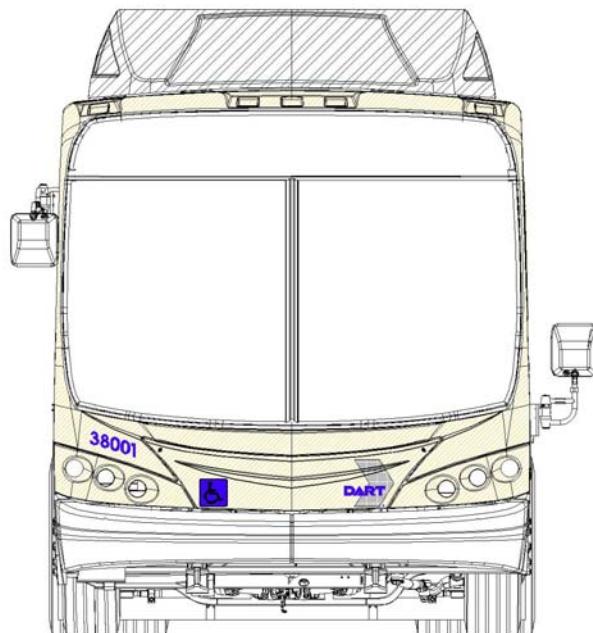


DART / Dallas, TX

Vehicle Data Logger (VDL)

Data Utility Software Manual



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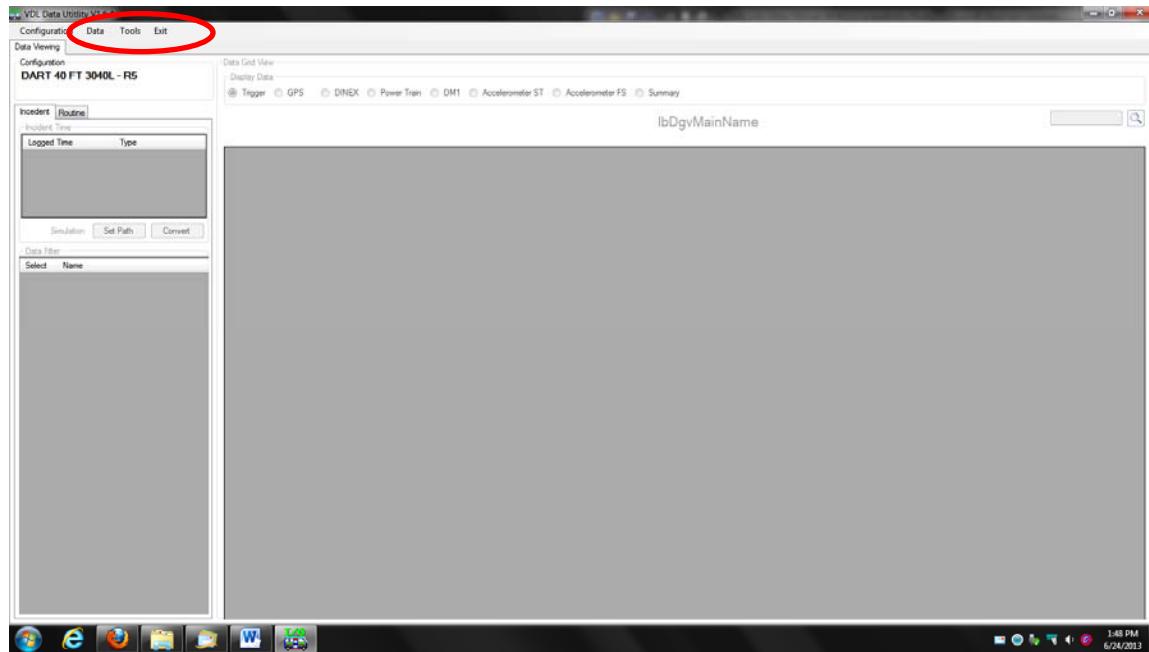
Prepared for DART by I/O Controls Corporation

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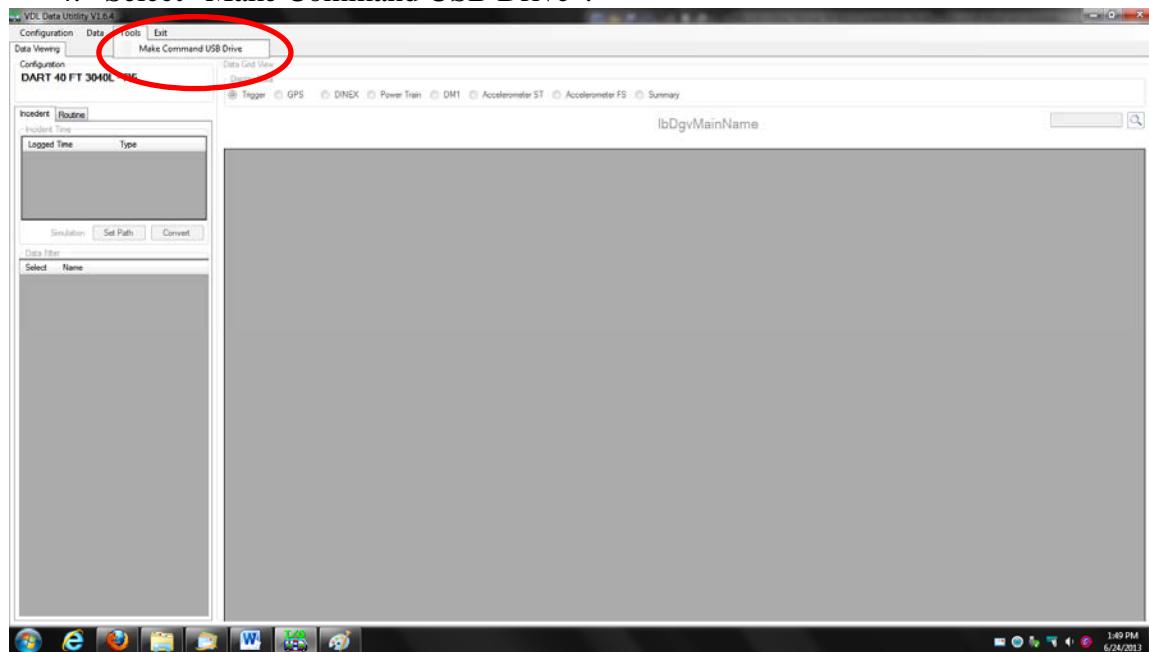
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Prepare USB Drive to download data from a VDL

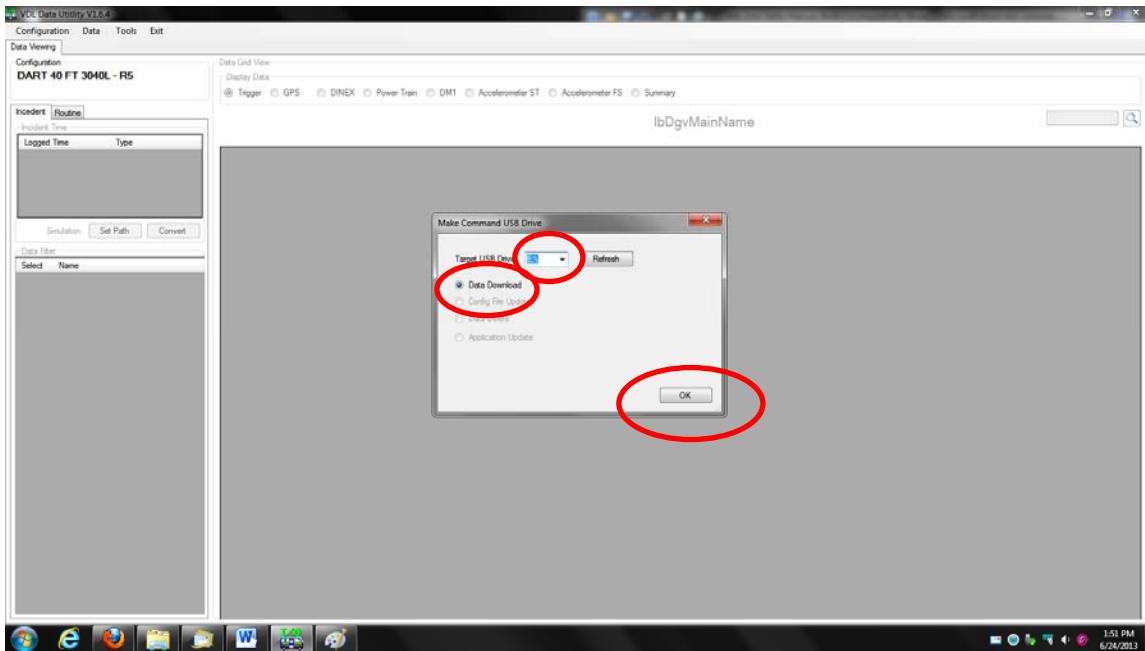
1. Plug the USB drive into your PC.
2. Start the VDL Administration Utility.
3. Click the “Tools” tab.



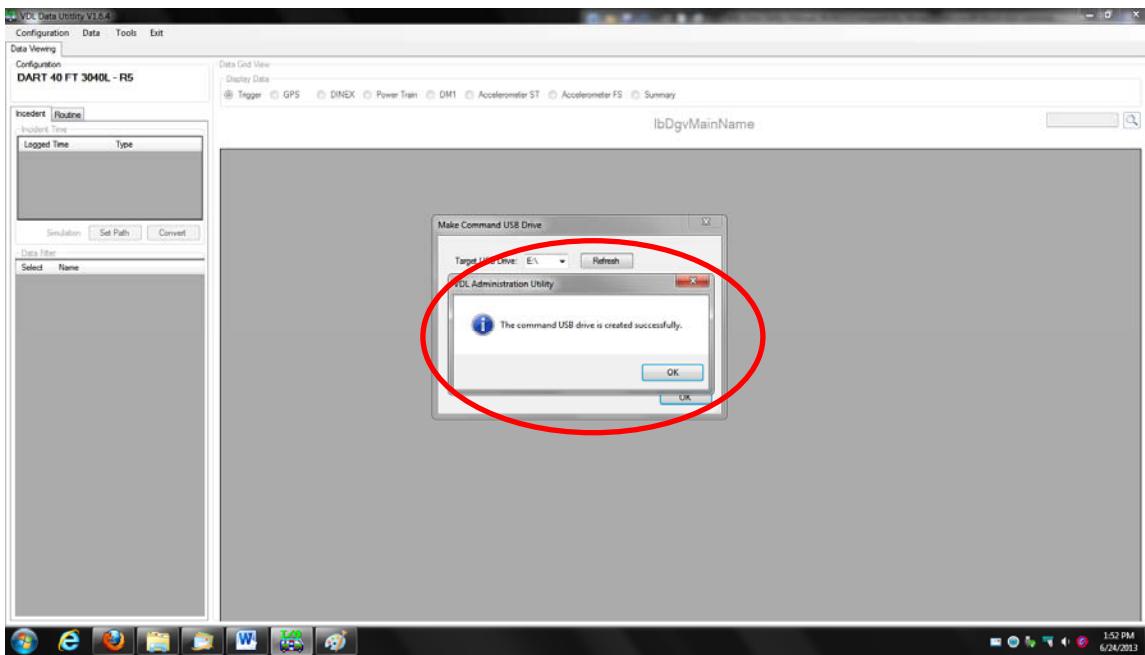
4. Select “Make Command USB Drive”.



5. Select the target USB drive, then the “Data Download” option. Next click the “OK” button.



6. The VDL Administration Utility will show a message window if the data download USB drive creation was successful.



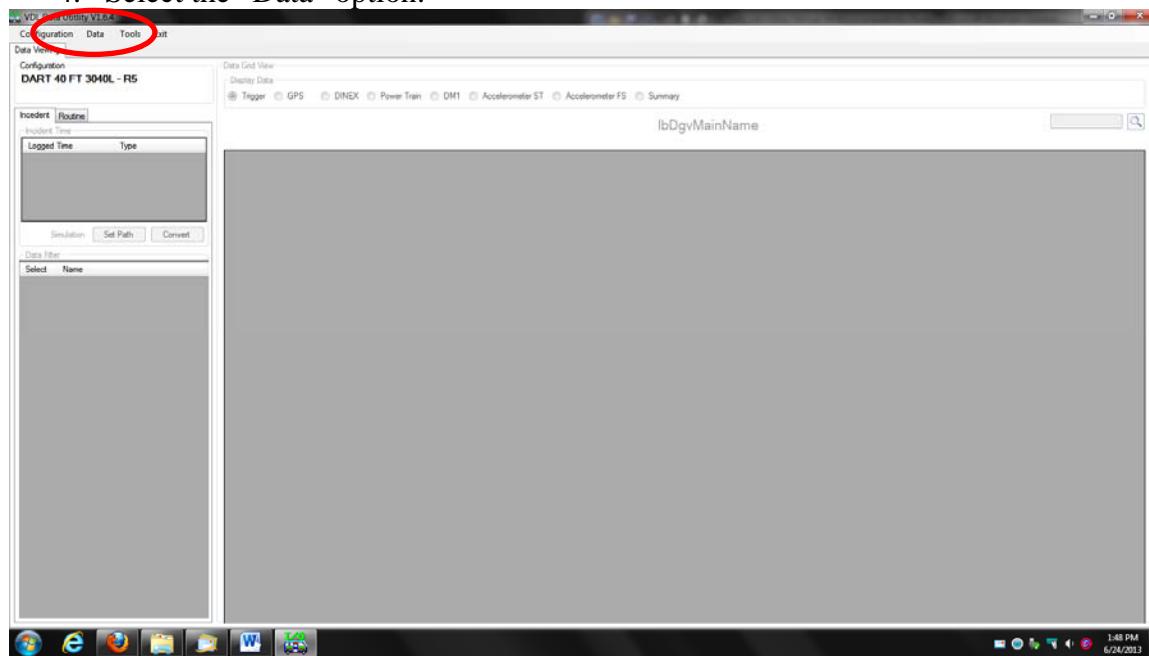
7. The USB drive is now ready to download data

Download Data Files From A VDL

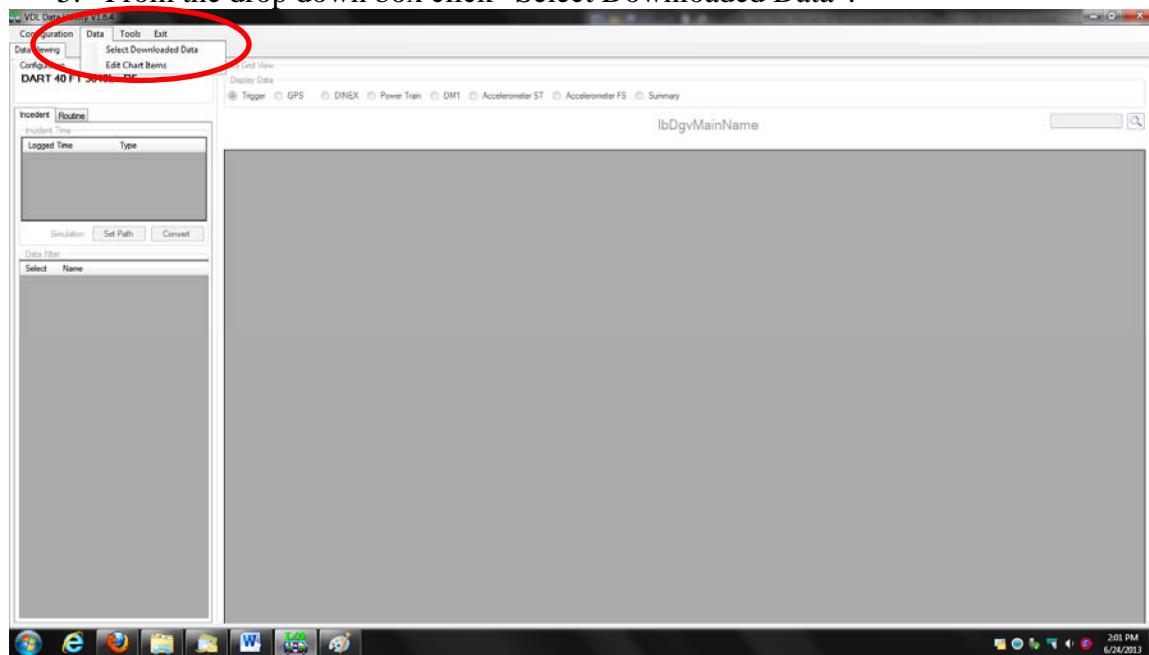
1. Plug the USB drive into the VDL USB connector on the vehicle. LED # 4 of VDL module will blink. That means it is downloading. If equipped with one the LED on the USB drive will also blink.
2. When the download process is finished the LED #4 stops blinking and remains off. The process may take 15 minutes or more depending on the amount of data to be downloaded.
3. Unplug the USB drive from VDL module.

View Data Files On A PC

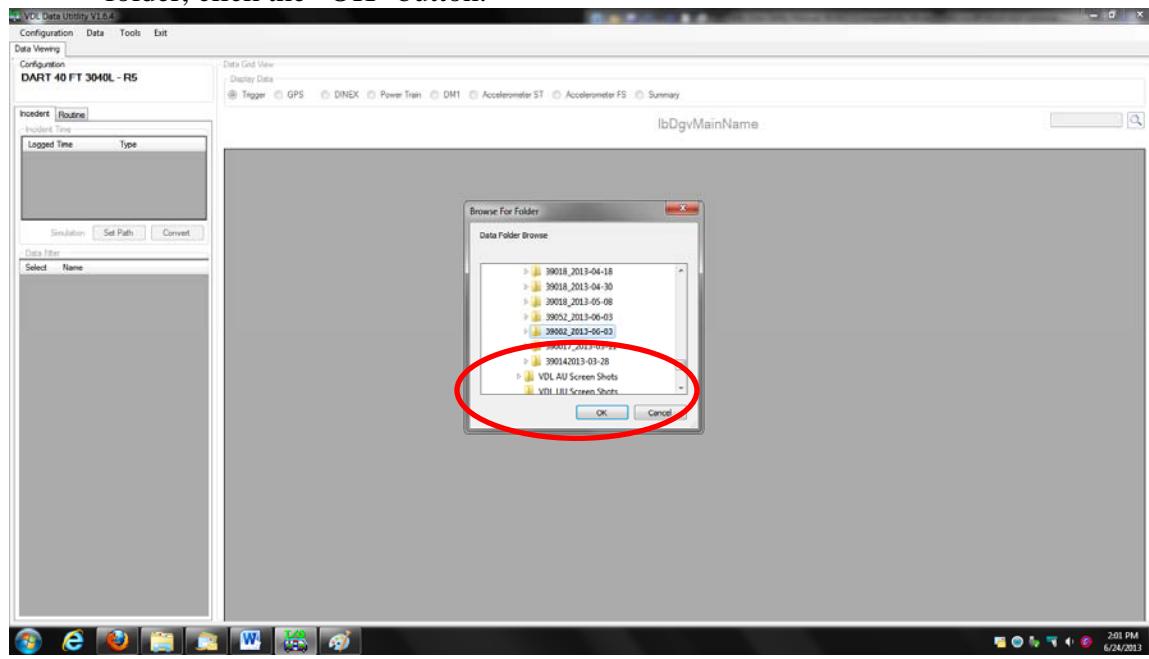
1. Plug the USB Drive into the PC with the VDL Administration Utility installed.
2. Copy the data folder from the USB drive to the desired location in the My Documents folder on the PC. The name of the folder is the download date. Note that the name does not include the bus number. If the bus number is desired then the user needs to add the name of the bus number to the data folder using the appropriate functions of the operating system installed on the PC
3. Start the VDL Administration Utility.
4. Select the “Data” option.



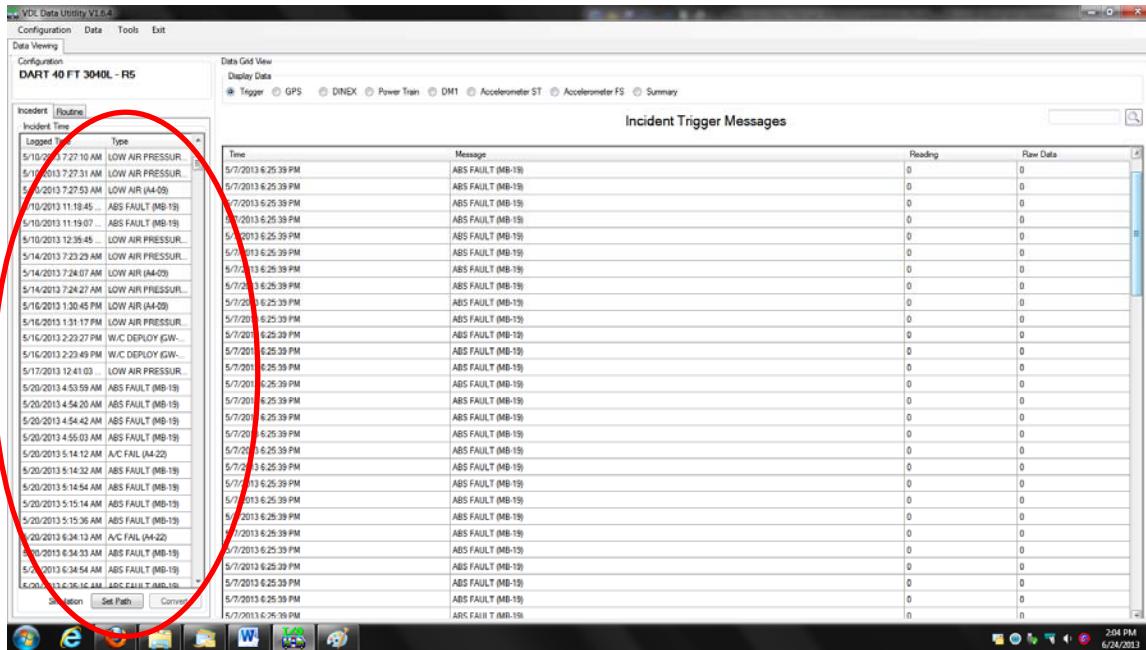
5. From the drop down box click “Select Downloaded Data”.



