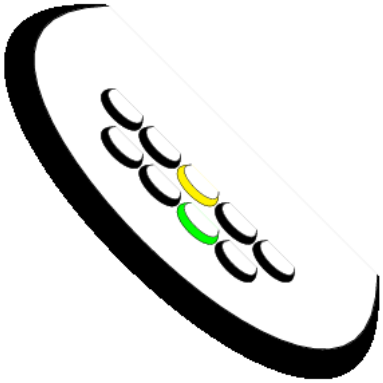
Synercon Technologies, LLC

Forensic Link Adapter User's Manual



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Contents

1 Using the Forensic Link Adapter **5**
- 1.1 Specifications . . . 5
- 1.2 Before Using the Forensic Link Adapter . . . 5
  - 1.2.1 Register as an Operator . . . 5
  - 1.2.2 Connect the FLA to the Internet . . . 5
  - 1.2.3 Setting the Time . . . 6
  - 1.2.4 Setting the Timezone . . . 6
- 1.3 Working with the Forensic Link Adapter . . . 6
  - 1.3.1 Powering Up . . . 7
  - 1.3.2 Shutting Down . . . 7
  - 1.3.3 Updating the FLA . . . 8
- 1.4 Display Screen Menu System . . . 9
- 1.5 Menu Screen Descriptions . . . 9
- 1.6 IP Addresses . . . 16
- 1.7 Standards Based Data . . . 16
  - 1.7.1 J1587 Data . . . 16
  - 1.7.2 J1939 Data . . . 17

2 Obtaining Data With Manufacturer's Software **19**
- 2.1 Installing Programs and Drivers . . . 19
  - 2.1.1 RP1210 Drivers . . . 19
  - 2.1.2 Manufacturer's Software . . . 19
  - 2.1.3 PDF Printer . . . 19
- 2.2 Enabling RP1210 Passthrough Mode . . . 20
- 2.3 Cummins PowerSpec Download Protocol . . . 20
- 2.4 DDEC Reports Download Protocol . . . 21
- 2.5 Download data with CatET . . . 22
  - 2.5.1 Prerequisites . . . 22
  - 2.5.2 Connecting to an ECM . . . 23
  - 2.5.3 Warranty Report . . . 25
  - 2.5.4 Snapshot Data . . . 32
  - 2.5.5 Preserving ECM Date and Time . . . 41
- 2.6 Forensic Write Blocking . . . 42

3 Using the Forensic Link Adapter Portal Website **43**
- 3.1 Common Data Elements . . . 43
- 3.2 Detroit Diesel Specific Data . . . 43

4 Troubleshooting **45**
4.1 Forensic Link Adapter Fails to Boot . . . 45
4.2 Screen Displays Funny Characters . . . 45
4.3 Forensic Link Adapter Cannot Connect to the Internet . . . 45
4.4 Software Does Not Connect to Vehicle . . . 45
4.5 A System Critical Error is Displayed . . . 45

5 Smart Sensor Simulators **47**

6 Administrator's Guide **49**
6.1 Account Overview . . . 49
6.2 Group Management . . . 51
6.2.1 Adding an Operator . . . 51
6.2.2 Assigning an FLA to the Group . . . 52

7 Definitions **55**

Bibliography **55**

1 Using the Forensic Link Adapter

1.1 Specifications

The Forensic Link Adapter is based on a powerful processor based on the Texas Instruments AM335x 1GHz ARM® Cortex-A8 Processor. It has 512MB of DDR3 RAM, 16 GB of internal storage, the NEON floating-point accelerator and 2 PRU 32-bit microcontrollers. The device has 2 Controller Area Network (CAN) channels, 2 J1708 Serial Channels, 100/10 Mbps Ethernet, USB 2.0, and a full implementation of the DG tech DPA4+ for RP1210 Compliance. The device has a GPS receiver, Real Time Clock, an accelerometer, and a rate Gyro. The display uses Organic LEDs for better sunlight readability. It runs embedded Linux and serves its own website.

1.2 Before Using the Forensic Link Adapter

1.2.1 Register as an Operator

The fla-admin should send you an email to invite you to be an operator for your FLA. The fla-admin email is initiated by the Organization administrator inviting a new operator. For more details, please see Chapter 6 on page 49.

1.2.2 Connect the FLA to the Internet

Connecting the FLA to the internet gives the FLA it full features. The best method to connect to the internet is to use a wired Ethernet connection to a router that has a DHCP server running. This is typical of most home and corporate networks. A DHCP server is usually built into a modem or router.

If a hard wired connection does not have a DHCP server running to provide an IP address, then the FLA will wait for about 45 seconds then try to serve an IP address to other computers on the network. This is important functionality in the field where a DHCP server and router may not be available.

An additional DHCP server on a corporate or work network may conflict with the your organization's IT policy. If there are doubts, please discuss providing the FLA with a reliable internet connection with your network system administrators.

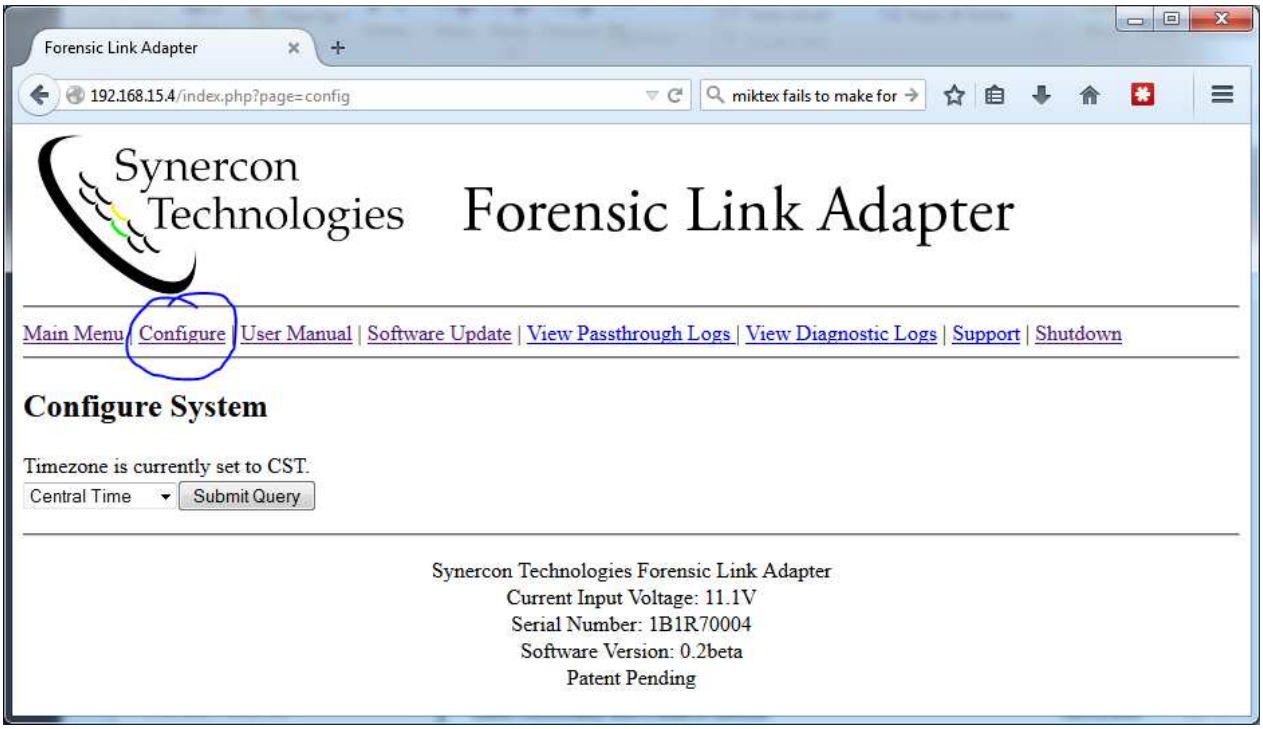


Figure 1.1: Setting the timezone on the FLA.

1.2.3 Setting the Time

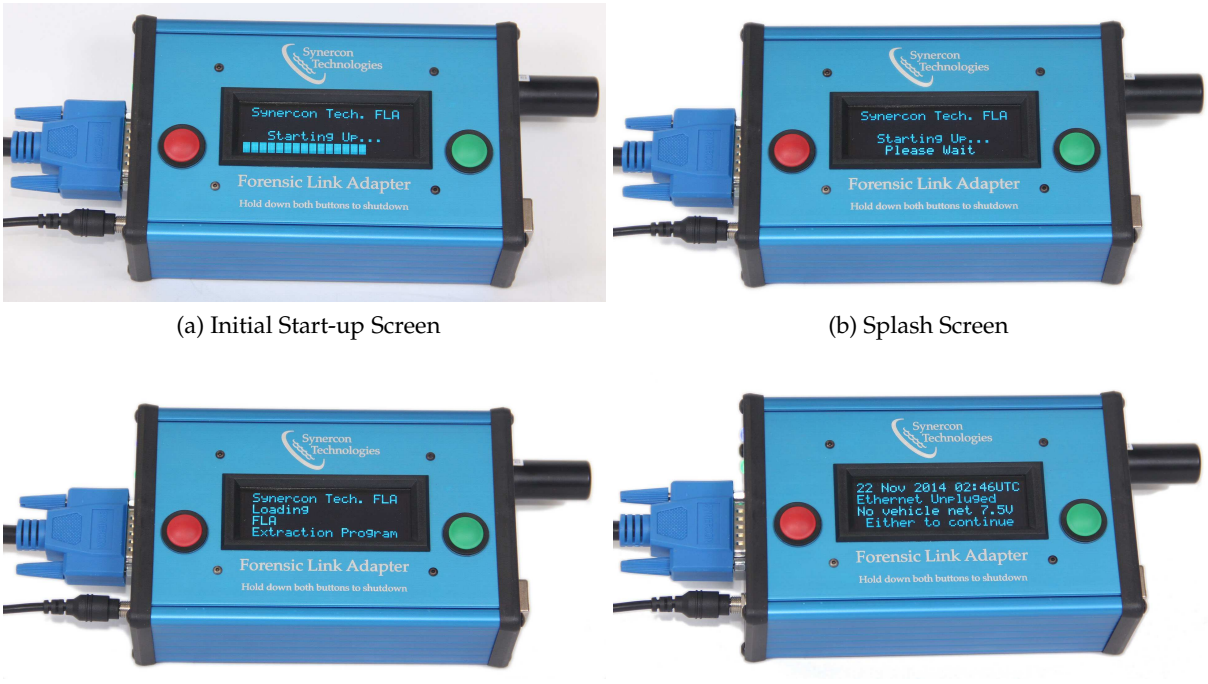
Once connected to the internet, the Forensic Link Adapter synchronizes the time with a network time server. This also sets the built in real time clock of the FLA, so accurate times are kept in the Forensic Link Adapter. A record of when the time was last set is stored and included in a time log in the data report.

1.2.4 Setting the Timezone

The timezone for the FLA can be set in the web interface. Open the web interface by typing in the IP address on the screen of the FLA into your favorite browser (e.g. Internet Explorer, Firefox, Chrome, etc.). Under the Configure menu, select the desired time zone, as seen in Figure 1.1.

1.3 Working with the Forensic Link Adapter

Once an investigator has established permission to download the data from a vehicle, the key needs to be turned to the on (not start) position for the FLA to communicate with the Electronic Control Modules (ECMs). The FLA can be plugged into the 9-pin diagnostic connector, which is usually located below the dash on the left side or to the left of the driver's seat. If the ECM was removed, then it should be connected through a Smart Sensor Simulator that emulates a truck.



(a) Initial Start-up Screen

(b) Splash Screen

(c) Program Starting

(d) Status Screen

Figure 1.2: Start up sequence on the front display panel.

1.3.1 Powering Up

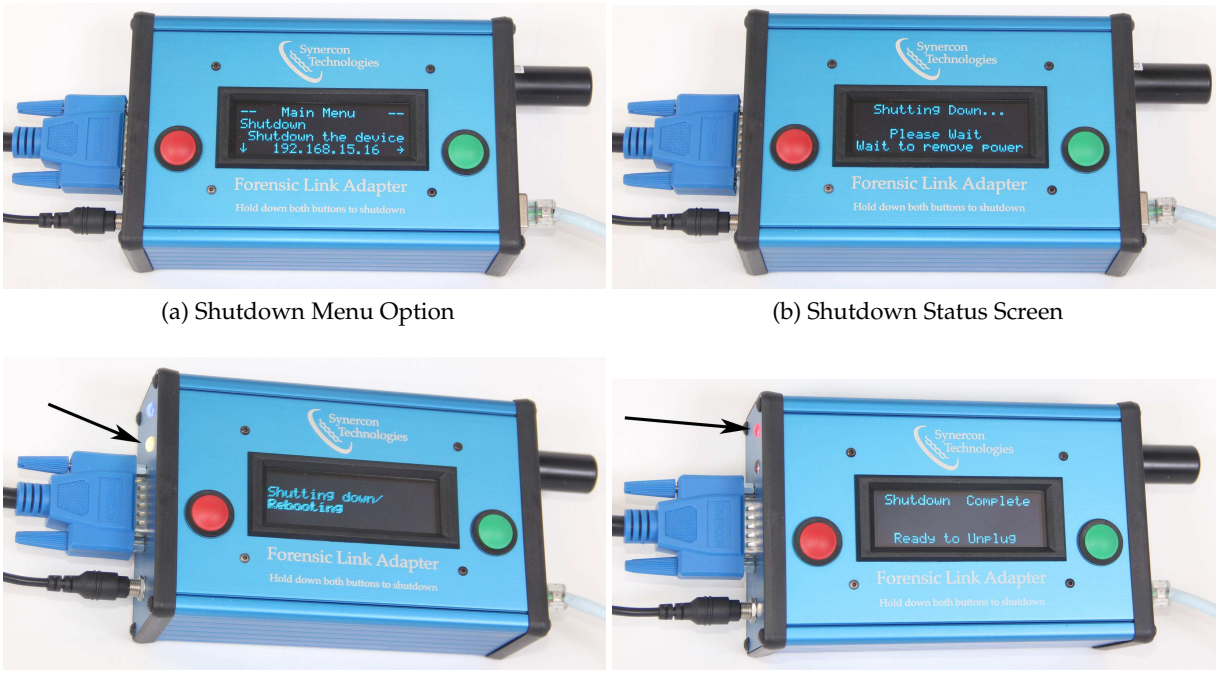
The FLA should start up automatically if power is available at the 9-pin diagnostic connector.

If the FLA does not power up when connected, check the voltage between pins A and B with a multimeter. This should read more than 11 volts for you to have sufficient power and time to get the data. If there is power available on those pins and the FLA did not start up, check for loose cables and connections.

1.3.2 Shutting Down

Since the Forensic Link Adapter is running the Linux operating system, it is best to shut down the device through the operating system. This means the user should take care to actively shut down the device by selecting shutdown from the menu or pressing the shutdown button on the web interface.

The shut down sequence displayed on the front panel is shown in Figure 1.3 on the following page. The user navigates to the Shutdown option by pressing the red button in the Main Menu. Pressing the green button activates the shutdown sequence. The shutdown sequence starts by issuing a command to the operating system to shut down. A message is sent to the display driver to initiate the shutdown sequence also. The display driver waits till the Linux system shuts off then displays the message seen in 1.3d. At this time, it is safe to unplug the system.



(a) Shutdown Menu Option

(b) Shutdown Status Screen

(c) Shutdown Progress

(d) Shutdown Complete

Figure 1.3: Shutdown sequence for the Forensic Link Adapter.

Figure 1.3c shows an arrow that points to a yellow blinking status LED during the shutdown process. Once the shutdown is complete a solid red LED comes on, as shown by the arrow in Figure 1.3d.

1.3.3 Updating the FLA

To update the FLA:

1. Plug the Ethernet connector into a known good internet connection. This may be a live wall jack, a home router, or tethered through a laptop that is sharing a wireless internet connection. A system administrator may have to help configure a work network to provide a sufficient internet connection.
2. Power on the FLA. It will automatically boot an display an IP address on the Status Menu screen.
3. With a computer connected to the same network as the FLA, navigate a browser to the IP address show on the front panel of the FLA. This should pull up the web interface for the Forensic Link Adapter.
4. From the main web interface, click the Update Software link
5. Confirm a software update by clicking the link on the page to start the updating process.
6. The process to update the FLA takes a long time, so please be patient and leave the device plugged into power and the Internet as it is performing its update.

1.4 Display Screen Menu System

The FLA has a built in 4X20 character display to give the user an indication of the status of the system. Press the red button to scroll through different menu options. Press the green button to select that highlighted function. Some screens are informational and either button can be used to advance the operation of the menu.

Upon boot, the startup screen will display with a progress bar coming across the bottom, as shown in Figure 1.2b. Once the progress bar completes, the screen will blank, and then start the FLA extraction screen.

1.5 Menu Screen Descriptions

1. A Startup Screen is shown when booting the device. A progress bar scrolls across the bottom in about 20 seconds. After that, the progress bar may change to say the words "Please Wait..." If the message to "Please Wait..." stays on and the automatic transition to display 2 does not happen within 30 seconds, the system may not have booted. See Section 4.1 on page 45 for further troubleshooting guidance.
2. The Program Loading screen shows the user that the FLA booted successfully and is loading the program needed to interface with the user through the display. It also sets up the files and directories for the current session. A few things happen in the background while this screen is present:
    a) The FLA system time is updated. If an Internet connection is available (i.e. the Ethernet cable is plugged into a known good network), then the FLA will get its system time from the network time server at NIST. Once it automatically updates the time, it also updates the time on its battery powered real time clock (RTC). If an Internet connection is not available, then the system time is updated from the RTC.
    b) The FLA tries to obtain a GPS lock.
    c) The FLA looks to see if vehicle networks are present. It detects the presence of network traffic on the J1708 network (9600 baud) and the J1939 network (CAN bus).
3. The first line of the Status Screen shows the current time with the time zone. The system time zone can be changed from the web interface, as described in Section 1.2.4 on page 6. The second line of the status screen shows the status of the Ethernet connection, as described in Section 1.6 on page 16. On the third line, the status of the vehicle network connection is displayed. The following options are available:
    a) No Vehicle Net means that network message traffic was not detected on either the J1939 network (CAN bus) or the J1708/J1587 serial bus. A message will also suggest to "Check Ing. Key" to remind the operator that the ignition key switch must be turned to the on or run position for network traffic to be present. If the key is on, sufficient power is available, and no vehicle networks are present, then the vehicle network may be compromised.

