as the Dearborn DPA5 or DrewLinQ drivers.

## REGISTERING

You need Internet Access:

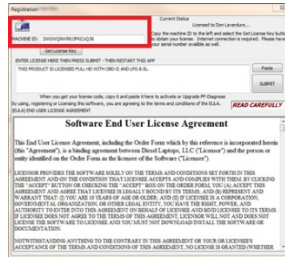


### STEP 1:

Go to <http://registration.diesellaptops.com/login> and create an account if you do not already have one (Press the **Get License Key** Button in the registration Screen)

You will need the Serial Number provided when purchasing PF-Diagnose, this is a short letter – number combination like this **A1BCdEf2**

You will also require the Machine ID, this is the number at the top left corner of the register screen that appears after you install PF-Diagnose or whenever you run the program unregistered. You can also find the Registration in the menu bar under tools. A Machine ID looks like this: 2WGWQ9W9gJJFKCUQ36



## STEP2:

Once you enter the details and select get key, will receive a long license code, Copy the code and paste it to the registration box in PF-Diagnose using Copy and Paste.

Be sure to copy only the code and not the trailing spaces

EXAMPLE:

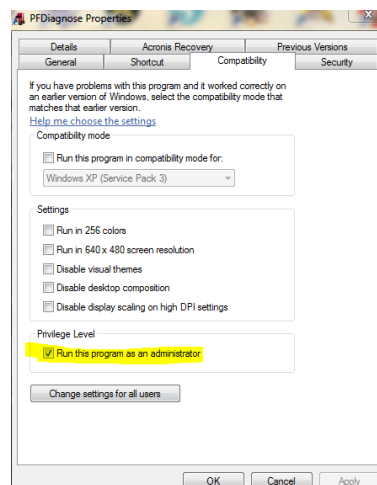
```
ItURZRSAAAw96PucMvJyVrHh0kx86SiK/i7Y8LATYEXVvMDyqUnP6L1Us59Mp2s
X+ridrCo5FaoPHhaKsmhZiL+3JvAGnzD7cn8yf4K1OLyNnpejQGL4uDLdj+TfsV1
yMYim9GGrS3tQZbyHY4yHowXSvg+asTfM3HuvGSw49Ez9peCD++GwL7fWwUlkCc
LFAWjM4VgmHn71RqG0I9/OVBJ9WEcrwa7HXkFk4pen8qqyOdqTnCKxj28ax+O
a/qbE/PfYjIGr3dhe9gTsmMxWsdMfmngFM23PDisTiegD/nWmTSX9Gd/GqxIMzf
RcflrCVbDFyM9hXwTrirEgRmvQeoAiyYPynizRwWt7r8zJgiotOQdLi06h0Wq0Qt
2ZuHecDHVmh1J3kU7kpO5HwVuGJ97XRGAAAAA==
```

Or select **COPY** on the web page and the **PASTE** button in the registration screen if the same PC is used to get the License Key.

Fig 2

## STEP3:

Select **SUBMIT** and PF-Diagnose will close. Make sure that you have right clicked on the desktop icon and select Properties and then select Compatibility, Check the box Run as Administrator ONLY!



Do Not check any other box on this screen... See above! If any other boxes are checked the program will fail to run properly.

## REGISTERING OFF-LINE

If your PC does not have internet access, You will have to use a USB key to transfer the Machine ID and License code to and from the PC.

*Note: Some email programs alter attached files, if this happens the key will fail, you may have to use an alternate email or we will provide you with an email account to use if necessary. Please be patient.*

*PF-Diagnose must be licensed and used under one user account, if you install PF-Diagnose as Administrator, you must sign in as User then run PF-Diagnose and follow the registration under the User account.*

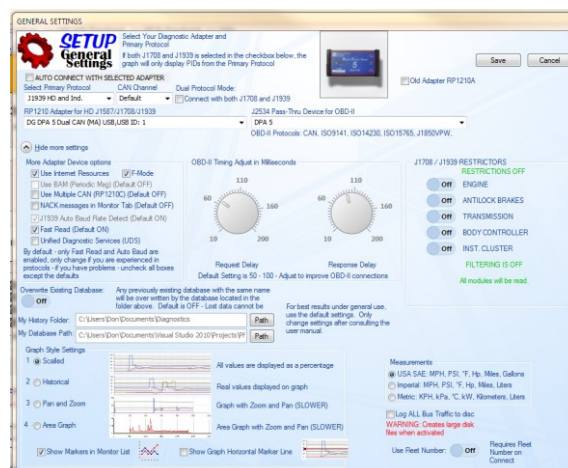
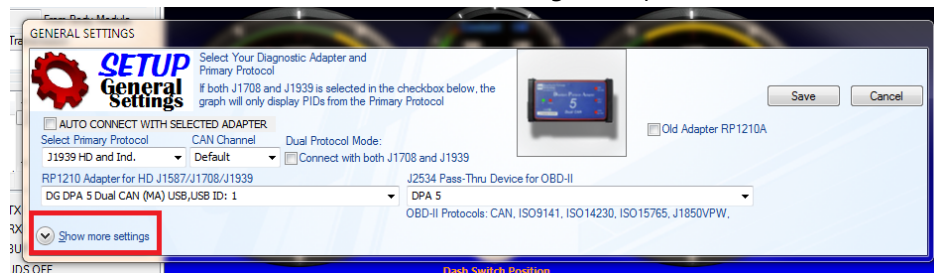
## SETTING UP PF-DIAGNOSE

Before you can connect, you need to Install your adapter drivers then select them in PF-Diagnose Setup. For this document we will use the DrewLinQ Adapter as an example.

PF-Diagnose works with any RP1210 /J2534 Adapter and setup is similar for all.

### Adapter Settings

Select Show More Settings to expand



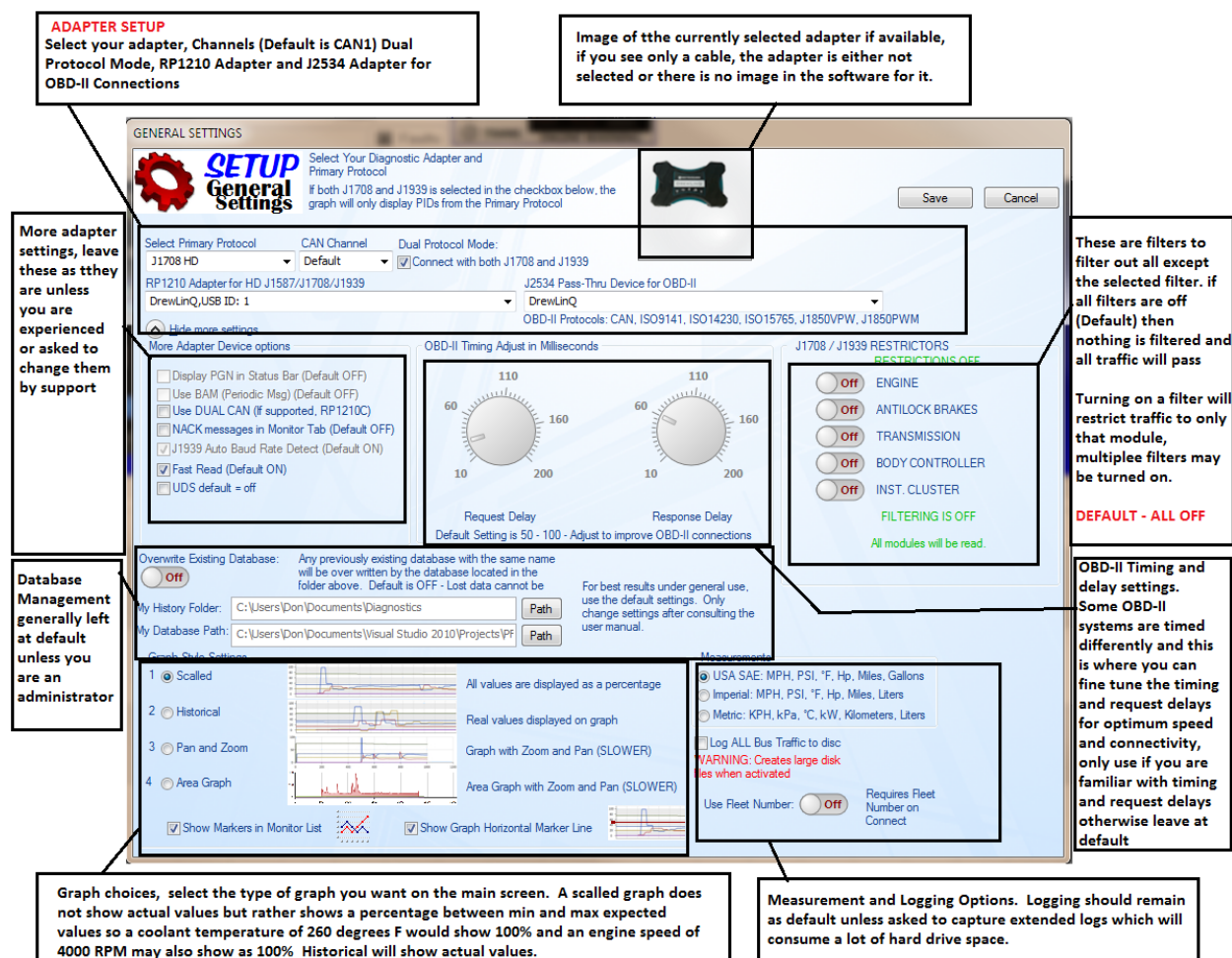
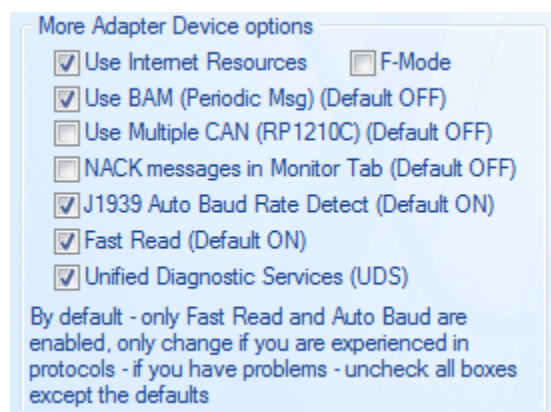


Fig 3

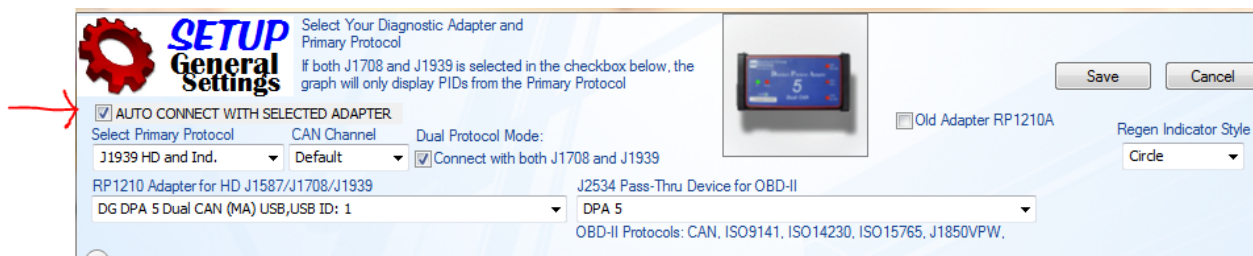


**UNIFIED DIAGNOSTIC SERVICES** – Check this box to use UDS or WWH-OBD if supported. UDS and WWH-OBD are often used for OEM Bi-Directional commands like Forced Regen.

**F-MODE** is for entertainment purposes, it changes the “Click” sound to a “Fart Sound” Everyone needs a laugh now and then...

**USE BAM** allows PF-Diagnose to send Adapter Present Messages to help keep diagnostic sessions alive, it is not needed on some engines.





**Use Internet to look up VIN** – This uses the VIN Lookup feature, if you are off-line or find delays when starting up, you can disable this feature and PF-Diagnose will not lookup the VIN unless you click the lookup button.

**CAN CHANNEL** – always use default unless you are an expert with adapters and protocols.

**Dual Protocol Mode** – Allows PF-Diagnose to use both J1708 and J1939 – NOTE the protocol in the Primary Protocol dropdown will be the protocol used for Graphs and Gauges. The other protocol will display parameters and DTCs only.

**Fast Read** – Always on unless you have an older truck and the data bus keeps crashing due to excessive traffic.

**J1939 and J1708 Restrictors**. These switches lock out various modules, when all are OFF – ALL modules will be scanned, if you want to block out one module, turn on the restrictor for that module, default is ALL OFF

**History Folder** is where logs and saved scans are saved

**My Database Path** is a path to the custom database where you can add your own DTC definitions. Only used for developers.