6. The “Browse For Folder” box opens. Browse to the desired folder, select the folder, click the “OK” button.

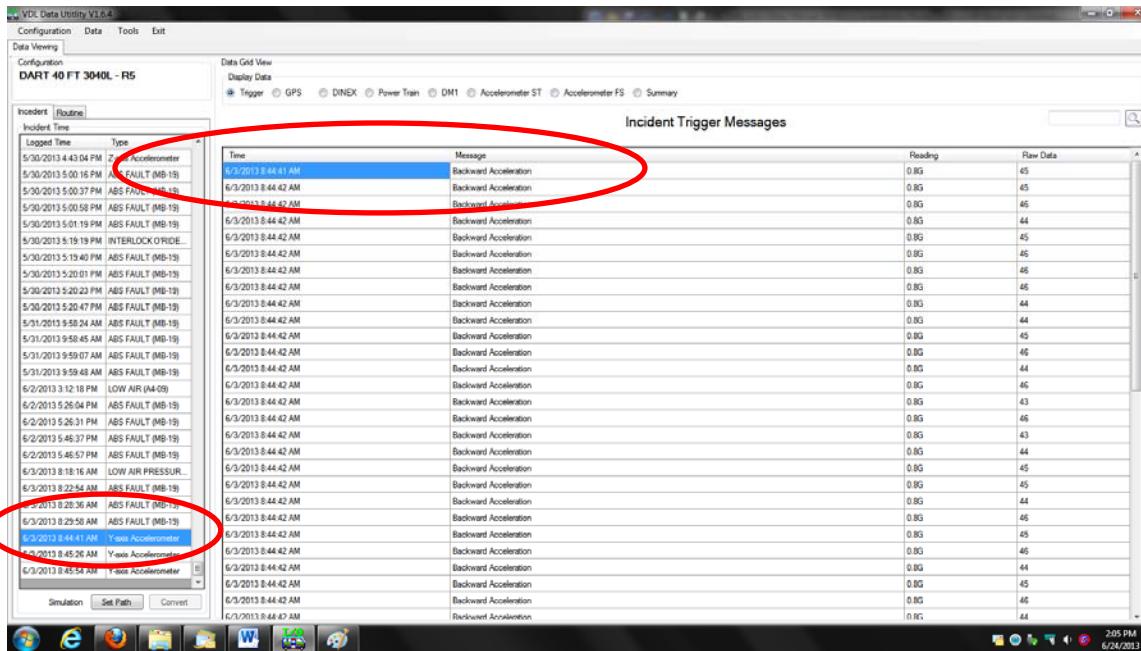


7. After the data folder is selected the system shows the list of logged incidents. The list could be empty if there is not any incident during the last 30 days.



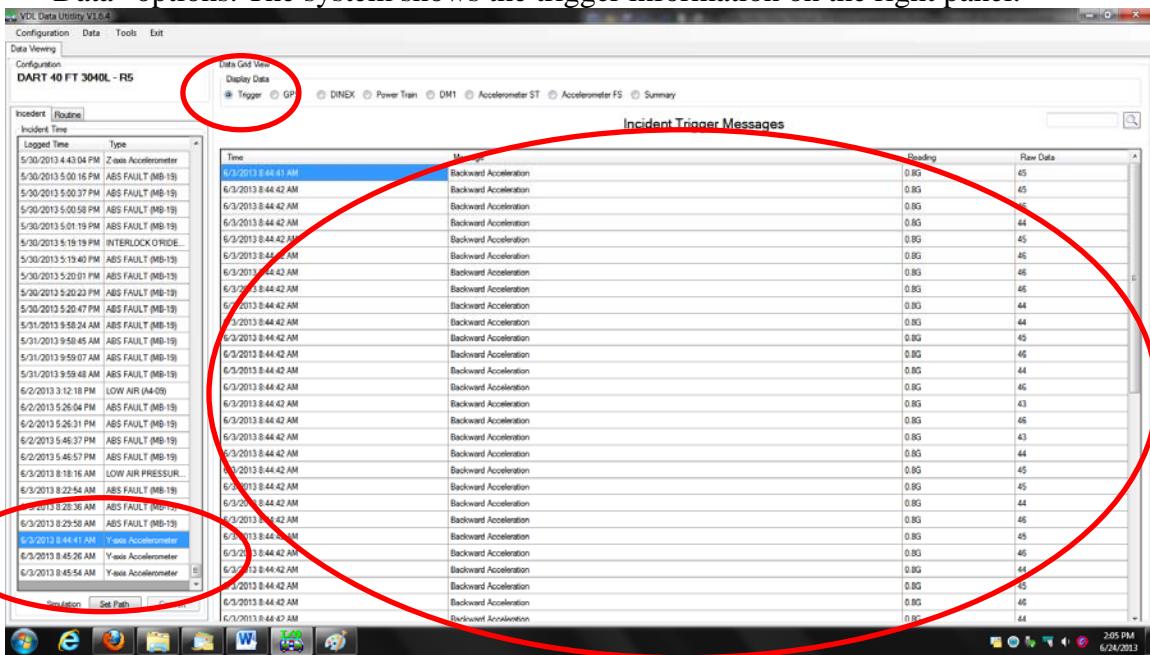
View Incident Data

Select an incident from the incident list. The system shows the logged data on the right panel. You may select the data type to be displayed from the “Display Data” options on the upper part of the right panel.



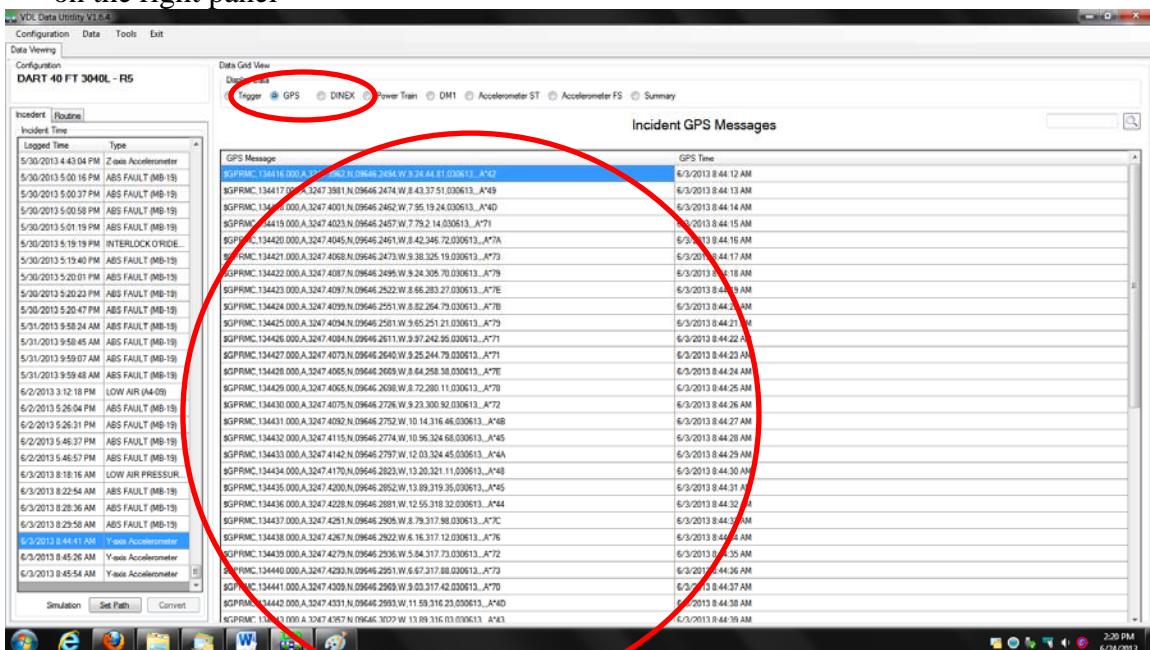
View Incident Trigger Data

On the left pane select the incident to be viewed, select “Trigger” from the “Display Data” options. The system shows the trigger information on the right panel.



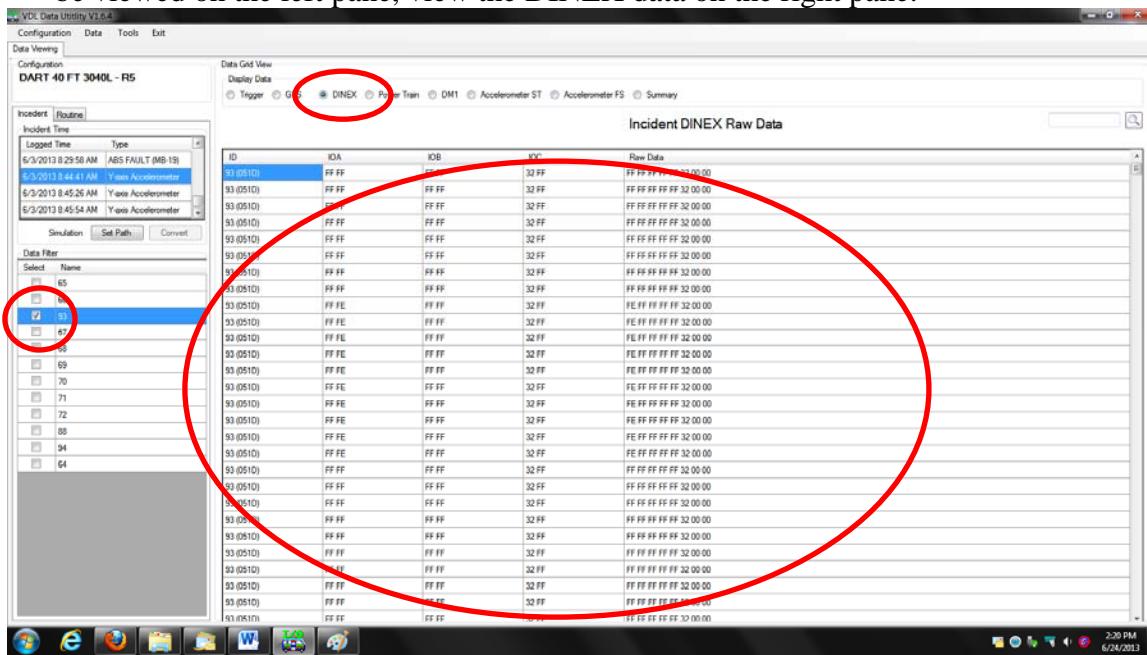
View Incident GPS Data

Select “GPS” from the “Display Data” options. The system shows the GPS messages on the right panel



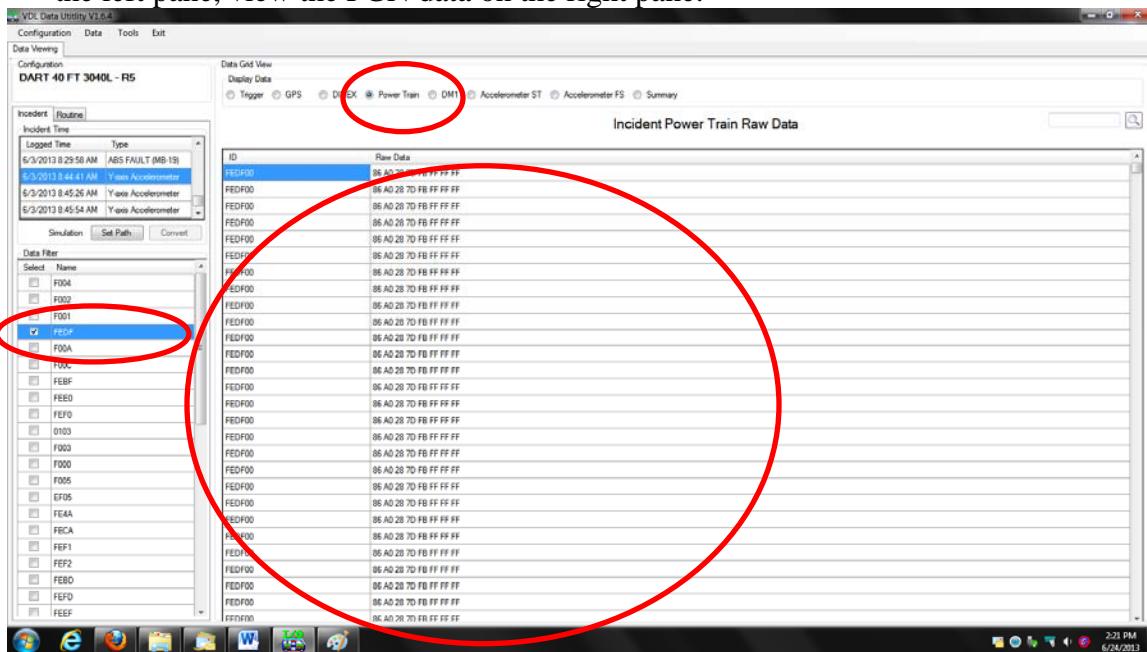
View Incident DINEX Data

Select “DINEX” on the “Display Data” menu, select the ID of the DINEX module to be viewed on the left pane, view the DINEX data on the right pane.



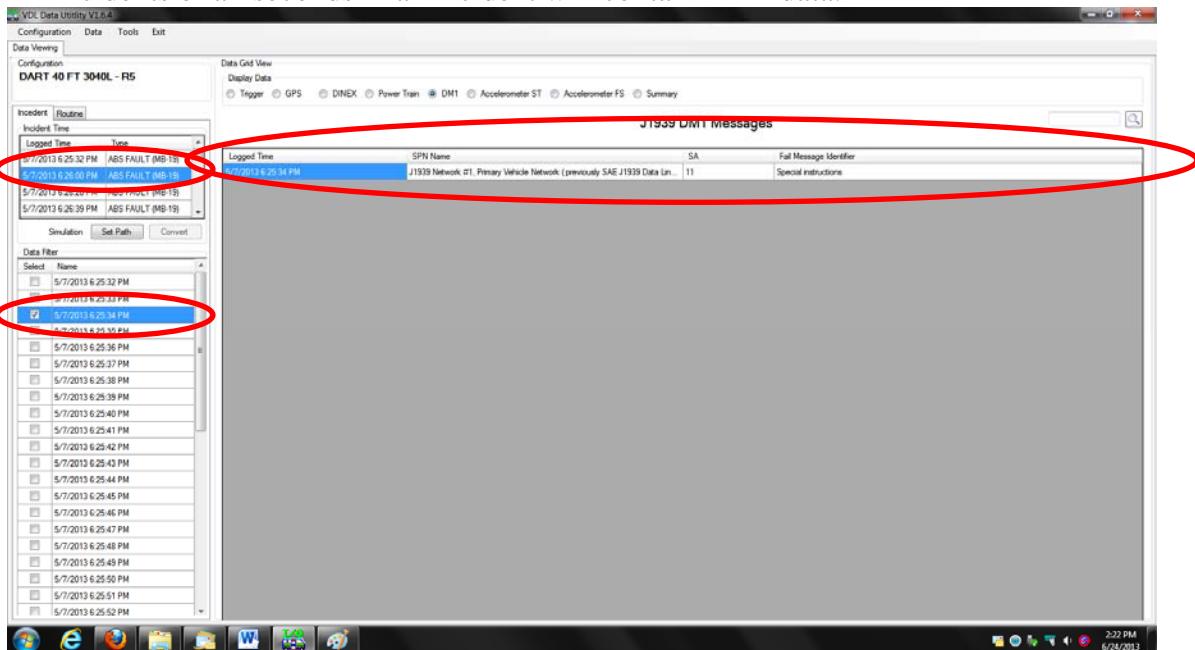
View Incident Power Train J1939 Data

Select “Power Train” on the “Display Data” menu, select the PGN to be viewed on the left pane, view the PGN data on the right pane.



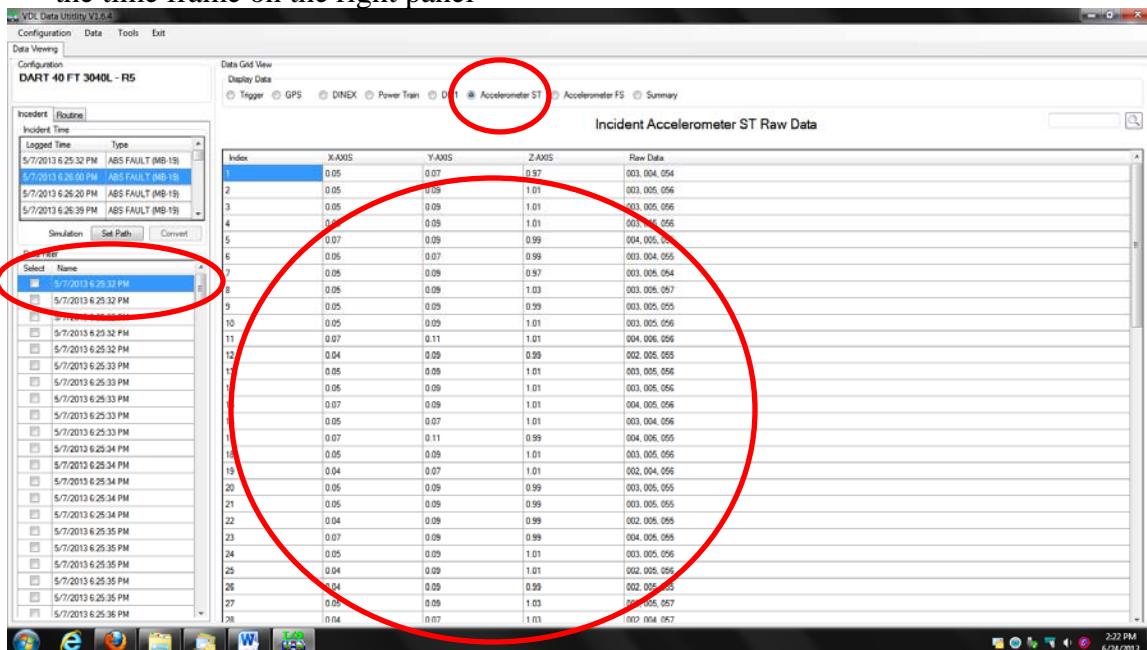
View Incident DM1 J1939 Data

Select “DM1” on the “Display Data” menu, select the second of the logged incident to be viewed on the left pane, view the DM1 data on the right pane. Note that not all incidents or all seconds in an incident will contain DM1 data.