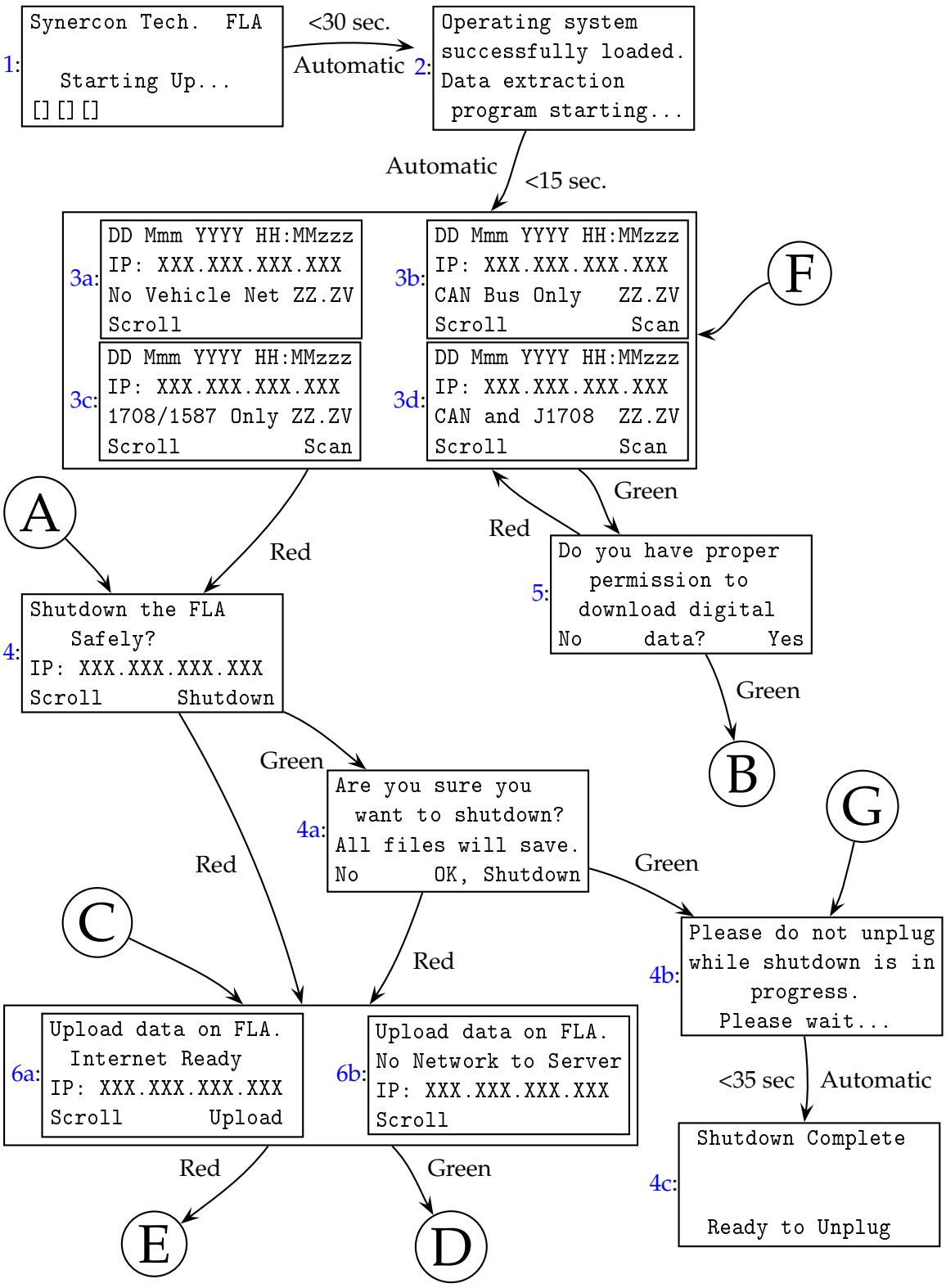


Figure 1.4: Forensic Link Adapter Screen Menu System as enumerated in Section 1.5

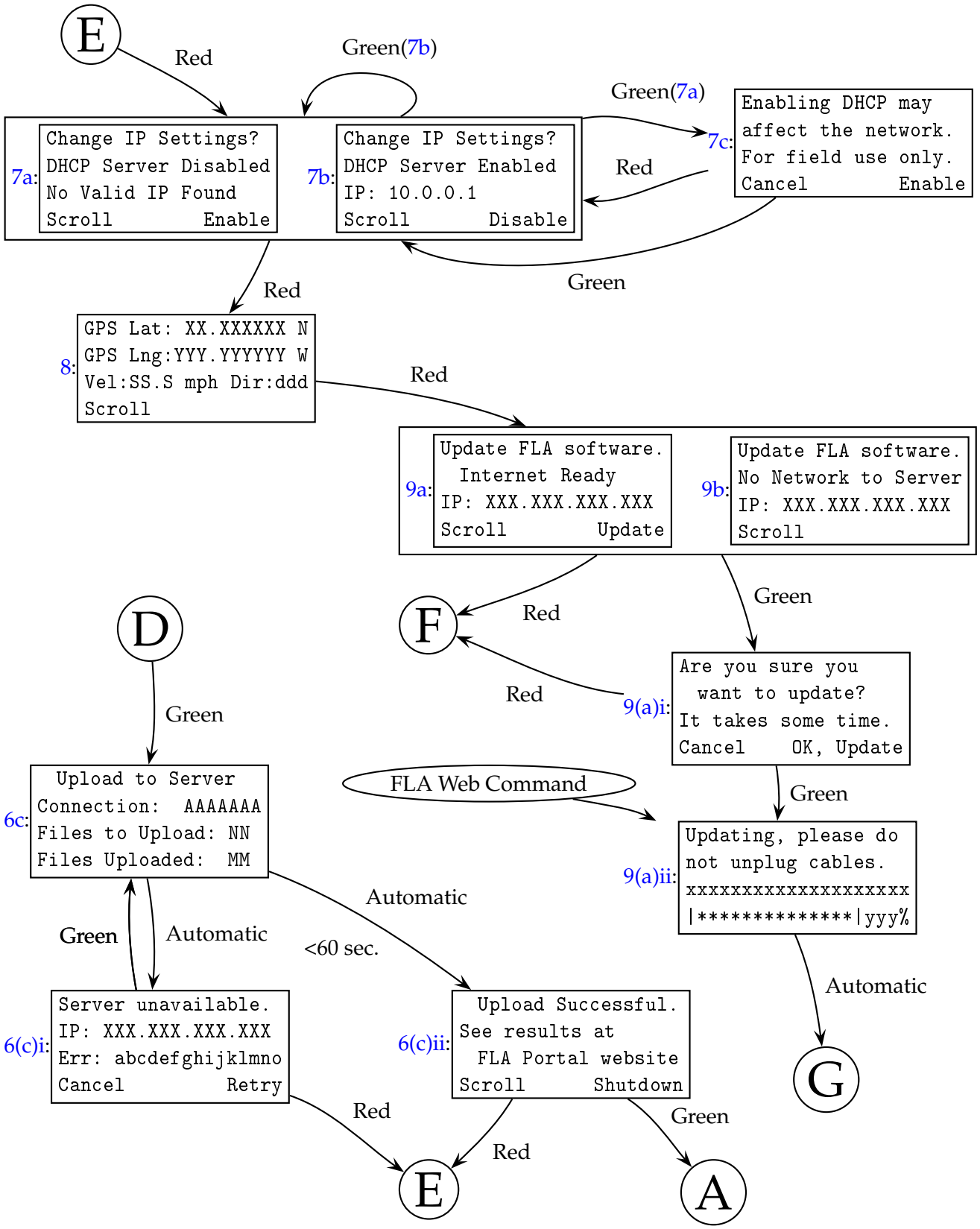


Figure 1.5: Forensic Link Adapter Screen Menu System (cont.) as enumerated in Section 1.5

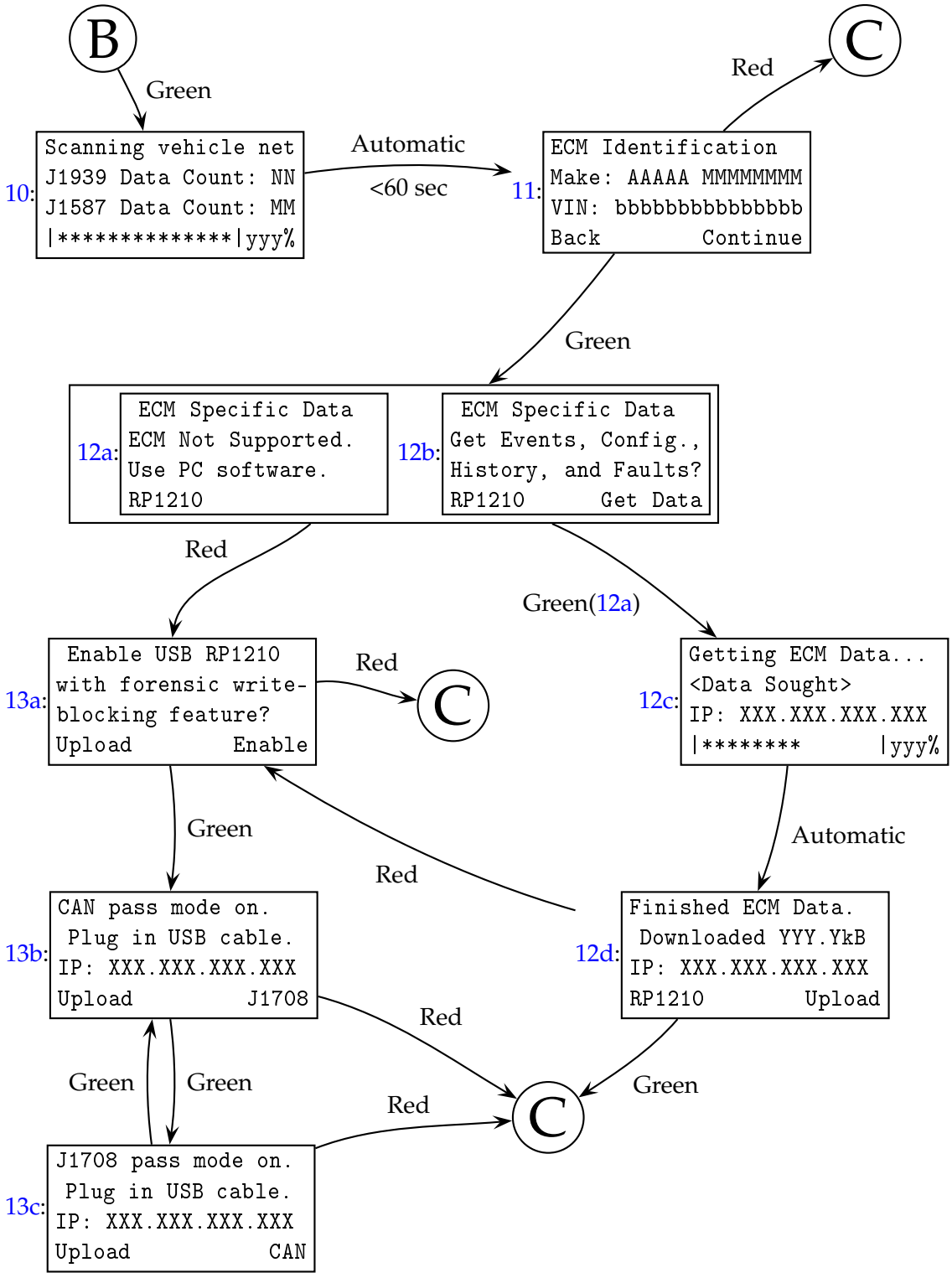


Figure 1.6: Forensic Link Adapter screen display when scanning a vehicle.

b) CAN Bus Only means that messages using the Controller Area Network are present. Since SAE J1939 specifies CAN as the network, this detects the presence of J1939 messages. J1708 network traffic was not detected.

c) 1708/1587 means no CAN or J1939 messages are present on the vehicle networks. This may be the case for older vehicles.

d) CAN and J1708 mean both networks are present and have traffic.

The system voltage is also displayed as detected by a voltage divider connected to the main processor. This voltage indication is not calibrated, but should give the user some feedback on the health of the vehicle system voltage. On the bottom line, there are button commands and an indicator showing the number of GPS satellites. The Red button advances the FLA to the next screen. The Green button starts the scan of the vehicle network to identify the system. The scan button is not available if no vehicle network is present.

4. The Shutdown dialog enables the user to shutdown the FLA computer system in a friendly way. This is similar to pressing the shutdown command on a PC. The shutdown command can also be invoked from within the FLA web interface. If the operator does not want to shutdown the FLA, then he or she can press the Red button to scroll to the next menu option. If the Green button is pushed, then the operator will invoke the shutdown sequence as described in the following displays

   a) A shutdown confirmation asks the user if that was their intention. This helps catch unintended shutdowns. The Red button will escape the shutdown command and move to the next menu option. The Green button will confirm the shutdown operation. A reminder that all the files will be saved is displayed to the user as well.

   b) The shutdown sequence requires power, so the user is advised not to unplug the device. During this phase, an LED indicator on the side may turn yellow.

   c) When shutdown is complete the main processor has turned off power. The display driver remains on with a static message that everything is ready to unplug. No commands are available. The LED should turn Red.

5. Once the FLA detects a vehicle network and the user presses the button to scan, the FLA asks the operator if they have the proper permission to download digital data. This permission is dependent on the case and the jurisdiction. The FLA system time is recorded when permission was acknowledged. Pressing the Green button in this menu defines the start of a download. The next screen to display is number 10.

6. The screen that says Upload data on FLA on the first line enables the user to push data to the server for archiving, decoding, decrypting and display. Upon entry into this screen and a valid IP address, the FLA tries to ping the Synercon Server for 5 seconds or less. After the ping, the FLA will display either 6a or 6b.

   a) If there is a valid network connection to the Synercon Server, the message on the second line of the FLA display will say Internet Ready and the Upload option is enabled for the Green button. Pressing the Green button will display screen 6c.

   b) If there is not a connection to the Network server, then a message on the second line will say No Network to Server. Be sure the Ethernet cable is connected, a valid IP address is

displayed, and the network administrator has granted your device access to the internet. The operator may want to try connecting the FLA to a different network.

c) The Upload to Server screen displays the connection status as "OK" or "Failed." When the connection is valid, the FLA securely uploads data package files to the Synercon Server. The number of files to upload (NN) corresponds to the number of times the FLA downloaded a vehicle or ECM since the last time data packages were sent to the Synercon Server. The number of files uploaded (MM) shows a counter that increments after each successful upload to the server.

i. Upload Failed. An error code is displayed in place of `abcdefghijklmno`. This error code will be important to the Synercon Support staff and may be related to FLA authentication.

ii. Upload Successful. See results at http://fla.synercontechnologies.com/. This website is where the data will be displayed.

7. Change IP network settings. This screen enables the operator to turn the FLA into a Dynamic Host Configuration Protocol (DHCP) server and give IP addresses to other computers on the network. Since only one DHCP server should be on a network at a time, this feature off by default. However, in the field, the FLA may need to set up an FLA network so the operator can connect to the FLA web page. The following descriptions explain how to enable and disable the DHCP server.

a) By default the DHCP server is disabled, as shown on line 2. Pressing the Green button will pull up the confirmation screen shown as display 7c. If the words "No Valid IP Found" are displayed on line 3, then turning on DHCP may be a good idea. If a valid IP address (IP: XXX.XXX.XXX.XXX) is displayed, then DHCP may not be needed.

b) After the DHCP server has been enabled, line 2 will display as such. The IP address should reset to 10.0.0.1.

c) The field use only warning should remind the operator that an already established network does not need another DHCP server. Enabling DHCP on the FLA on an established network may lead to IP address conflicts for other devices on the network.

8. A GPS utility screen exists to enable the user to see and save GPS information. The GPS coordinates in decimal are displayed along with speed and direction.

9. It is recommended to update the FLA software periodically. The FLA must be connected to the Internet in order to get software updates.

a) If an Internet connection to the update server exists, then the Green button will be enabled for the user to select Update.

i. Once the Green button is pushed, an update confirmation display enables the user to cancel an update operation. Pressing the Green button again will confirm the update should start. It is important to not unplug the FLA power and Ethernet cables during the update.

ii. Update progress is displayed with current operations shown as xxxxxxxxx on display. This process takes a long time and the scroll bar may seem to pause occasionally.

b) If there is no access to the update server, then the Green button is disabled. The FLA will need to be connected to the Internet by the Ethernet cable.