**Graph Styles** – Select the style of graph you prefer. Some are more diagnostic and others are more informational.

Select The DrewLinQ, J708 as the Protocol, Connect with Both Protocols checkbox, and select DrewLinQ in the OBD-II Pass-thru box. As shown in Fig 3. In most cases, your setup should look identical to this for the DrewLinQ



## MEASUREMENTS

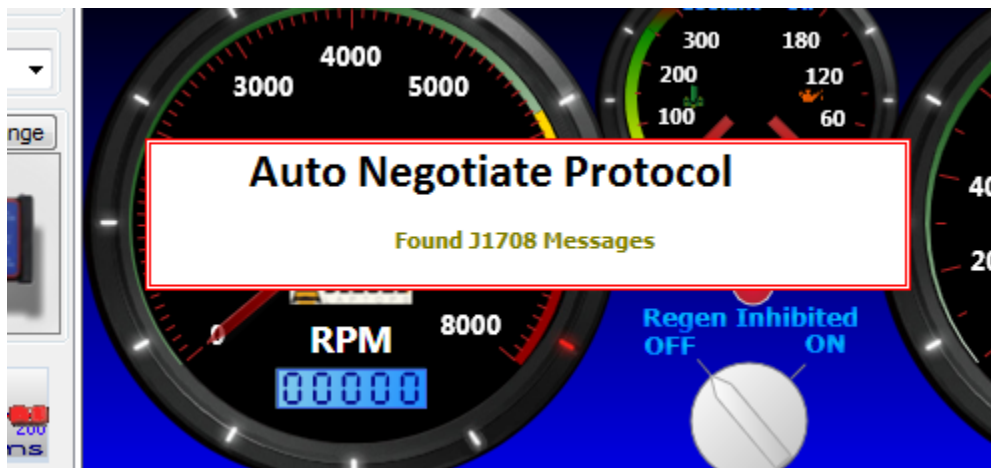
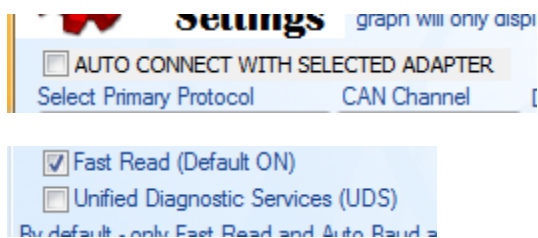
Select your preferred settings for measurements and graphs. All other settings can be altered but may have undesired affects, please remember these changes so you can change them back. As a default for the DPA5, use the above settings.

## NEW IN VERSION 8

### AUTO CONNECT WITH SELECTED ADAPTER

This only applies to Heavy Duty, OBD-II connections have not changed.

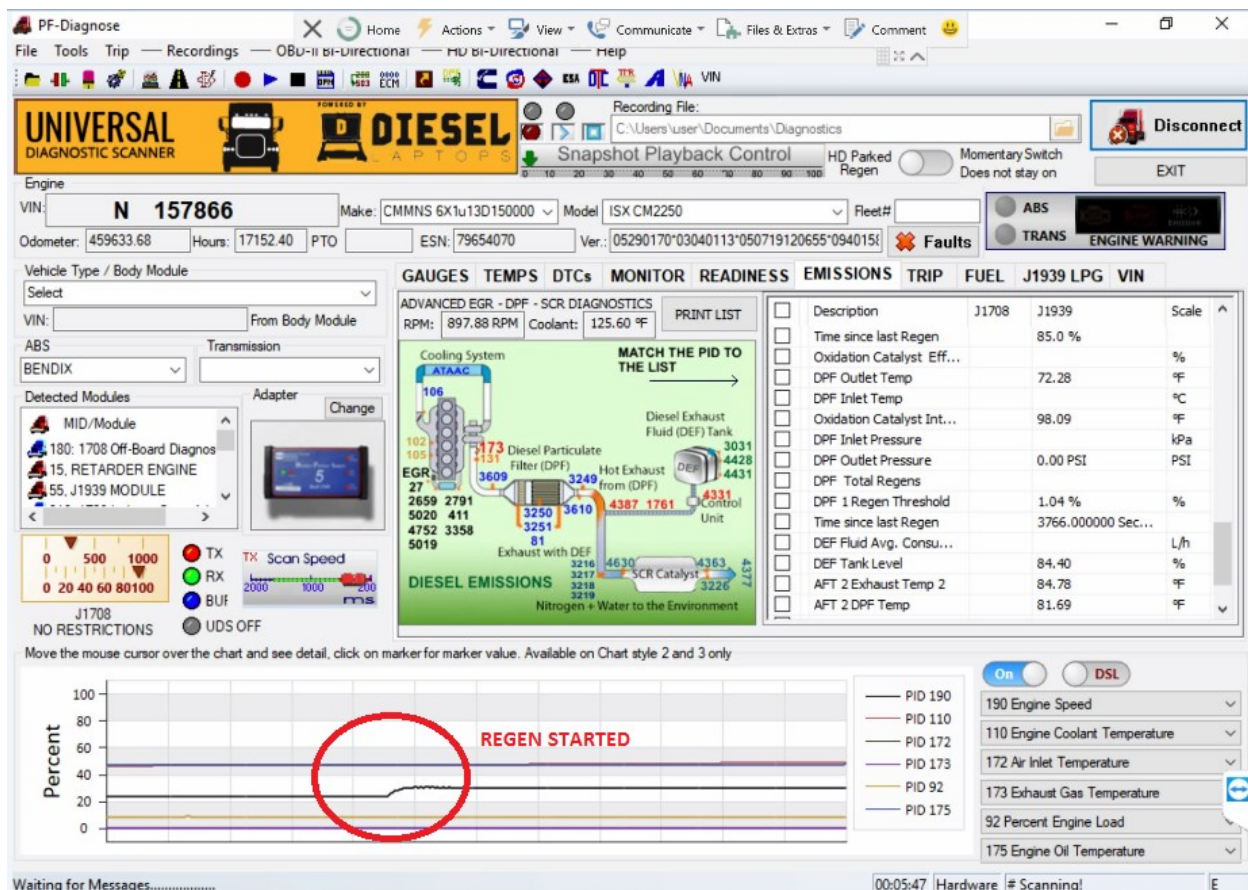
Check this box and PF-Diagnose will check to see if you have J1708, J1939 or both and if UDS is selected, it will check for UDS (Unified Diagnostic Services)



## AUTO CONNECT WITH SELECTED ADAPTER

If this box is unchecked, the connect is the same as with prior versions. When checked the software will search for responses on all channels using all protocols and configure itself.

## DPF REGENS



Currently, Forced DPF Regens are supported for the following... REGENS may work on other vehicle models but has not been tested at the time this manual was made.

Engine	Year Range Tested - May work on other models
Cummins ISX12 CM2350	2013 through 2019
Cummins ISX15 CM2350	2013 through 2019
Cummins ISL CM2350	2013 through 2019
Detroit Diesel DD13 EPA2010	2010 through 2012
Detroit Diesel DD15 EPA2010	2010 through 2012
Detroit Diesel DD16 EPA2010	2010 through 2012
MaxxForce 11 (EPA2010)	2010 & Newer
MaxxForce 13 (EPA2010)	2010 & Newer
MaxxForce 15 (EPA2010)	2010 & Newer
Paccar MX 13	tested on 2014

**To perform a Forced regen, park on a paved parking lot or gravel, away from obstacles or other vehicles as the exhaust may become very hot and has been known to catch grass or wood structures on fire and melt the body panels of adjacent vehicles.**

To change the regen indicator style, select it from this setup item.



## REGEN CONDITIONS THAT MUST BE MET

The engine should be at idle, Park Brake Set, No emissions related fault codes other than Soot or Ash Load messages, and the engine should be at operating temperature.

If PF-Diagnose has not identified your vehicle make and model, give it a half a minute or so to populate this data, or manually select the engine make in the make drop-down, The model does not matter in version 8.0.0

Make:	<input type="text" value="Detroit Diesel DDEC"/>	Model:	<input type="text" value="DD13 EPA10 (2010 2011 2012 2013)"/>
190982821	ESN: 79246070	Ver.:	022*004*000*000*X*014*001*14*10*

If you try to regen without this field being filled you will get a failed notice telling you to select a make.

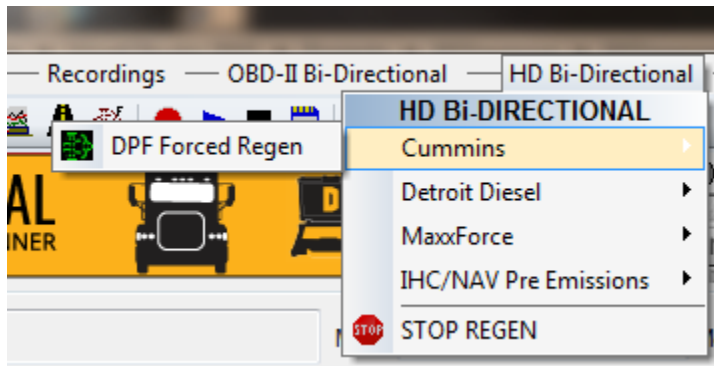
If your truck does not support Regen or if your truck has a problem or has not met the above conditions, you may get a "Regen Failed" error





Correct the problem if possible and retry.

## CUMMINS



Select the HD Bi-Directional Menu and select Cummins.

Then select DPF Forced Regen

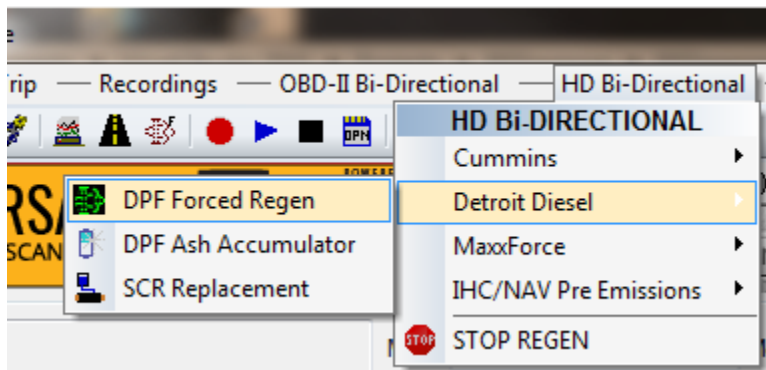
Detroit Diesel has the same option with several other OEM tests that may be supported in your vehicle.

## UDS (Unified Diagnostic Services) IN DETROIT DIESEL

Detroit Diesel requires UDS, so if you have not checked the UDS box in setup, PF-Diagnose will test for UDS support and apply it automatically if a Bi-Directional command is issued.

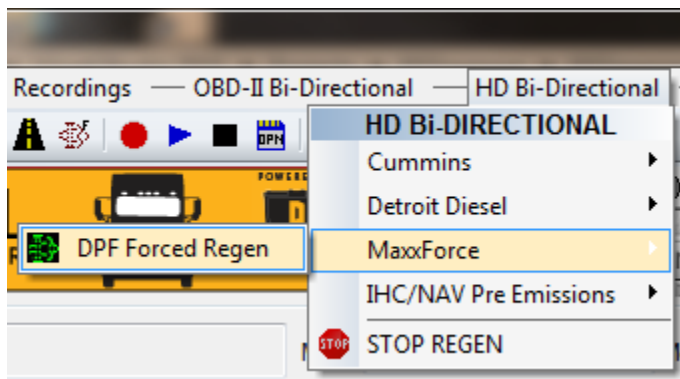
Once a Regen has started, you can disconnect the PC and the Regen should continue until all of the soot in the filter has been converted to ASH.

**We recommend that you do not disconnect and that you monitor the entire process so you can abort the regen at the first sign of trouble. The Regen criteria and process is controlled entirely by the truck ECU and only initiated and monitored by PF-Diagnose...**



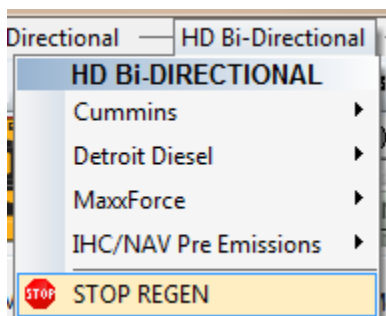
## MaxxForce

MaxxForce Vehicles must be connected at all times for Forced Regen. Start the regen as normal then leave the PC connected. If you disconnect for any reason, regen will stop.

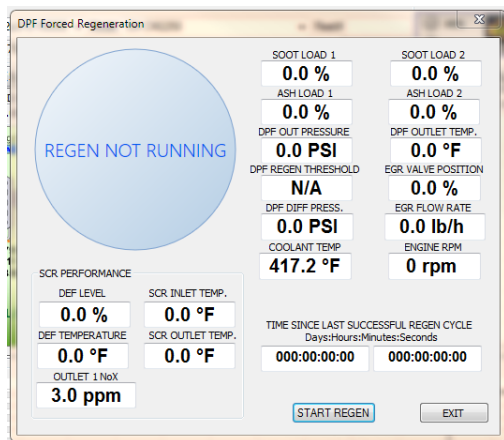


## STOP REGEN

To STOP a regen, Select the STOP REGEN button or Depress the Clutch and Brake at the same time and Regen should stop. ***ALWAYS ALLOW TIME FOR EXHAUST TO COOL BEFORE SHUTTING TRUCK OFF!***



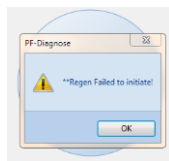
Once you select the Regen Option, The following dialog will appear



To begin a Forced Regen, select **START REGEN** and the indicator will change from *REGEN NOT RUNNING* to *REQUESTING REGEN*



If there is a problem such as a fault code or other factor that is preventing a regen, or if there is no DPF on this vehicle, the following error should be indicated.