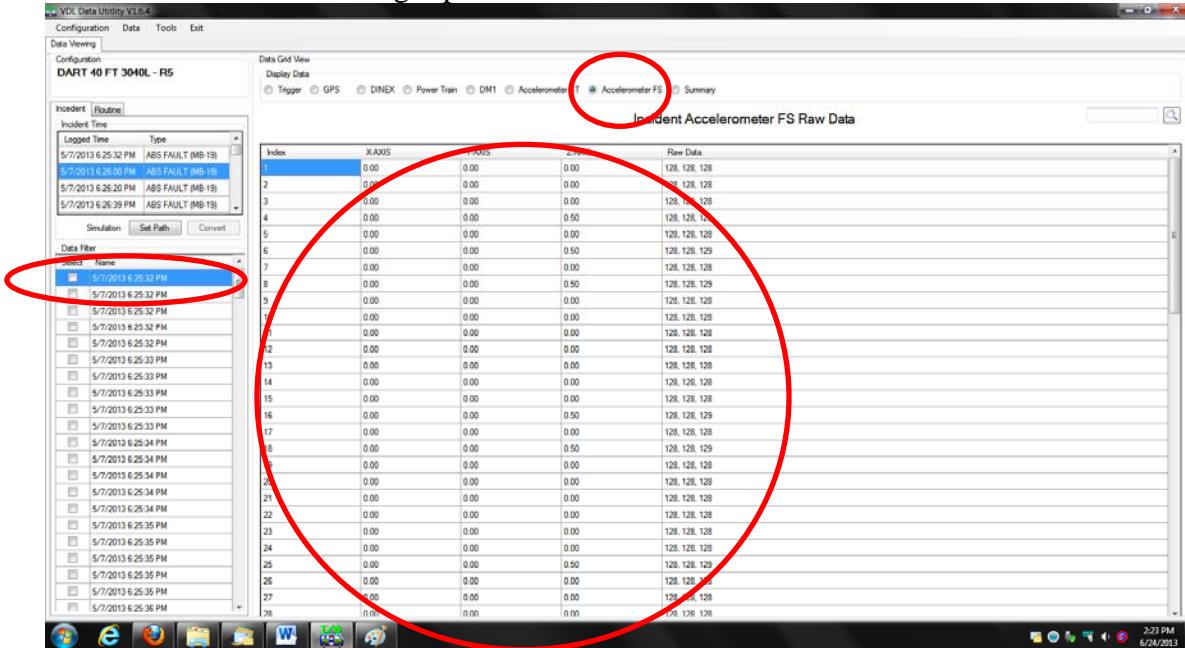
View Incident Sensitive Accelerometer Data

Select “Accelerometer ST” from “Display Data” options then select the time frame of the incident to be viewed on the lower left pane. View the accelerometer messages of the time frame on the right panel



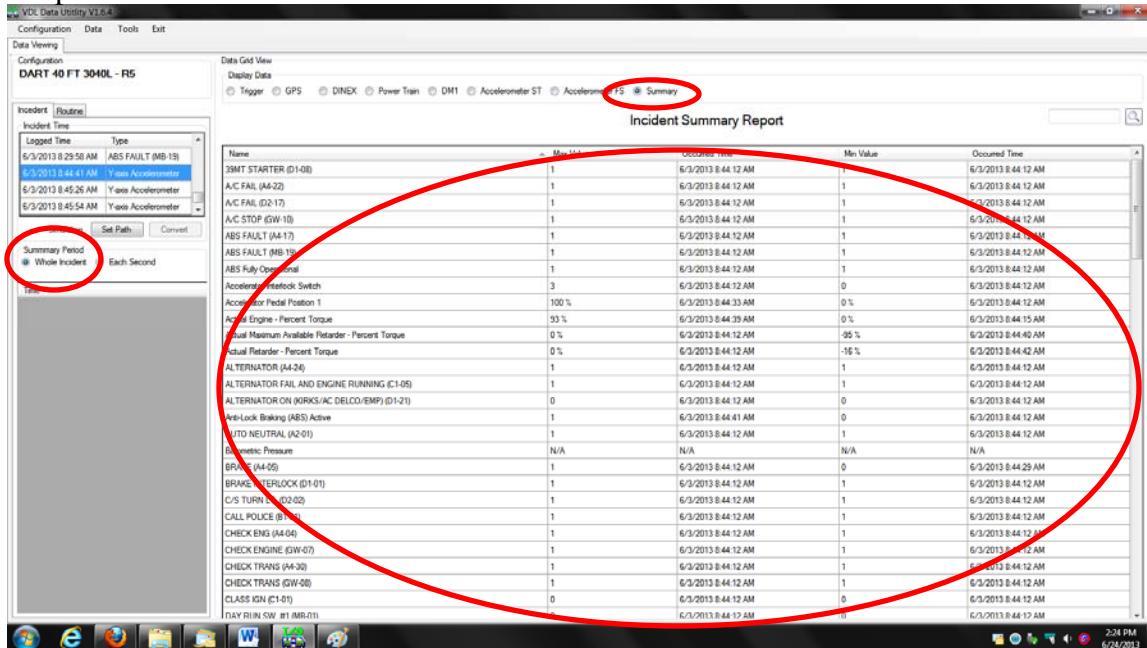
View Incident Large Scale Accelerometer Data

Select “Accelerometer FS” from “Display Data” options then select the time frame of the incident to be viewed on the lower left pane. View the accelerometer messages of the time frame on the right panel

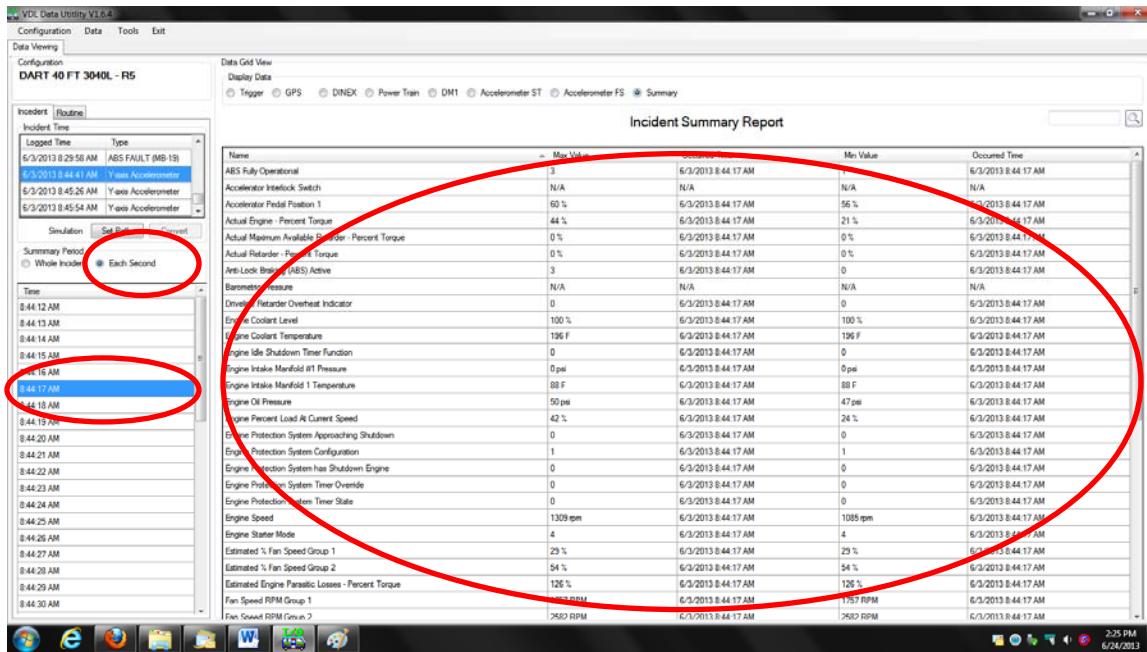


View Incident Summary Data

Select “Summary” from the “Display Data” options. Select “Whole Incident” from the “Summary Period” options. View the summary of the entire incident on the right panel.

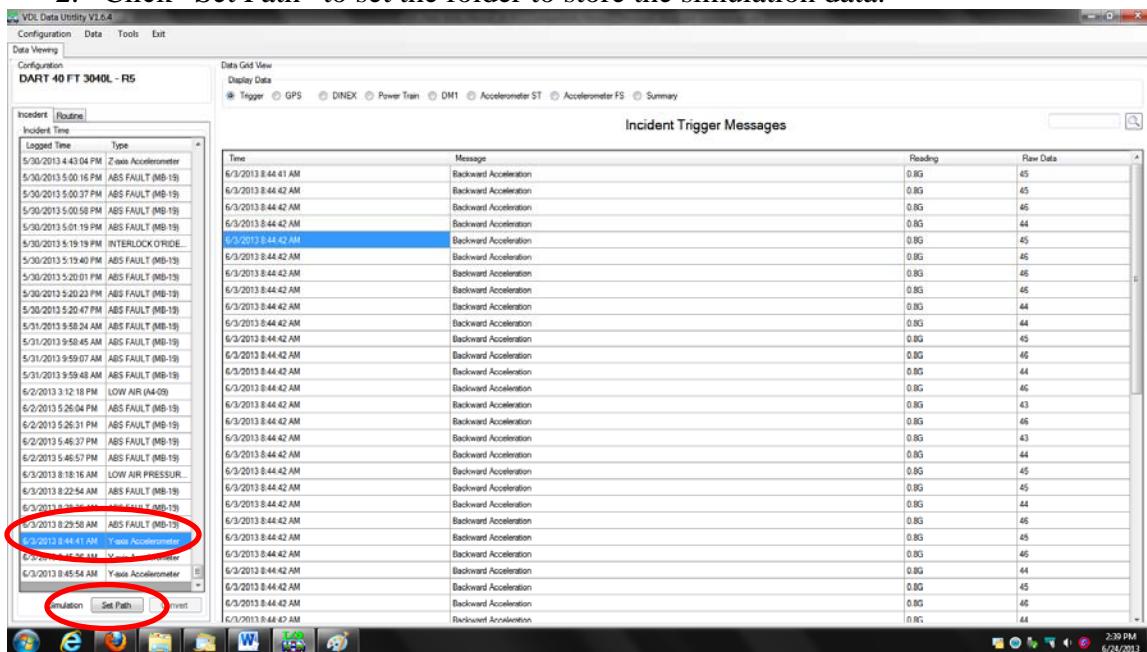


To view a summary of each second of an incident select “Each Second” from the “Summary Period” options on the left pane. Select the desired second to be viewed on the left pane, the summary for that second is shown on the right pane.

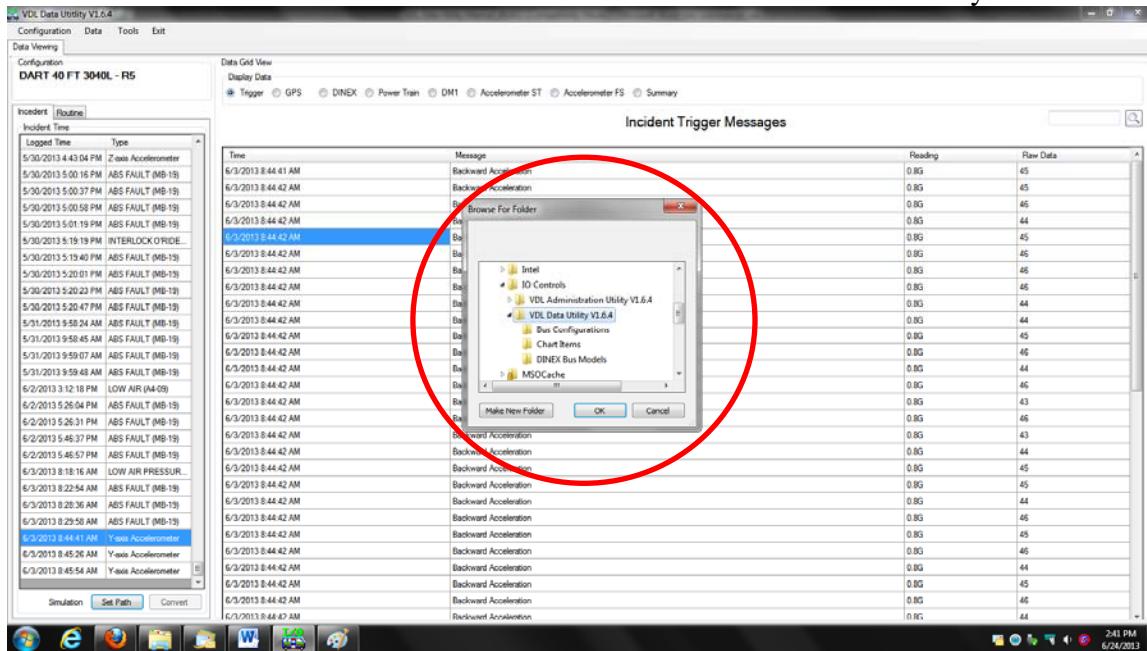


Generate Incident Simulation File

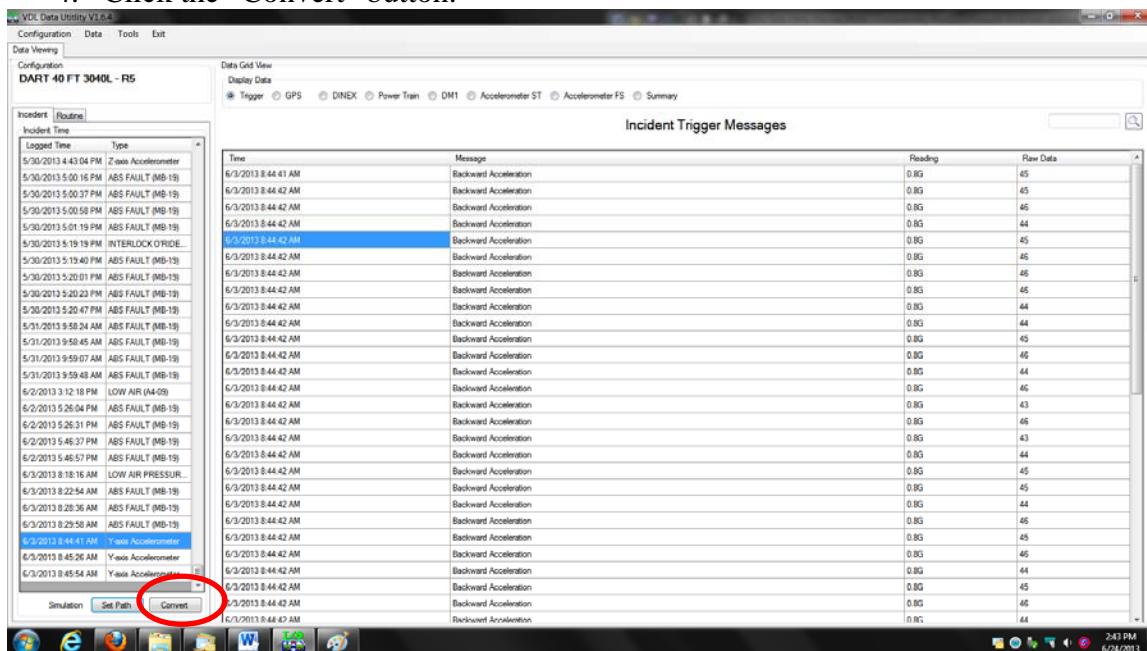
1. Select an incident from the “Incident Time” list.
 2. Click “Set Path” to set the folder to store the simulation data.



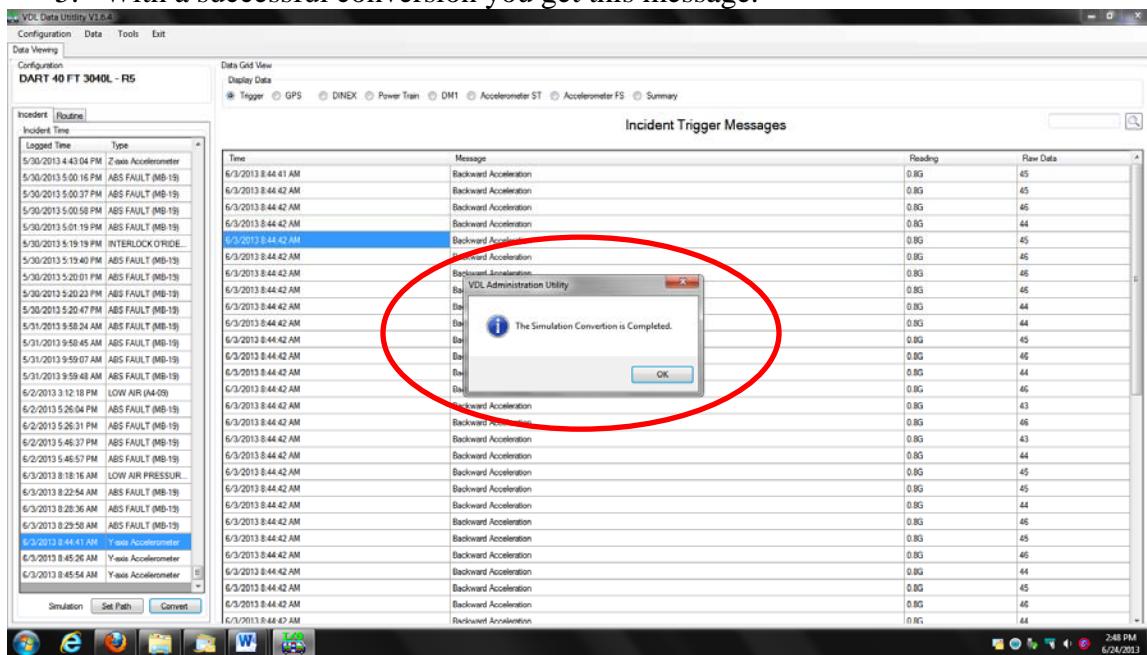
3. In the “Browse For Folder” box browse to the folder that the VDL Data Utility application file is located in and click “OK”. The default Windows 7 64bit OS location is C:\IO Controls\VDL Data Utility v1.6.4. The converted file for the simulation must be stored in the same folder as the VDL Data Utility is located in.



4. Click the “Convert” button.



5. With a successful conversion you get this message.



6. If a short cut to “blackbox” is not available in your Start >IO Controls menu folder browse to the VDL Administration Utility folder and double click the “blackbox” application file. The default Windows 7 64bit OS location is C:\Program Files (x86)\IO Controls\VDL Administration Utility.

7. Select the incident that you want to see.

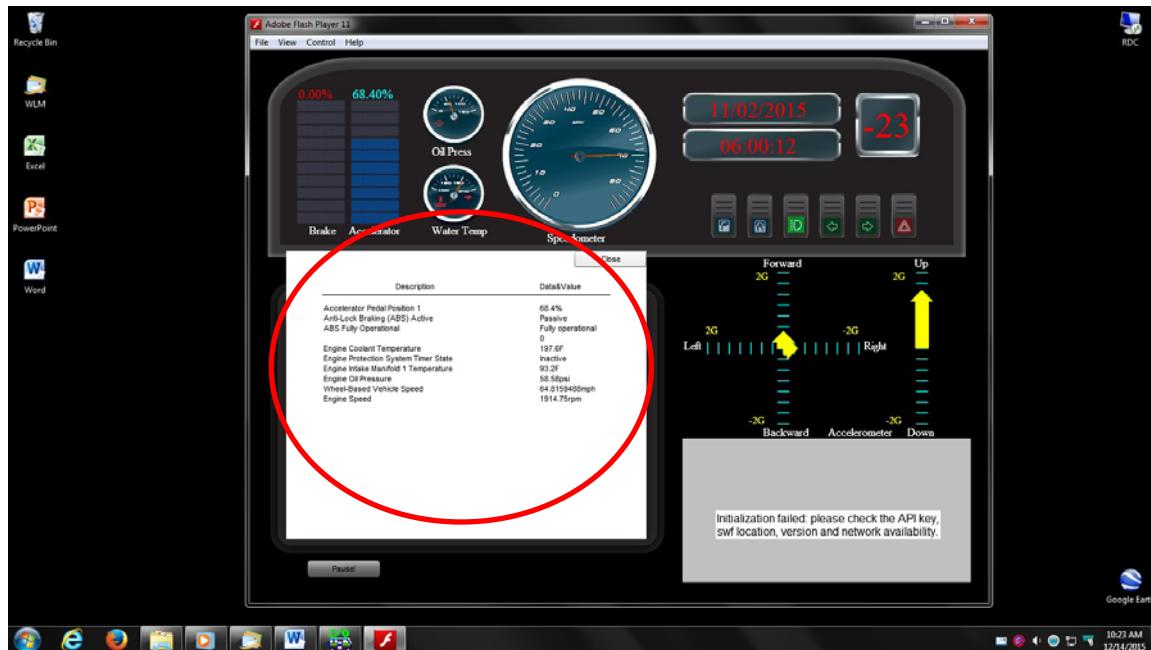


8. Click the “Start” button to start the simulation.

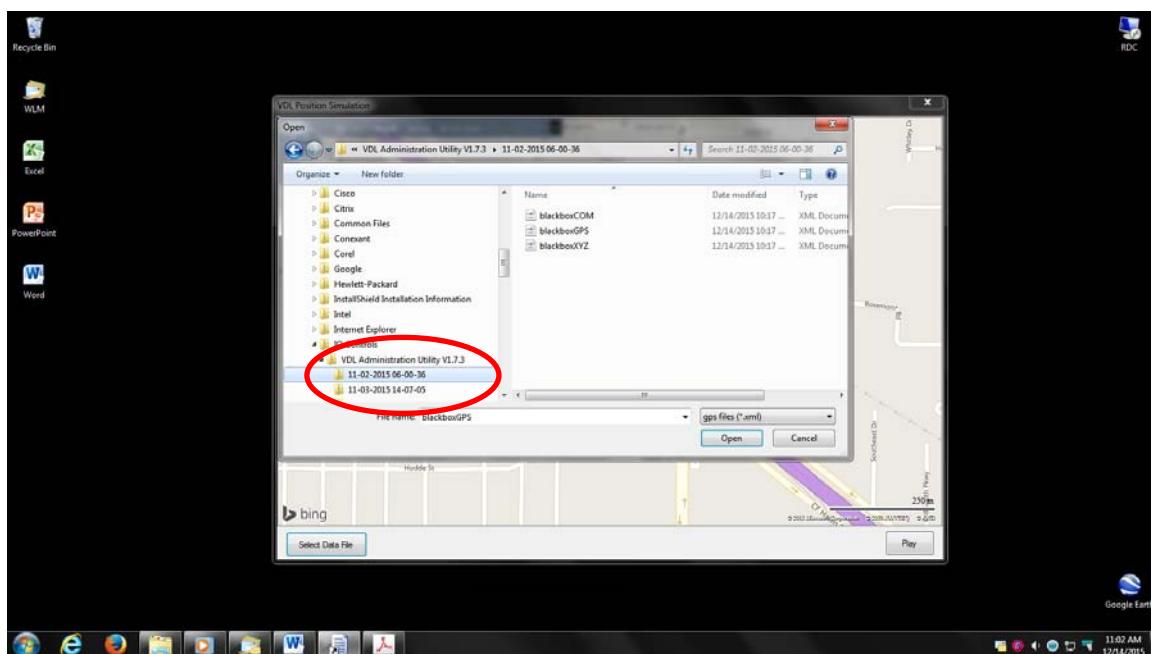
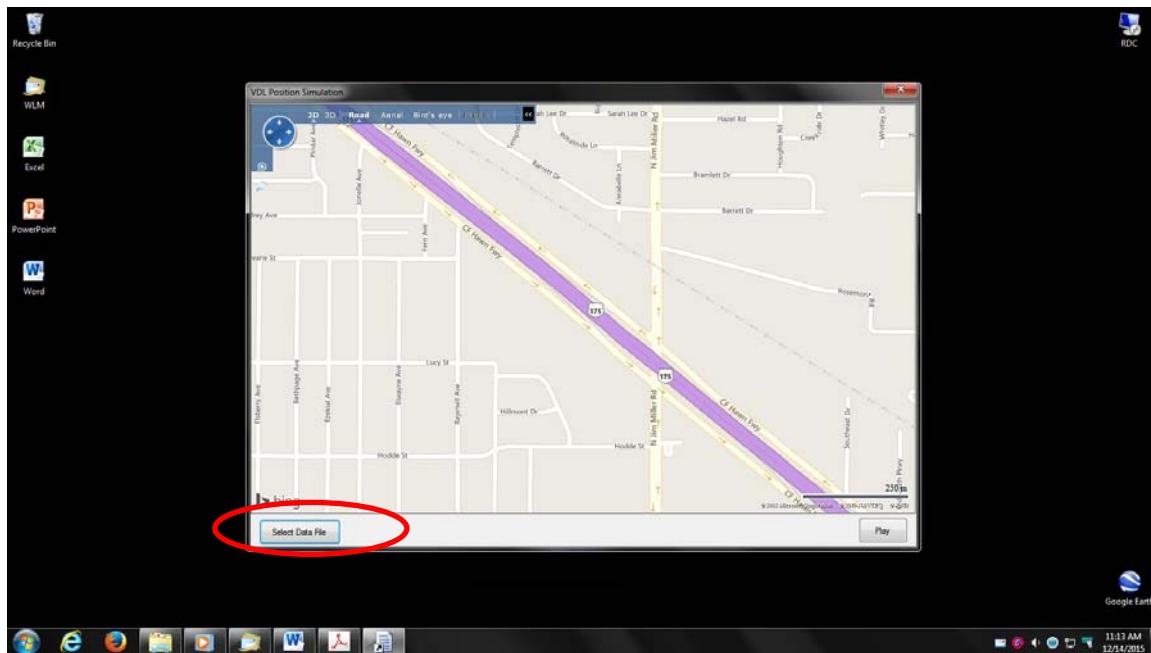