10. Once permission was acknowledged, the FLA will scan the available vehicle networks. The program is looking for all data defined in the J1587 or J1939 standards that may be available and useful, as explained in further detail in Section 1.7 on the following page. As those data elements are obtained from their respective networks, the counter will increment reflecting the recording of the data. Once the data elements have been requested, the FLA will be able to identify the different ECMs.
11. The ECM Identification screen shows the identification information stored in the first Engine ECM. The ECM make (AAAAA) and model (MMMMMMMM) comes from requesting the Component Identification. The Component Identification is a J1587 message with PID of 241 or a J1939 message with SPNs 586 and 587. The Vehicle Identification Number (VIN) comes from J1587 PID 237 or J1939 SPN 237. These data may or may not be present depending on how the ECM is programmed. If the data are not present from the Engine ECM, then the next source is used, if available.
12. Once the ECM type is known, the FLA will check to see if the ECM is supported. If it is supported, then ECM specific data can be obtained.

    a) If the ECM is supported, then different types of data can be obtained that include Event Data, Configuration Data, Historical Data, and Fault Data. If this menu screen is displayed, then the FLA detected that it can capture data from an ECM on the network. Pressing the Green button will start the process of gathering specific data.

    b) No current support for getting ECM Specific Data exists of this screen is displayed. As such, both the Red and Green buttons move the interface to the RP1210 mode where the operator can use the FLA with other software.

    c) Getting ECM data... is a display screen that shows the progress of the current download. The tag <Data Sought> is dependent on the ECM and may say things like Hard Brake, Engine Usage Log, Data Plate, or other phrases that to indicate the progress of the download. After each attempt, a flag saying either Success or Failed will be displayed.

    d) Once the ECM specific data is downloaded, a message saying Finished ECM Data is displayed along with the total number of bytes downloaded. If the operator wants to continue an investigation using PC based software, then he or she can press the Red button to go into RP1210 passthrough mode. Otherwise, the Green button brings the user back to the upload menu. In the field. it may be that a data upload is possible due to the lack of an internet connection. In this case, the operator can press the Red button once to get to menu 3 on page 9 and again to get to the Shutdown menu.

13. The RP1210 passthrough mode enables operators to use other PC based software to interface with the vehicle. The FLA will be connected to a PC by a USB cable to communicate on the vehicle bus. The FLA uses a DGTech eDPA to communicate with the PC. As such, it is important to have the DG Drivers installed before using the RP1210 mode, as described in Section 2.1.1 on page 19. This mode invokes a write blocking feature that prevents certain messages from reaching the ECM. For more details on the messages that get blocked when the write-blocker is running, see Section 2.6 on page 42. Both the J1939 and J1708 networks are enabled at the same time in passthrough mode.

a) This display screen asks to enable the passthrough mode. If the Red button is pressed, then the system goes back to the status display (Screen 3). Pressing the Green button turns on the Passthrough mode.

b) Passthrough mode is on when this screen is displayed. A reminder to plug in the USB cable is printed on line 2. At any time, the operator can terminate the pasthrough mode and either go back one screen or transition to uploading the data.

c) J1708 pass mode.

Network traffic is recorded and logged during screens 11, 12c, and 13b. A data package is defined from network data coming from the vehicle starting when the user acknowledges permission to when the operation of the FLA transitions back to the Upload option.

1.6 IP Addresses

The IP address Line can have the following statements:

IP: XXX.XXX.XXX.XXX A valid IP address. XXX can be any number between 0 and 255. Often on a private home network, the first numbers will be 192.168.XXX.XXX.

IP: 10.0.0.1 The IP address when the FLA's DHCP server is activated. The FLA will give other devices on the network an IP address too, which may cause problems on an established network.

Ethernet Unplugged There is no live connection between the FLA and an outside device. If a network connection was present, there may be around a 30 second lag for this message to display after a cable is unplugged.

Finding IP Address The Ethernet connection is plugged in and linked to another connection, but the FLA has not been issued an IP address from the network router.

No Valid IP Found The Ethernet connection could not find a valid DHCP server from which to obtain an IP address. The operator may need to navigate to menu screen 7 to enable the DHCP server.

1.7 Standards Based Data

1.7.1 J1587 Data

The FLA scans the J1708 for the following data. If the data is not displayed in the report, then it was not available by the network.

PID	Parameter Identification Name	PID Description	Units

1.7.2 J1939 Data

The FLA scans the J1708 for the following data. If the data is not displayed in the report, then it was not available by the network.

PID	Parameter Identification Name	PID Description	Units

2 Obtaining Data With Manufacturer's Software

There are two protocols used to communicate over a heavy truck: 1) J1939, and 2) J1708. These modes are needed to make use of the DG RP1210 embedded device used to communicate with Manufacturer's software.

2.1 Installing Programs and Drivers

2.1.1 RP1210 Drivers

The FLA uses the DG Technologies drivers to enable Windows programs to communicate with the ECMs. Download and install the drivers on your laptop or local machine from

http://www.dgtech.com/product/dpa/software/DPA4P_136.zip.

For more information, see the DG website

http://www.dgtech.com/product/dpa4plus/downloads/downloads.php. The Adapter Validation Tool is a useful program to test the connections between the computer, FLA, and Vehicle.

2.1.2 Manufacturer's Software

Download Cummins PowerSpec from

http://cumminsengines.com/powerspec.

This will only work on Windows 7 or newer. You need to register PowerSpec for free, but you do not have a license the program for it to work.

Download Detroit Diesel DDEC Reports from

http://www.ddcsn.com/cps/rde/xchg/ddcsn/hs/3448.htm.

The direct download link is

http://www.ddcsn.com/cps/rde/xbcr/ddcsn/DDECReports805.exe.

Restart your computer after installing.

2.1.3 PDF Printer

If a PDF generator is not installed on your computer system, then having the ability to print to PDF is useful. An example of a free PDF printer is the

BullZip PDF printer

2.2 Enabling RP1210 Passthrough Mode

If the ECM is a Caterpillar, DDEC IV DDEC V, or MBE, then enable the J1708 Pass-through mode from the FLA menu screen.

If the ECM is a Cummins, DDEC VI, DDEC 10, then enable J1939.

Once enabled, connect a USB cable from the FLA to the laptop with the DG drivers installed.

2.3 Cummins PowerSpec Download Protocol

1. Turn the ignition key to the on position (if it is not already on), but do not start the engine.
2. Plug in the FLA to the diagnostic connector. Ensure it powers on and boots.
3. Perform a Standards based download using FLA Diagnostics.
4. Enable J1939 Passthrough mode
5. Launch DG Adapter Validation Tool (AVT).
    a) Select the appropriate installed device driver.
    b) Switch the protocol to J1939 in the adapter validation tool.
    c) Click Run Test.
    d) If the Adapter Validation Tool passes the test, then two windows will turn green as shown in Figure 2.1 on page 22. This means the ECM and the computer are connected through the RP1210 Device. If a test fails, review the suggestions output by the Adapter Validation Tool and try again. It may require shutting down the FLA, unplugging the USB, and disconnecting the FLA from power. Similarly, the PC may need to be rebooted.
6. Open Cummins PowerSpec.
7. Click on Advanced -> Settings and set the settings like the ones shown in Figure
8. Click on Connect.
9. Click Read Data
10. If available:
    a) Press the Fault Codes button and Save the report as a PDF file.
    b) Press the Trip Information button and Save the report as a PDF file.
    c) Press the Feature Settings button and Save the report as a PDF file.
    d) Press the Sudden Decel button and Save the report as a PDF file.
    e) Press the Dataplate button and Save the report as a PDF file.
    f) Press the Duty Cycle button and Save the report as a PDF file.
    g) Press the After Treatment button and Save the report as a PDF file.

11. Exit passthrough mode by pressing a button on the FLA. Exiting this mode takes some time, so the button press may not work at first.
12. Establish Internet connection with the FLA. An IP address other than 10.0.0.1 should show up on the FLA display.
13. Scroll to the Upload to Server option on the FLA and upload the data to the server.

2.4 DDEC Reports Download Protocol

1. Turn the ignition key to the on position (if it is not already on), but do not start the engine.
2. Plug in the FLA to the diagnostic connector. Ensure it powers on and boots.
3. Perform a Standards based download using FLA Diagnostics.
4. Enable the network passthrough mode
   a) Use J1708 Passthrough mode for DDEC IV, DDEC V, and Pre-2008 Mercedes Engines.
   b) Use J1939 Passthrough mode (selected from menu screen on FLA) for all newer DDEC or Mercedes modules.
5. Launch DG Adapter Validation Tool (AVT).
   a) Select the appropriate installed device driver.
   b) Switch the protocol to in the adapter validation tool to the same one selected in Step 4.
   c) Click Run Test.
   d) If the Adapter Validation Tool passes the test, then two windows will turn green as shown in Figure 2.1 on the next page. This means the ECM and the computer are connected through the RP1210 Device. If a test fails, review the suggestions output by the Adapter Validation Tool and try again. It may require shutting down the FLA, unplugging the USB, and disconnecting the FLA from power. Similarly, the PC may need to be rebooted.
6. Open DDEC Reports.
7. The Connection Manager may start automatically.
8. Press Extract Data.
9. Once the data is extracted, Select File -> Print and print all the data (should be over 30 pages). Print to a PDF file
10. Close DDEC Reports.
11. Navigate to the DDEC Reports directory to find the recently made .XTR file. (Default installation is C:\Detroit Diesel\DDEC Reports\Diagnostic\DATA PAGES\ Copy the .XTR file into your case file directory.
12. Exit passthrough mode by pressing a button on the FLA. Exiting this mode takes some time, so the button press may not work at first.

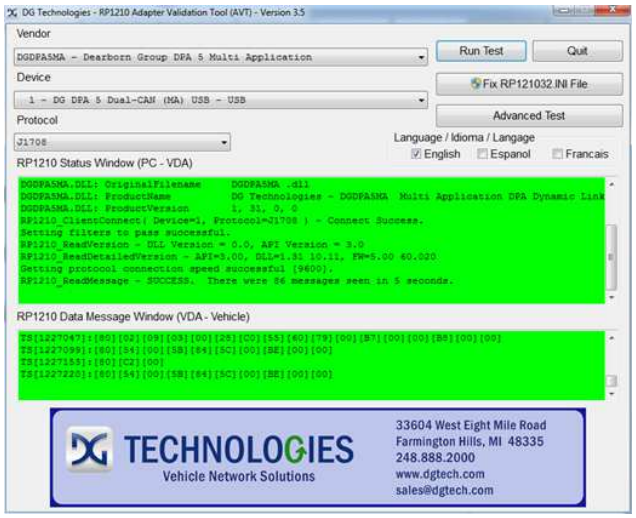


Figure 2.1: Adapter Validation Tool showing a successful connection between an ECM and the local computer.

13. Establish Internet connection with the FLA. An IP address other than 10.0.0.1 should show up on the FLA display.

14. Scroll to the Upload to Server option on the FLA and upload the data to the server.

2.5 Download data with CatET

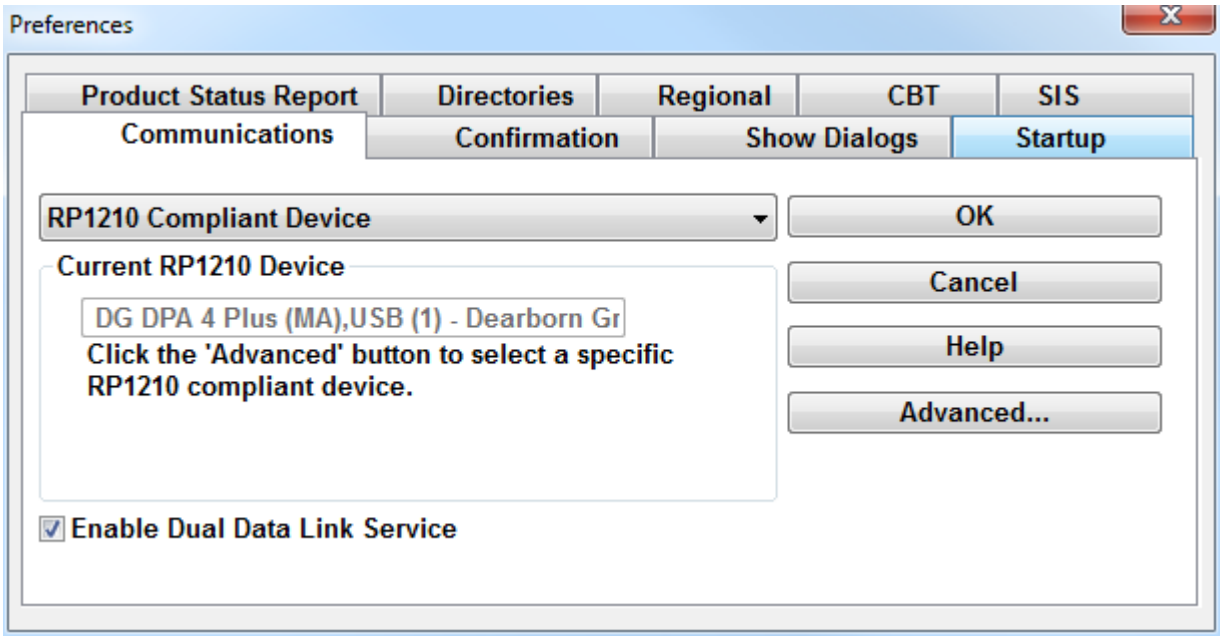
This section provides a protocol to use CatET to download Caterpillar ADEM II, ADEMIII, and ADEMIV engine control modules. These modules are found on C series engines (i.e. C-15, C-12, C-9, and C-7).

2.5.1 Prerequisites

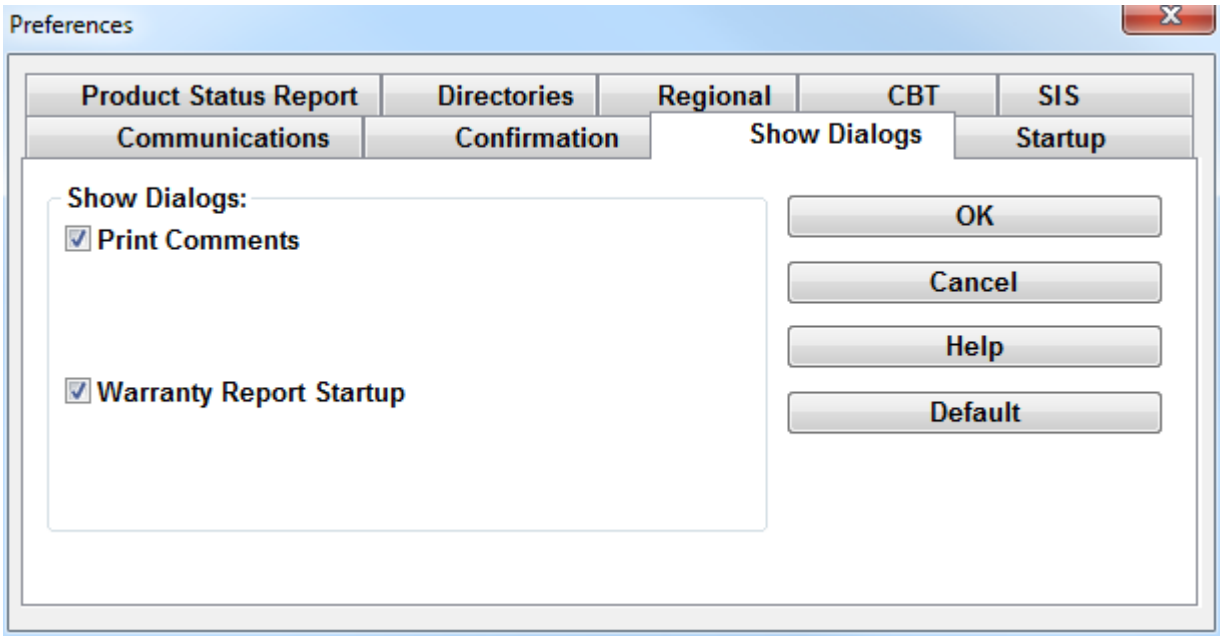
You must have the DG RP1210 drivers installed on your computer. The procedure for obtaining and installing these drivers is found in Section 2.1.1 on page 19.

Caterpillar Electronic Technician (ET) must be installed on your computer. The procedure described in this section was based on version 2013A.

Set the preferences in CatET to use the DG DPA 4 Plus, which is the RP1210 device built into the FLA. This is shown in the following picture.



Setting the Warranty Report Startup helps with the work flow when connected, as seen in the following picture. These settings will remain from session to session.



It is recommended to create a new data directory for each download to keep track of the data and not mix it with other information.

2.5.2 Connecting to an ECM

1. Turn the ignition key to the on position (if it is not already on), but do not start the engine.

2. Plug in the FLA to the diagnostic connector. Ensure it powers on and boots.

3. Perform a Standards based download using the FLA.

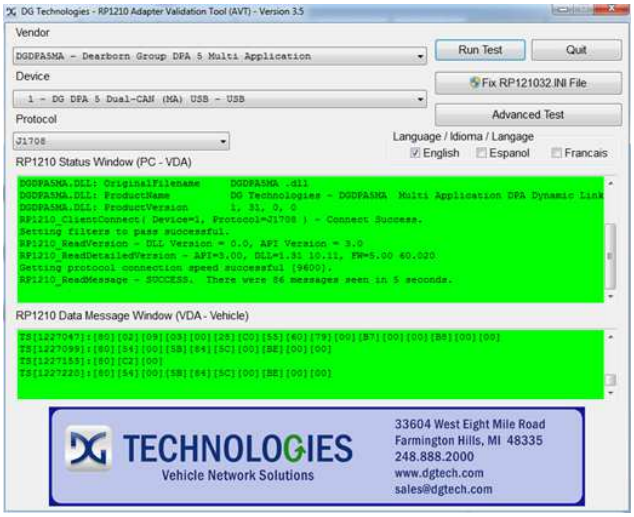
4. The FLA needs to be in J1708 passthrough mode, which is screen 13c. Once the FLA is in passthrough mode, it will log and preserve network traffic for a forensically verifiable record.

5. Launch DG's Adapter Validation Tool (AVT).

   a) Select the appropriate installed device driver (DG-DPA4 +).

   b) Switch the protocol to J1708 in the adapter validation tool.