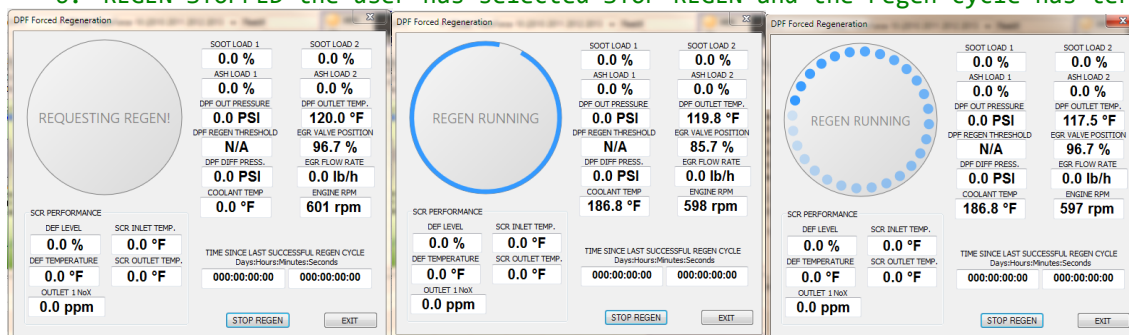


And the indicator wheel will display this



There are 5 States for this indicator

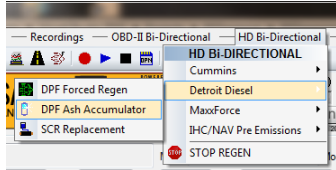
1. **REGEN NOT RUNNING** The regen is not running and has not been requested or has cancelled
2. **REGEN RUNNING** The vehicle is indicating that the regen cycle is currently running
3. **REGEN COMPLETE** The regen cycle has completed without error
4. **REGEN ERROR** there has been an error detected that is preventing a regen cycle.
5. **REQUESTING REGEN** The user has selected START REGEN and the request has been sent to the appropriate modules for action.
6. **REGEN STOPPED** the user has selected STOP REGEN and the regen cycle has terminated.



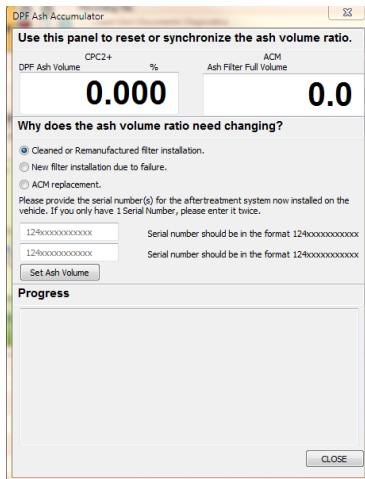
## REGEN POP-UP

There are several common REGEN related PIDs displayed for the user to monitor. Not all PIDs are supported by all manufacturers so if a value is missing or shows a zero value when you know that the value is indeed not "0", or is a value is not plausible ie: **Coolant Temperature = 415 Degreeres F**, you may ignore this value as this is likely due to a fault or the manufacturer is not following SAE guidelines very closely... To stop a regen at any time, select STOP REGEN

## DETROIT DIESEL Bi-Directional Commands



There are 4 Additional Bi-Directional Commands for Detroit Diesel in this release, more to follow.



DPF ASH ACCUMULATOR which contains 3 commands

1. **Cleaned or Remanufactured Filter Installation** – You removed the DPF, had it cleaned or purchased a REMAN filter and installed it.
2. **New Filter Installation due to failure** – The filter developed a fatal failure and you purchased a NEW DPF Filter and installed it.
3. **ACM Replacement** – The Aftertreatment Control Module was defective or damaged and you replace just the module.

Follow the directions on the dialog,

Select the function to perform as described above, enter the serial numbers as indicated, if you only have 1 serial number, enter it in the first box and leave the last box empty. And select **Set Ash Volume**

The Progress Box below the button will display the progress and any errors.

## SCR REPLACEMENT

SCR Replacement

Use this panel to reset SCR Accumulators when replacing an SCR catalyst.

Time above SCR Inlet Temp Hour: 0 Time above SCR Inlet Temp Min: 0 Time above SCR Inlet Temp Sec: 0

Time above SCR Inlet Temp2 Sec: 0 Time above SCR Outlet Temp Sec: 0

Please provide the Serial Number for the new SCR Unit.

Please provide the serial number for the new SCR Unit  
12xxxxxxxxxxxx Serial number should be in the format 124xxxxxxxxxxxx

Reset SCR Accumulators

Progress

CLOSE

The SCR Catalyst is responsible for converting harmful pollutants into harmless liquids and gasses. These conversions are recorded and monitored by the various control modules so if you replace a defective SCR, you should reset the values so you are not asked to get it serviced before it is required.

Simply enter the serial number of the NEW SCR Assy. And then select **RESET SCR ACCUMULATORS**

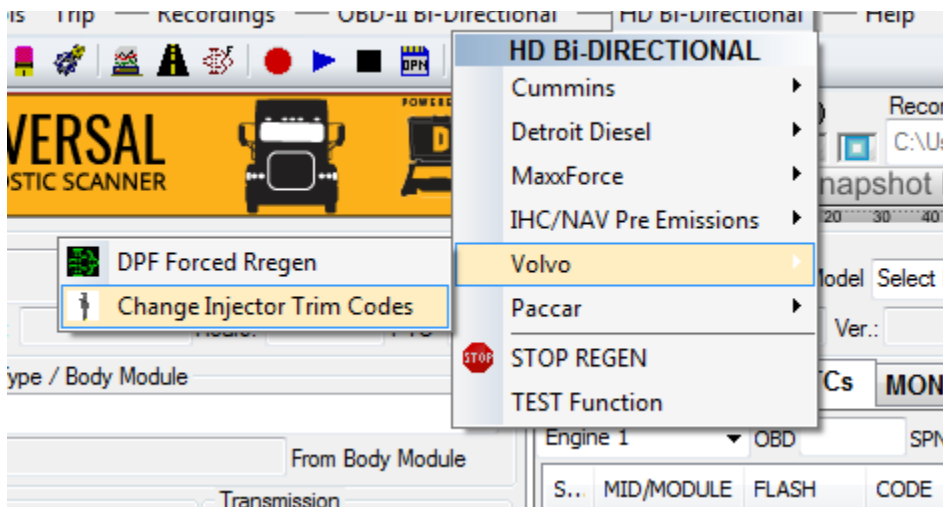
If the accumulators read zero and you are changing the SCR, select RESET anyway to ensure the SCR accumulators are reset properly.

If after the reset the values are not zero or near zero, you may need to attend a dealer to have the accumulators reset.

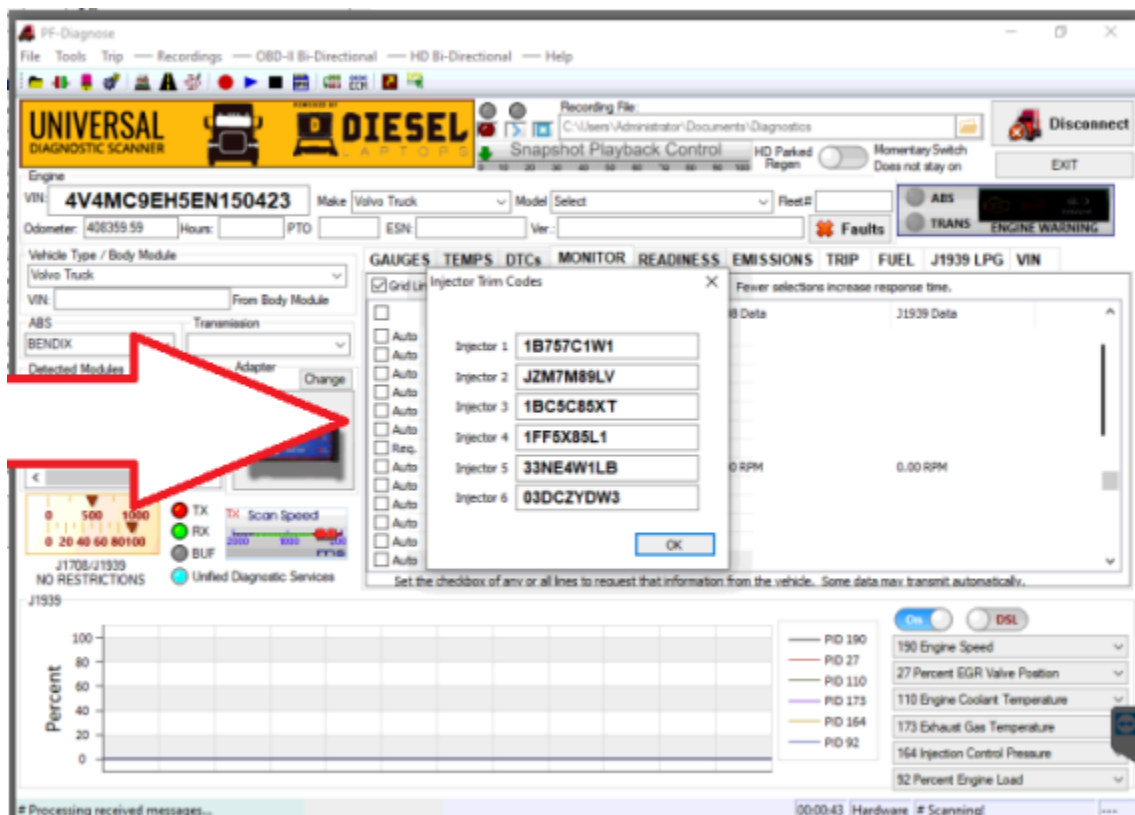
## VOLVO INJECTOR TRIM CODES

Under Volvo in Bi-Directional commands select **Change Injector Trim Codes**

This will allow you to reprogram new injectors

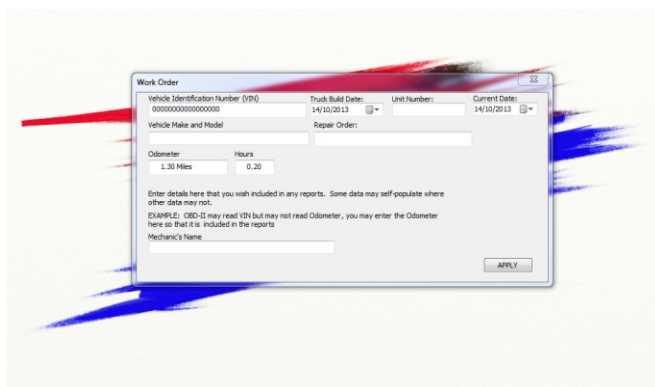






## WORK ORDER

Enter any details you wish added to various reports and if unavailable, you can enter the VIN or mileage here. Note: OBD-II does not read mileage so you may want to enter it here so it is included in reports.



## CONNECTING TO A TRUCK

Now that PF-Diagnose is set up and all of the drivers are installed, we are ready to connect to a vehicle.

First connect the adapter to the Vehicle, then connect the USB cable to the laptop and turn the key ON in the truck. (Do Not Start)