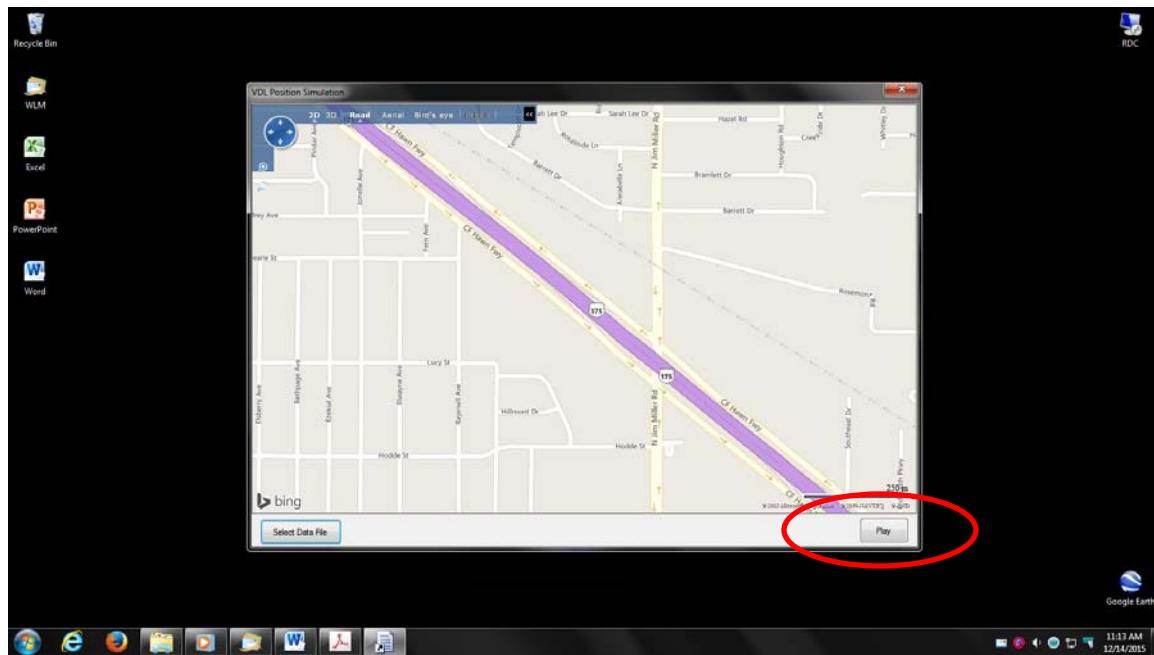
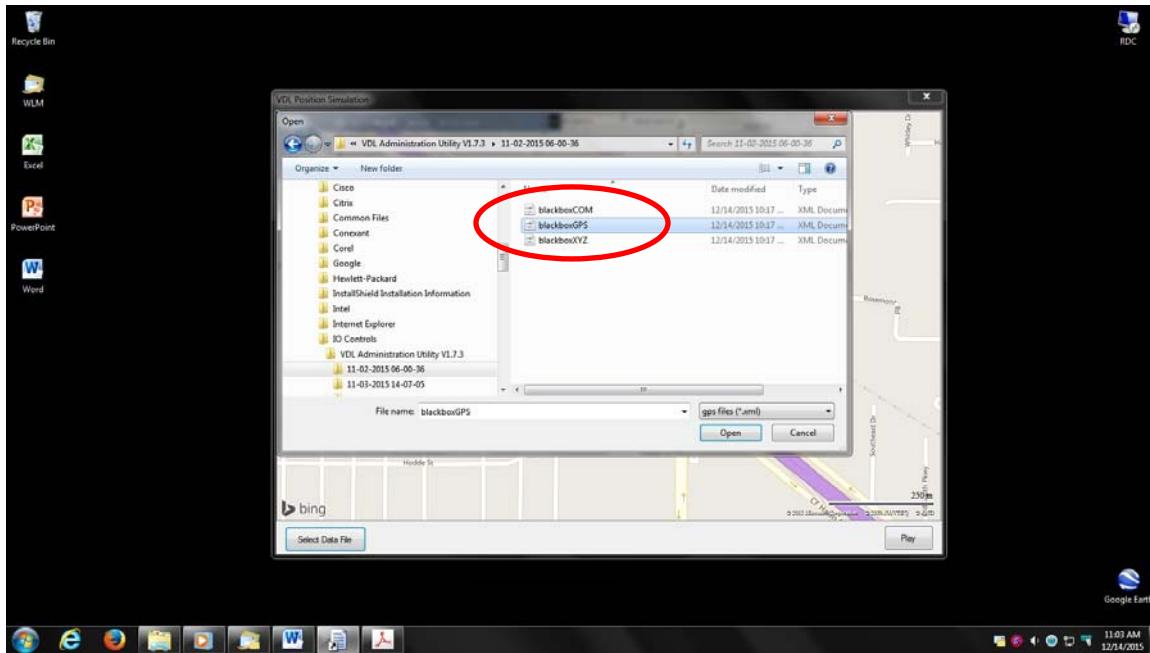
9. During Simulation play you may select the “Power Train” or “Multiplex” buttons to view the associated data.





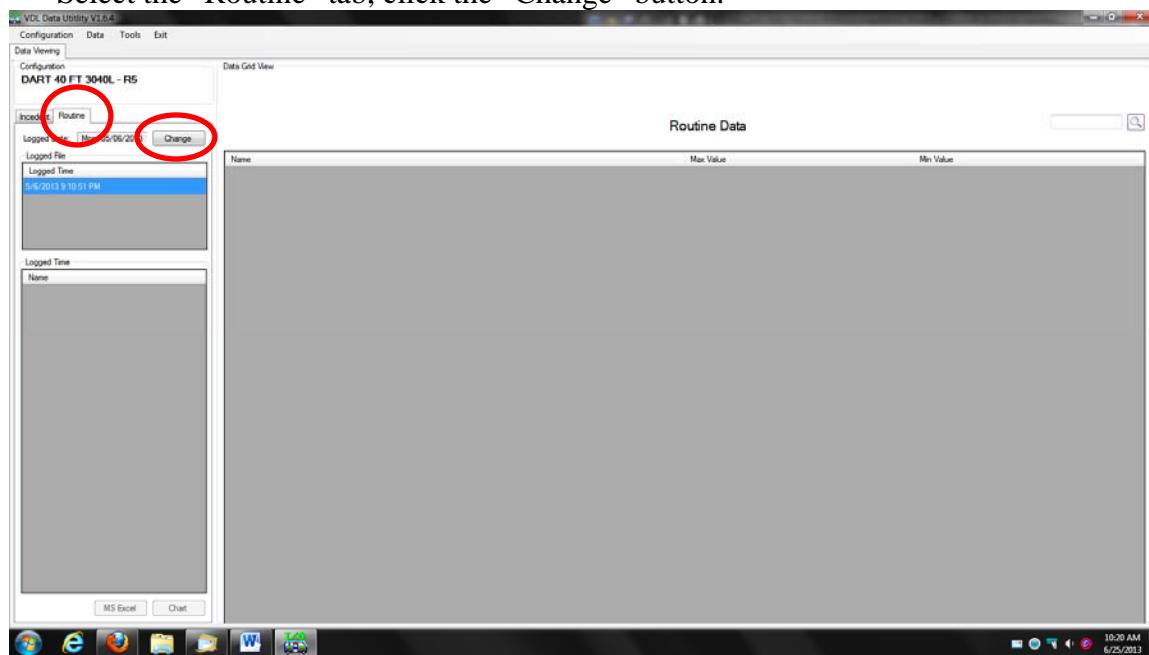
10. To view the incident on a map the PC must be connected to the internet. If a short cut to “GPS Tracker” is not available in your Start >IO Controls menu folder browse to the VDL GPS Tracker folder and double click the “GPS Tracker” application file. The default Windows 7 64bit OS location is C:\Program Files (x86)\IO Controls\VDL GPS Tracker.
11. Click the “Select Data File” button then browse to the incident folder that you want to see. Next double click the “blackboxGPS” xml file. After the “blackboxGPS” xml file has been loaded click the “Play” button to view



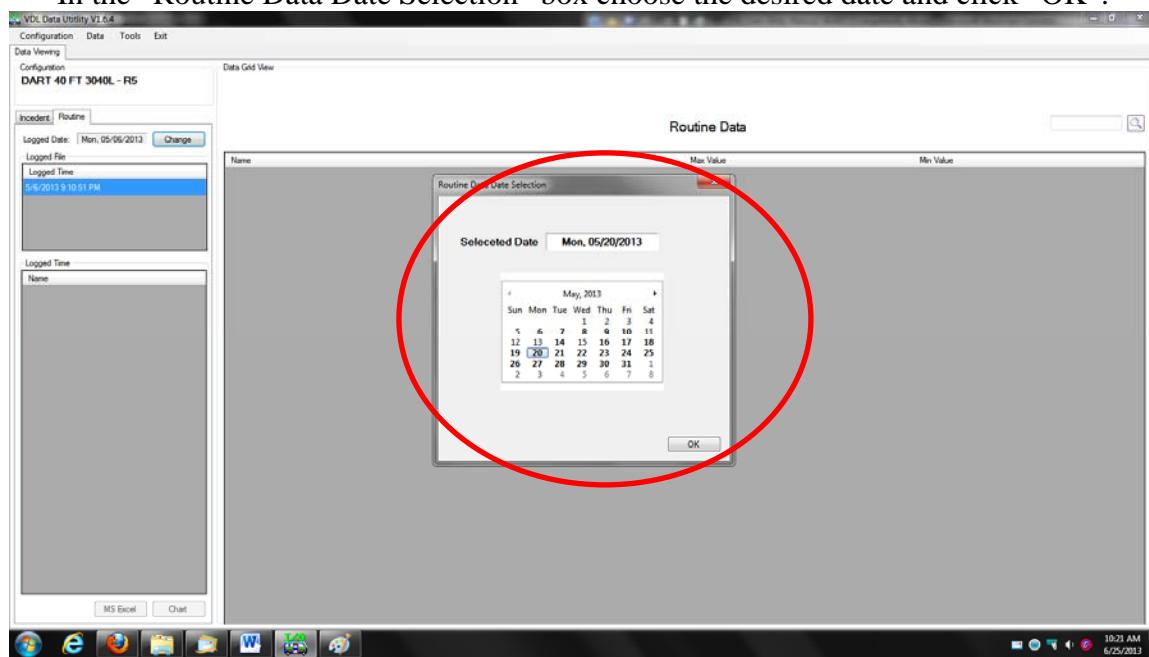


View Routine Data Summary

Select the “Routine” tab, click the “Change” button.



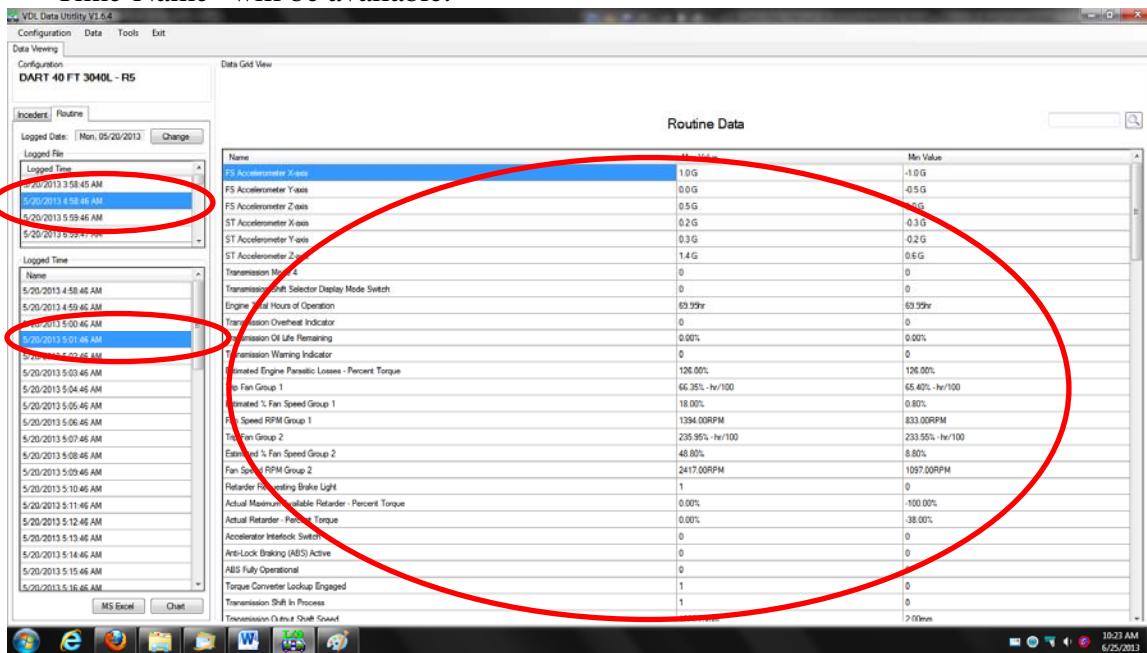
In the “Routine Data Date Selection” box choose the desired date and click “OK”.



Under “Logged File-Logged Time” select the file to be viewed on the left panel.

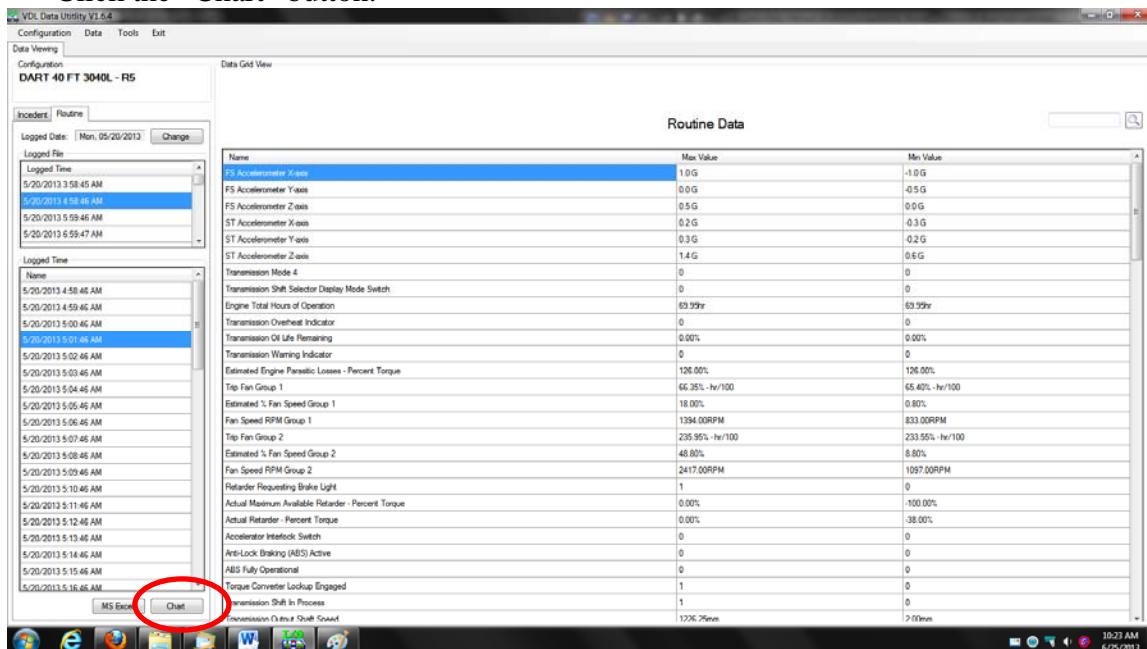
Under “Logged Time-Name” select the time to be viewed on the left panel.

Routine data is shown on the right panel. Note that you will have to click on a selection under “Logged File-Logged Time” before any selections under “Logged Time-Name” will be available.

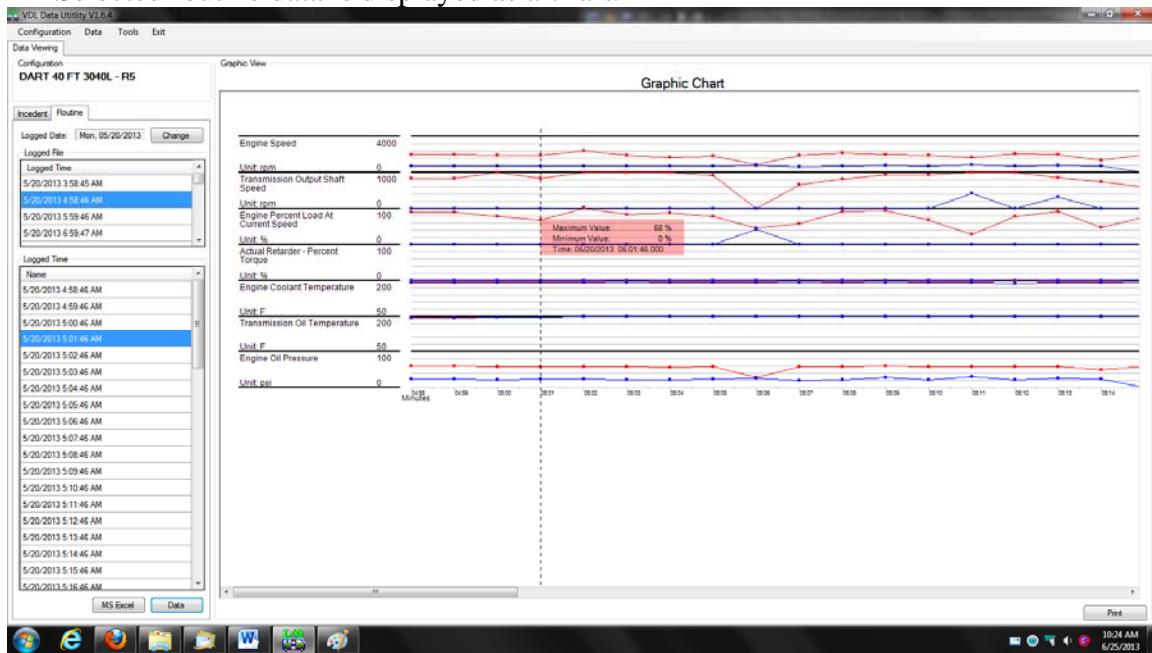


View Routine Data Chart

Click the “Chart” button.