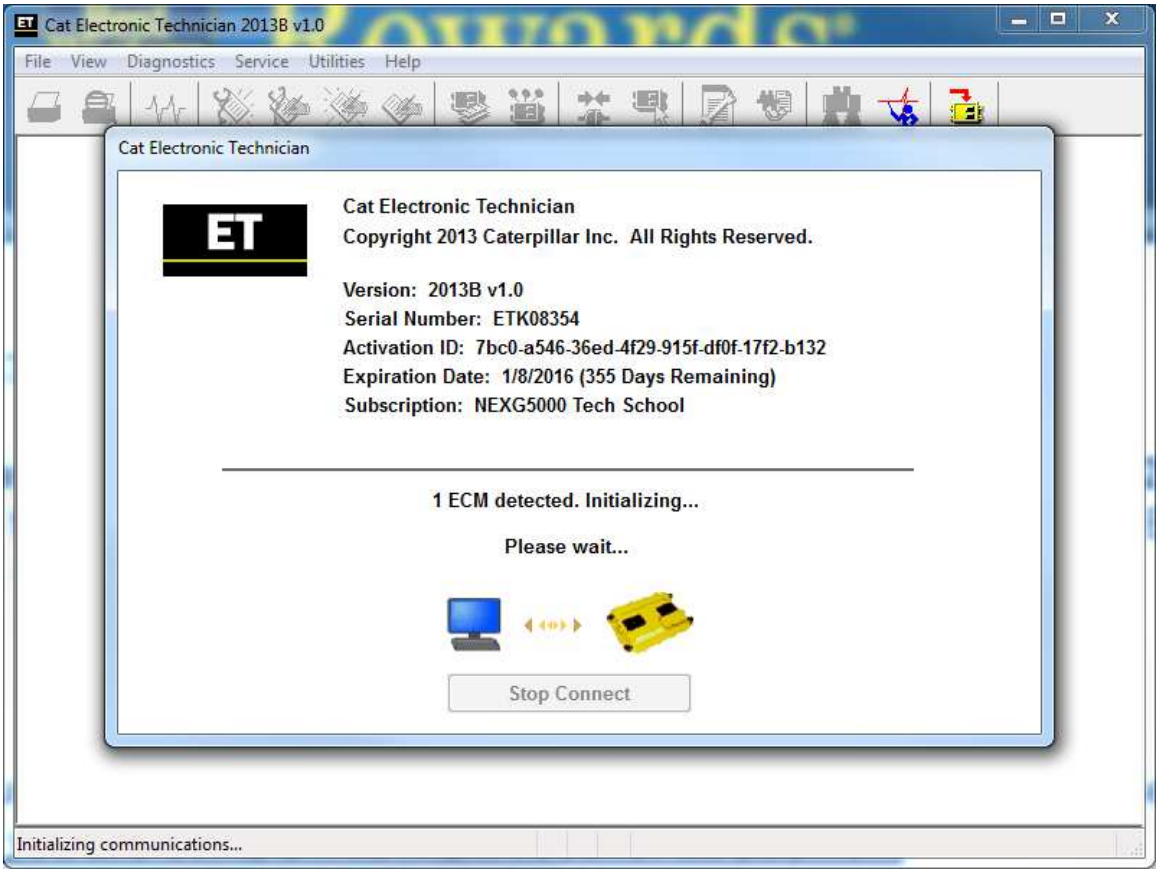
   c) Click Run Test.



   d) If the Adapter Validation Tool passes the test, then two windows will turn green as shown in Figure 2.1 on page 22. This means the ECM and the computer are connected through the RP1210 Device. If a test fails, review the suggestions output by the Adapter Validation Tool and try again. It may require shutting down the FLA, unplugging the USB, and disconnecting the FLA from power. Similarly, the PC may need to be rebooted.

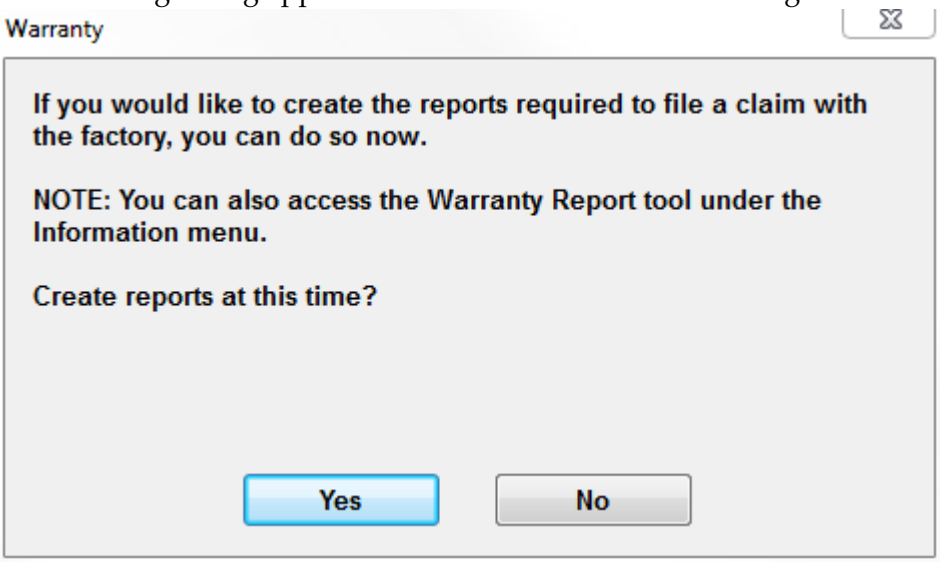
   e) Close the AVT.

6. With the FLA connected through USB, start CatET. The program should automatically connect to the ECM, as shown in the following picture. If not, then the user can press F8 to connect once CatET is running.

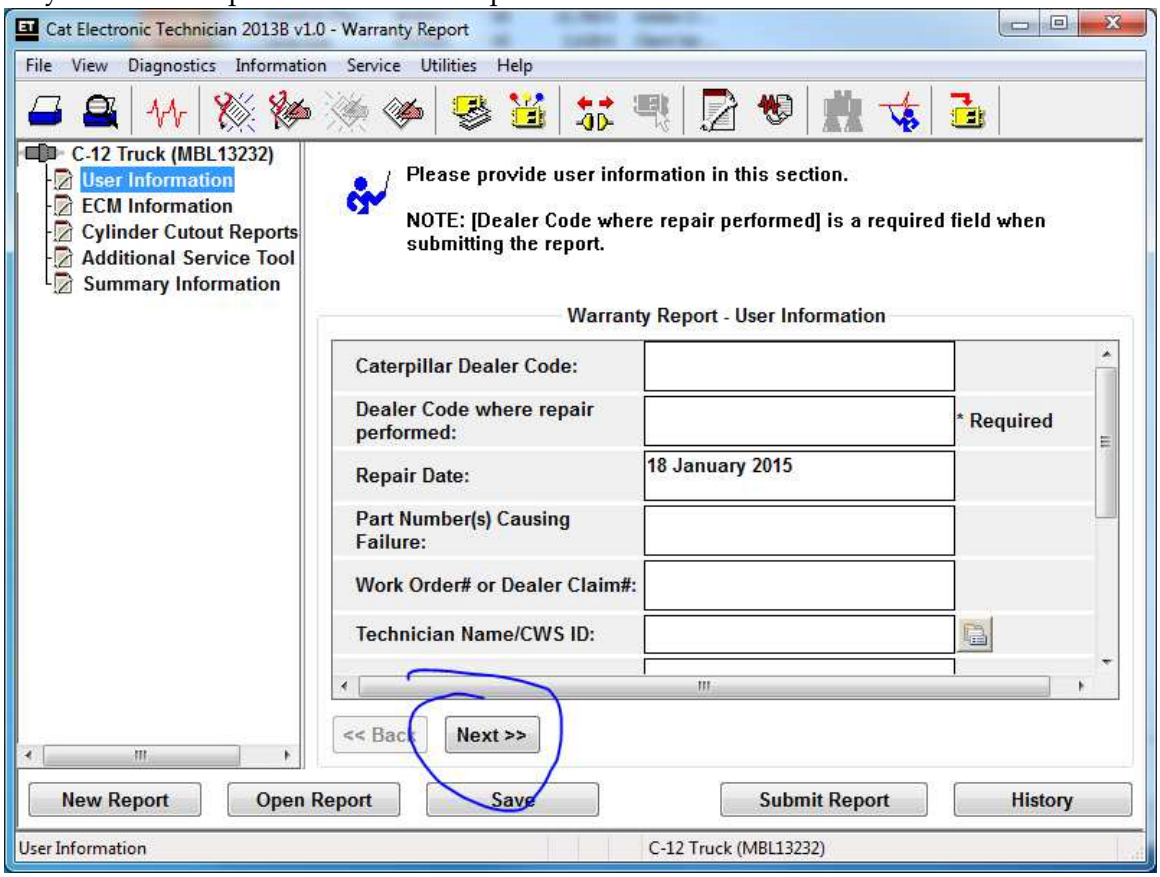


2.5.3 Warranty Report

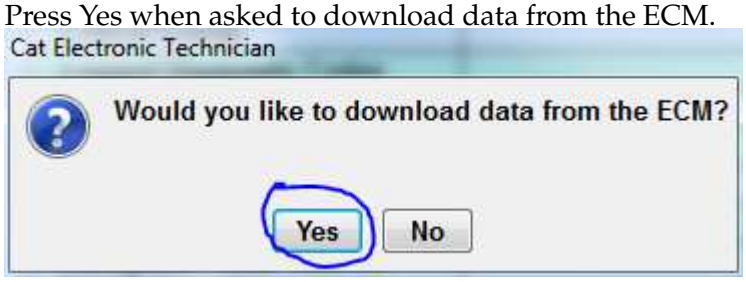
1. CatET will automatically ask if you would like to create a Warranty Report. Press Yes when the following dialog appears. This can also be accessed through the Information menu.



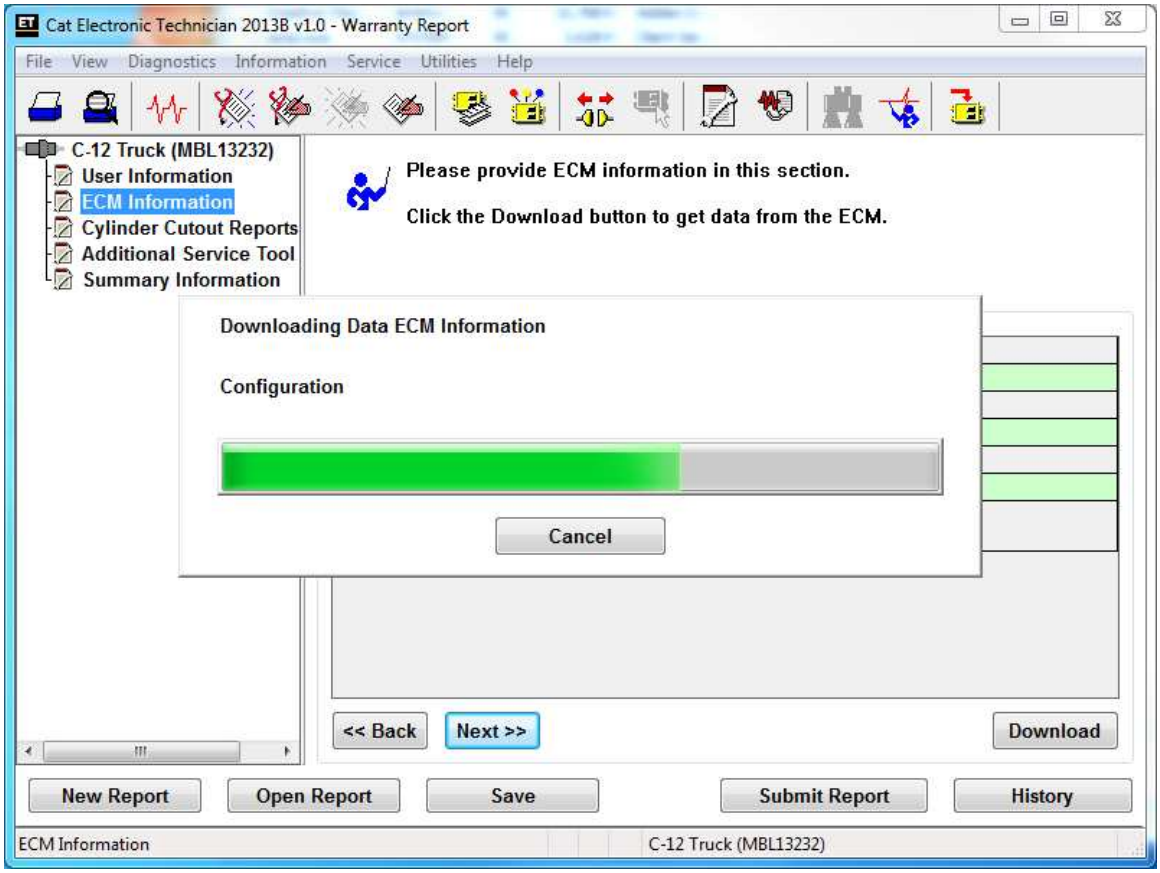
2. An information screen will appear. This can be filled out as desired. Leaving the fields blank may be the best option. Press Next to proceed.



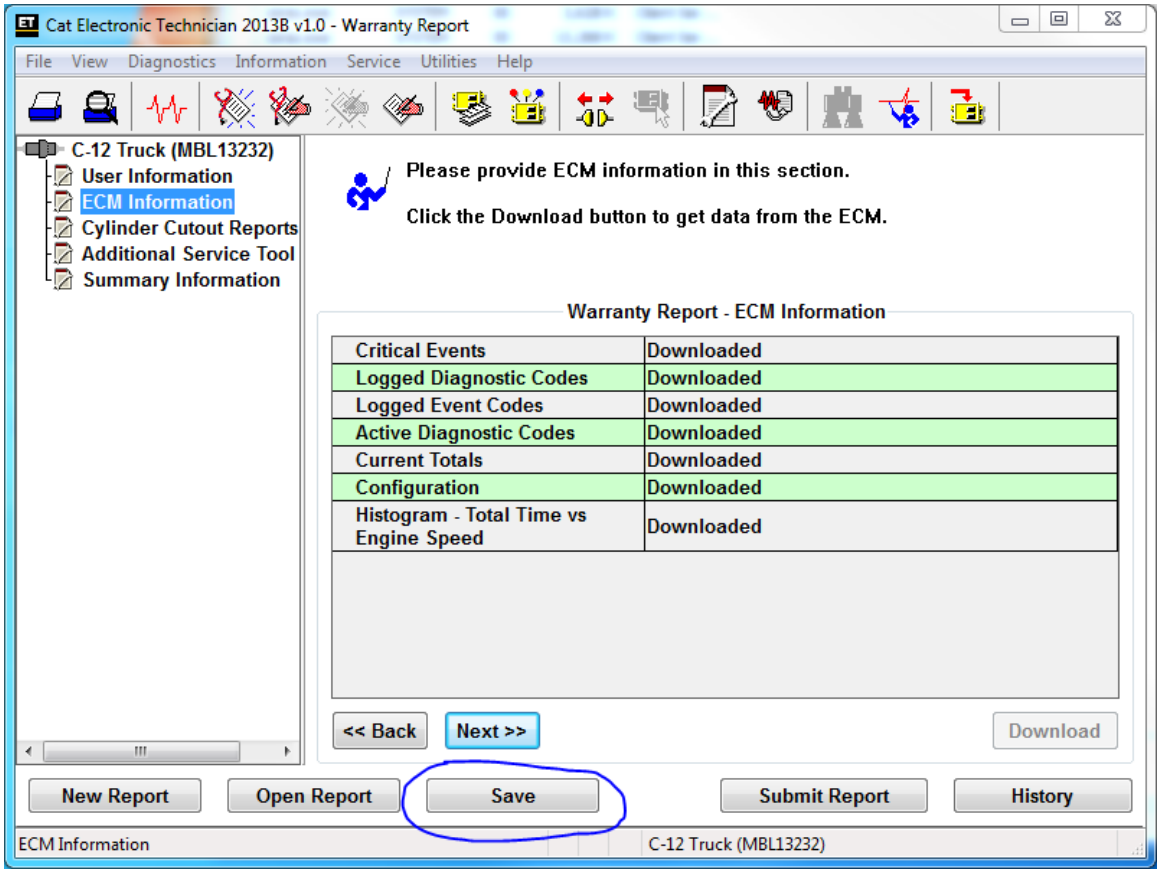
3. Press Yes when asked to download data from the ECM.



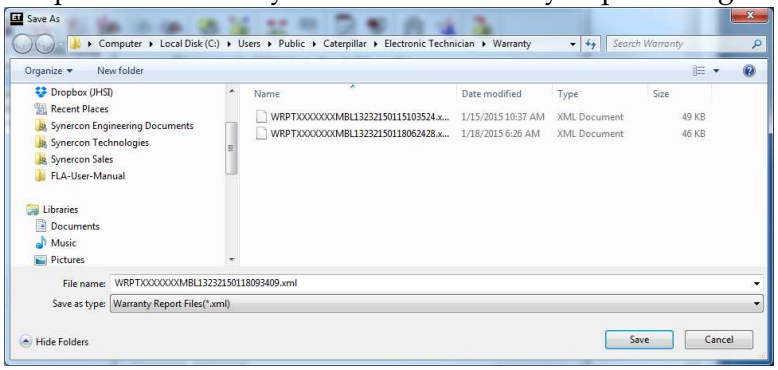
4. The software will download data for the report. The Configuration data takes the longest time.



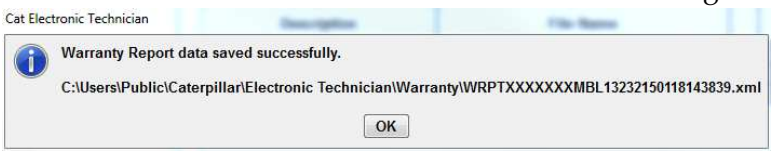
5. Once the data is downloaded, press Save to create an XML file.