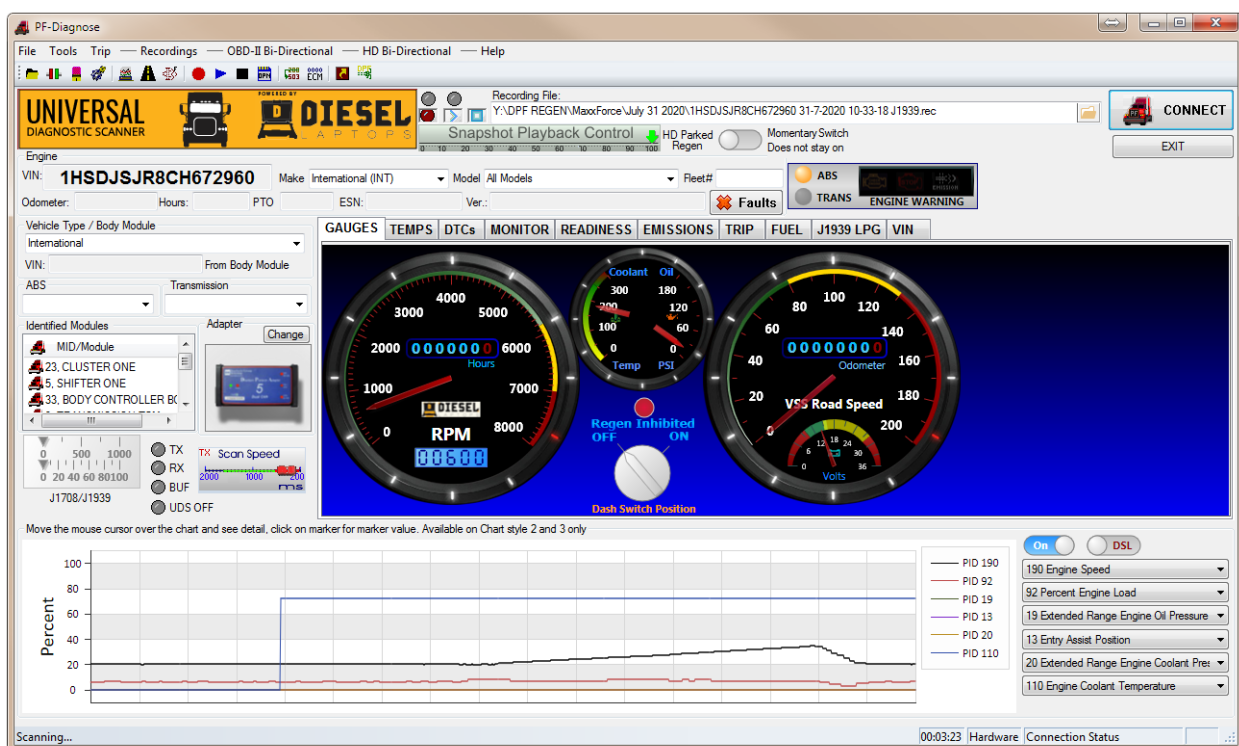
Fig 4

## GAUGES



Fig 5

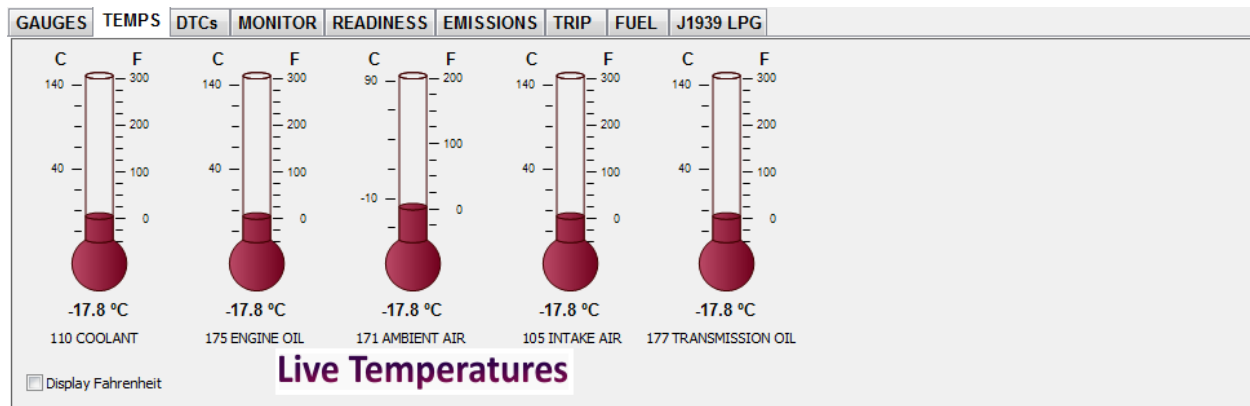
There are 10 PID shown here in a graphic form. Not all data may be available on some models however we chose gauges that are most common.



**REGEN INHIBITED** indicates that the REGEN process is inhibited either by a switch the driver has set or some other reason such as a DTC. This switch does not perform any function other than indicate to you.

*The OFF – Forced ON switch is an indicator only, you cannot force a regen by selecting this control.*

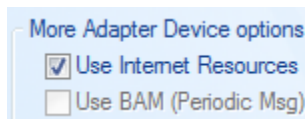
## TEMPS



Here you can monitor 5 basic temperatures in real time using a familiar thermometer graphic

## DTCs

If you are connected to the internet, The program will look up any fault codes on the Diesel Laptops Truck Fault Codes database. To disable this feature and use only the internal database which may be outdated, uncheck the Use Internet Resources box in setup.



GAUGES		TEMPS		DTCs		MONITOR		READINESS		EMISSIONS		TRIP		FUEL		J1939 LPG	
Engine 1    ▾ OBD    SPN 0    Byte7/8 0    0    PID 0    SID 0    FMI 0    OEM 0    Grid <input checked="" type="checkbox"/> Update																	
S...	MID/MODULE		FLASH	CODE	FMI	COUNT	DESCRIPTION										
	Engine #1 J1708		131	PID:091	04	000	*Accelerator position signal out of range low										
	Engine #1 J1708		152	PID:108	04	000	*Barometric pressure signal out of range low										
	Engine #1 J1708		332	PID:164	13	000	*Injection control pressure above specification with engine not running										
	Engine #1 J1708		122	PID:102	04	000	*Intake manifold absolute pressure signal out of range low										
	Engine #1 J1708		211	PID:100	04	000	*Engine oil pressure signal out of range low										
P. FREEZE FRAME VALUES STORED			M/TID    TEST NAME    C/TID    RESULT    MAX    MIN														
There are no items to show in this view.			There are no items to show in this view.														

DTCs or Diagnostic Trouble Codes is the heart of PF-Diagnose. Here you will receive any active or inactive fault codes along with the code numbers and descriptions.

S...	MID/MODULE	FLASH	CODE	FMI	COUNT	DESCRIPTION
	Engine #1 J1708	141	PID:084	04	000	*Vehicle speed signal out of range low
	Engine #1 J1708	142	PID:084	03	000	*Vehicle speed signal out of range high
	Engine #1 J1708	621	SID:253	01	000	*Engine using mfg. default rating program engine

## MODULE

This is the source of the code, it tells you what module generated the code

## FLASH

The Flash is the OEM Code number that refers to the code, this is useful in looking up codes in the manufacturers repair manuals.

## CODE

Here you will see the PID (Parameter Identification) SID (System Identification) or SPN (Suspect Parameter Number) This indicates what sensor, or actuator is the source of the fault.

## FMI

The FMI (Failure Mode Index) tells you what went wrong, Example, short, open or out of range.

## COUNT

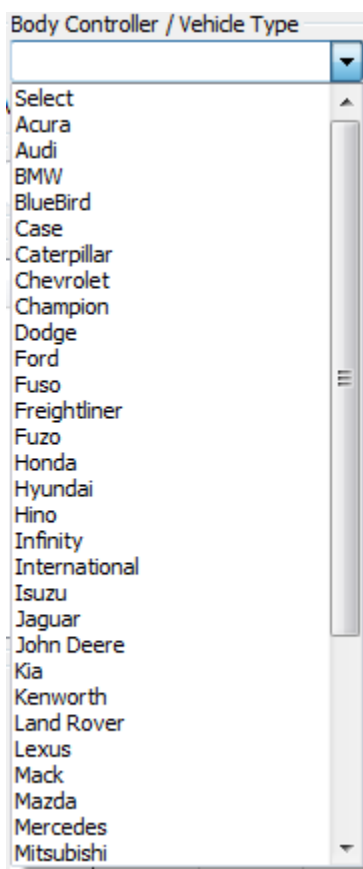
The count is a zero based count of how many times this fault has occurred. 0=not supported, this can be anywhere from 0 to 255.

## DESCRIPTION

The description is a translation of what the code is. In some cases, PF-Diagnose can't locate the code in its extensive database and will indicate this by displaying Unknown fault code.

Make sure the make for ABS, Transmission, Engine and Vehicle has been entered, then select Look up or refresh to check again. PF-Diagnose needs to know this to look up the code in the correct database. If your vehicle did not supply this information, you can select or enter it in the appropriate boxes.

Example, Body Controller / Vehicle Type



## FREEZE FRAMES

Freeze Frames are conditions at the time the code was set, when you select or highlight a fault, if a freeze frame for that fault was set, it will be displayed here.

PID	FREEZE FRAME VALUES STORED
There are no items to show in this view.	

## ONBOARD TEST RESULTS (OBD-II)

You can activate onboard tests and get the results here, these are known as TID and MID tests and are supported on most OBD-II Vehicles. There are websites that will tell you what a particular TID is for and



what values should be displayed under specified conditions. Please refer to Manufacturer manuals and the web sites for Ford and GM in the help menu. GREEN Results = PASS, RED Results = FAIL

M/TID	TEST NAME	C/TID	RESULT	MAX	MIN
\$01	HO2S11 Load	\$81	1.751 A	3.000 A	0.550 A
\$02	HO2S12	\$01	0.4499360 V	7.9952700 V	0.0000000 V
\$02	HO2S12 Load	\$81	1.291 A	3.000 A	0.400 A
\$05	HO2S21	\$80			

## MONITOR

The Monitor Tab is where you can request and monitor values from sensors and actuators

The checkbox on the left is for requesting a particular value, and if supported, the value will be displayed.

<input type="checkbox"/>	LONG TERM FUEL TRIM BANK 2	
<input checked="" type="checkbox"/>	RPM	Engine 1 Speed 0.00 RPM
<input checked="" type="checkbox"/>	VSS	Vehicle Speed 0.00 MPH
<input checked="" type="checkbox"/>	SPARKADV	Timing Advance 10.00 °
<input type="checkbox"/>	IAT	Intake Air Temperature
<input type="checkbox"/>	MAF	MAF air flow

## IMPORTANT NOTES

### OBD-II

To receive a value and keep it updated, this box must be checked

### J1708

Some PIDs are transmitted automatically and others are not, to receive data on those that are not automatically transmitted, check the box, once data appears, you should uncheck this box. The data will continue to refresh until you turn off the vehicle.

### J1939

As with J1708, some data is transmitted automatically, however, some SPNs are refreshed only while this box is checked.

### UDS

Unified Diagnostic Services is a set of common commands that have been UNIFIED across various vehicle types and is generally used for things like running Regens or OEM Bi-Directional Controls.

### ALL VEHICLES

The more data requested, the slower the response, For this reason you should only request data you need to diagnose a particular fault. Requesting ALL available data could cause the data bus to become overloaded.

## ZOOM FEATURE

By double-clicking on any item in the monitor list, you can zoom in on that parameter only, this is handy for viewing without the distraction of other values or from a distance. Click anywhere in this box to go back to the list.

## TROUBLESHOOTING HELP

Make sure that you have the make and model selected so PF-Diagnose knows where to look for troubleshooting if available.

PF-Diagnose

File Tools Trip Recordings OBD-II Bi-Directional HD Bi-Directional Help

Recording File: Y:\DPF REGEN\MaxForce\July 31 2020\1HSDJSJR8CH672960 31-7-2020 10-33-18 J1939.rec

CONNECT EXIT

Engine VIN: 1HSDJSJR8CH672960 Make: International (INT) Model: All Models Fleet#: ABS TRANS ENGINE WARNING

Odometer: Hours: PTO ESN: Ver: Faults

Vehicle Type / Body Module International

VIN: From Body Module

ABS Transmission

Identified Modules

Adapter Change

MID/Module

23. CLUSTER ONE

5. SHIFTER ONE

33. BODY CONTROLLER BK

J1708/J1939

TX Scan Speed

RX

BUF

UDS OFF

GAUGES TEMPS DTCs MONITOR READINESS EMISSIONS TRIP FUEL J1939 LPG VIN

Engine 1 OBD SPN 0 Byte7/8 0 0 PID 0 SID 0 FMI 0 OEM 0 Grid Update

STATUS	MID/MODULE	FMI	COUNT	DESCRIPTION
Active	Suspension	14	001	Unrecognized Fault Code, Root Cause Not Known
Inactive	Trans. 1	14	005	Parking Brake Switch Special Instructions
Inactive	Trans. 1	09	005	Anti-Lock Braking (ABS) Active Abnormal update rate
Inactive	Trans. 1	14	005	J1939 Network #1, Primary Vehicle Network Special Instructions
Inactive	Trans. 1	0	000639	
Inactive	Trans. 1	0	000751	
Inactive	Trans. 1	11	004	Unrecognized Fault Code, Root Cause Not Known

PID FR... M/TID TEST NAME C/TID RESULT MAX MIN

There are no items to show in this view.

There are no items to show in this view.