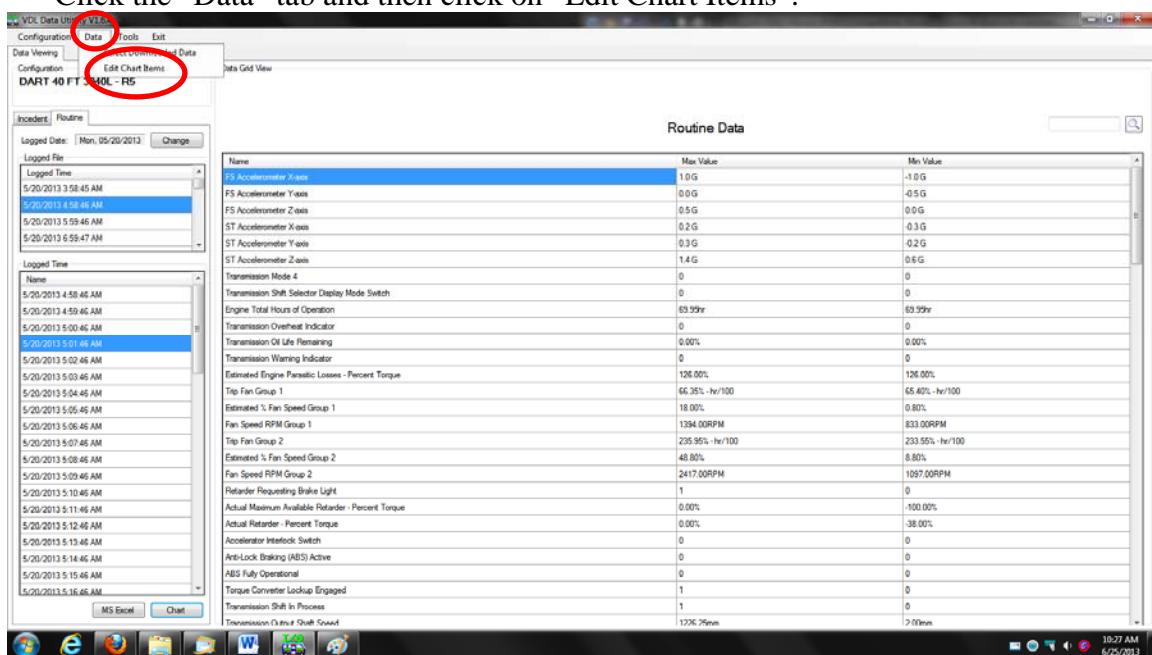


Selected routine data is displayed as a chart.

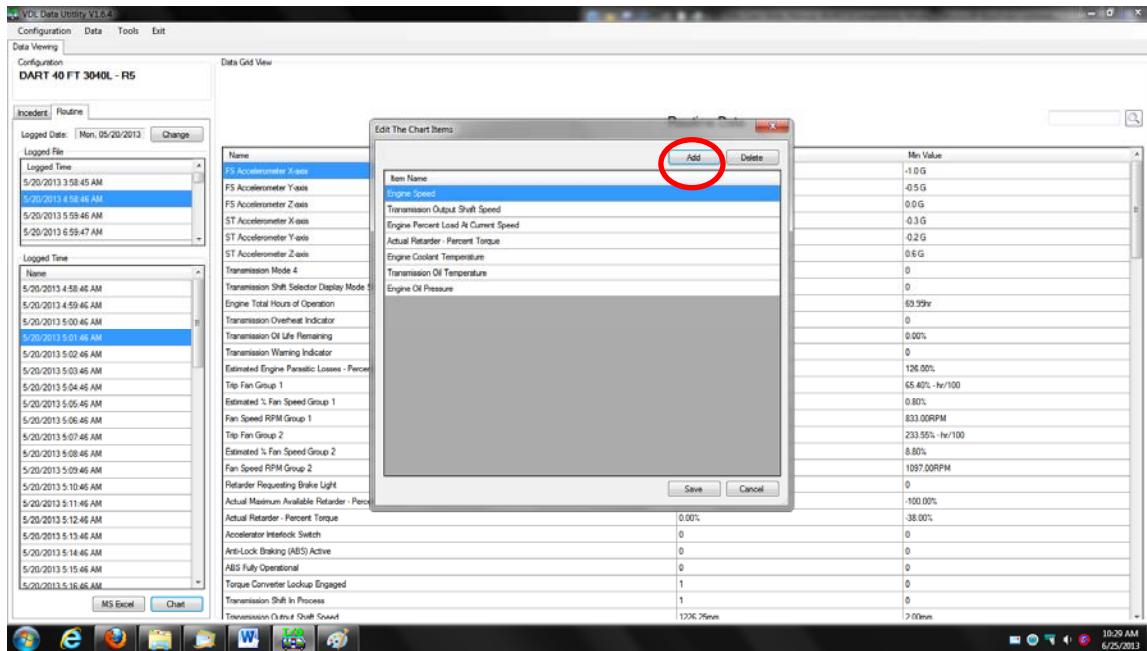


Edit Routine Data Chart Items

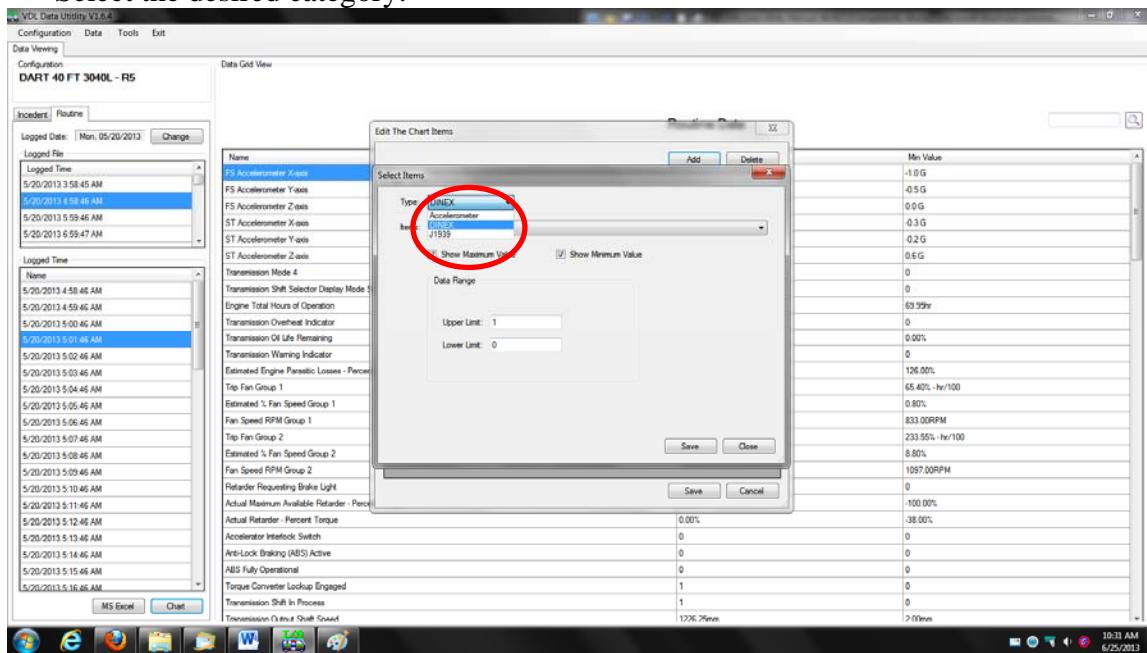
Click the “Data” tab and then click on “Edit Chart Items”.



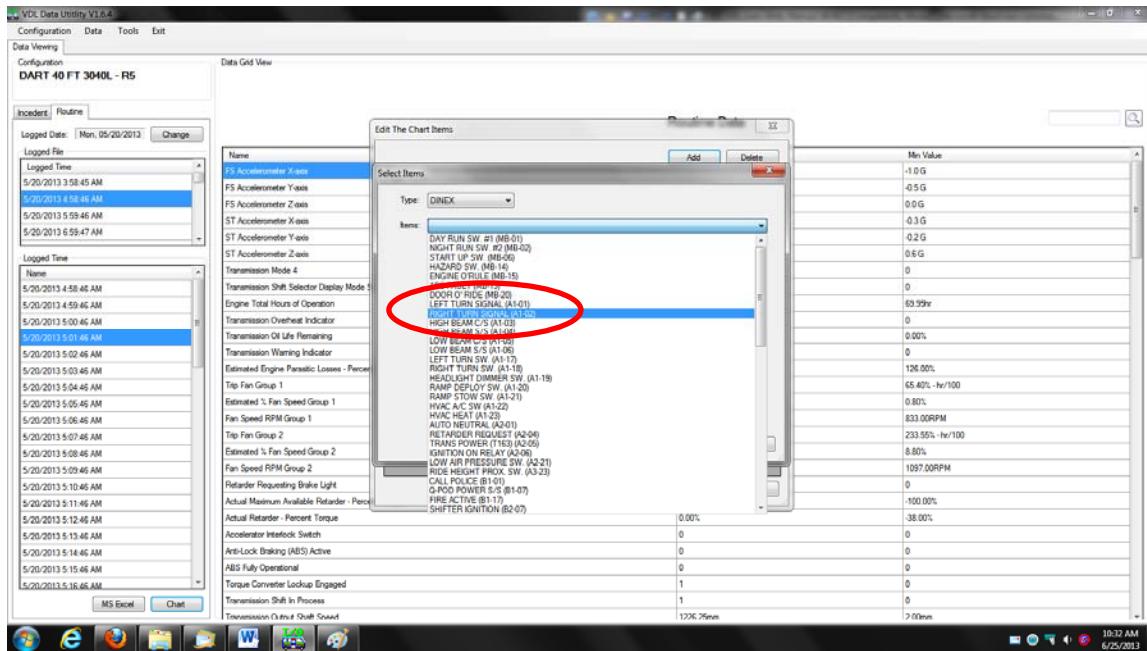
To add items click on the “Add” button.



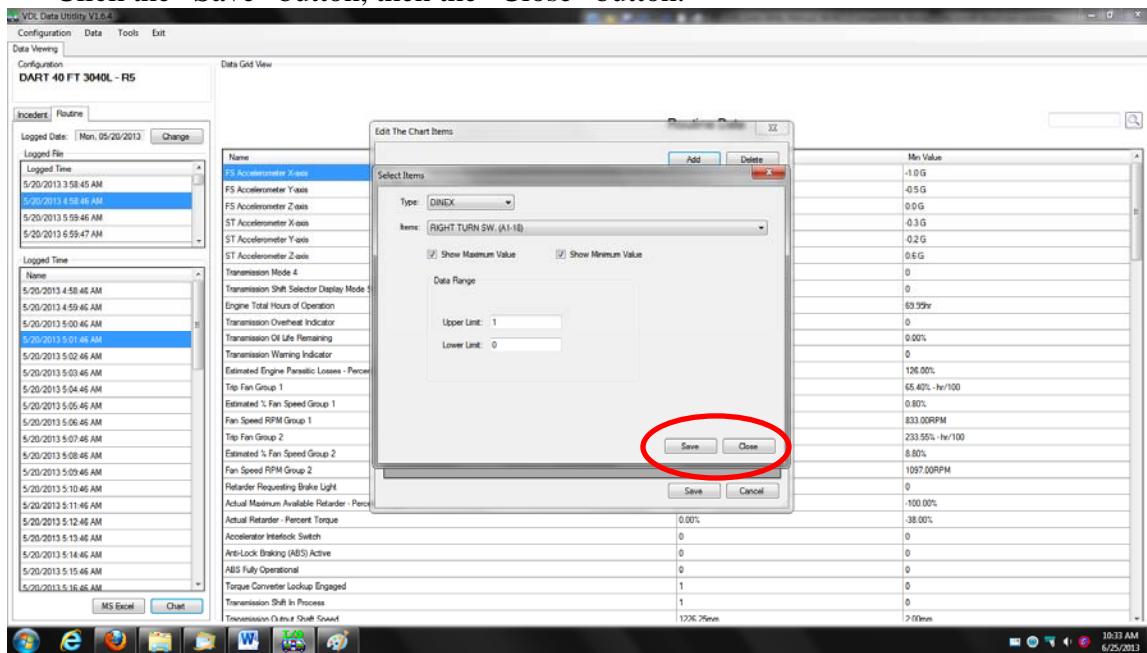
Select the desired category.



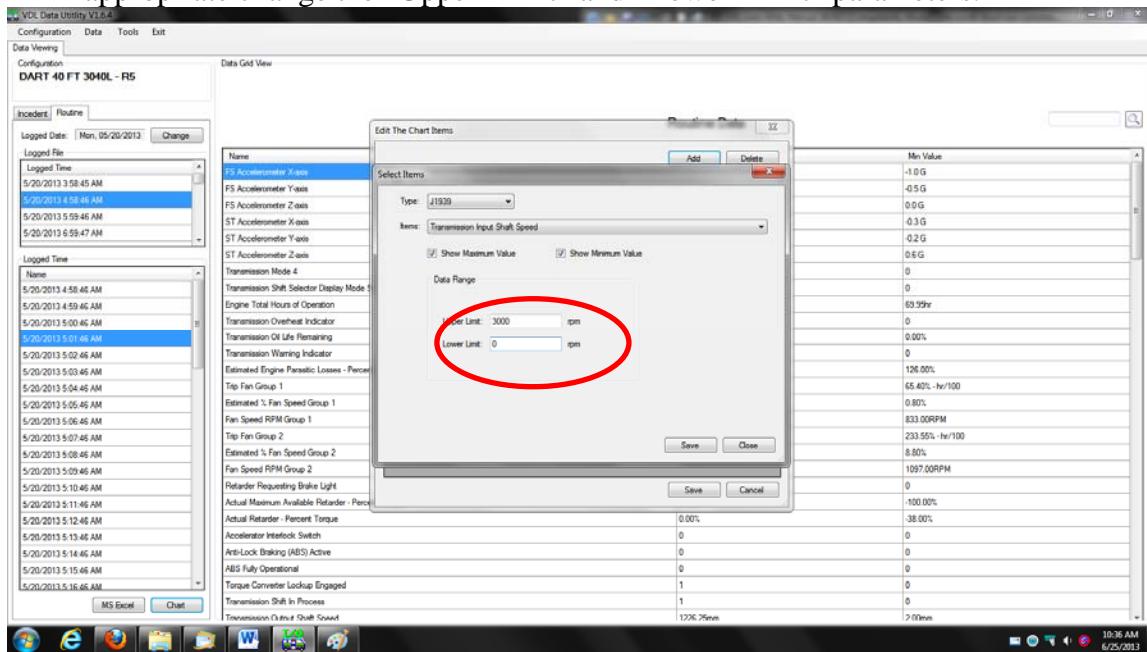
Make the desired selection.



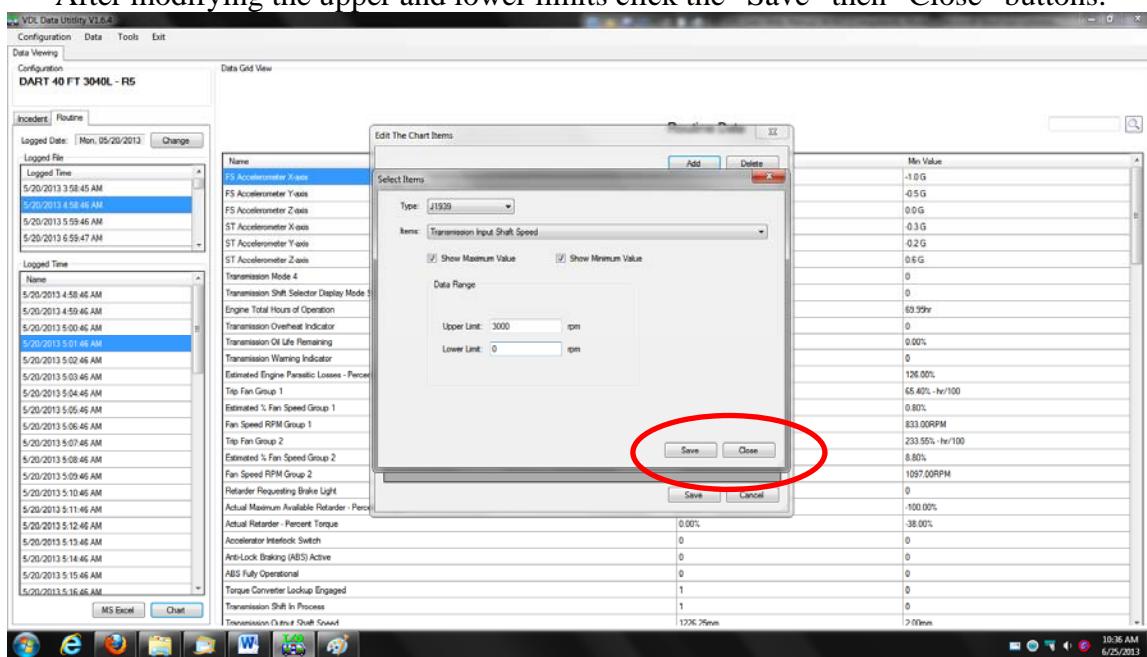
Click the “Save” button, then the “Close” button.



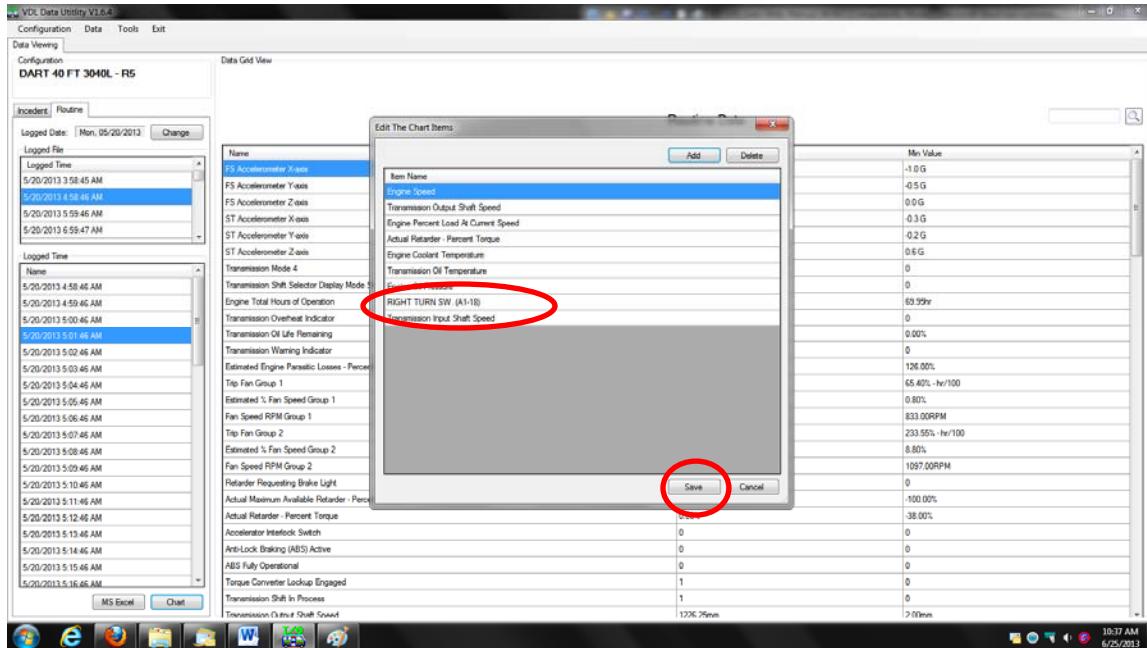
If appropriate change the “Upper Limit” and “Lower Limit” parameters.



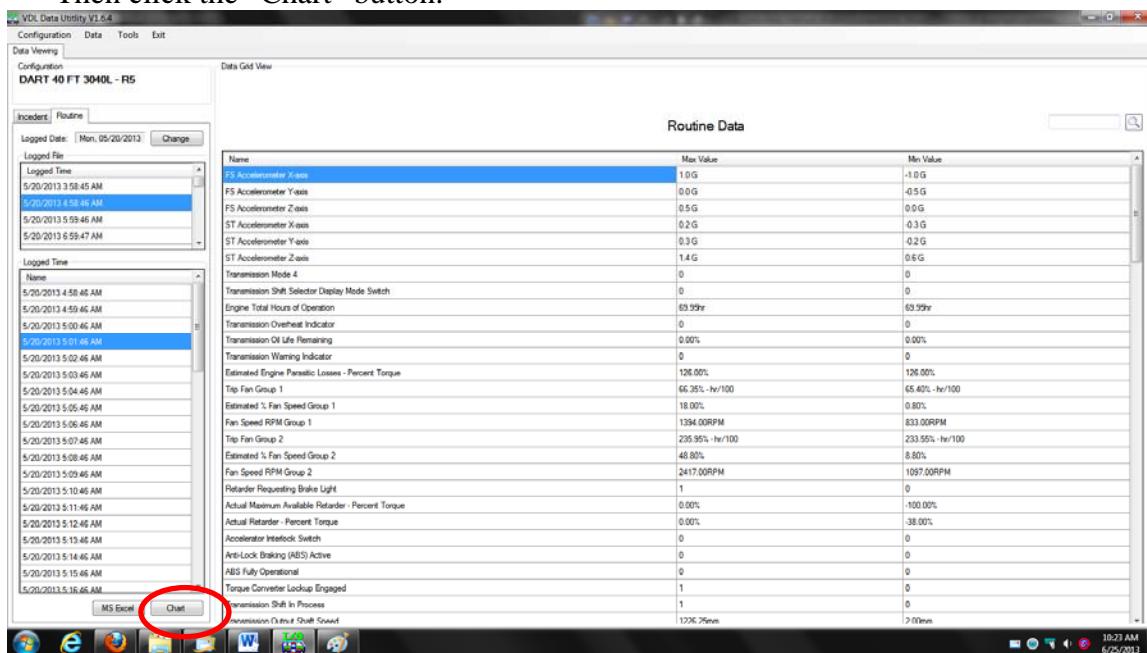
After modifying the upper and lower limits click the “Save” then “Close” buttons.