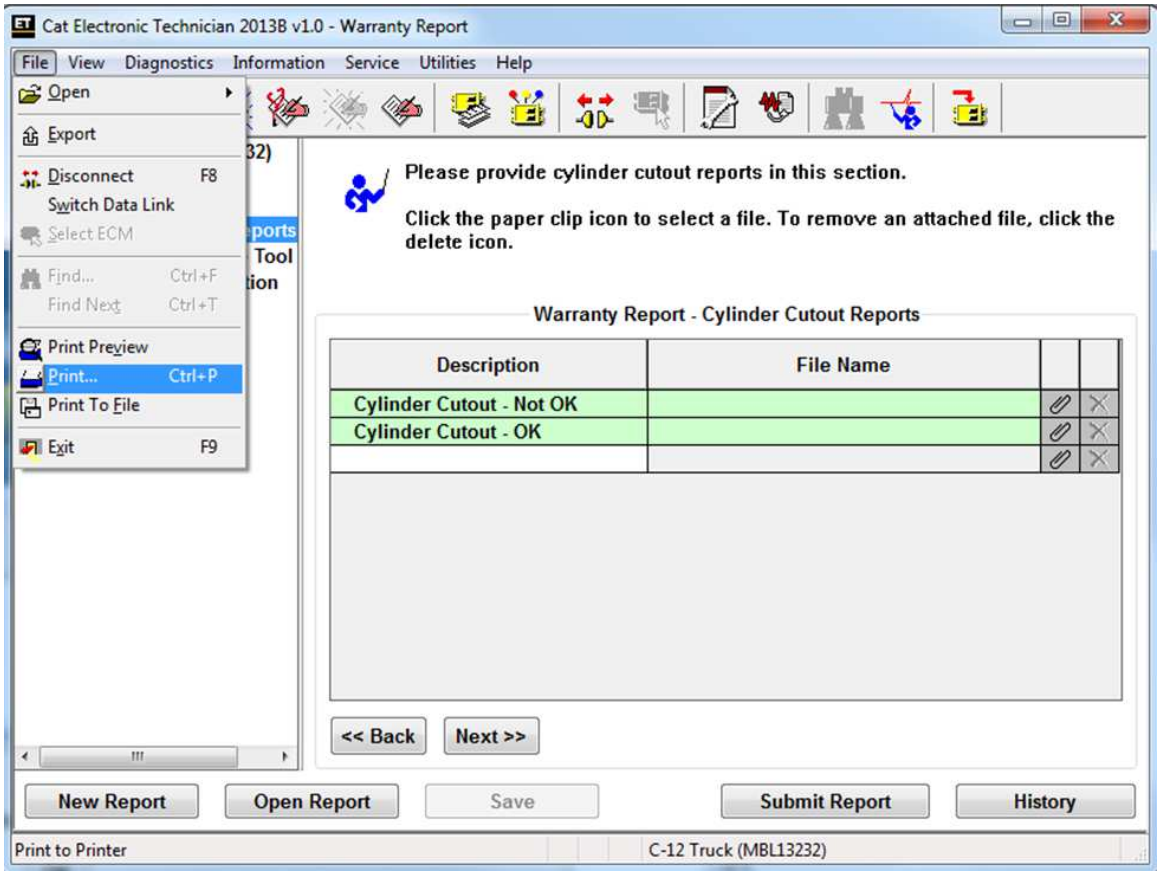
6. Keep track of where you save the Warranty Report using the Save As dialog.



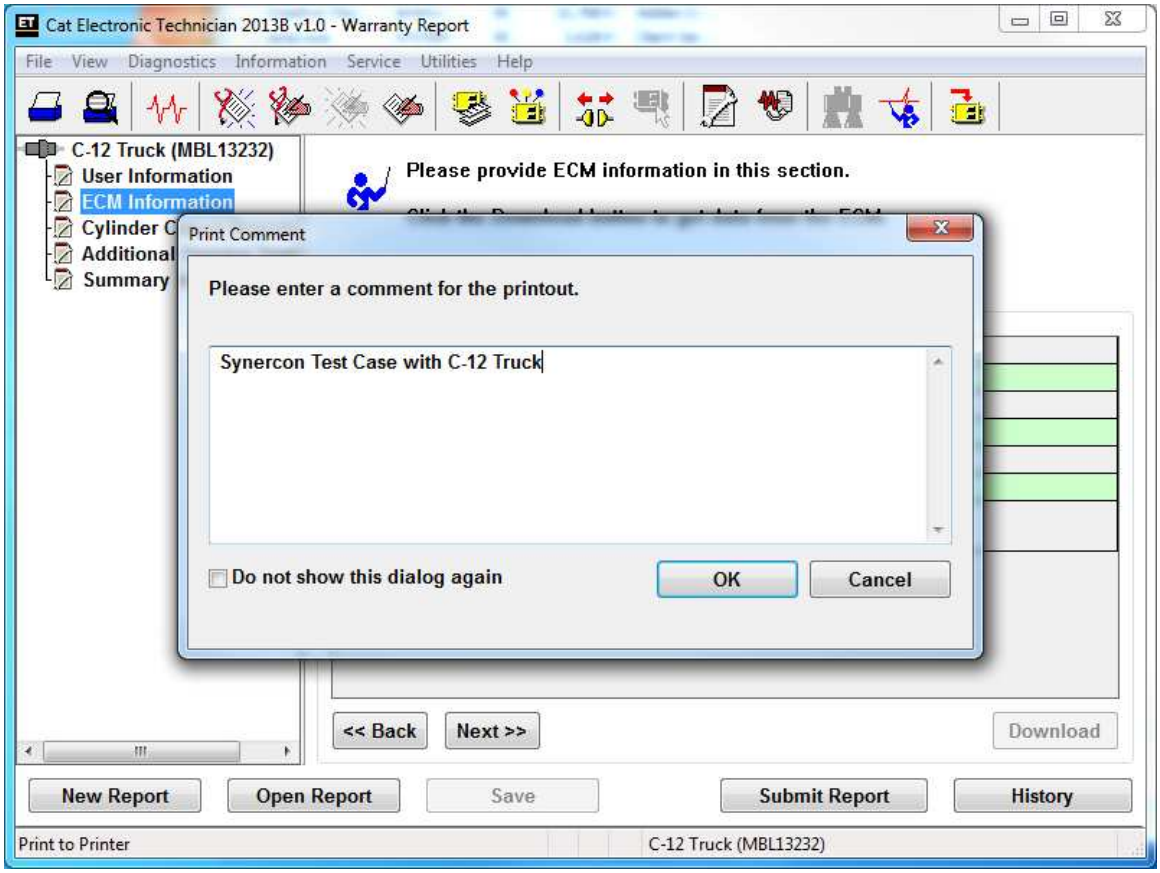
7. Record where the file was saved based off the following confirmation:



8. Print the Warranty Report using the Print menu option



9. Enter Comments that will appear on the header of the report.



10. The first page of the Warrany Report appears as follows:

Cat Electronic Technician 2013B v1.0
Warranty Report

1/18/2015 9:45 AM

Comments:
Synercon Test Case with C-12 Truck

C-12 Truck (MBL13232)

Parameter	Value
Vehicle ID	2HSCEAXR24C015095
Engine Serial Number	MBL13232
ECM Serial Number	21736103IK
Personality Module Part Number	2368689-00
Personality Module Release Date	may03
Personality Module Code	235
ECM Date/Time	1/18/2015 9:51:11 AM

Summary Information

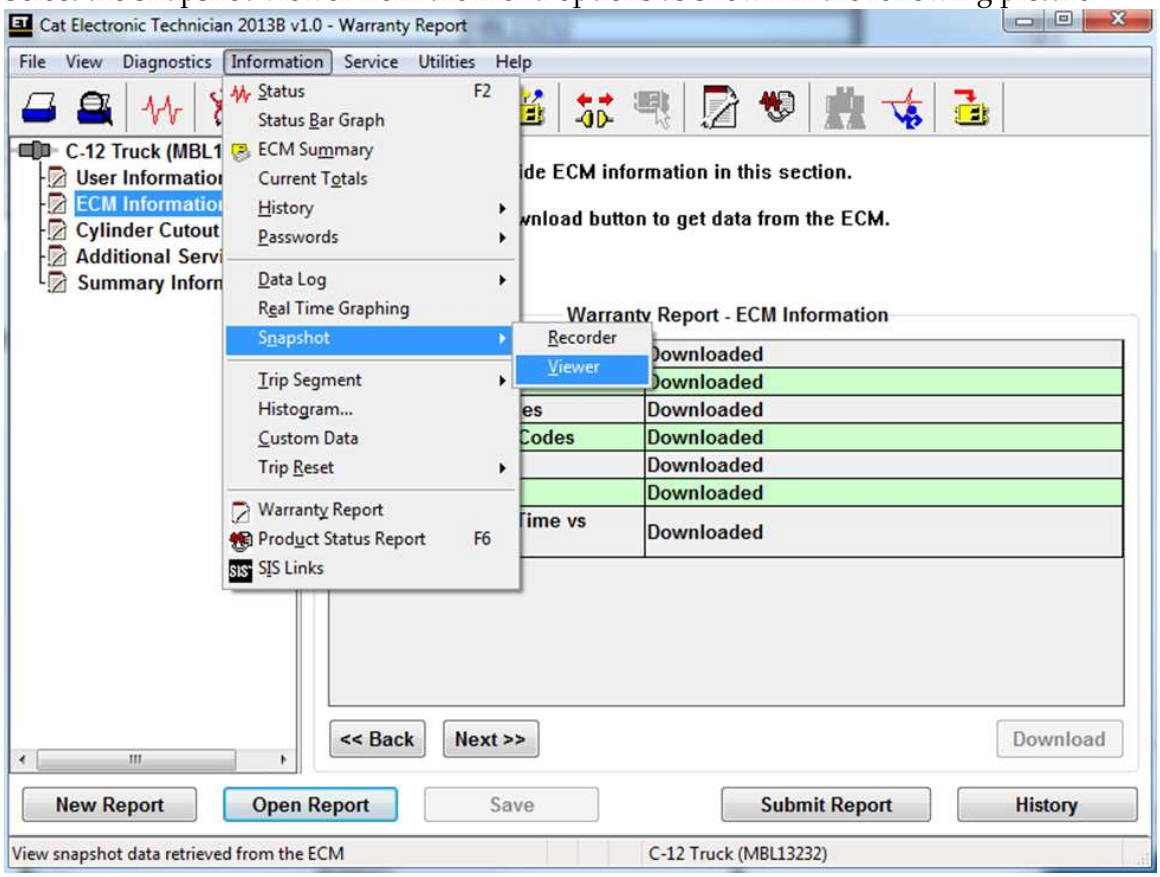
Engine Serial Number	MBL13232
ECM Date/Time	1/18/2015 9:40:47 AM
Report file Creation PC Date and Time	18/01/15 09:34:09 AM
Report file Last Modified PC Date and Time	18/01/15 09:44:32 AM
Total Distance	641486 Miles
Total Time	17850:17 hours
Total Fuel	104722 gal
Diagnostic Clock	19514 hours
Vehicle ID	2HSCEAXR24C015095
ECM Serial Number	21736103IK
Personality Module Part Number	2368689-00
Personality Module Release Date	may03
Personality Module Code	235

11. Scrolling through the Configuration data will reveal the Quick Stop Rate. If this is set to 0, then there may not be any Sudden Deceleration Snapshots.

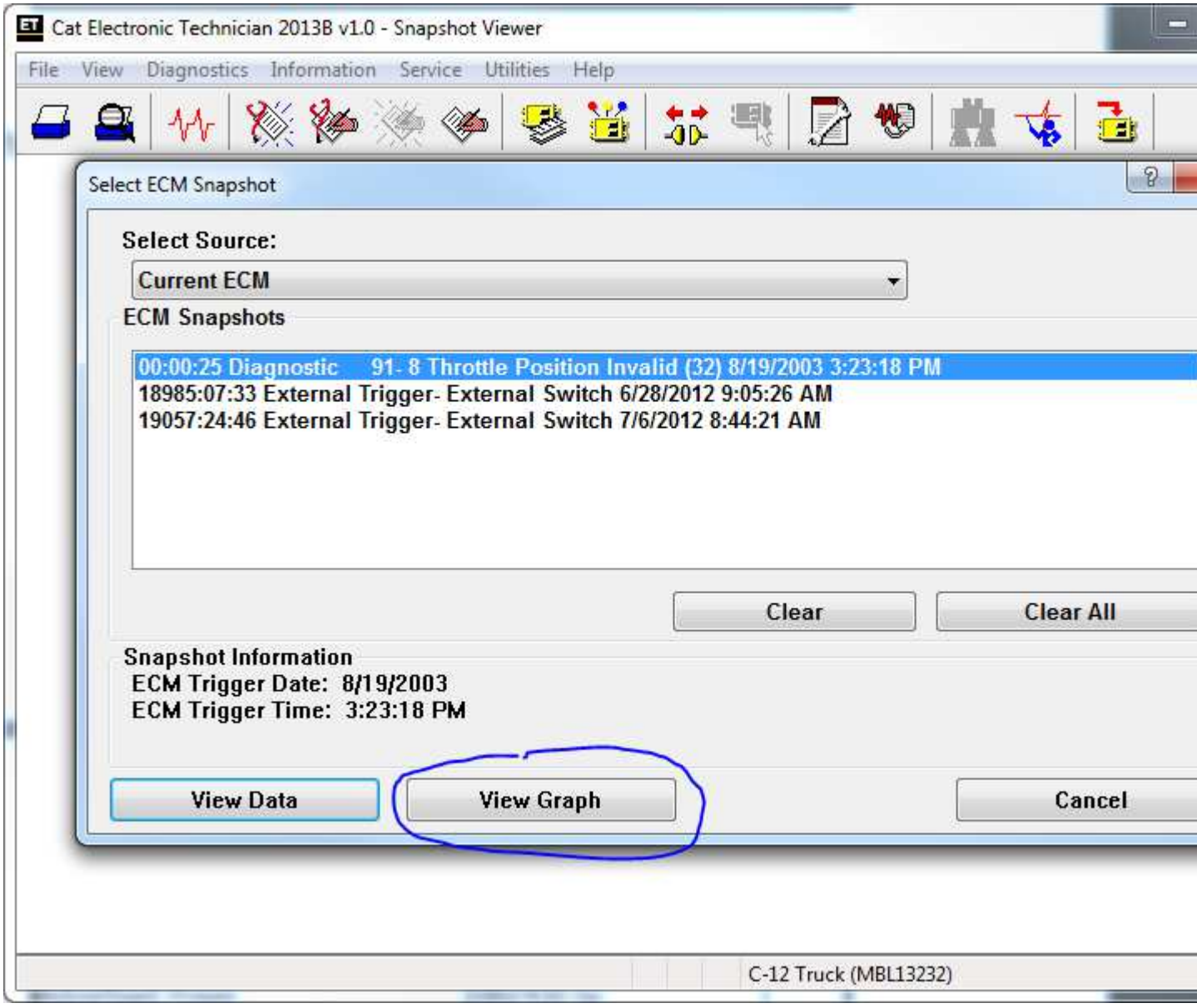
Theft Deterrent System Control	No	
Theft Deterrent Password	****	
Quick Stop Rate	7	mph/s
Minimum Idle Time (0 = Off)	5	min
Driver Reward Enable	Enabled	

2.5.4 Snapshot Data

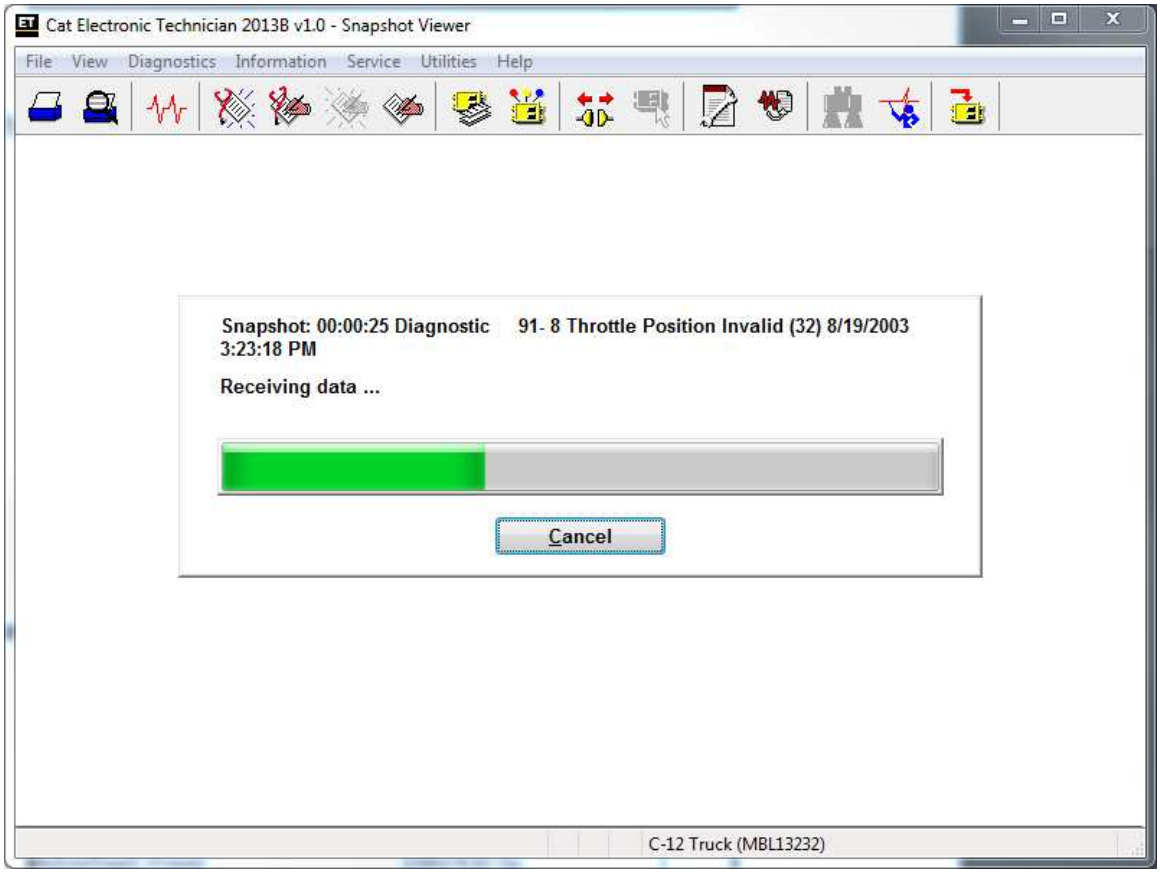
1. Select the Snapshot Viewer from the menu options as shown in the following picture:



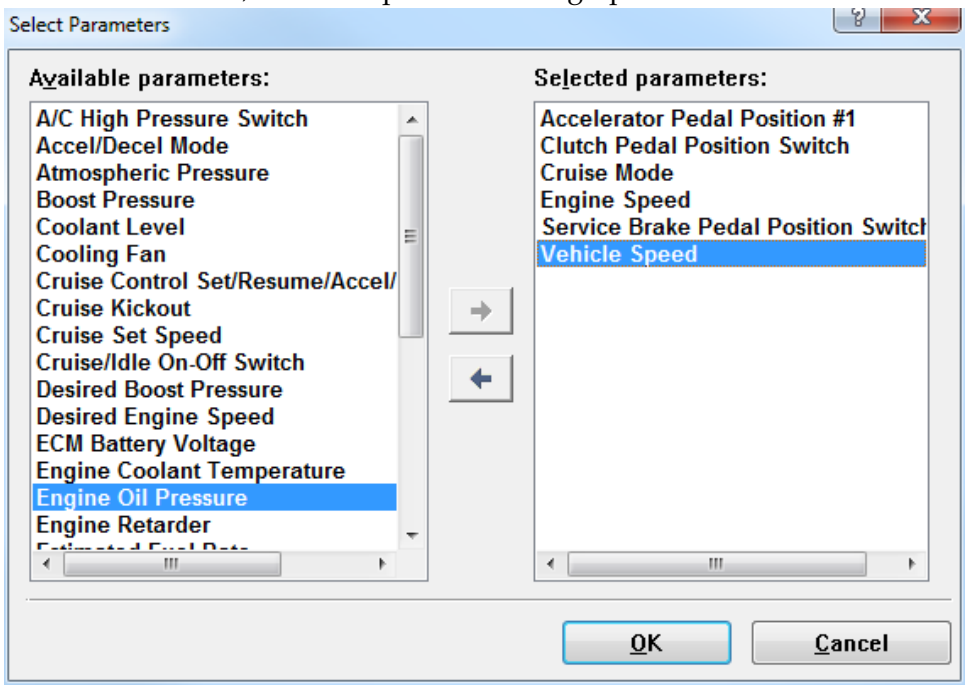
2. A menu of recorded Snapshots appear. Please select next one and press View Graph. Taking a screenshot of this dialog box is a good idea to keep track of all the available Snapshots.



3. A progress bar will appear.

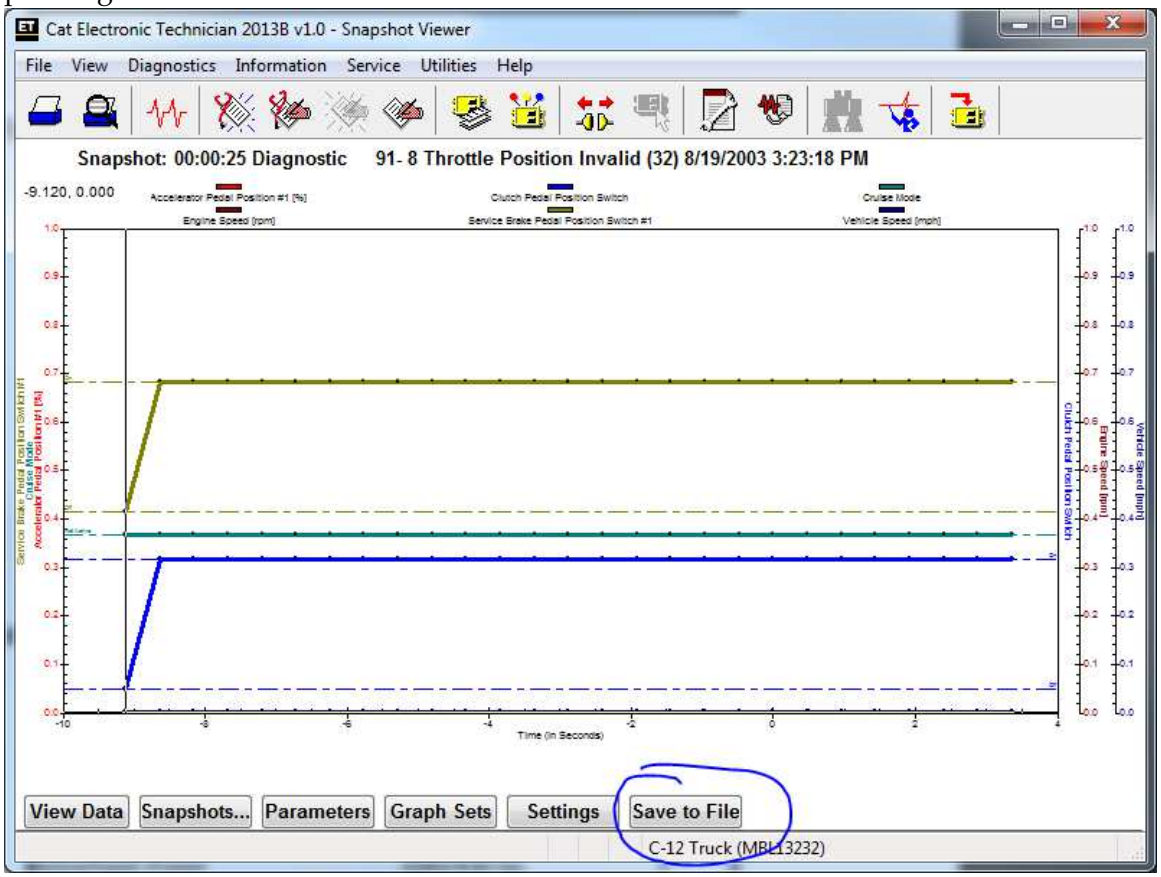


4. Once downloaded, select the parameters to graph.

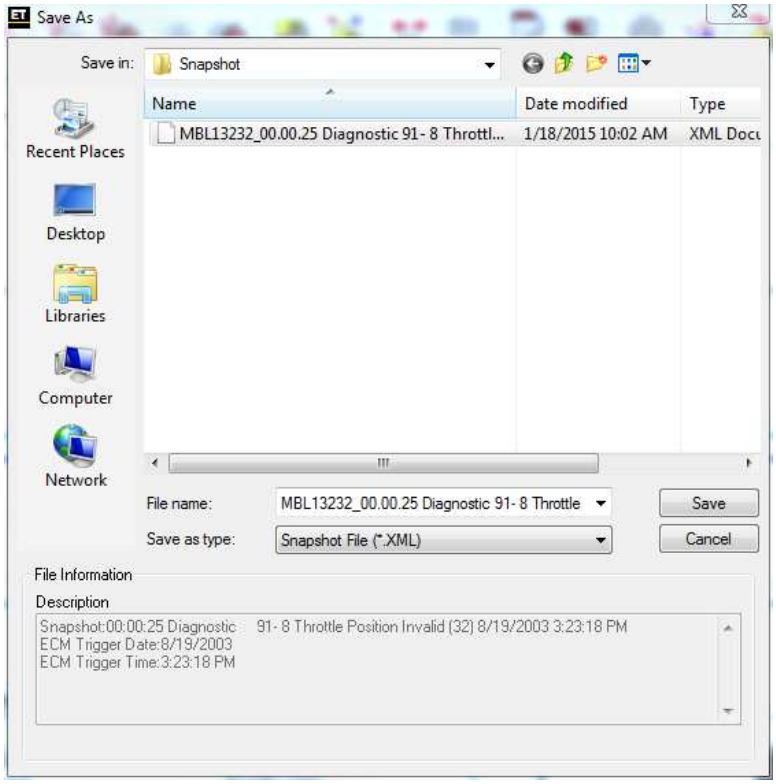


5. The resulting graph will show and all the data (even the data not shown) can be saved by

pressing Save to File.

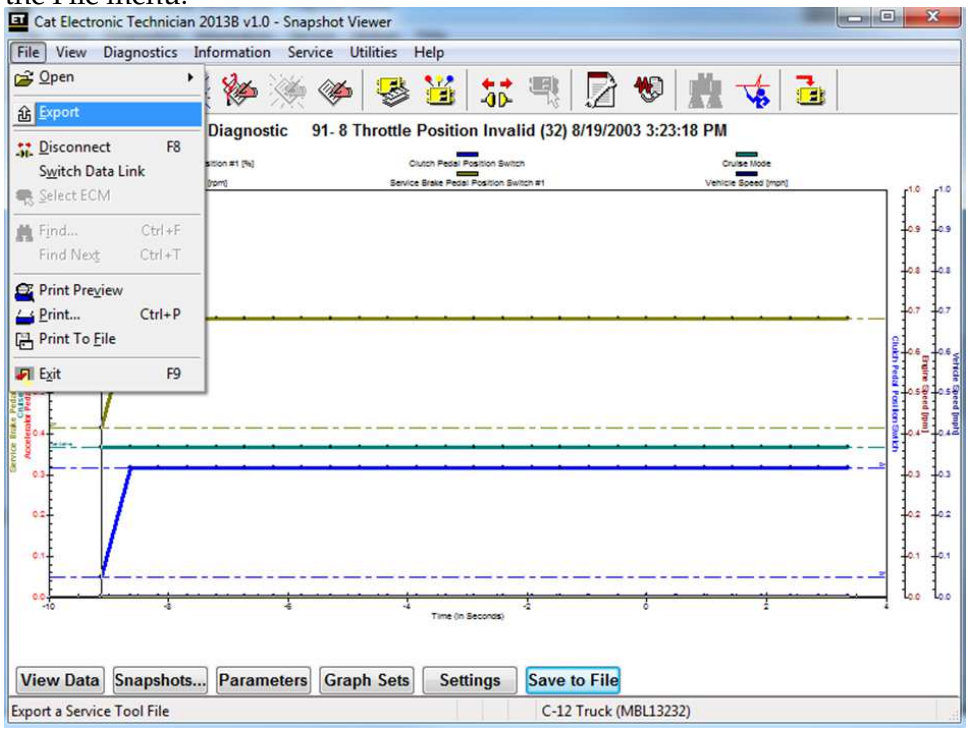


6. Record where the Snapshot File gets saved.

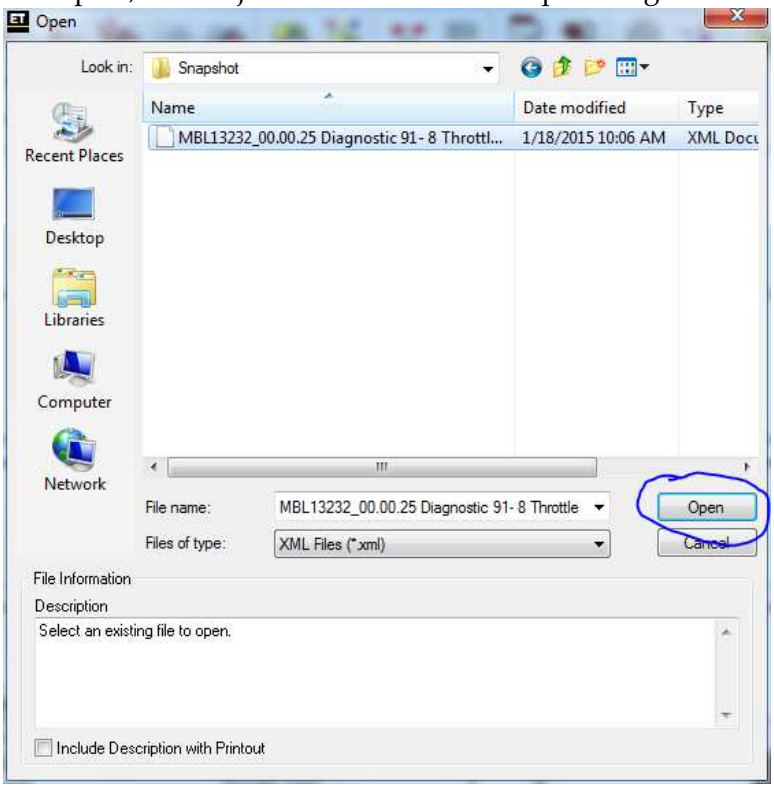


7. Print the Snapshot from the file menu.

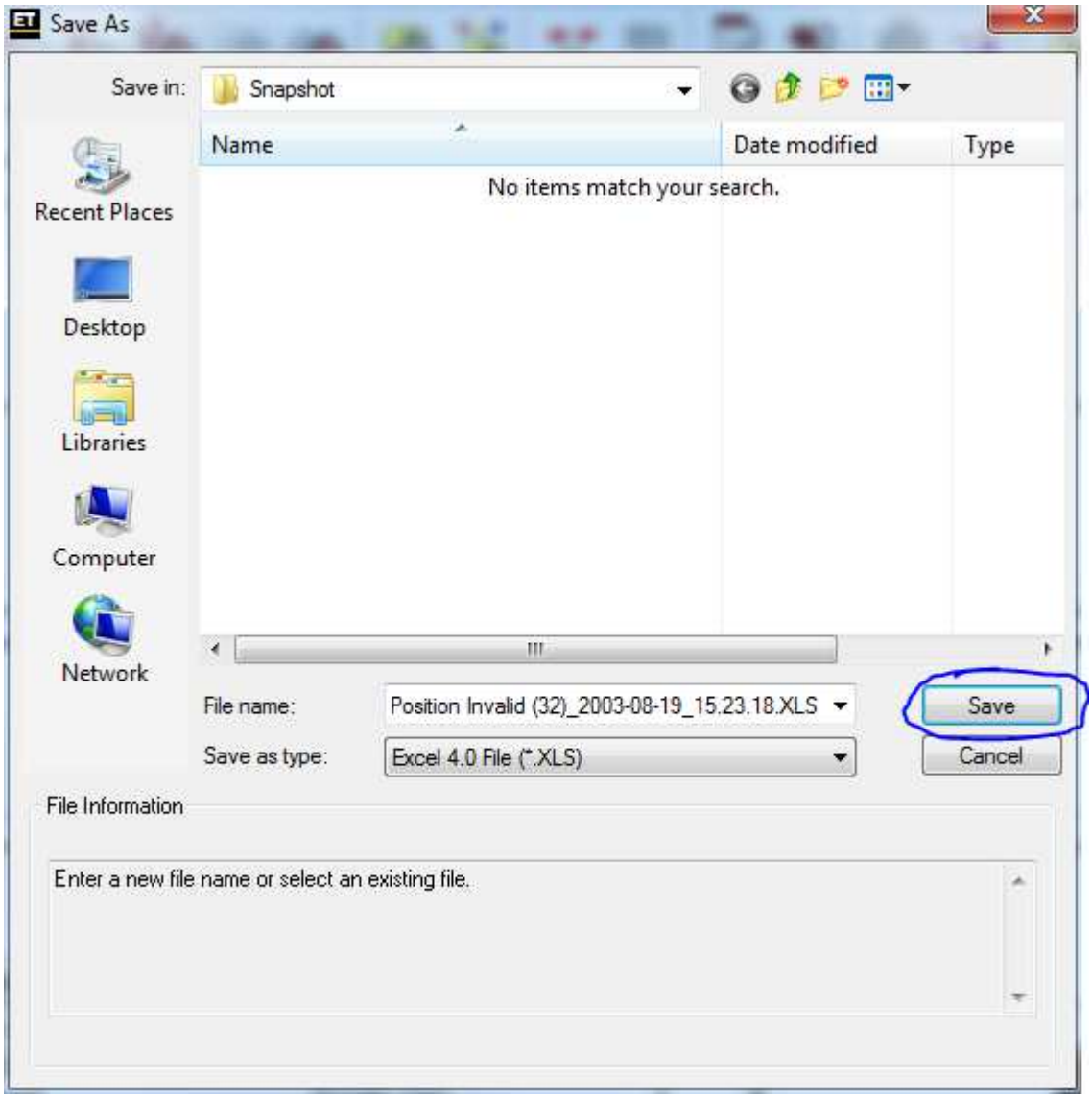
8. Once saved, the Snapshot file can be Exported to MS Excel by pressing the Export option in the File menu.



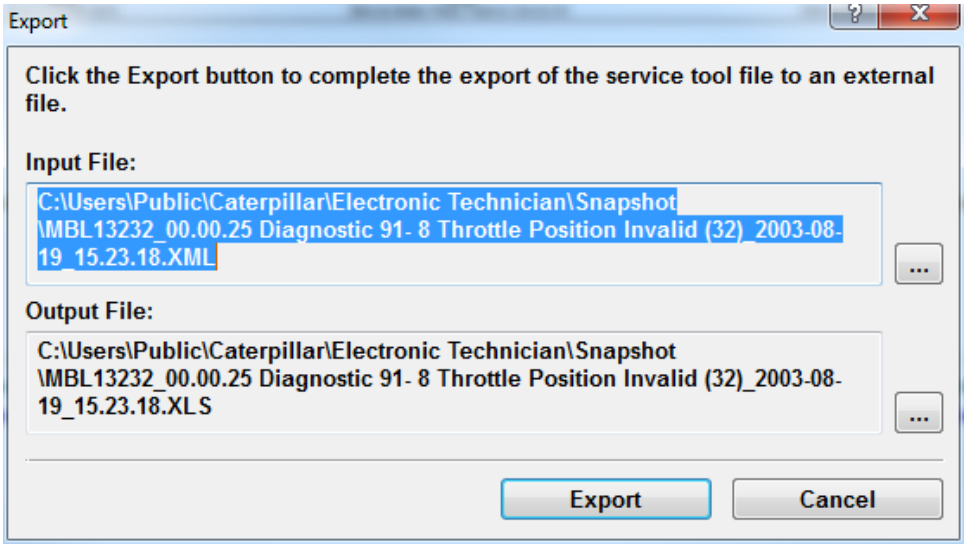
9. To Export, the file just saved needs to be opened again.