Move the mouse cursor over the chart and see detail, click on marker for marker value. Available on Chart style 2 and 3 only

Percent

100

80

60

40

20

0

0 500 1000

0 20 40 60 80 100

J1708/J1939

On DSL

190 Engine Speed

92 Percent Engine Load

19 Extended Range Engine Oil Pressure

13 Entry Assist Position

20 Extended Range Engine Coolant Pres

110 Engine Coolant Temperature

Scanning... 00:03:23 Hardware Connection Status

Make: Cummins CMMNS Model: ISB CM2150 Fleet#: ABS TRANS ENGINE WARNING

PTO ESN: Ver: Faults

Change

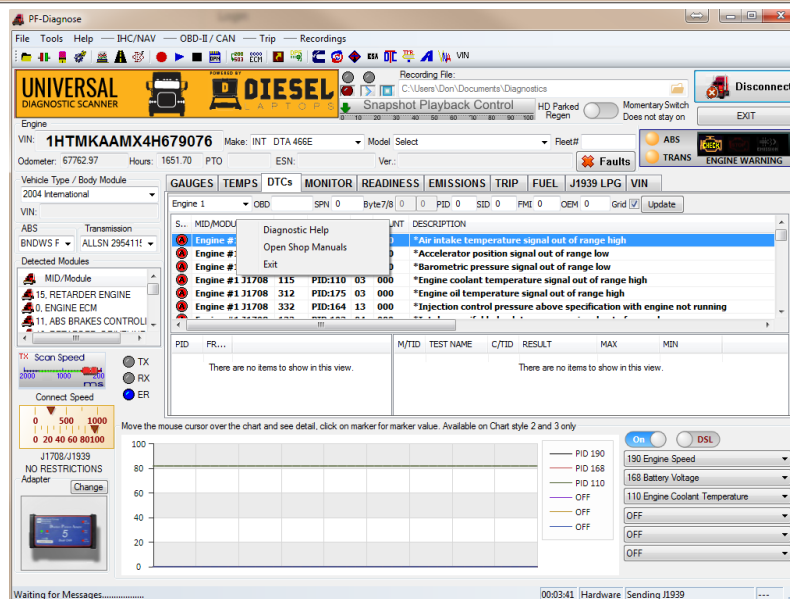
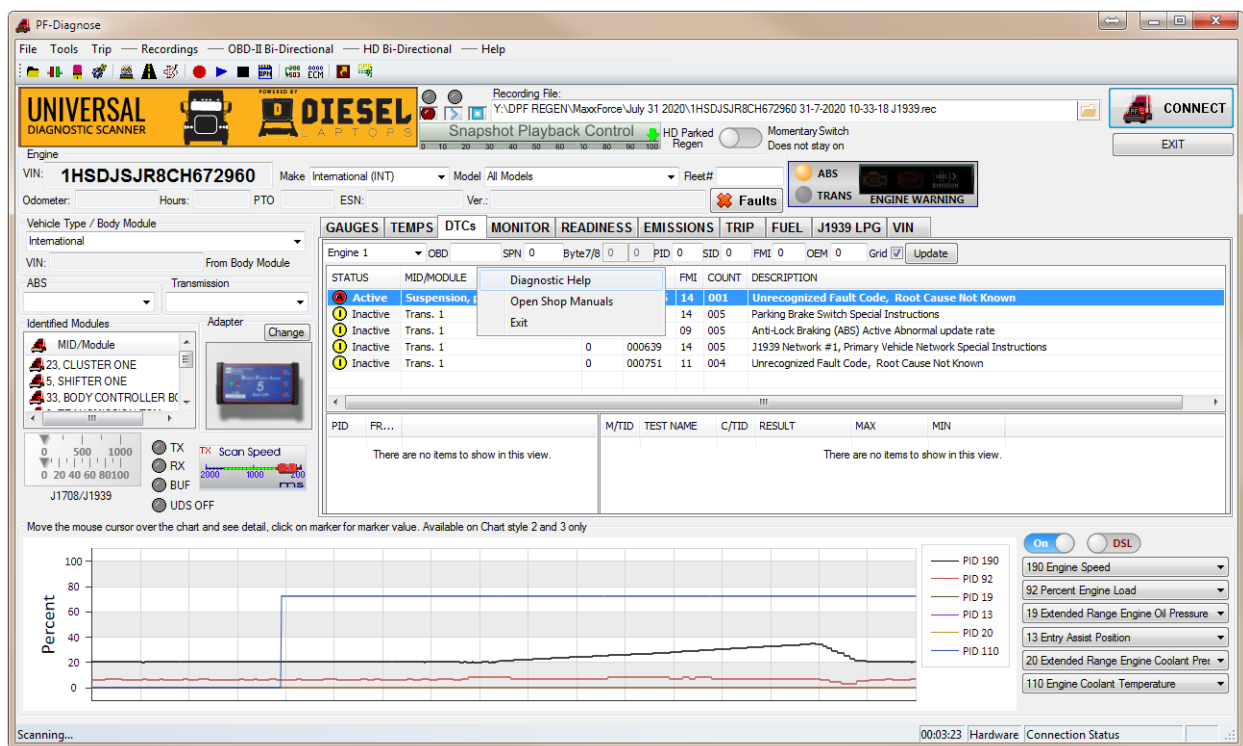
GAUGES TEMPS DTCs MONITOR READINESS EMISSIONS TRIP FUEL J1939 LPG

Engine 1 OBD SPN 0 Byte7/8 0 0 PID 0 SID 0 FMI 0 OEM 0 Grid Update


S...	MID/MODULE	FLASH	CODE	FMI	COUNT	DESCRIPTION
Engine 1	1981	003251	15	007		Aftertreatment Particulate Filter Differential Pressure - Above Normal Operating Rang...

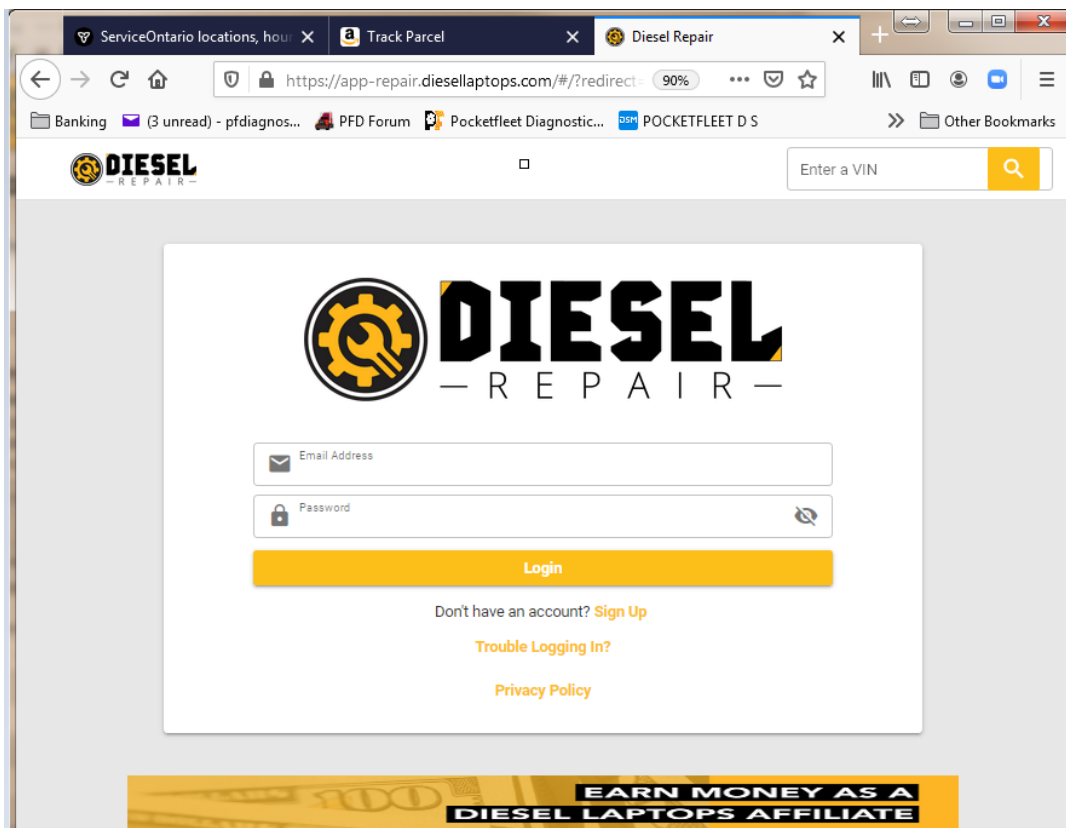
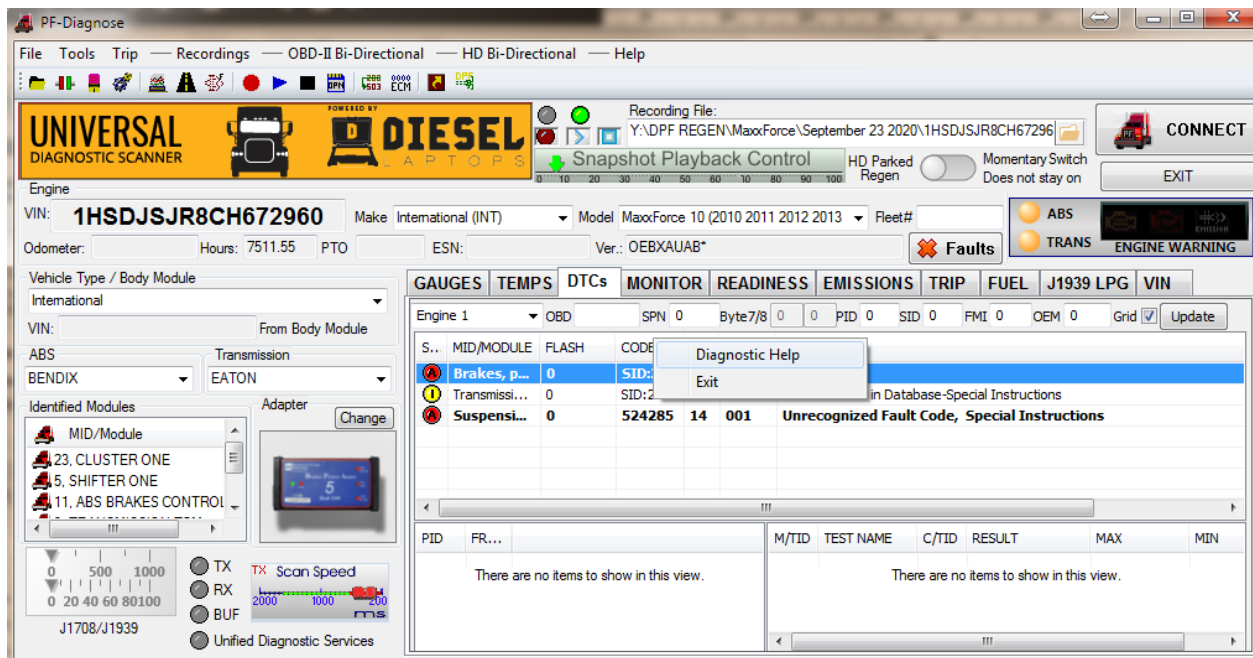
08/J1939

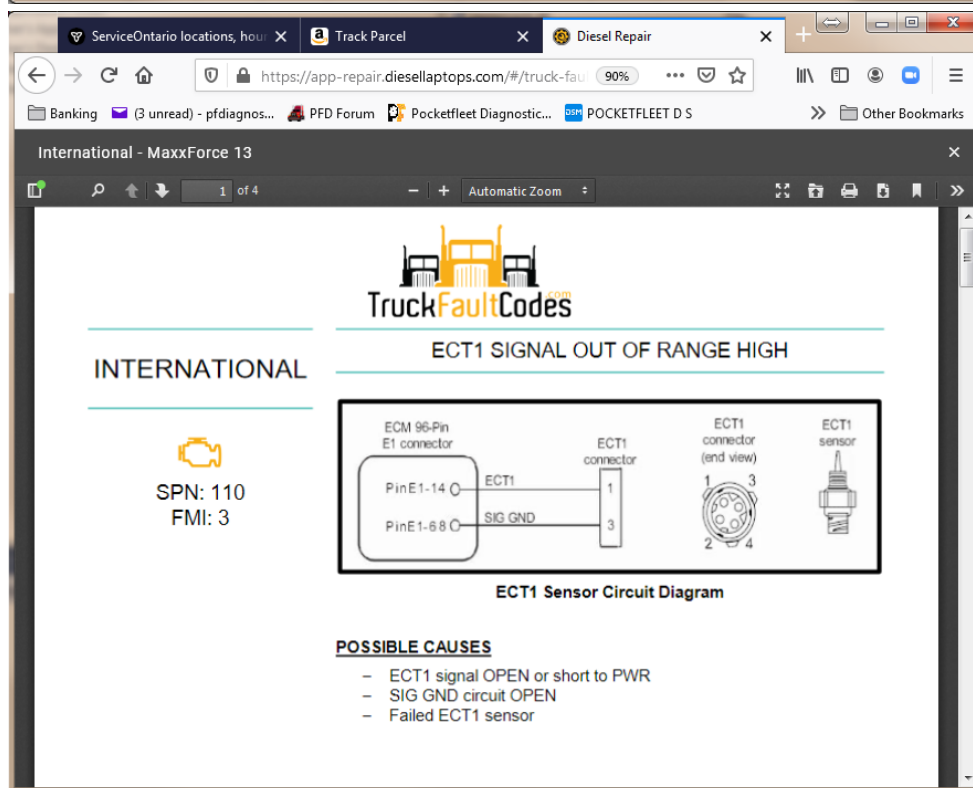
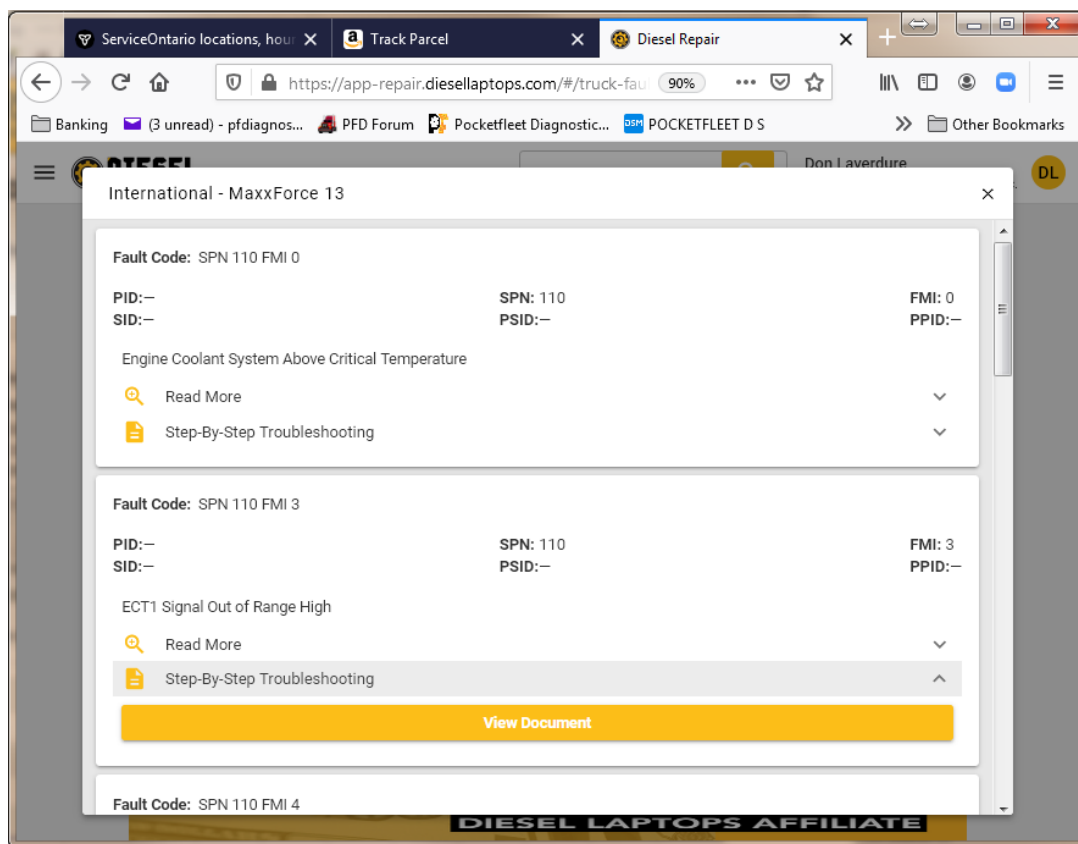
Select the code and double click on it