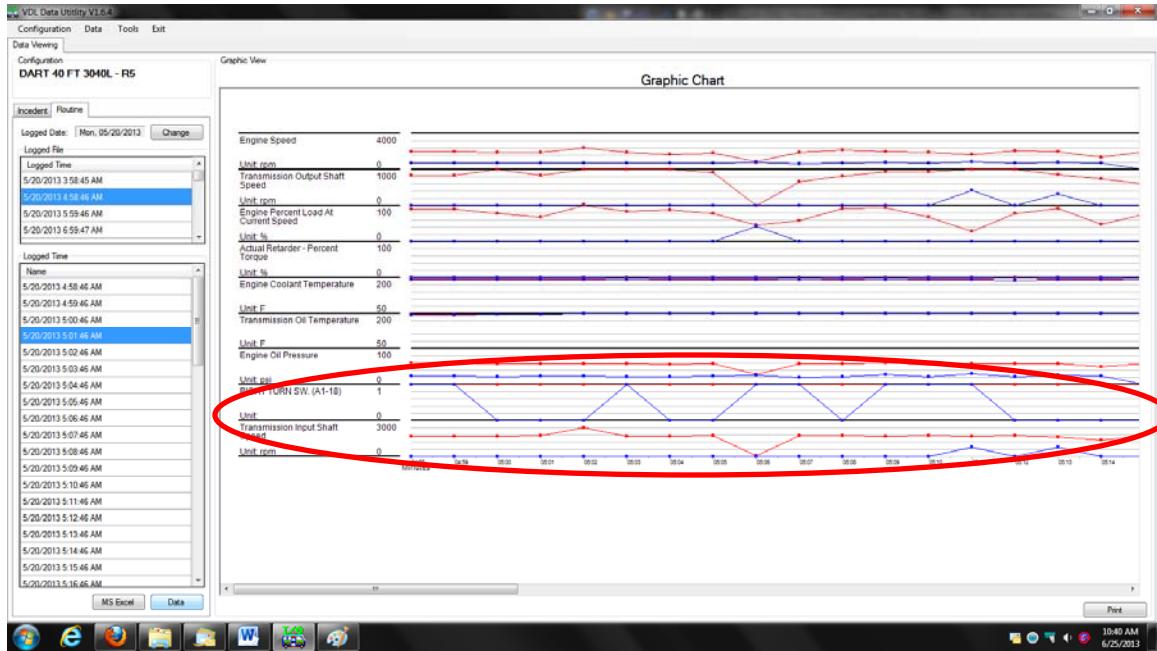
Added items are shown in the “Edit The Chart Items” box. Click the “Save” button.



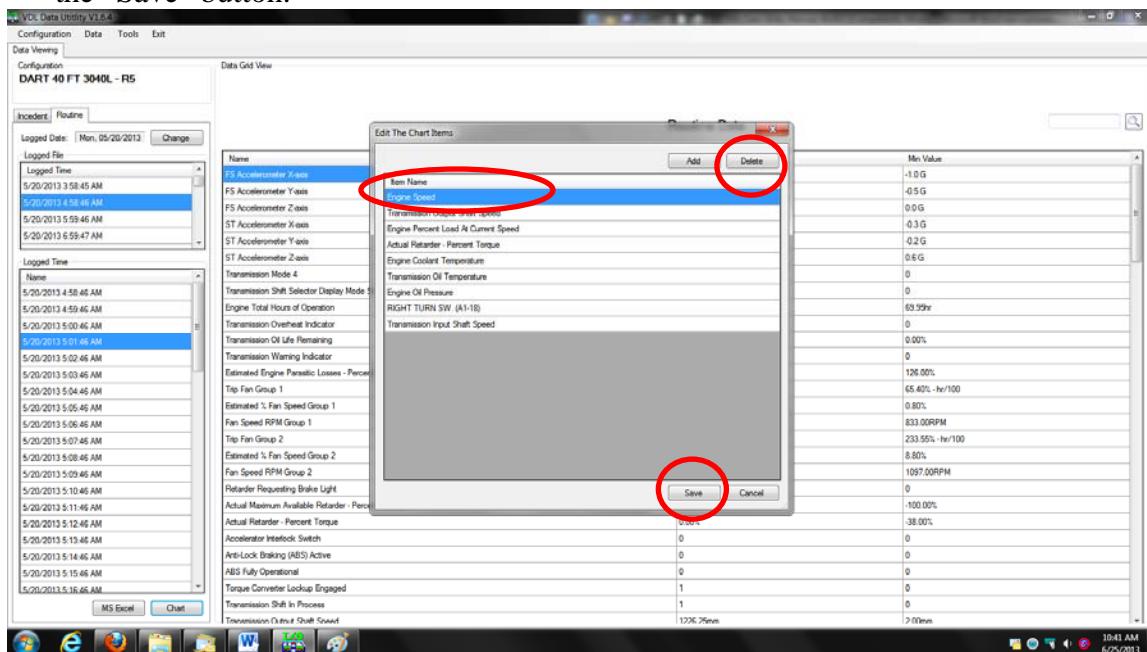
Then click the “Chart” button.



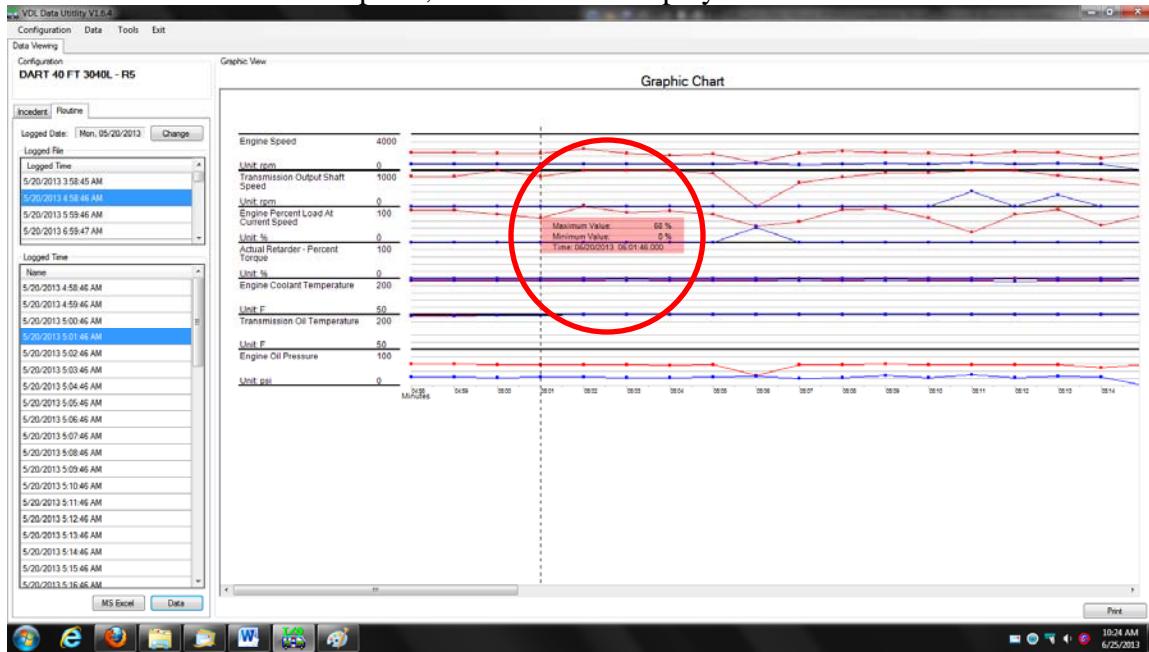
View the added items on the chart.



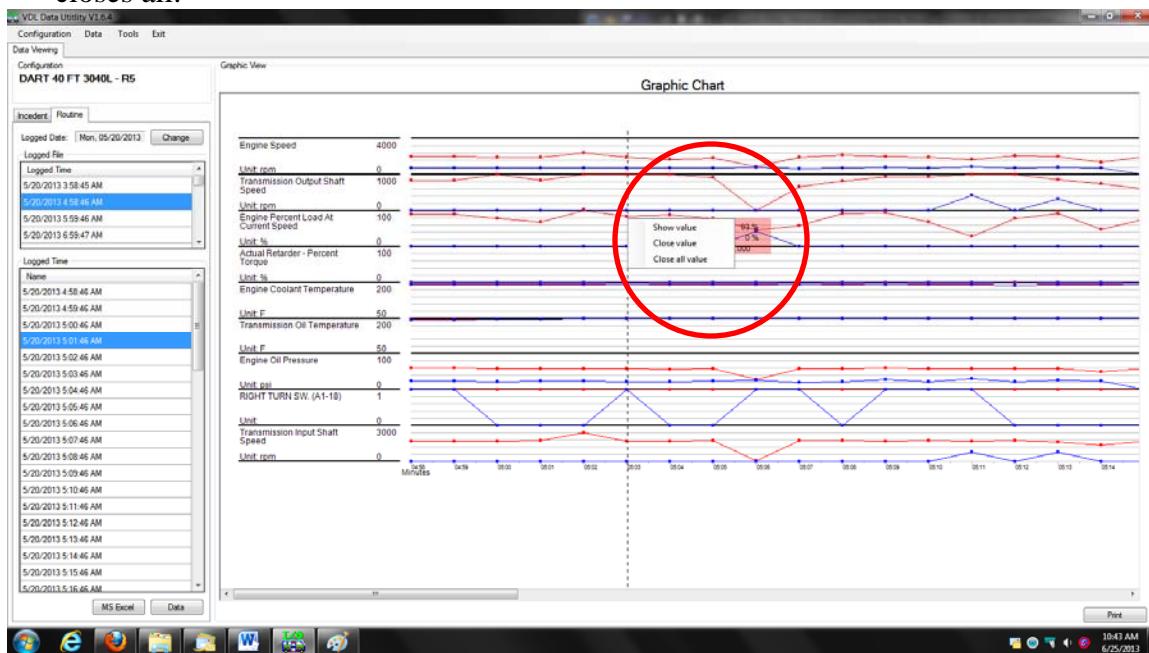
To delete items choose the item to be deleted then click on the “Delete” button, then the “Save” button.



To show the maximum and minimum values for a given minute time frame move the mouse over the desired point, the values are displayed.

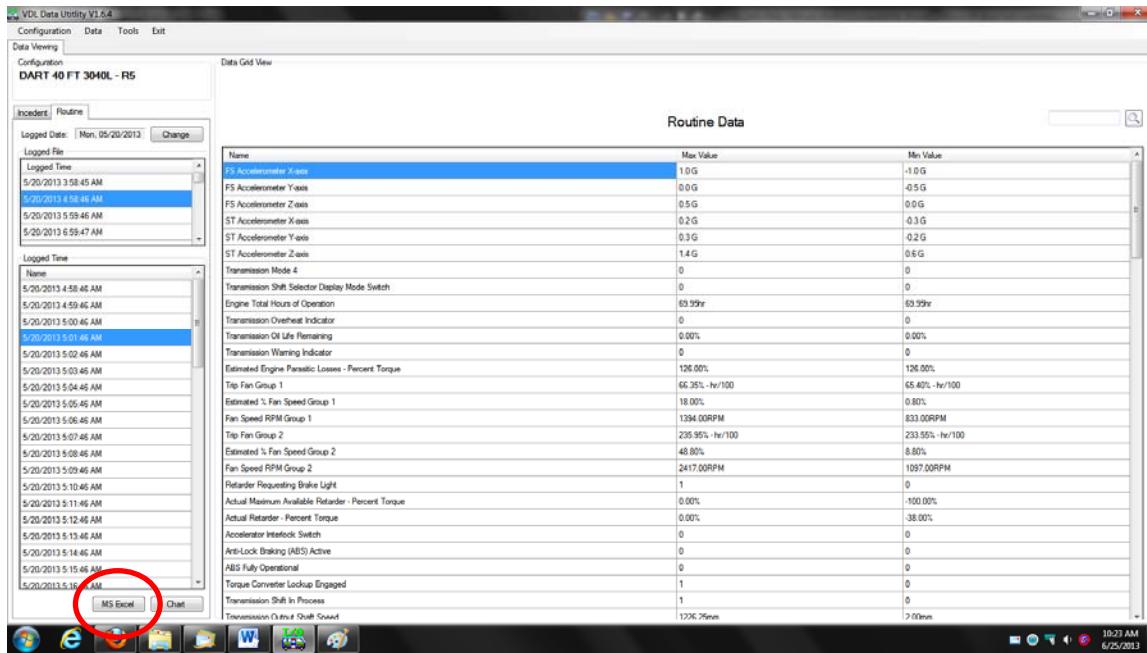


While the “Min” and “Max” values are shown right clicking the mouse brings up the “Value” display box. The options are “Show Value”, “Close Value” and “Close All Value”. “Show Value” will display the min/max values on the chart after the mouse has been moved. “Close Value” closes the highlighted value while “Close All Value” closes all.



Export Routine Data To Excel

- Click the “MS Excel” button and save to the desired location.



VDL Normal Operation Check

- On the vehicle turn the “Master Run” switch to the “Run” position.
- Typically it takes 30 seconds to 60 seconds for the VDL to fully initialize. When the VDL has initialized the bank of 8 LED’s on the VDL will flash once.
- After the VDL has initialized LED 1 will be on steady and LED 5 will be flashing or on steady.
- If LED 1 is flashing that just means the VDL battery is charging.
- As long as LED 1 and LED 5 are on steady or flashing the VDL is functioning properly.
- If LED 1 continues to flash after 15 minutes of continuous charging refer to the “VDL Battery Operation” section.

VDL Status LED Description

Use the below tables to determine the status of the VDL and to assist in determining if the VDL is operating normally.

LEDs

No	Name	Solid On	Flashing	Off	Remark
1	Power/Battery	Normal	Low Battery	No Power	
2	System Status	N/A	Error	Normal	See System Status LED
3	Incident	In incident	N/A	Normal	
4	Downloading	N/A	Downloading	Normal	
5	GPS	Normal	Acquiring Satellite	VDL Not Working	
6	Reserved				
7	N/A				
8	N/A				

System Status LED

The system uses the number of flash to indicate the error.

Times	Description	Remark
0	Dummy	
1	DINEX Empty	Receive message but without any data. Normally means it is not connected
2	J1939 Empty	Same as above
3	2 nd CAN Empty	Same as above
4	Acc ST Empty	Same as above
5	Acc FS Empty	Same as above
6	GPS Empty	Same as above
7	DINEX Error	No message for 3 seconds. Normally means the microprocessor is not working.
8	J1939 Error	Same as above
9	2 nd CAN Error	Same as above
10	Accelerometer ST Error	Same as above
11	Accelerometer FS Error	Same as above
12	GPS Error	Same as above
13	Write Routine Data Error	
14	Write Incident Data Error	

VDL Incident Battery Operation Notice

Battery Function

The VDL incident battery is not used during normal operations of the VDL module, but is powered by the bus 24V power. The VDL is designed to record 30 seconds before an incident and 15 seconds after the incident. The module is powered by the bus 24V power and doesn't use the VDL battery power unless bus stops providing 24V power to the module while recording an incident. In this case the VDL battery will continue to power the module until module has finished recording the incident and then properly shuts down.

Battery Charging

The VDL module will begin charging the VDL battery when the module is powered up. LED 1 on the module will flash when the VDL battery is being charged. When the VDL battery is fully charged the LED 1 will stay ON and not flashing when the Master Switch is ON. The VDL battery is rated to be charged and discharged 300 times. When the VDL module is first installed or the battery is replaced, the battery will take approximately 6-8 hours of continuous charging to be fully charged.

Battery Maintenance

I/O Controls recommends that the VDL should be checked every six months for proper battery operation. After the VDL battery has been fully charged the first time, the battery should take approximately 15 minutes to fully charge again. When the VDL battery is fully charged, LED 1 on the module will remain ON and not flash while the module is powered up. If the battery is charging, LED 1 on the module will flash while the Master Switch is ON. After approximately 15 minutes of VDL module operation, if the battery is still charging it is recommended that the VDL battery should be replaced. This indicates that the VDL battery is not holding a proper charge. **IMPORTANT:** *If the bus has not been in service for an extended period of time please allow the battery to completely charge then retest.* The VDL battery should be ordered from I/O Controls using part number WIR-4096-5.

G4-VDL-01 Incident Battery Pack Replacement Instruction

1. Remove the module from vehicle.
2. Open the battery cover plate as shown, refer (fig.1 and fig.2)

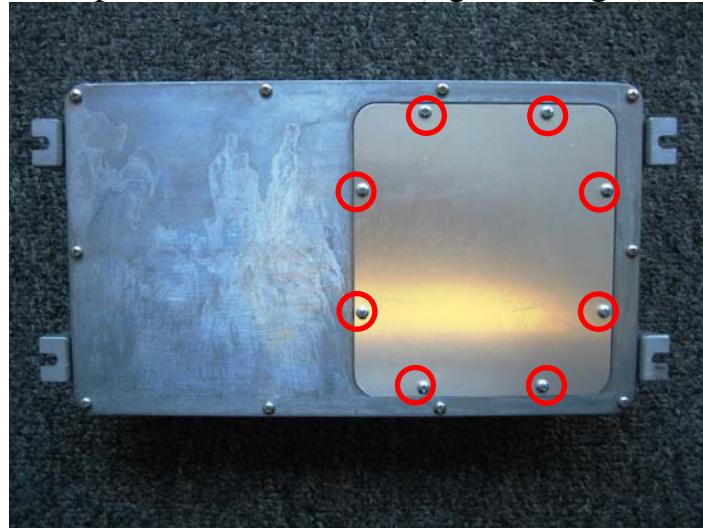


Fig.1

Battery Cover

Fig.2

3. Disconnected the battery pack connector as shown:

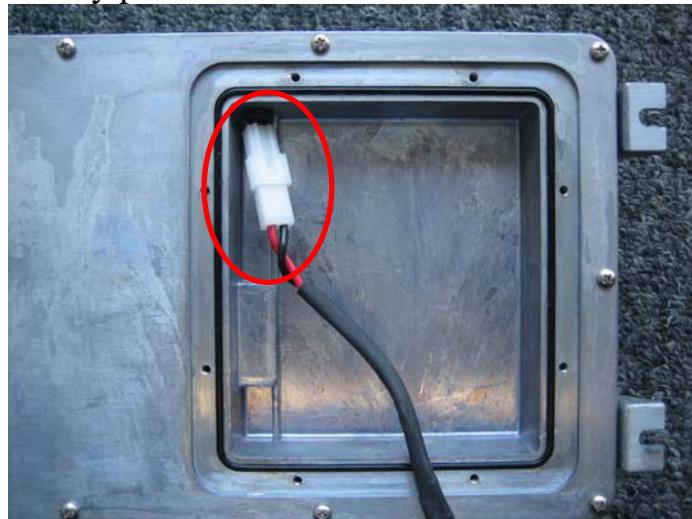


Fig.3

4. Install a new BATTERY PACK (Part Number is: "WIR-4096-5") as shown:

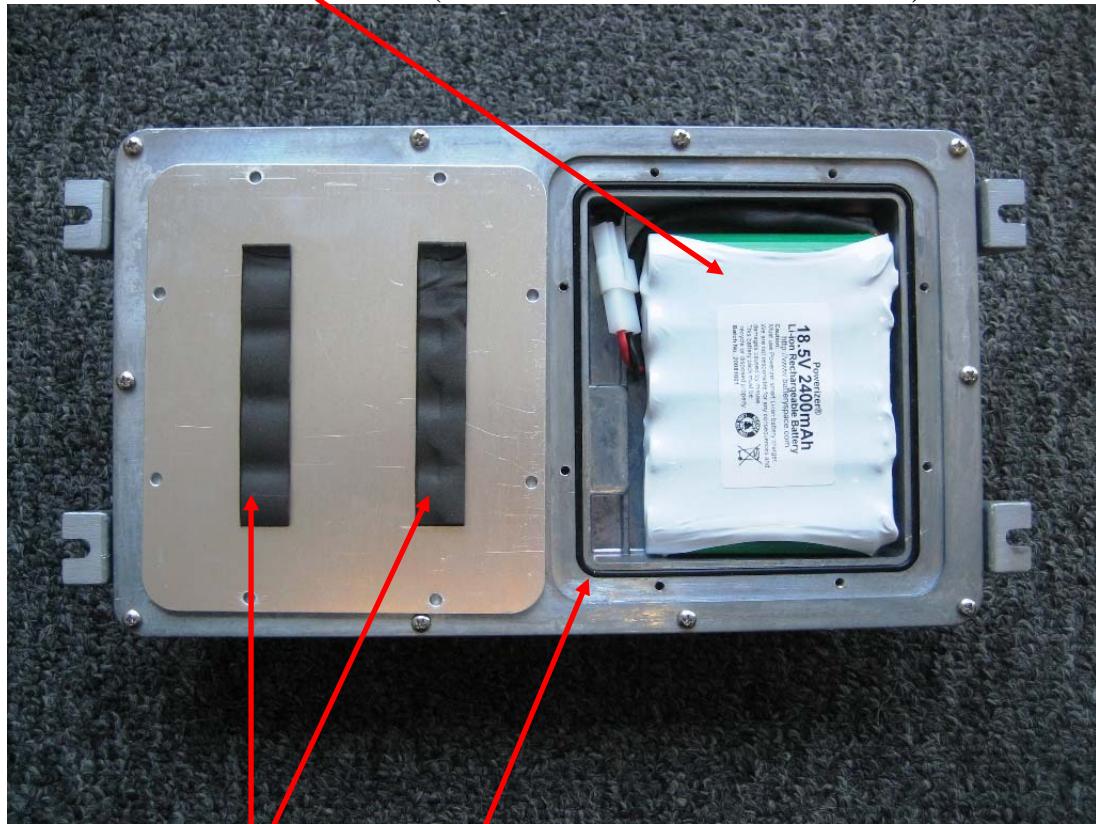


Fig.4

5. Make sure the GASKET and SEAL RING properly installed.

6. Install the Battery Cover Plate as shown:

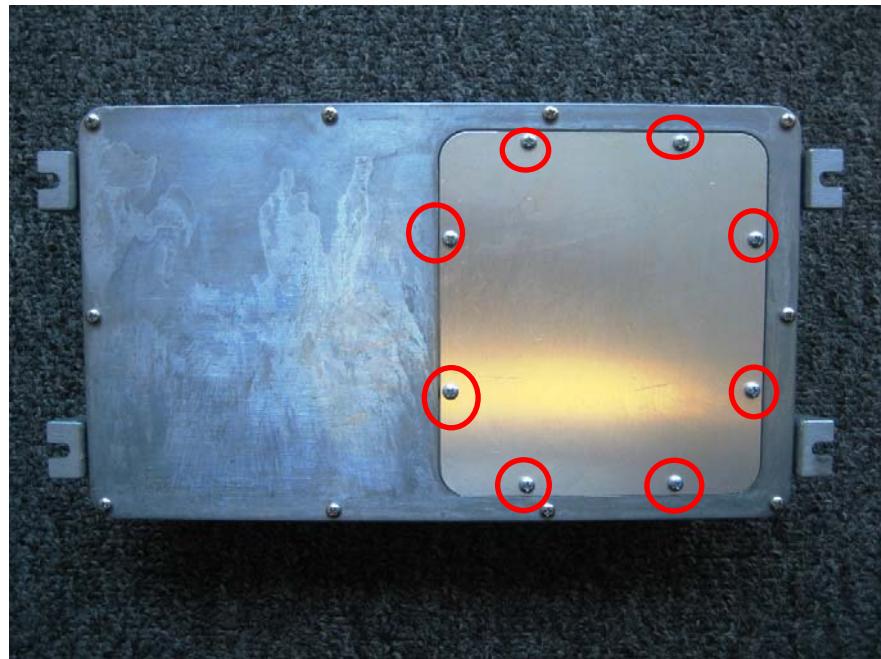


Fig. 5

7. Install the module to vehicle and turn the ignition to the Master Sw #1 position. The module up to one minute to power up.
8. Make sure the LED “1” is “ON” and not flashing when battery pack fully charged, or if LED “1” is flashing the new battery pack is charging.