10. The exported file can be saved as an .XLS file

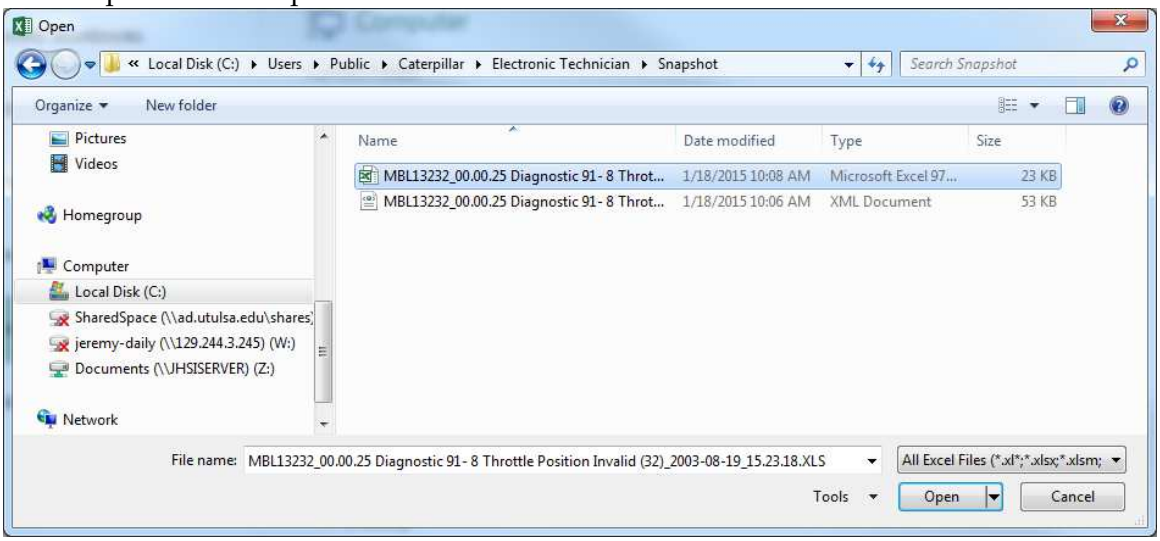


11. A confirmation dialog gives the option to change file names.

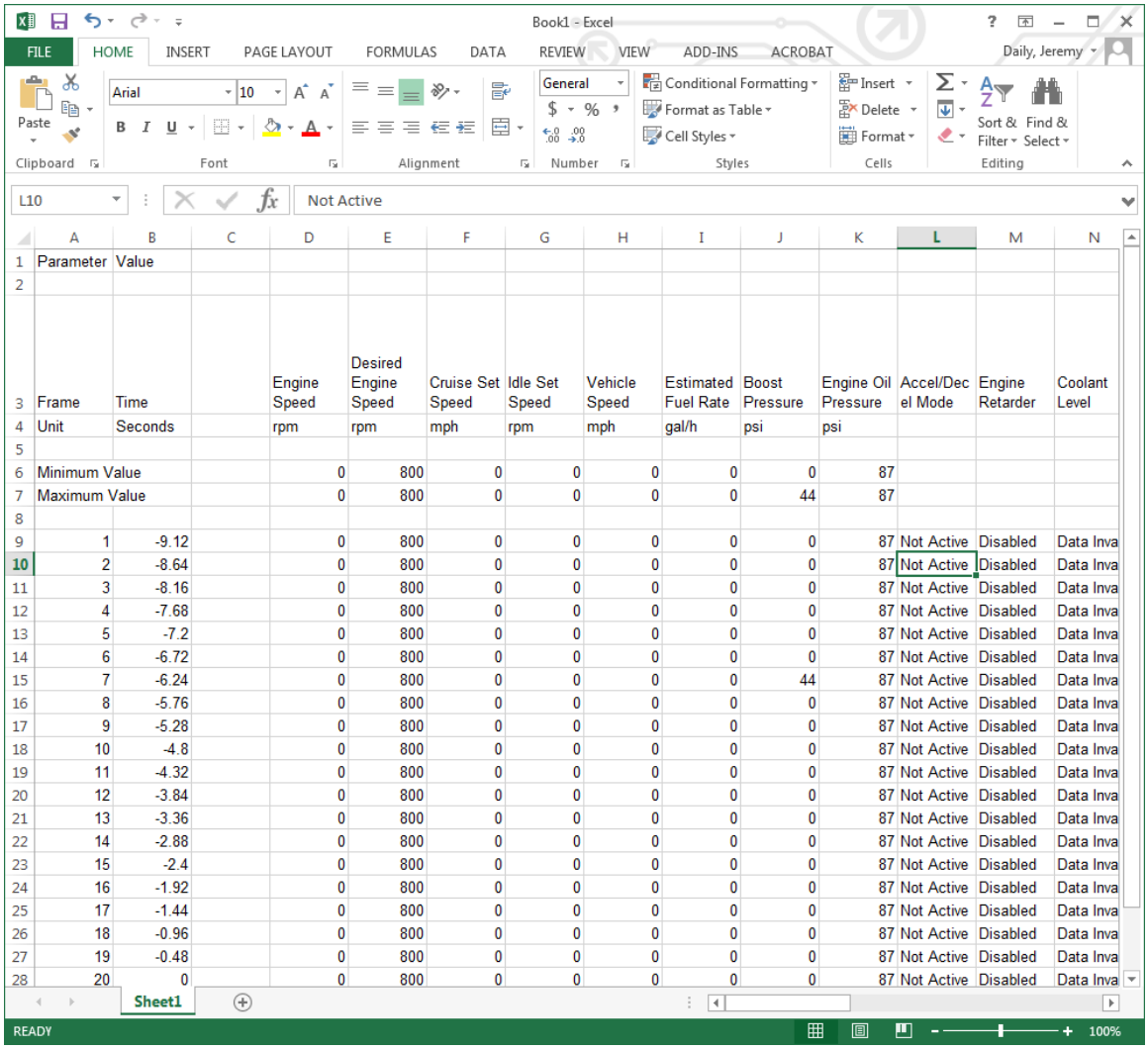


12. Record where the file was saved.

13. The Snapshot can be opened in Excel.



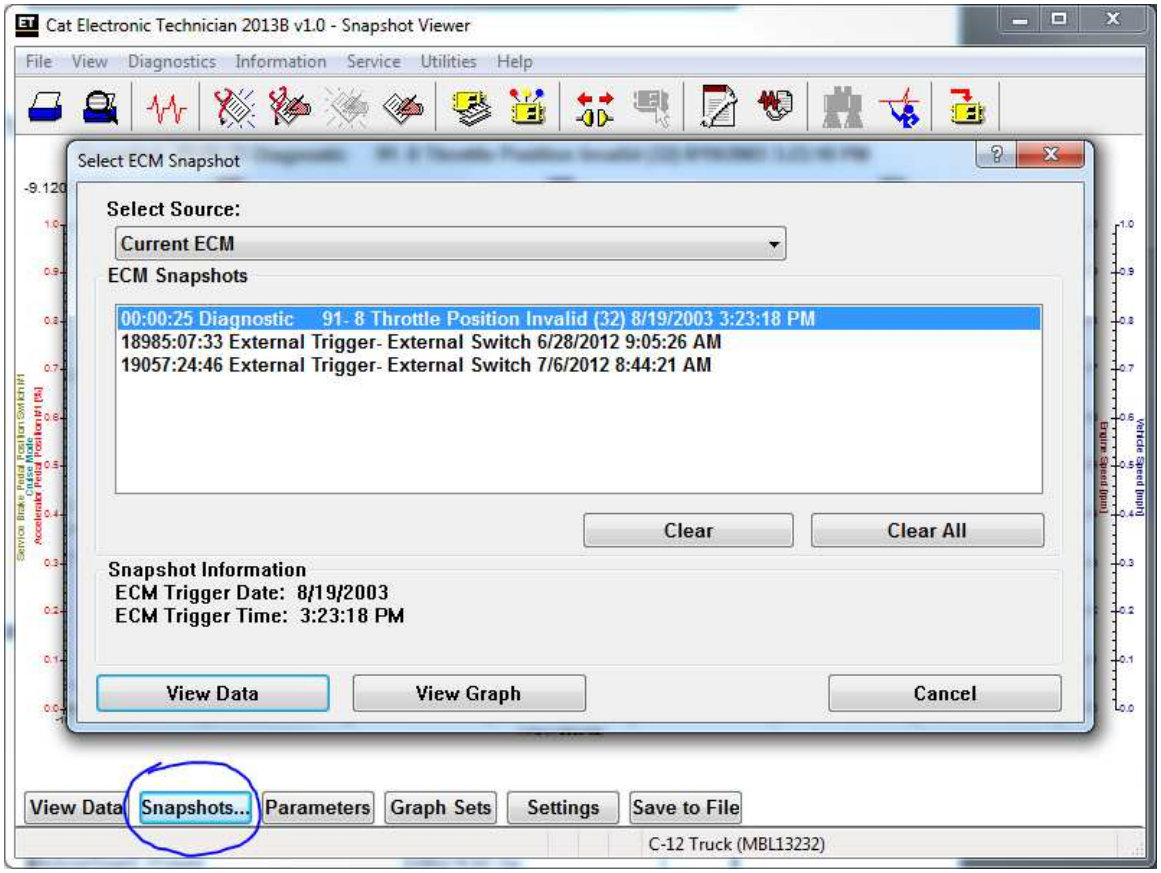
14. The excel file should appear like to picture below:



Book1 - Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Parameter	Value												
2														
3	Frame	Time		Engine Speed	Desired Engine Speed	Cruise Set Speed	Idle Set Speed	Vehicle Speed	Estimated Fuel Rate	Boost Pressure	Engine Oil Pressure	Accel/Decel Mode	Engine Retarder	Coolant Level
4	Unit	Seconds		rpm	rpm	mph	rpm	mph	gal/h	psi	psi			
5														
6	Minimum Value			0	800	0	0	0	0	0	87			
7	Maximum Value			0	800	0	0	0	0	44	87			
8														
9	1	-9.12		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
10	2	-8.64		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
11	3	-8.16		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
12	4	-7.68		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
13	5	-7.2		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
14	6	-6.72		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
15	7	-6.24		0	800	0	0	0	0	44	87	Not Active	Disabled	Data Inva
16	8	-5.76		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
17	9	-5.28		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
18	10	-4.8		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
19	11	-4.32		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
20	12	-3.84		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
21	13	-3.36		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
22	14	-2.88		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
23	15	-2.4		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
24	16	-1.92		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
25	17	-1.44		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
26	18	-0.96		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
27	19	-0.48		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva
28	20	0		0	800	0	0	0	0	0	87	Not Active	Disabled	Data Inva

15. The additional Snapshots can be accessed by pressing the Snapshots... button in CatET.



16. Repeat this Snapshots section for all the available Snapshots.

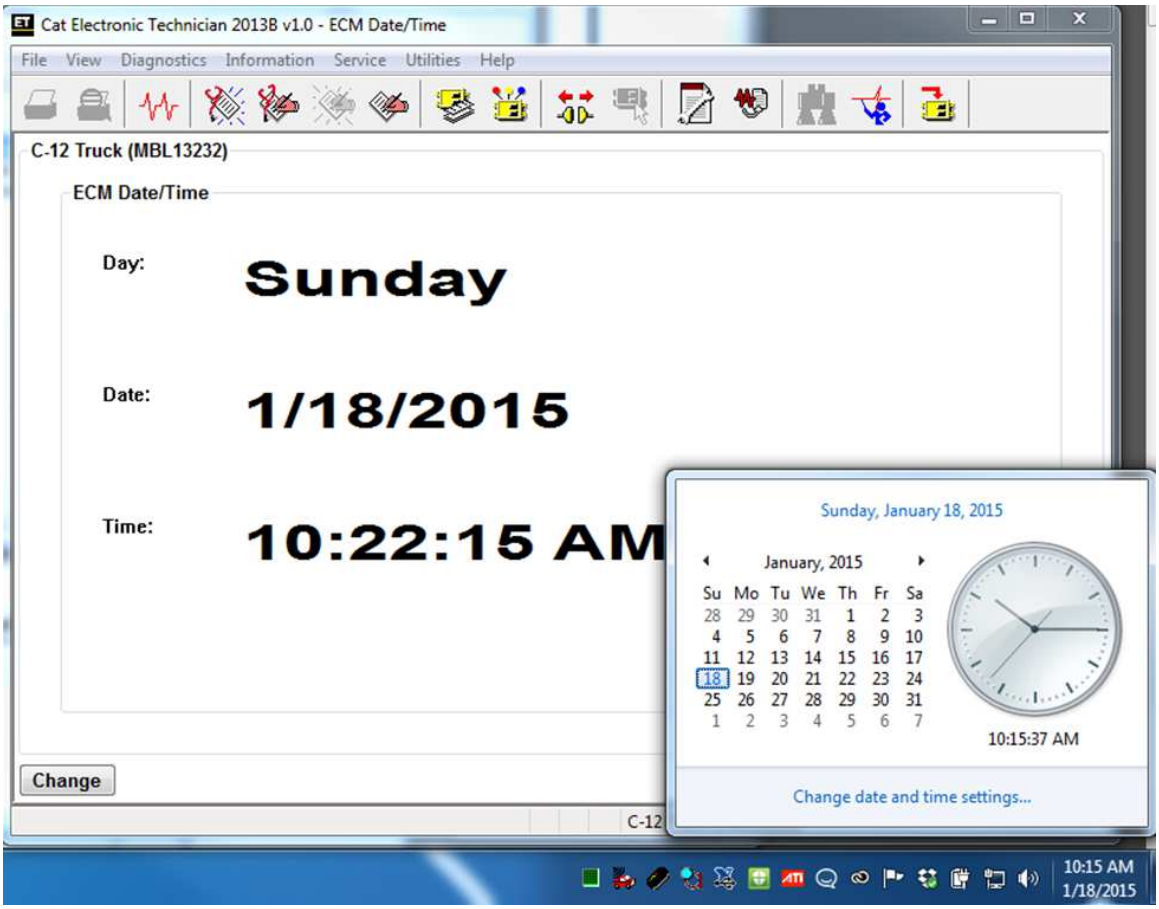
2.5.5 Preserving ECM Date and Time

1. Select ECM Date/Time from the Service Menu.

2. Open the PC System Clock and press the PrntScrn key on the PC keyboard.

3. Paste (Ctrl-v) the captured graphic into Paint or MS Word.

4. Save the document with the screenshot.



2.6 Forensic Write Blocking

There are certain messages that should not be transmitted to the ECM during a forensic examination. These messages are the kind that will change the data stored on the ECM in a meaningful way. Resetting or clearing fault codes, changing the ECM time, and resetting trip data should always be avoided.

3 Using the Forensic Link Adapter Portal Website

Once an FLA operator uploads the data to the server, the data will be decrypted and parsed on the server and made available to members of the group.

3.1 Common Data Elements

3.2 Detroit Diesel Specific Data

4 Troubleshooting

In this chapter, a guide to overcome problems encountered in the field is presented. The troubleshooting tree will tie back into the menu system an use both the screen menu display and the FLA web interface.

4.1 Forensic Link Adapter Fails to Boot

As the FLA boots, it may see something that it doesn't like and fails to pass its own self test. Often restarting will fix the problem. If connected to a truck, restart with the key in the off position so only power is connected.