## GETTING HELP

 **Diagnostic Help**, is currently available for mainly engine diagnostics, it will take you to the TruckFaultCodes.com website where you must have an account. (Currently free) sign in and the repair steps for this code will be displayed. For this to work, the VIN number must be in the VIN box, you may have to wait a minute or two, if the VIN does not populate, try disconnecting and reconnecting.





Exit - You can also just click off the menu and it will also close.

Thousands of repair documents are available for hundreds of truck models... This is one of the most comprehensive vehicle repair databases available and it is included in PF-Diagnose.



## MONITOR TAB

View live PIS/SPNs

If data is not present, it may need to be requested, this is done by checking the box on the left, if the checkmark erases by itself that means the data request was sent.

<input checked="" type="checkbox"/>	Grid Lines	<input type="checkbox"/>	Shaded Lines	Fewer selections increase response time.		
<input type="checkbox"/>	SPN-PID	Description	J1708 Data	J1939 Data		
<input type="checkbox"/>	Req. 82	Air Start Pressure				
<input type="checkbox"/>	Auto 83	Road Speed Limit Status	Inactive	0.00 %		
<input type="checkbox"/>	Auto 84	Road Speed	0.00 Kph	0.00 Kph		
<input type="checkbox"/>	Auto 85	Cruise Control Status	OFF:Brk sw OFF:....	OFF		
<input type="checkbox"/>	Auto 86	Cruise Control Set Speed	0.00 Kph			
<input type="checkbox"/>	Req. 87	Cruise Control High-Set Limit Speed				
<input type="checkbox"/>	Req. 88	Cruise Control Low-Set Limit Speed	56.35 Kph			
<input checked="" type="checkbox"/>	Auto 89	Power Takeoff Status	OFF INACTIVE			
<input type="checkbox"/>	Auto 90	PTO Oil Temperature				
<input type="checkbox"/>	Auto 91	Percent Accelerator Pedal Position		0.00 %		
<input type="checkbox"/>	Auto 92	Percent Engine Load	0.00 %	0.00 %		
<input checked="" type="checkbox"/>	Auto 93	Output Torque				
<input type="checkbox"/>	Auto 94	Fuel Delivery Pressure				

<input checked="" type="checkbox"/>	Grid Lines	<input type="checkbox"/>	Shaded Lines	Fewer selections increase response time.		
<input type="checkbox"/>	SPN-PID	Description	J1708 Data	J1939 Data		
<input type="checkbox"/>	Auto 164	Injection Control Pressure				
<input type="checkbox"/>	Auto 165	Compass Bearing				
<input type="checkbox"/>	Auto 166	Rated Engine Power	250.00 hp			
<input type="checkbox"/>	Auto 167	Alternator Voltage				
<input type="checkbox"/>	Auto 168	Battery Voltage	ENG: 13.05v TX:0....			
<input type="checkbox"/>	Auto 169	Cargo Ambient Temperature				
<input type="checkbox"/>	Auto 170	Cab Interior Temperature				
<input type="checkbox"/>	Auto 171	Ambient Air Temperature				
<input type="checkbox"/>	Auto 172	Air Inlet Temperature		25.00 °C		
<input type="checkbox"/>	Auto 173	Exhaust Gas Temperature				
<input type="checkbox"/>	Auto 174	Fuel Temperature				
<input type="checkbox"/>	Auto 175	Engine Oil Temperature		100.00 °C		
<input type="checkbox"/>	Auto 176	Turbo Oil Temperature				

The colors indicate different conditions, the BLUE indicates the road speed setting is legal, the Yellow indicates that there is an active fault for this parameter, and brow indicates there is an inactive fault for this parameter.

## ZOOMING IN

You can zoom in on any PID in the monitor tab to get a large display so you can see the value from a distance, handy when performing wiggle tests for observing from in the cab.

☒ Grid Lines ☐ Shaded Lines PRINT Fewer selections increase response time.

Coolant Temp

69.80 °F

Set the checkbox of any or all lines to request that information from the vehicle. Some data may transmit automatically.

## READINESS TAB

The readiness tab is for OBD-II compliant vehicles and displays the results of key emissions related onboard tests.

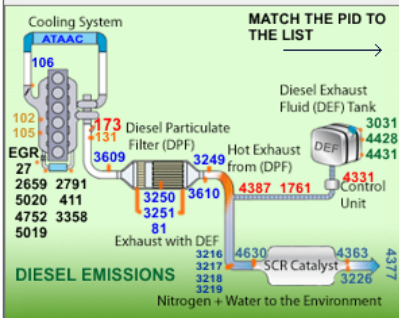
GAUGES	TEMPS	DTCs	MONITOR	READINESS	EMISSIONS	TRIP	FUEL
Diagnostic Readiness MONITOR				This Drive Cycle	OBD-II Emissions	FUEL STATE	
Sup. Stat. Sup. Stat.				DTC Count: 0	Unknown		PRINT
Missfire				Yes Complete	Yes Incomplete		
Fuel System				Yes Complete	Yes Complete		
Component				Yes Complete	Yes Complete		
Catalyst				Yes Ready	Yes Not Ready		
Heated Catalyst				No N/A	No N/A		
Evaporative System				Yes Ready	No N/A		
Secondary Air				No N/A	No N/A		
A/C Refrigerant				No N/A	No N/A		
Oxygen Sensor				Yes Ready	Yes Not Ready		
O2 Sensor Heater				Yes Ready	Yes Not Ready		
EGR System C7				No N/A	No N/A		
				HD OBD J1708 / J1939	Fuel Type		
				Active Inactive	Unknown		
				DTC Count: 0 0			
				ODB Compliance			
				Inspection / Maintenance			
				Distance Traveled with MIL On	N/A	MIL_DIST	
				Warm-ups since DTCs cleared	N/A	WARM_UPS	
				Distance since DTCs cleared	N/A	CLR_DIST	
				Engine run during MIL (Minutes)	N/A	MIL_TIME	
				Time since DTCs cleared	N/A	CLR_TIME	

Refer to your maintenance manual for the descriptions of the various results

## EMISSIONS TAB

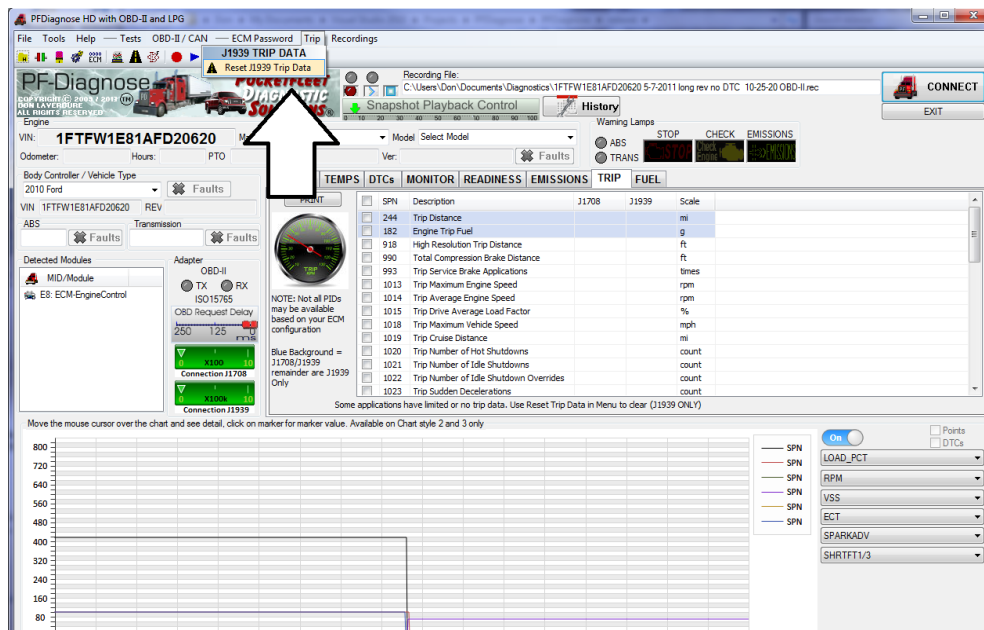
The emissions tab is for specific sensor and actuators that are emissions related (J1708 and J1939 ONLY)

The graphic on the left gives an approximate location for each sensor.

GAUGES	TEMPS	DTCs	MONITOR	READINESS	EMISSIONS	TRIP	FUEL		
ADVANCED EGR - DPF - SCR DIAGNOSTICS					PRINT LIST				
									
					<input type="checkbox"/>	PID/SPN	Description	J1708	J1939
					<input type="checkbox"/>	131	Exhaust Back Pressure J1708		
					<input type="checkbox"/>	27	EGR Valve Position		
					<input type="checkbox"/>	81	DPF Pressure		
					<input type="checkbox"/>	173	Exhaust Gas Temperature		
					<input type="checkbox"/>	102	Intake Manifold Pressure		
					<input type="checkbox"/>	105	Intake Manifold Temperature		
					<input type="checkbox"/>	106	Engine Air Inlet Pressure		
					<input type="checkbox"/>	107	Air Filter Differential Pressure		
					<input type="checkbox"/>	2659	EGR Flow Rate		
					<input type="checkbox"/>	5020	EGR Mix Inlet Temperature		
					<input type="checkbox"/>	4752	EGR Cooler Efficiency		
					<input type="checkbox"/>	3672	EGR Bypass Position		
					<input type="checkbox"/>	3358	EGR Inlet Pressure		
					<input type="checkbox"/>	5019	EGR Outlet Pressure		

## TRIP TAB

This tab displays trip data stored by the ECU, In J1939, you can reset the trip data by selecting the trip menu item, (NOT SUPPORTED ON ALL VEHICLES)



## FUEL TAB

The Fuel Tab is similar to the Trip and Emissions tab, it is a place where only Fuel Related parameters are displayed. This is supported in J1939 and J1708 only

GAUGES

TEMPS

DTCs

MONITOR


READINESS

EMISSIONS

TRIP

FUEL

PRINT



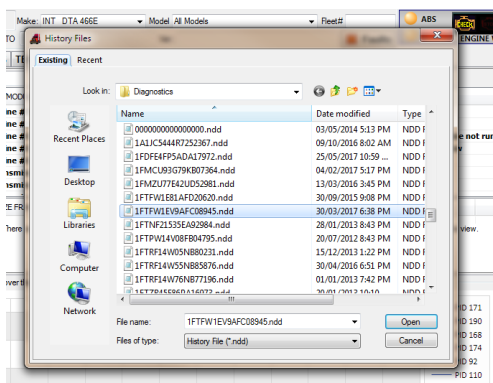
NOTE: Not all PIDs may be available based on your ECM configuration

<input type="checkbox"/>	PID/SPN	Description	J1708	J1939	Scale
<input type="checkbox"/>	235	Total Idle Hours			Hrs
<input type="checkbox"/>	236	Total Idle Fuel Used			G
<input type="checkbox"/>	244	Total Trip Distance			Mi
<input type="checkbox"/>	248	Total PTO Hours			Hrs
<input type="checkbox"/>	250	Total Fuel Used			G
<input type="checkbox"/>	182	Total Trip Fuel			G
<input checked="" type="checkbox"/>	184	Instantaneous Fuel Economy			MPG
<input type="checkbox"/>	1001	Trip Drive Fuel Used			G
<input type="checkbox"/>	1002	Trip Moving PTO Fuel			G
<input type="checkbox"/>	1003	Trip PTO Fuel Used			G
<input type="checkbox"/>	1004	Trip Idle Fuel Used			G
<input type="checkbox"/>	1005	Trip Cruise Fuel			G
<input type="checkbox"/>	1006	Trip Drive Fuel Economy			MPG
<input type="checkbox"/>	1028	Total PTO Fuel Used			G
<input type="checkbox"/>	1835	Total Average Fuel Economy			MPG

## HISTORY

Select Files – View History

History files have an extension of ndd Find the VIN number of the vehicle who's history you want to view and select it.