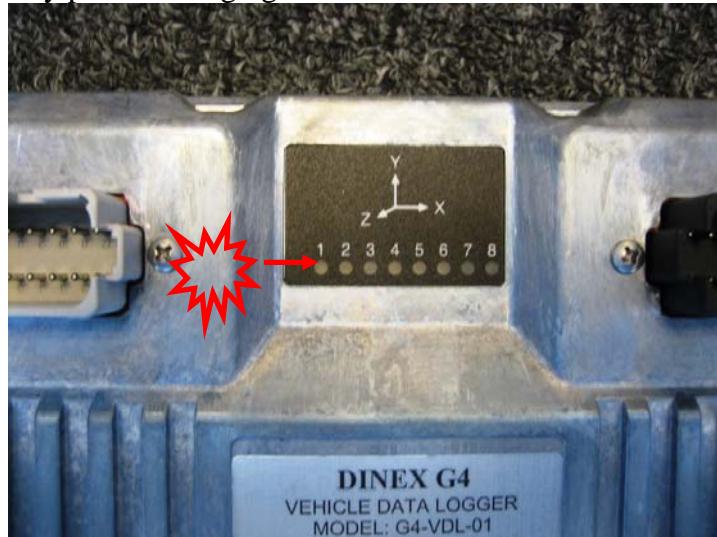


Fig. 6

Done!

VDL RTC Battery Operation Notice

Battery Function

The VDL RTC battery is used to maintain proper date and time if a GPS signal is not available.

Battery Charging

The VDL module applies a constant charge voltage to the RTC battery when the VDL is active. When the VDL module is first installed or the battery is replaced, the battery will take approximately 6-8 hours of continuous charging to be fully charged.

Battery Maintenance

I/O Controls recommends that the VDL should be checked every six months for proper battery operation. Disconnect the GPS antenna from the VDL then start the bus. After the VDL has initialized download the VDL data to a USB drive. Insert the USB drive to a PC and browse to the “Interval Routine Data” folder. If this folder contains a “2006-01” folder then the RTC battery needs to be replaced or the VDL needs replaced. Replace the RTC battery with a fully charged RTC battery then retest. If the test does not pass then replace the VDL. **IMPORTANT:** *After testing is complete, reattach the GPS antenna cable. If the bus has not been in service for an extended period of time please allow the battery to completely charge then retest.*

**G4-VDL-01 RECHARGEABLE BATTERIES REPLACEMENT
INSTRUCTION**

1. Remove the module from vehicle.
2. Unscrewing 8pcs screws of bottom case as shown:

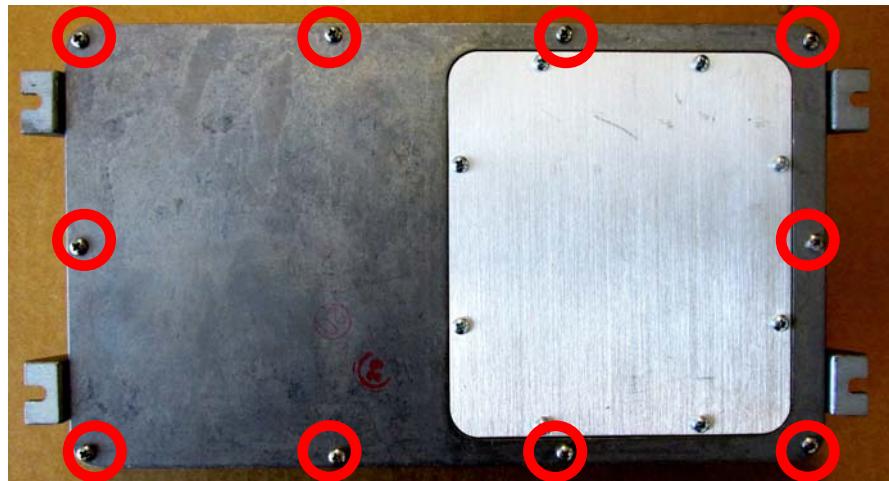


Fig. 1a

3. Open the bottom case as shown:



Fig. 1b

4. Remove **SD Card bracket and SD Card** as shown:

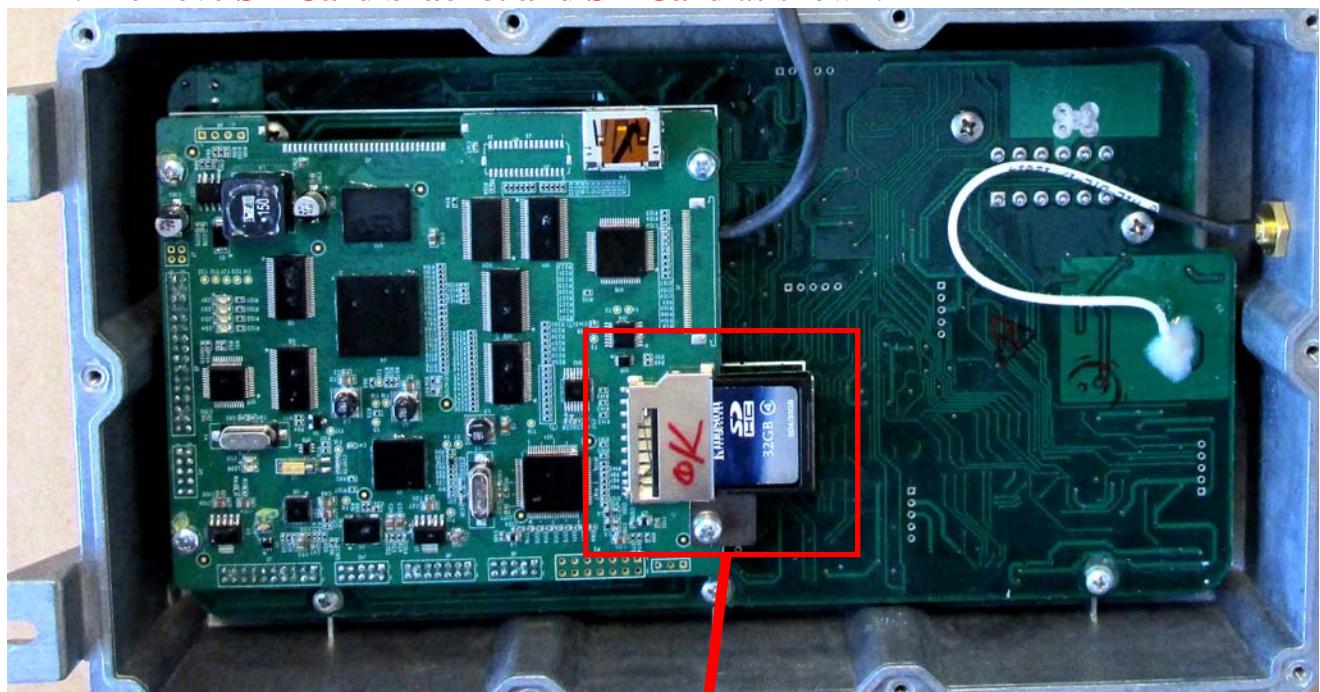


Fig. 2a

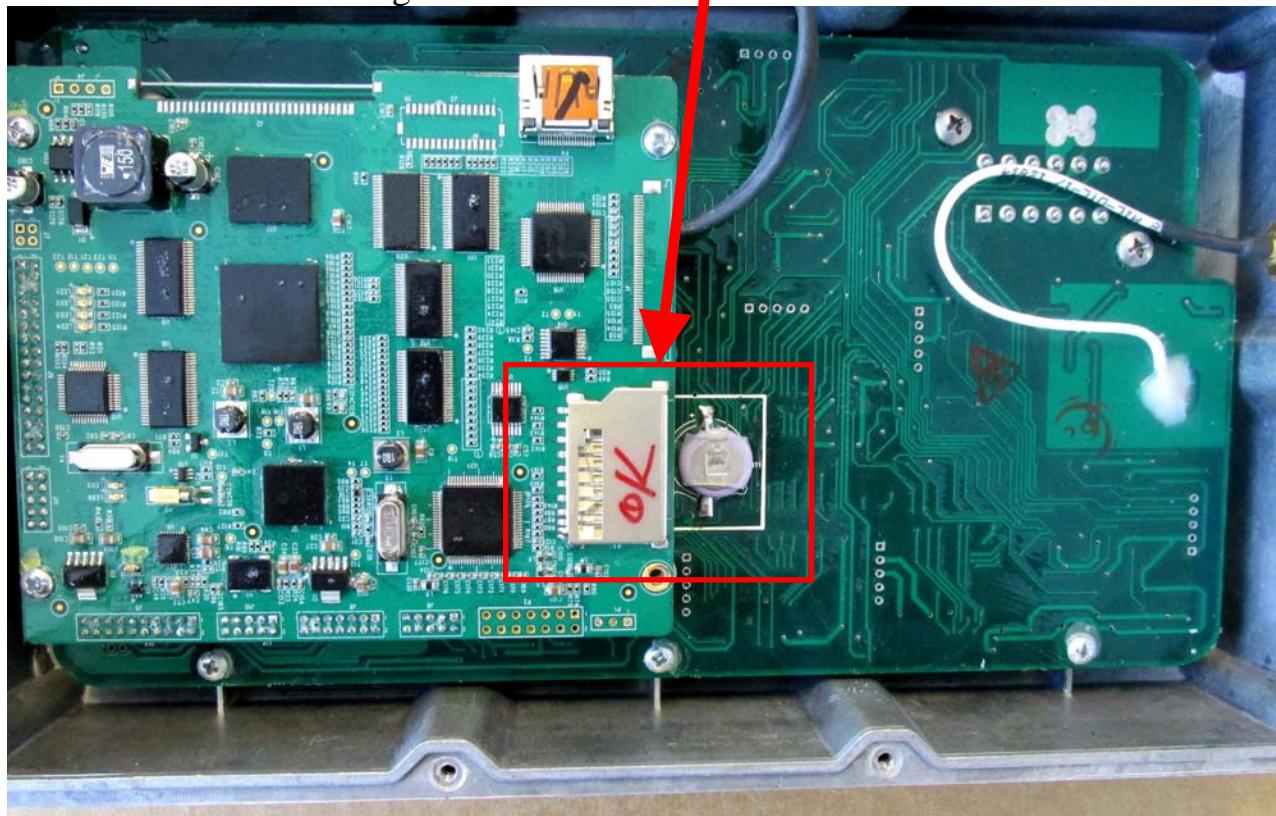


Fig. 2b

5. Change the new **BTR-0007 (ML1220)** battery by use soldering iron and make sure **polarity** is correct as shown:

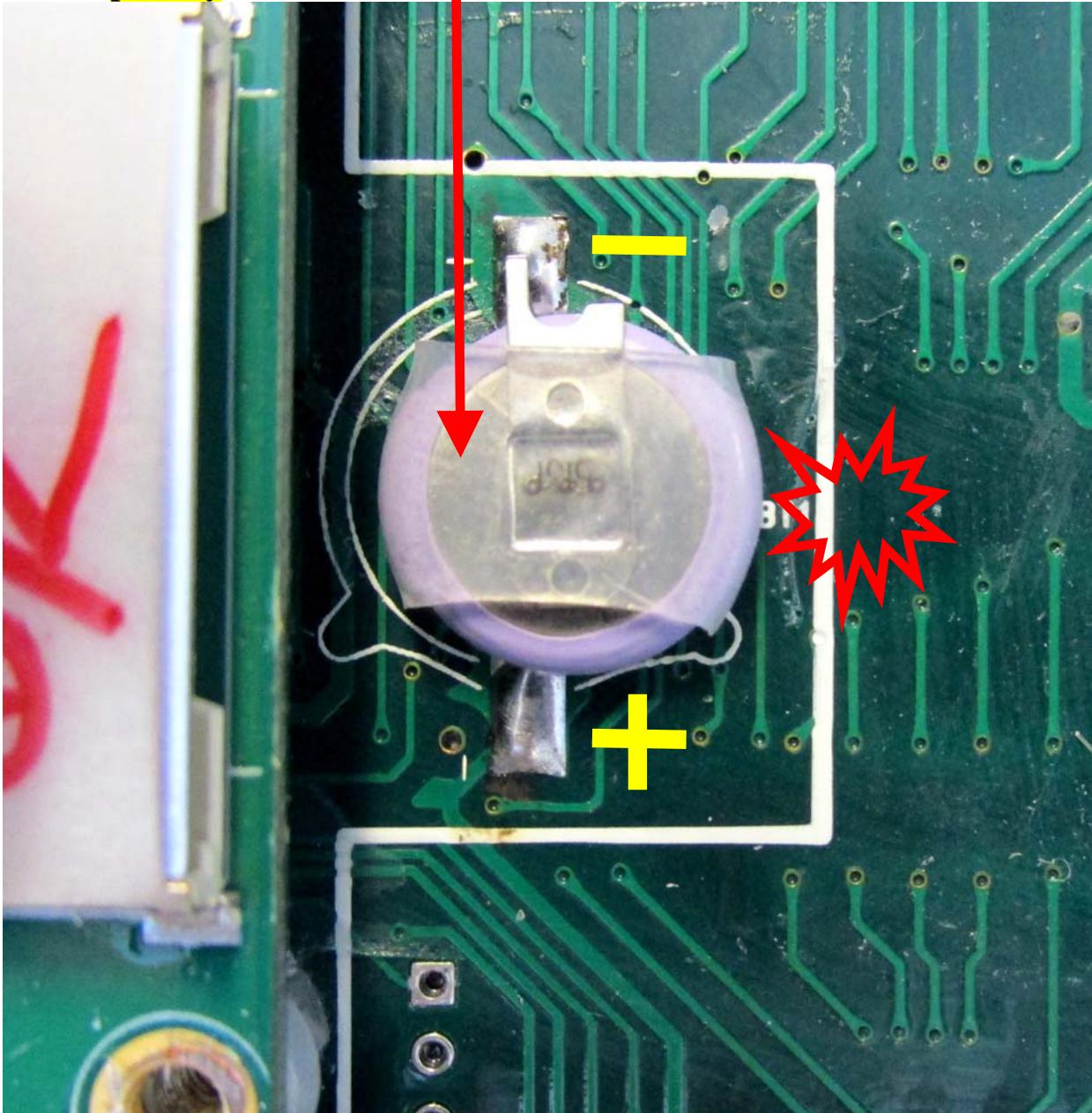


Fig. 3

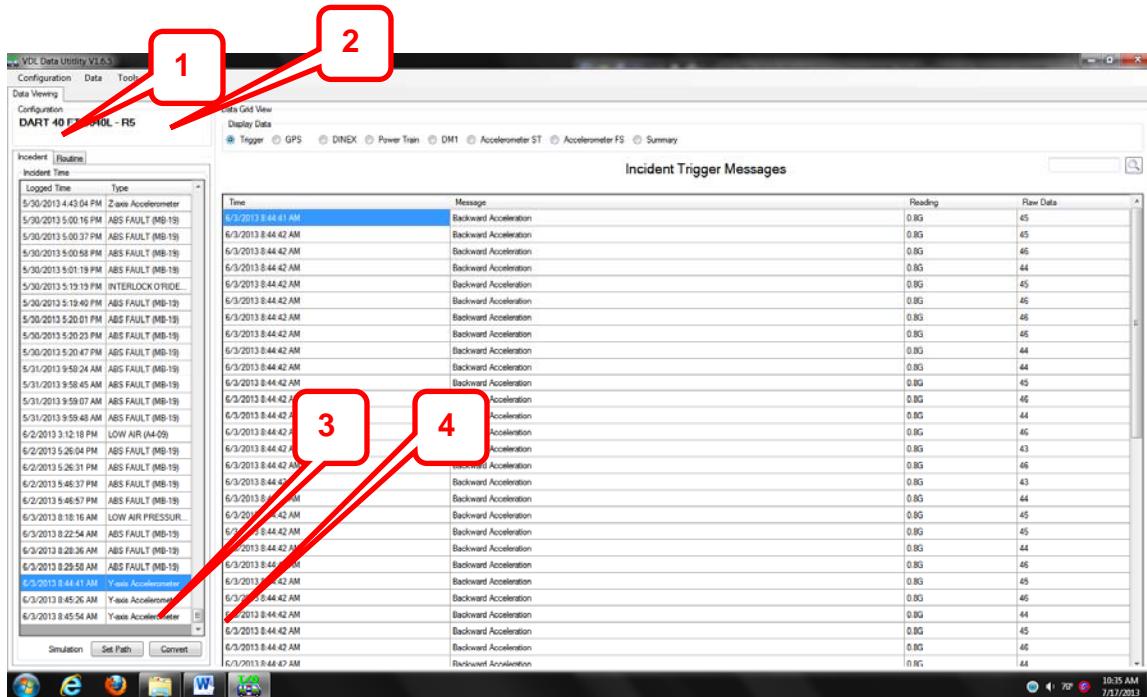
Note: Don't follow the PCB white color screen polarity mark and follow this article yellow polarity mark.

6. Re-assemble SD Card, SD Card Bracket and bottom case.

Done!