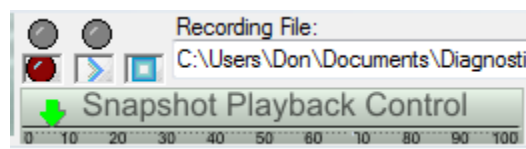


```
16/07/2011 12:37:59 PM Exit PF-Diagnose Uncleared Codes: 33
MID:128 PID:091 FMI:004 COUNT:000 FAULT: Percent Accelerator Pedal Position Voltage below normal or shorted low
MID:128 PID:108 FMI:004 COUNT:000 FAULT: Barometric Pressure Voltage below normal or shorted low
MID:128 PID:164 FMI:013 COUNT:000 FAULT: Injection Control Pressure Out Of Calibration
MID:128 PID:102 FMI:004 COUNT:000 FAULT: Boost Pressure Voltage below normal or shorted low
MID:128 PID:100 FMI:004 COUNT:000 FAULT: Engine Oil Pressure Voltage below normal or shorted low
MID:128 MODE:056 FMI:011 COUNT:000 FAULT: AUXILIARY OUTPUT DEVICE DRIVER NO. 8 Root Cause Not Known
MID:128 MODE:042 FMI:011 COUNT:000 FAULT: INJECTION CONTROL PRESSURE Root Cause Not Known
MID:128 MODE:254 FMI:008 COUNT:000 FAULT: CONTROLLER Abnormal frequency pulsewidth or period
MID:128 MODE:250 FMI:002 COUNT:000 FAULT: J1708 (J1587) DATA LINK Data irratic intermittant or incorrect
MID:130 MODE:151 FMI:014 COUNT:001 FAULT: System Diagnostic Code 1-Input and Output Speeds not Plausable
the input shaft speed sensor and
output shaft speed sensor are not
plausible Special Instructions

NOTE, This is just a test
```

## RECORD AND PLAYBACK

You can record a session by selecting the red record button and play it back by selecting the file to play back and the blue play button. Recordings are named using the VIN, Date time and Protocol followed by .rec

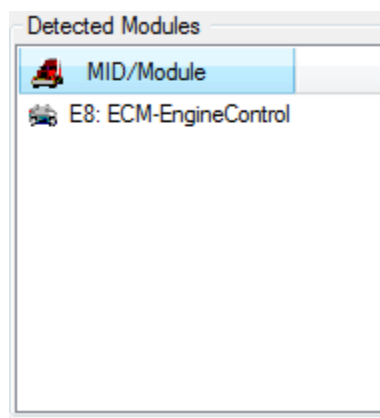


## NOTES ON RECORD

To record all data, you should start the recording BEFORE you connect and stop the recording after you recorded the event you need. Recordings can become very large so you should try to keep them under 5 min in length.

## DETECTED MODULES

This is a list of the modules that PF-Diagnose can identify, it may not include all modules.

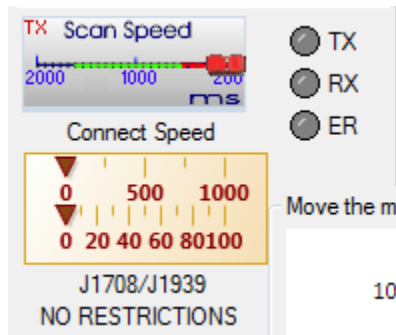


## ADAPTER CONTROL

The adapter control contains a scan speed or request delay slider control, This is used to regulate the speed at which PF-Diagnose makes requests, In OBD-II, requesting too frequently can cause a delay in the results, so if you rev the engine, and a second or more passes before you see the result on the graph, the delay needs to be increased, by sliding the slider to the left, you will increase the request delay and that will increase response.

Requesting data too fast causes delays in the results.

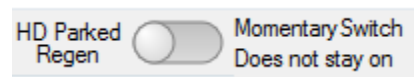
The green gauges, if supported in your version, simply indicate the data connect speed of your adapter in J1939 or J1708 or Both., The adapter image is the adapter you have selected.



The red and green LEDs indicate Transmit and Receive and are not directly connected to the adapter but are used to indicate where in PF-Diagnose the control is, is PF-Diagnose trying to read or is it requesting something... The Blue LED indicates an error, Errors should self-correct but if not send the log PFDiagnoseSession.log from the Documents \Diagnostics folder to support for analyzing.

## FORCED OR COMMANDED REGENERATION

### Parked Regen Switch J1939



If you are connected using J1939 only, You may select the Commanded Regen Switch, This is similar to the regen switch found on the dash of many trucks



When selected, the command will be sent 5 times and then the switch will turn itself off. Regen will start if conditions are met or if the switch is supported by the ECM

Here is an example of the conditions required by International EPA10 engines

The following entry conditions are required for manual parked regeneration:

- DPF lamp ON, signaling need to regenerate
- No disabling DTCs (1114, 1115, 1141, 1142, 1299, 1311, 1312, 1397, 1398, 1742, 1741, 2159, 2544, 2545, 2673, 2674)
- ECT above 65 °C (150 °F)
- Engine running
- Vehicle speed below 2 mph
- Parking brake must be set

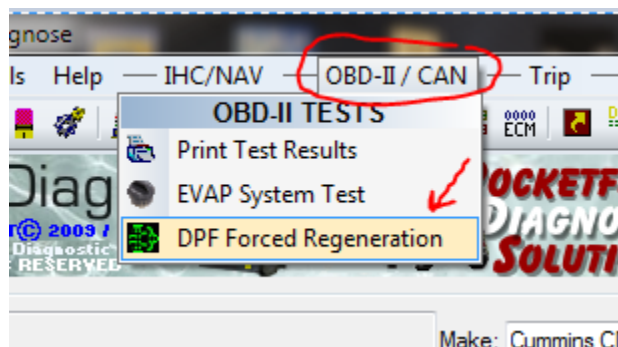


- Brake pedal not pressed
- Accelerator pedal not pressed
- PTO not active
- Driveline disengaged
- Turn inhibit regeneration switch to OFF
- EGT2 and EGT3 below 500 °C (932 °F)

If these conditions are not met, a parked regen cannot commence.

## REGEN – OBD-II Engines

When connected to an OBD-II Engine such as Isuzu or Hino, and the engine supports SAE Forced Regen Commands, You can initiate a forced parked regen by selecting the OBD-II/CAN menu and selecting DPF Forced Regeneration in that menu



**CAUTION:** Regeneration causes the exhaust and other components to reach extremely high temperatures and should never be done indoors or near anything flammable such as tall grass. ALLWAYS FOLLOW MANUFACTURER PROCEEDURES AND SAFETY RULES

## RECOMMENDED REGEN SETTINGS

**GENERAL SETTINGS**

**SETUP General Settings**

Select Your Diagnostic Adapter and Primary Protocol  
If both J1708 and J1939 is selected in the checkbox below, the graph will only display PIDs from the Primary Protocol

☒ **AUTO CONNECT WITH SELECTED ADAPTER**

Select Primary Protocol: **J1939 HD and Ind.** CAN Channel: **Default** Dual Protocol Mode: ☒ Connect with both J1708 and J1939

RP1210 Adapter for HD J1587/J1708/J1939: **DG DPA 5 Dual CAN (MA) USB, USB ID: 1** J2534 Pass-Thru Device for OBD-II: **DPA 5**

Old Adapter RP1210A ☐ Regen Indicator Style: **Gradient**

Hide more settings

**More Adapter Device options**

☒ Use Internet Resources ☐ F-Mode  
☐ Use BAM (Periodic Msg) (Default OFF)  
☐ Use Multiple CAN (RP1210C) (Default OFF)  
☐ NACK messages in Monitor Tab (Default OFF)  
☒ J1939 Auto Baud Rate Detect (Default ON)  
☒ Fast Read (Default ON)  
☐ Unified Diagnostic Services (UDS)

By default - only Fast Read and Auto Baud are enabled, only change if you are experienced in protocols - if you have problems - uncheck all boxes except the defaults

**OBD-II Timing Adjust in Milliseconds**

Request Delay: **110** Response Delay: **110**  
 Default Setting is 50 - 100 - Adjust to improve OBD-II connections

**J1708 / J1939 RESTRICTORS**

**RESTRICTIONS OFF**

☐ ENGINE  
☐ ANTILOCK BRAKES  
☐ TRANSMISSION  
☐ BODY CONTROLLER  
☐ INST. CLUSTER

**FILTERING IS OFF**  
 All modules will be read.

Overwrite Existing Database: ☐ Off  
 Any previously existing database with the same name will be over written by the database located in the folder above. Default is OFF - Lost data cannot be

My History Folder: **C:\Users\Don\Documents\Diagnostics** Path  
 My Database Path: **C:\Users\Don\Documents\Visual Studio 2010\Projects\PF** Path

For best results under general use, use the default settings. Only change settings after consulting the user manual.

**Graph Style Settings**

1 ☒ Scaled  
 2 ☐ Historical  
 3 ☐ Pan and Zoom  
 4 ☐ Area Graph

All values are displayed as a percentage  
 Real values displayed on graph  
 Graph with Zoom and Pan (SLOWER)  
 Area Graph with Zoom and Pan (SLOWER)

☒ Show Markers in Monitor List ☐ Show Graph Horizontal Marker Line

**Measurements**

☒ USA SAE: MPH, PSI, °F, Hp, Miles, Gallons  
☐ Imperial: MPH, PSI, °F, Hp, Miles, Liters  
☐ Metric: KPH, kPa, °C, kW, Kilometers, Liters

☐ Log ALL Bus Traffic to disc  
**WARNING: Creates large disk files when activated**

Use Fleet Number: ☐ Off Requires Fleet Number on Connect

## TOOLBAR

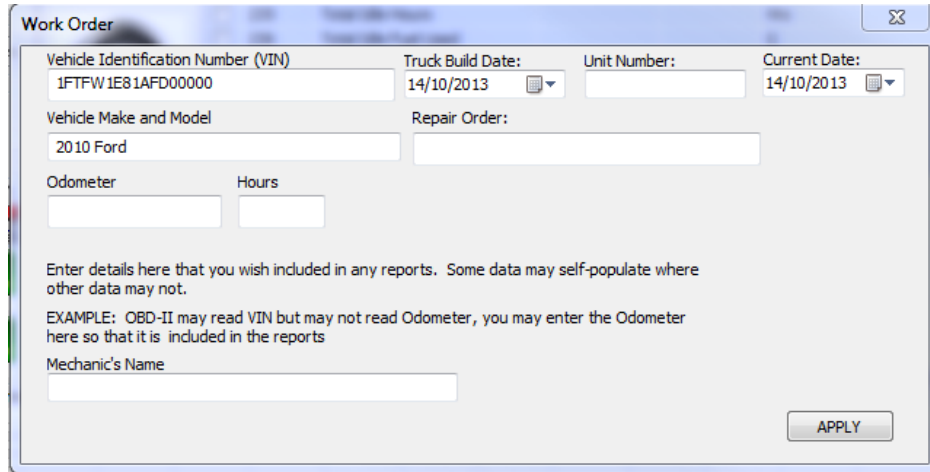
The toolbar is a quick selection tool for menu items



- History
- Connect/disconnect
- Erase ALL faults in ALL modules
- Setup
- Print the current graph
- Clear Trip Data (J1939)
- Force a DPF Regeneration (OBD-II DIESEL ONLY)
- Record a session
- Play a Session
- Stop Recording or playing
- Select a record file to play back
- Change Parameters
- ECM Password
- Exit PF-Diagnose

## WORK ORDER

This is a place where you can enter data that did not auto-fill from the vehicle, An example would be VIN number, Mileage in OBD-II, and other details such as Unit Number, Mechanic's name and repair order number. These details are used for reports



Work Order

Vehicle Identification Number (VIN): 1FTFW1E81AFD00000

Truck Build Date: 14/10/2013

Unit Number:

Current Date: 14/10/2013

Vehicle Make and Model: 2010 Ford

Repair Order:

Odometer: Hours:

Enter details here that you wish included in any reports. Some data may self-populate where other data may not.

EXAMPLE: OBD-II may read VIN but may not read Odometer, you may enter the Odometer here so that it is included in the reports

Mechanic's Name:

APPLY

## OTHER MENU FEATURES

There are several other features such as Export to Excel, Copt graph or Gauges to clipboard, Reset ECU, Print various reports, and open specific web pages.

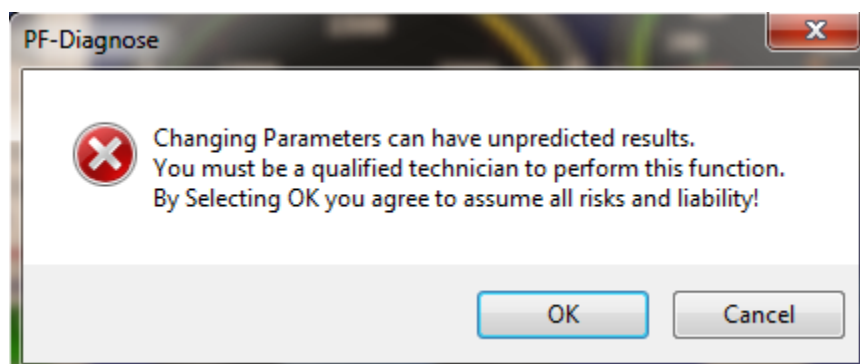
## SETTING THE LOGO ON REPORTS

To change the logo, open the install folder, locate the file LOGO.jpg, Open it in a graphic editor and edit it to display your logo, Do not resize the image, resizing will distort the logo. You may resize your logo to fit in the logo.jpg image boundaries.



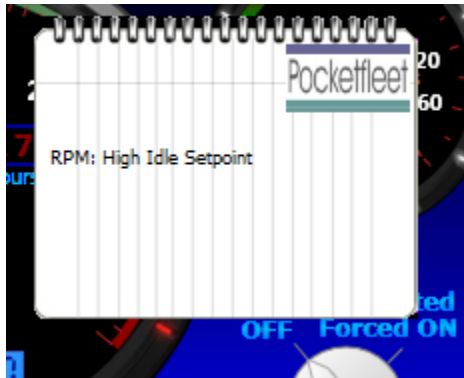
## CHANGING PARAMETERS

This feature is currently only available for International DT Series engines and it to be used at your own risk, When you select Change Parameters you must agree to these terms before continuing



**ONLY CHANGE PARAMETERS IF YOU KNOW WHAT YOU ARE DOING – ARE AWARE OF THE REACTION – ARE QUALIFIED TO MAKE SUCH CHANGES – AND ARE WILLING TO ASSUME ALL RESPONSIBILITY FOR THIS ACTION**

If you agree, and only if you agree, a box will pop up displaying the PIDs being read



If this seems to stall, please allow up to 3 minutes for this process to complete, although it may appear to have locked up, it may still be working in the background.

Next, after all of the PIDs have been identified, you will be asked for the ECM Password. The default is

“0000” (Four Zeros)



Enter the password or 4 zeros and select OK

The PIDs available will be listed with the currently programmed values.

A screenshot of a 'Parameters' window. It contains a table with four columns: PID, Value, Units, and Changed. The table lists various engine and vehicle parameters. The 'Changed' column has a '1' in the first column, indicating that the first parameter has been changed. The 'Save' and 'Cancel' buttons are at the bottom right.

PID	Value	Units	Changed
EFRC: Engine Family Rating Code	2152	Hex	1
VIN	1HTHKAAMX4H679076	ASCII	1
Engine Serial Number	470HH2U1448582	ASCII	1
Transmission Type	Allison MD or SR110	State	1
Rated Horsepower	250.000	hp	1
RPM: High Idle Setpoint	2450.000	RPM	1
RPM: Low Idle Setpoint	700.000	RPM	1
RPM: Rated Speed Setpoint	2300.000	RPM	1
Total Engine On Time	16517.000	hr	1
Total Fuel Used	7434.375	gal	1
Total Miles	42088.800	mile	1
Vehicle Type	NGV	State	1
AHS: EGR Mode	OFF	State	0
AHS: VGT Mode	NOH-VGT	State	0
Cold Ambient Protection Mode	ON	State	1
EFRC: Regulation Type	Type 1	State	1
EFRC: Engine Family Extension	0.000	State	1
Engine Oil Pressure Enable	Variable Capacitance	State	1
Two Speed Axle	OFF	State	1
Transmission Gear teeth	16.000	teeth	1
Transmission Top Gear Ratio	0.650	1	1
Tire Revs	512.000	rev/mile	1
Pulses Per Mile 1	45629.000	pulses/mile	1
Pulses Per Mile 2	45629.000	pulses/mile	1
Rear Axle Ratio 1	5.570	1	1
Rear Axle Ratio 2	5.570	1	1

If the parameter is greyed out and has a lock in the locked position icon, it is not dealer programmable and can only be changed by International Corporate.

If the value has a drop-box of choices, you can change the choice by clicking on the item and selecting a new choice, this has a Units type of STATE, meaning there are several possible states for this parameter and you can choose one.

	Cold Ambient Protection Mode	ON	State	1
	EFRC: Regulation Type	Type 1	State	1
	EFRC: Engine Family Extension	Type 0		1
	Engine Oil Pressure Enable	Type 1	State	1
	Two Speed Axle	Type 2	State	1
	Transmission Gear teeth	16.000	teeth	1
	Transmission Top Gear Ratio	0.650		1

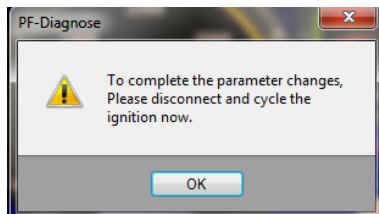
When you make any changes, the item that you changed is shown by the value turning red

	Transmission Gear teeth	16.000	teeth	1
	Transmission Top Gear Ratio	0.650		1
	Tire Revs	514	rev/mile	1
	Pulses Per Mile 1	45629.000	pulses/mile	1
	Pulses Per Mile 2	45629.000	pulses/mile	1
	Rear Axle Ratio 1	5.570		1

In this example the Tire Revolutions per Mile has been changed to **514** rev/mile

Once all of your changes have been made, select SAVE

You must now exit PF-Diagnose and cycle the ignition key on the truck for the programming to complete



If the Password was correct and this engine is supported, The parameters will now be changed to the new values. If the values have not changes, you could have the wrong password, or the engine ECM program level is not supported by PF-Diagnose.

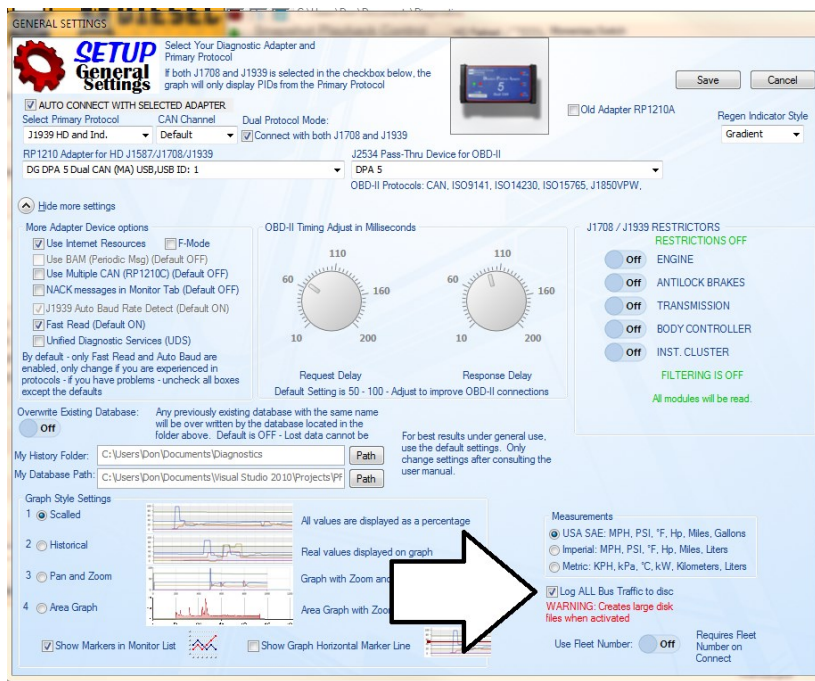
## DPF FORCED REGENERATION

For OBD-II Vehicles select the OBD-II Drop-down and select DPF FORCED REGENERATION

For J1939 Heavy Vehicles, Select the DPF Regen Button on the tool bar

NOTE: This software performs DPF Regeneration according to SAE Regulations and standards, Not all vehicles use SAE provisions for DPF Regen or Monitoring and therefore this software may not force a regen. If the Regen codes are proprietary, you may require OEM or OEM Licensed software to properly regenerate the DPF Filter.

If the Bi-Directional command indicates that this vehicle should be compatible and still fails to regenerate, please contact support and save the PFDiagnoseSession.log file from My Documents\Diagnostics. If detailed logs are required, you may be asked to retry the regen and turn on enhanced logging in the settings screen before retrying as shown in the image below.



**ALWAYS FOLLOW SAFETY PRECAUTIONS WHEN RUNNING ANY REGEN OR TEST – SEE OEM MANUAL FOR SPECIFIC PRECAUTIONS**

## **LICENSE AGREEMENT**

EULA - end user license agreement contains the terms that you must agree to before using PF-Diagnose. Please read carefully. If you have any questions, concerns or issues, please email [support@DieselLaptops.com](mailto:support@DieselLaptops.com) or call toll free: 888-983-1975 during regular business hours

## **END USER LICENSE AGREEMENT (EULA)**

## **SOFTWARE PRODUCT LICENSE**

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(ii) If the use exceeds or exceeded the use permitted by this Agreement by more than 25%, Licensee shall also pay to Licensor, within 30 days following the date of Licensor's written request therefor, Licensor's reasonable costs incurred in conducting the audit.

(iii) If the use exceeds or exceeded the use permitted by this Agreement by more than 25%, Licensor shall also have the right to terminate this Agreement and the license granted hereunder, effective immediately upon written notice to Licensee.

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(b) Licensor will not be responsible or liable to Licensee, or deemed in default or breach hereunder by reason of any failure or delay in the performance of its obligations hereunder where such failure or delay is due to strikes, labor disputes, civil disturbances, riot, rebellion, invasion, epidemic, hostilities, war, terrorist attack, embargo, natural disaster, acts of God, flood, fire, sabotage, fluctuations or non-availability of electrical power, heat, light, air conditioning, or Licensee equipment, loss and destruction of property, or any other circumstances or causes beyond Licensor's reasonable control.

(c) All notices, requests, consents, claims, demands, waivers, and other communications hereunder shall be in writing and shall be deemed to have been given: (i) when delivered by hand (with written confirmation of receipt); (ii) when received by the addressee if sent by a nationally recognized overnight courier (receipt requested); (iii) on the date sent by facsimile or email (with confirmation of transmission) if sent during normal business hours of the recipient, and on the next business day if sent after normal business hours of the recipient; or (iv) on the third day after the date mailed, by certified or registered mail, return receipt requested, postage prepaid. Such communications must be sent to the respective parties at the addresses set forth on the Order Form (or to such other address as may be designated by a party from time to time in accordance with this Section 16(c)).

(d) This Agreement, together with the Order Form, all annexes, schedules, and exhibits attached hereto and all other documents that are incorporated by reference herein, constitutes the sole and entire agreement between Licensee and Licensor with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations, and warranties, both written and oral, with respect to such subject matter.

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(g) This Agreement may only be amended, modified, or supplemented by an agreement in writing signed by each party hereto. No waiver by any party of any of the provisions hereof shall be effective unless explicitly set forth in writing and signed by the party so waiving. Except as otherwise set forth in this Agreement, no failure to exercise, or delay in exercising, any right, remedy, power, or privilege arising from this Agreement shall operate or be construed as a waiver thereof; nor shall any single or partial exercise of any right, remedy, power, or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, remedy, power, or privilege.

(h) If any term or provision of this Agreement is invalid, illegal, or unenforceable in any jurisdiction, such invalidity, illegality, or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

(i) For purposes of this Agreement, (a) the words "include," "includes," and "including" shall be deemed to be followed by the words "without limitation"; (b) the word "or" is not exclusive; and (c) the words "herein," "hereof," "hereby," "hereto," and "hereunder" refer to this Agreement as a whole. Unless the context otherwise requires, references herein: (x) to Sections, Annexes, Schedules, and Exhibits refer to the Sections of, and Annexes, Schedules, and Exhibits attached to, this Agreement; (y) to an agreement, instrument, or other document means such agreement, instrument, or other document as amended, supplemented, and modified from time to time to the extent permitted by the provisions thereof and (z) to a statute means such statute as amended from time to time and includes any successor legislation thereto and any regulations promulgated thereunder. This Agreement shall be construed without regard to any presumption or rule requiring construction or interpretation against the party drafting an instrument or causing any instrument to be drafted. The Order Form and all Annexes, Schedules, and Exhibits referred to herein shall be construed with, and as an integral part of, this Agreement to the same extent as if they were set forth verbatim herein.



(j) The headings in this Agreement are for reference only and do not affect the interpretation of this Agreement.

Revised April 1, 2019

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