Section 2: Individual Screen Information

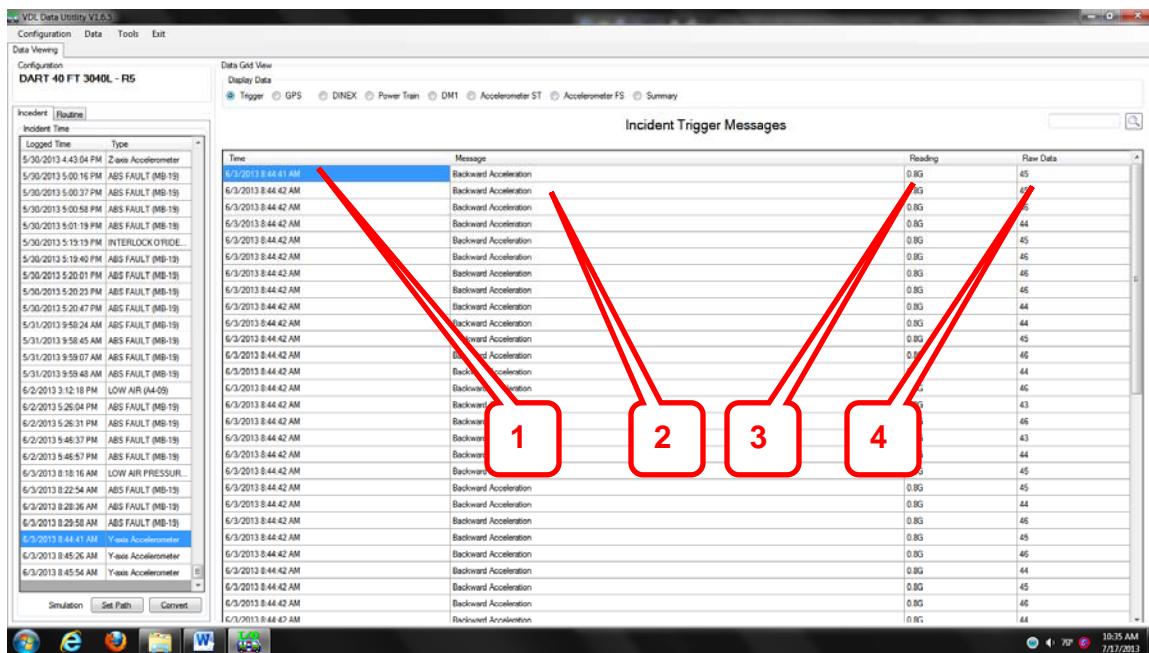
Data Viewing: Incident



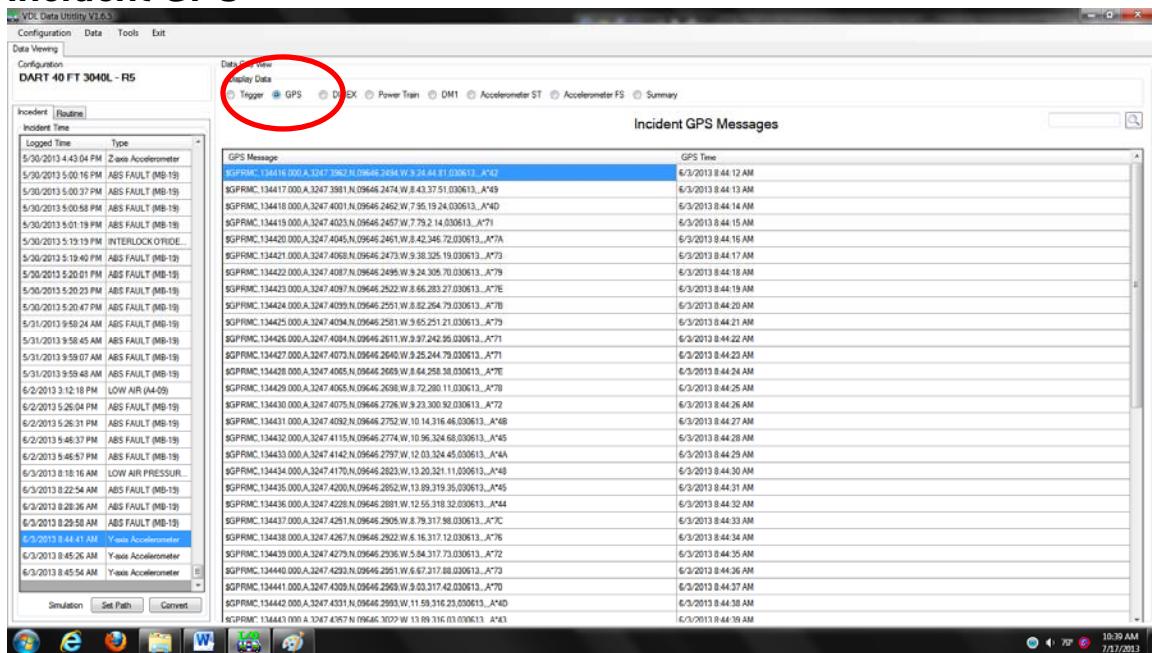
1. Column “Log Time”: The time when the incident was triggered
 2. Column “Type”: The name of the item that triggered the incident.
 3. Button “Set Path”: To set the path of the folder that the simulation data will save to.
 4. “Button “Convert”: Convert the incident data into the simulation files. The button will be enabled after the path is defined.

Incident Trigger

There might be some other items that hit the trigger value after the first trigger. VDL logs the first 100 triggered items.



1. Column “Time”: The time triggered item logged.
 2. Column “Message”: The name of the items that hit the trigger value.
 3. Column “Reading”: The converted value of the logged item.
 4. Column “Raw Data”: The raw data of the logged item.

Incident GPS

The format of GPS message is:

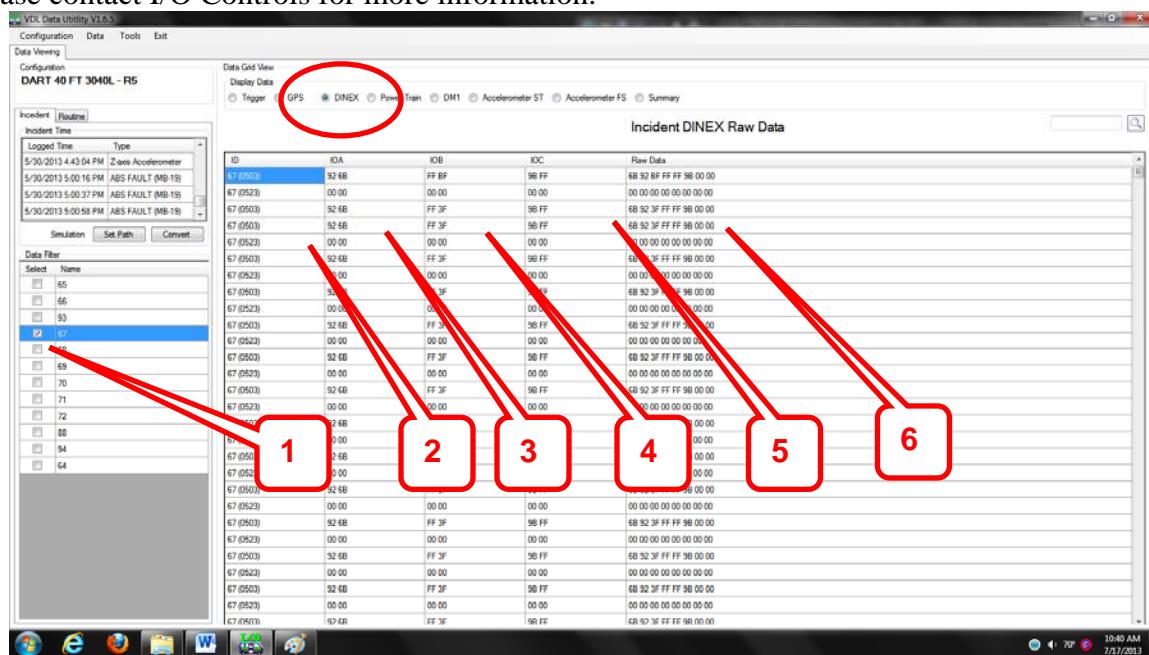
\$GPRMC,220516,A,5133.82,N,00042.24,W,173.8,231.8,130694,004.2,W*70

1 2 3 4 5 6 7 8 9 10 11 12

1. 220516 Time Stamp
2. A validity - A-ok, V-invalid
3. 5133.82 current Latitude
4. N North/South
5. 00042.24 current Longitude
6. W East/West
7. 173.8 Speed in knots
8. 231.8 True course
9. 130694 Date Stamp
10. 004.2 Variation
11. W East/West
12. *70 checksum

Incident DINEX

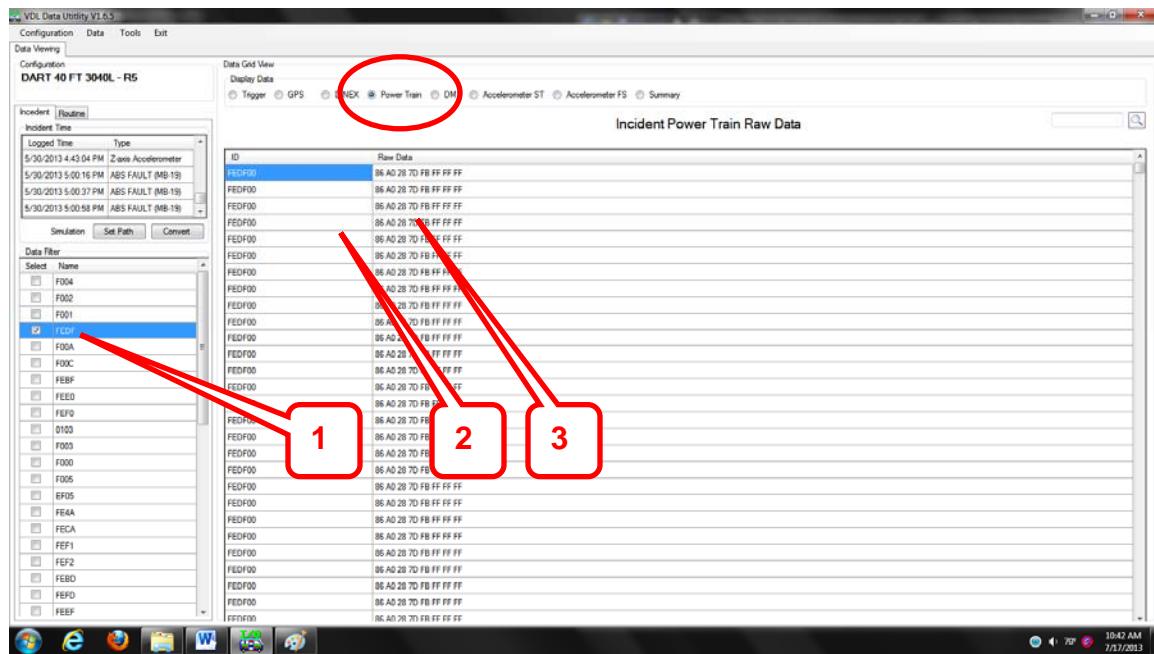
The data that is logged from the DINEX CAN bus. This is the data that each DINEX module sends to the MBC during the incident logging period. Each module has three input/output ports. Each I/O port has 16 binary channels. Different module types have different channel definitions. The VDL system decodes the data and displays it in the summary report. If you want to know how to decode the data from the displayed raw data, please contact I/O Controls for more information.



1. Data Filter: User can select the messages from any ID to show on the right panel
 2. ID: The module ID and the DINEX message ID of the message
 3. IOA: The first input/output port of the module. It is in hexadecimal format.
 4. IOB: The second input/output port of the module. It is in hexadecimal format.
 5. IOC: The third input/output port of the module. It is in hexadecimal format.
 6. Raw Data: The 8 bytes data sent to the DINEX CAN bus. Byte 1-2 are IOA, byte 3-4 are IOB, byte 5-6 are IOC, and byte 7-8 is not used in normal I/O operation.

Incident Power Train

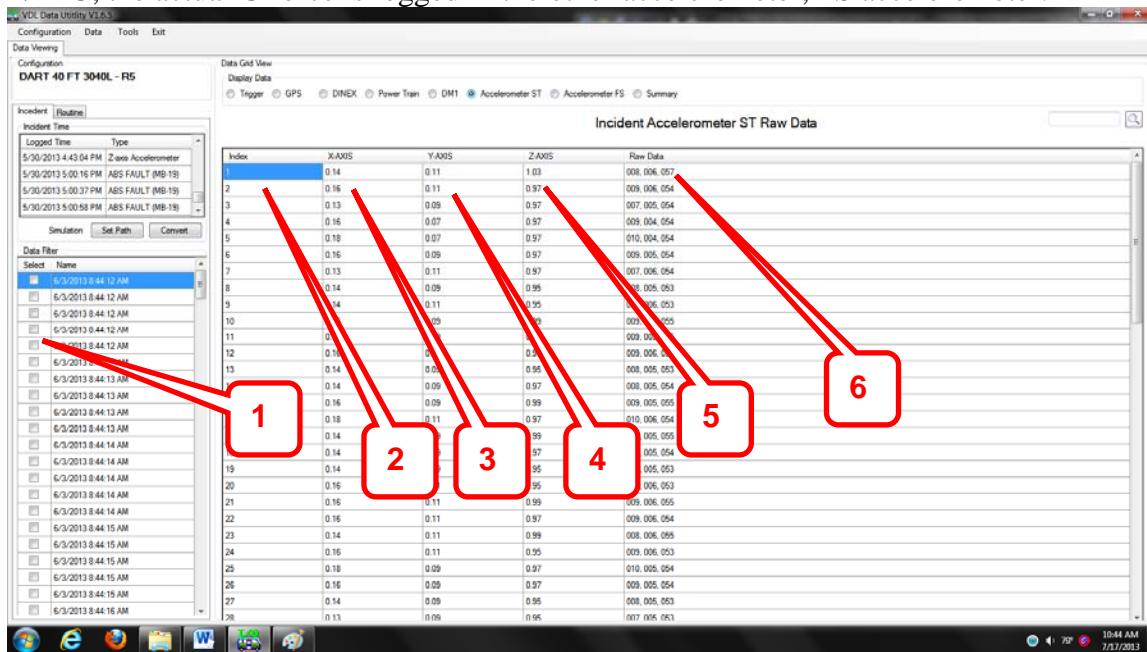
The data that is logged from the J1939 Power Train CAN bus. The 1939 power train messages are sent by the engine, transmission, ABS system, and other components on the bus. The format of the messages complies to the SAE J1939 standard. Each message contains one CAN ID and 8 bytes of data. The VDL system decodes the data and displays it in the summary report. If you want to know how to decode the data from the raw data, please contact I/O Controls for more information.



1. Data Filter: User can select the J1939 PGN number and show the messages in the right panel.
2. ID: The PGN number and the source address of the CAN message
3. Raw Data: The 8-byte data of the CAN message in hexadecimal format.

Incident Accelerometer ST

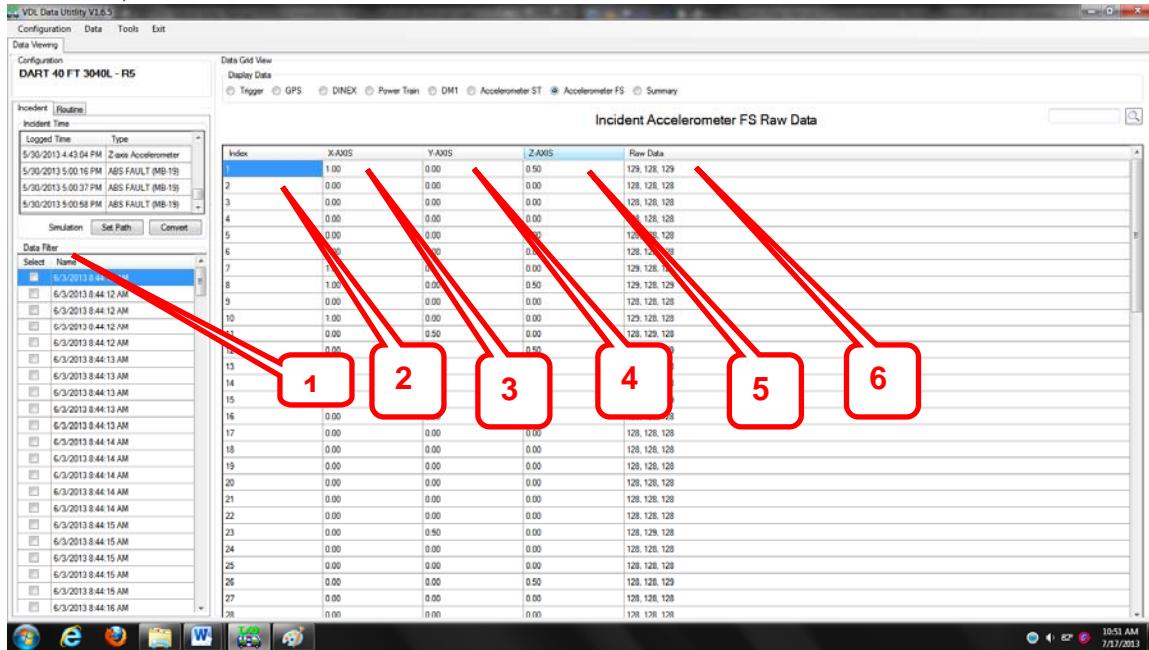
Displays the data logged from the sensitive accelerometer. The resolution of the ST accelerometer is 0.1G and the data range is +/- 2G. The ST accelerometer is used to log the status of bus operation, such as hard break or fast acceleration. For impact larger than +/- 2G, the actual G force is logged in the other accelerometer, FS accelerometer.



1. Data Filter: The G force data logged in the selected time, in second, will display in the right panel.
2. Index: The sequence of the data
3. X-AXIS: Forward/Backward G force
4. Y-AXIS: Leftward/Rightward G force
5. Z-AXIS: Upward/Downward G force
6. Raw Data: The data received from accelerometer before converted to G force.

Incident Accelerometer FS

Displays the data logged from the large scale accelerometer. The resolutions of the FS accelerometer is 1G in X direction, 0.5G in Y/Z directions. The ranges are +/- 70G in X direction, +/- 50G in Y/Z directions.



1. Data Filter: The G force data logged in the selected time, will display in the right panel.
2. Index: The sequence of the data
3. X-AXIS: Forward/Backward G force
4. Y-AXIS: Leftward/Rightward G force
5. Z-AXIS: Upward/Downward G force
6. Raw Data: The data received from accelerometer before convert into G force.

Incident Summary

The Summary report converts the raw data into a readable format. The data is aggregated into maximum and minimum values of a period. There are two options of the period. One is whole incident and the other one is each second within the incident.

Name	Max Value	Occurred Time	Min Value	Occurred Time
ABS Fully Operational	3	5/30/2013 5:00:09 PM	1	5/30/2013 5:00:09 PM
Accelerator Interlock Switch	N/A	N/A	N/A	N/A
Accelerator Pedal Position 1	42 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Actual Engine - Percent Torque	49 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Actual Maximum Available Retarder - Percent Torque	49 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Actual Retarder - Percent Torque	0 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Anti-Lock Braking (ABS) Active	3	5/30/2013 5:00:09 PM	0	5/30/2013 5:00:09 PM
Barometric Pressure	N/A	N/A	N/A	N/A
Brake Pedal Position	0 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Driveline Retarder Overheat Indicator	100 %	5/30/2013 5:00:09 PM	100 %	5/30/2013 5:00:09 PM
Engine Coolant Level	100 %	5/30/2013 5:00:09 PM	100 %	5/30/2013 5:00:09 PM
Engine Coolant Temperature	100 F	5/30/2013 5:00:09 PM	100 F	5/30/2013 5:00:09 PM
Engine Fan Speed	0 RPM	5/30/2013 5:00:09 PM	0 RPM	5/30/2013 5:00:09 PM
Engine Intake Manifold Pressure	100 %	5/30/2013 5:00:09 PM	100 %	5/30/2013 5:00:09 PM
Engine Intake Manif	100 %	5/30/2013 5:00:09 PM	100 %	5/30/2013 5:00:09 PM
Engine Oil Pressure	49 %	5/30/2013 5:00:09 PM	49 %	5/30/2013 5:00:09 PM
Engine Percent Load	0 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Engine Protection System Approaching Shutdown	0	5/30/2013 5:00:09 PM	0	5/30/2013 5:00:09 PM
Engine Protection System Configuration	1	5/30/2013 5:00:09 PM	1	5/30/2013 5:00:09 PM
Engine Protection System has Shutdown Engine	0	5/30/2013 5:00:09 PM	0	5/30/2013 5:00:09 PM
Engine Protection System Timer Override	0	5/30/2013 5:00:09 PM	0	5/30/2013 5:00:09 PM
Engine Protection System Timer State	0	5/30/2013 5:00:09 PM	0	5/30/2013 5:00:09 PM
Engine Speed	1419 rpm	5/30/2013 5:00:09 PM	1135 rpm	5/30/2013 5:00:09 PM
Engine Starter Mode	4	5/30/2013 5:00:09 PM	4	5/30/2013 5:00:09 PM
Estimated % Fan Speed Group 1	0 %	5/30/2013 5:00:09 PM	0 %	5/30/2013 5:00:09 PM
Estimated % Fan Speed Group 2	1 %	5/30/2013 5:00:09 PM	1 %	5/30/2013 5:00:09 PM
Estimated Engine Parasitic Losses - Percent Torque	126 %	5/30/2013 5:00:09 PM	126 %	5/30/2013 5:00:09 PM
Fan Speed RPM Group 1	0 RPM	5/30/2013 5:00:09 PM	0 RPM	5/30/2013 5:00:09 PM
Fan Speed RPM Group 2	933 RPM	5/30/2013 5:00:09 PM	933 RPM	5/30/2013 5:00:09 PM

1. Summary Period: The two options of summary period, whole incident and each second.
2. Name: The name of the item. If it is a J1939 power train item, the VDL system displays the SPN name. If it is a DINEX I/O channel, the VDL system displays the channel name.
3. Max Value: The maximum value during the period. If the value is followed by a unit, that means it has been converted. If there is no unit that means it is the maximum number of the status.
4. Occurred Time: The time when the maximum value is logged.
5. Min Value: The minimum value during the period.
6. Occurred Time: The time when the minimum value is logged