4.2 Screen Displays Funny Characters

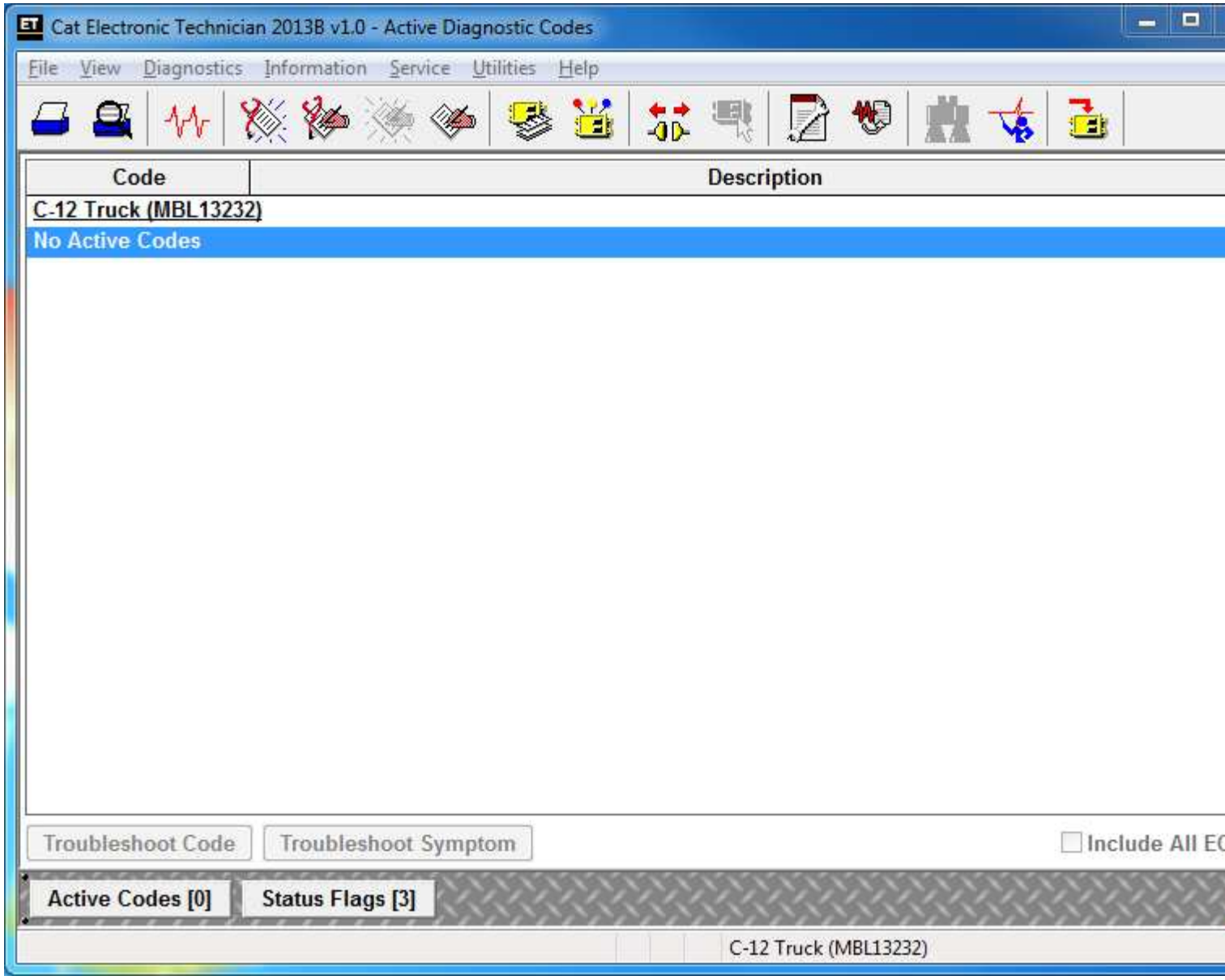
4.3 Forensic Link Adapter Cannot Connect to the Internet

4.4 Software Does Not Connect to Vehicle

4.5 A System Critical Error is Displayed

5 Smart Sensor Simulators

The Smart Sensor Simulator is a bench downloading harness for different ECMs that is programmed to emulate a working truck.



6 Administrator's Guide

The deployment of the Forensic Link Adapter software based on a hierarchy with the following tiers:

Organizations are the top level with a site administrator as the person in charge. Typically this is a highway patrol, a state police, or a company. The person in charge of the organization has the ability to oversee the data and use of the different FLAs.

Groups are a sub-level within an organization. For example, East District and West District may be groups within an State Police organization. If an organization only has a few operators and a few FLAs, it may not make sense to have different groups.

Operators are trained users of the FLA and are responsible for collecting data in the field. Operators can be assigned to different groups. Every operator in the group is able to see the data packages from all the FLAs assigned to the group, regardless of which operators downloaded the data.

Forensic Link Adapters are the hardware devices that an organization owns.

For smaller operations, it is likely that the organization, group, and operator are all the same person.

6.1 Account Overview

Forensic Link Adapters are assigned to each organization at the time of purchase. Once the organization completes the purchase, the serial numbers of each FLA will be loaded into the Organization's profile. An invitation to set up the Organization will be sent to the site administrator. For example, the Lieutenant in charge of the crash reconstruction division will become the site administrator once he or she registers by following the link sent in the invitation e-mail.

Once logged in as a Site Administrator, an account overview page will be available, much like the one shown in Figure 6.1 on the following page. Many of the fields on the web page are linked to various functions. The top bar (in black) has links to your default login page, the latest FLA download if you are an operator, a list of all the organizations, FLAs, and some account access settings. The web page is set up in three distinct tables as seen in Figure 6.1.

1. Organization Groups
2. FLA Operators
3. Forensic Link Adapter (FLA)

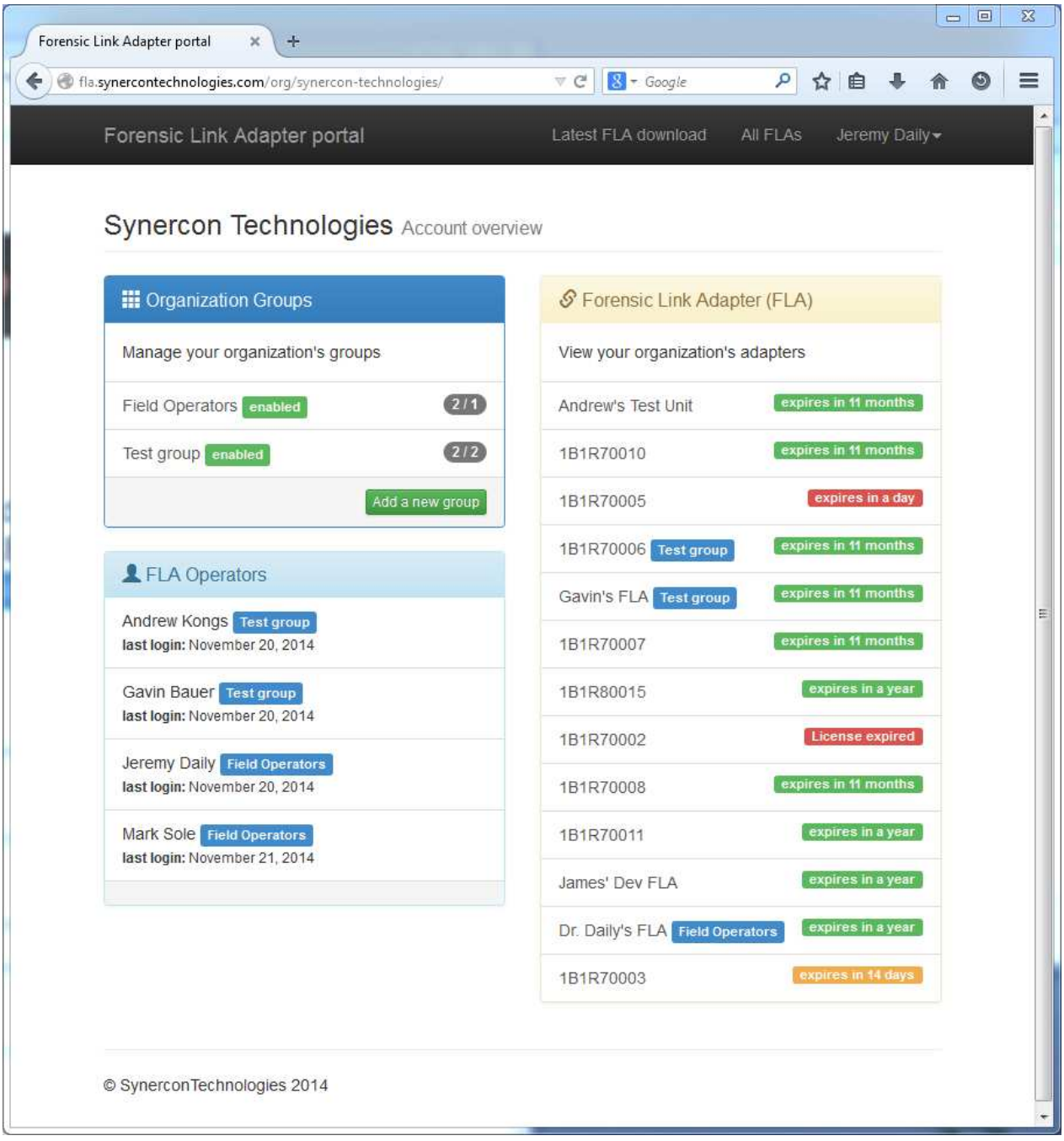


Figure 6.1: Example Forensic Link Adapter Portal web page for the Account overview

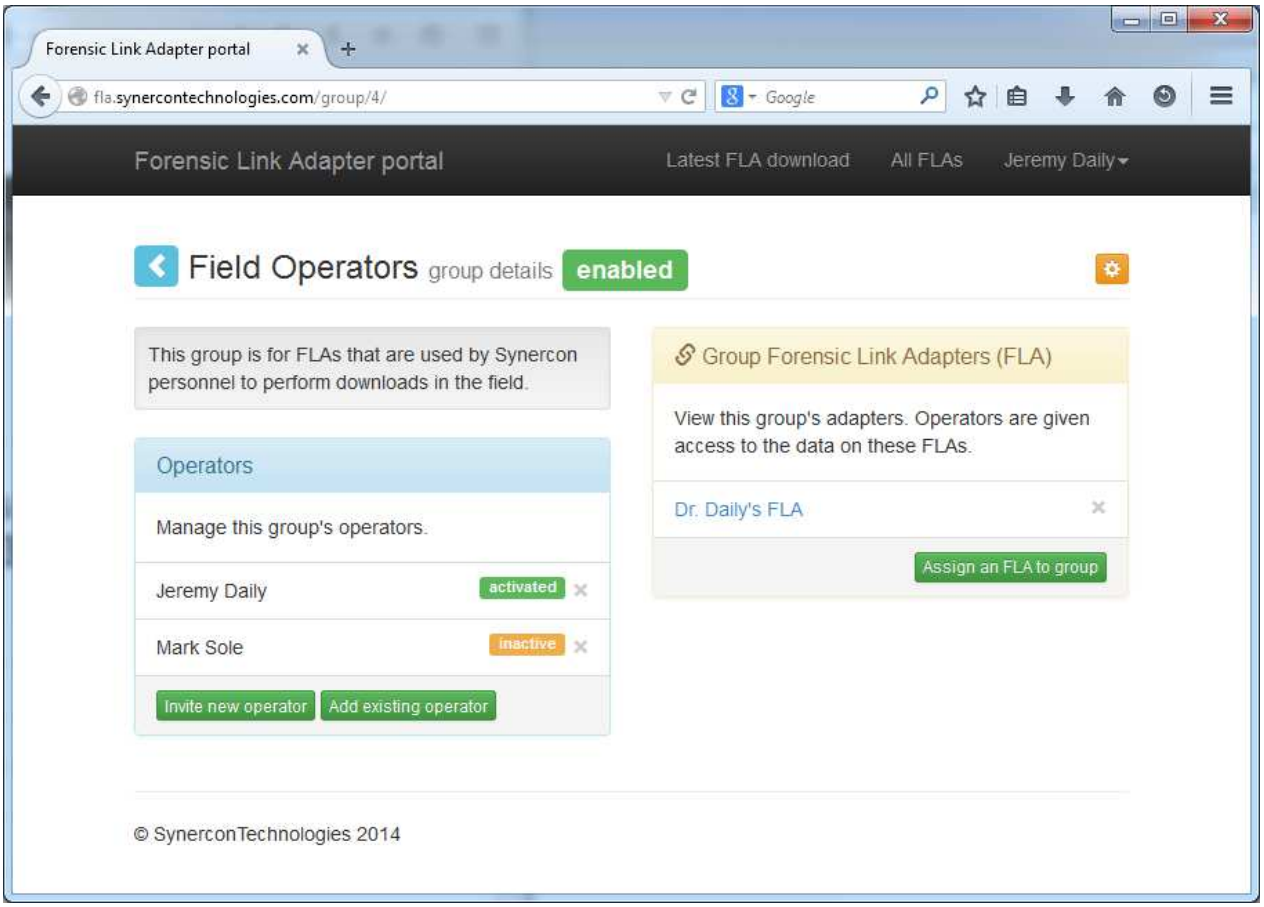


Figure 6.2: Example Group Details web page from the Forensic Link Adapter Portal.

6.2 Group Management

It is the responsibility of the Organization administrator to set up groups and operators according to the desired structure of the Organization. You can have operators that have access to more than one group.

6.2.1 Adding an Operator

There are two ways to get an operator access to the group's FLAs. The first is to invite a new operator and the second is to invite an existing operator. However, the existing operator must have accepted an invitation from the Organization under a unique e-mail address. By clicking on the lower left box the says Invite new operator shown in 6.2, a web page similar to the one shown in 6.3 on the following page. The required user information includes name and email address. The FLA portal uses e-mail addresses to identify operators. Therefore, if a person belongs to different organizations, they would have to use a different e-mail for each organization. New operators will get an e-mail from `fla-admin@synercontechnologies.com` with a link to register with the site.

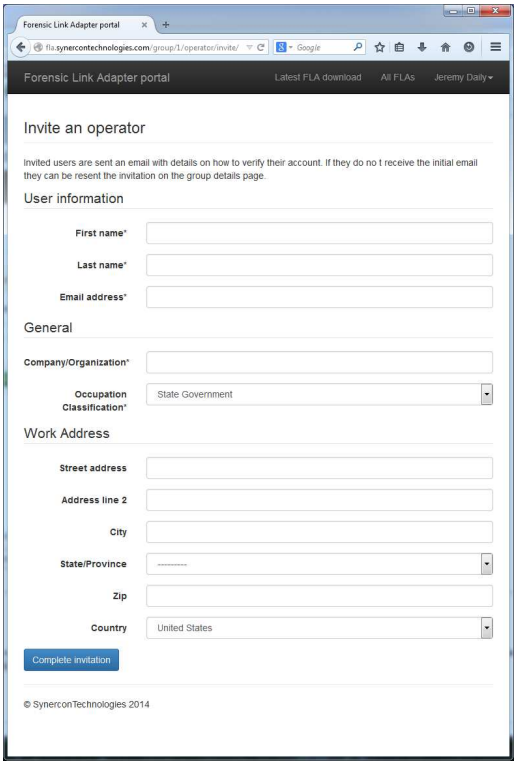


Figure 6.3: New Operator invitation form on the FLA portal website.

Many times this e-mail will be filtered as junk, so advising the recipient to check their e-mail filters and junk folder may be necessary.

The Work Address details on the Invite and operator page are used to fill in a report with

6.2.2 Assigning an FLA to the Group

Each group needs to have at least one Forensic Link Adapter assigned to it. To assign an FLA to a group, click the button to see a list of available FLAs for your organization. Only people in the group can see the data on the FLA assigned to that group

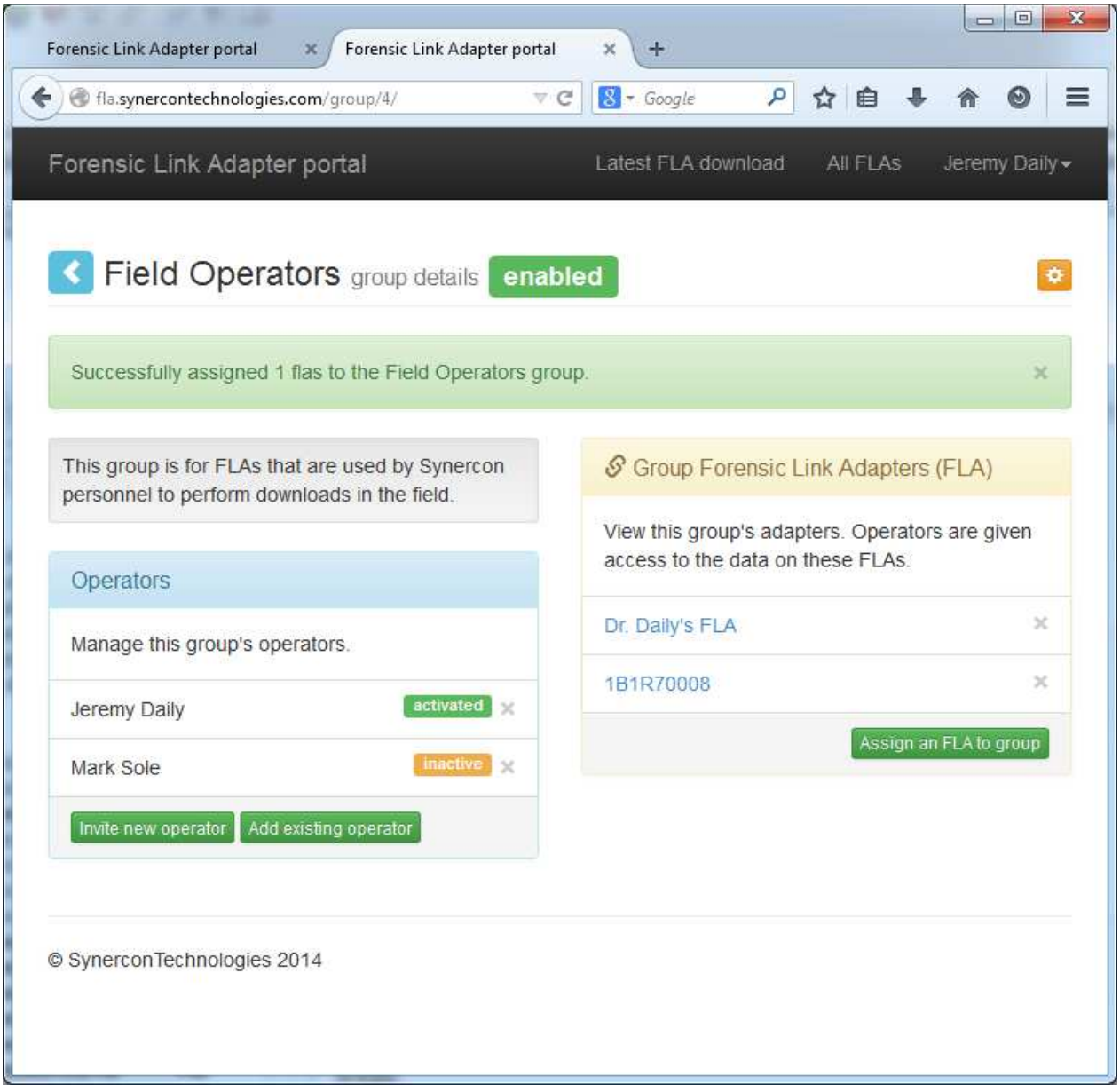


Figure 6.4: Assigned FLAs

7 Definitions

When dealing with heavy truck data, there are many acronyms, symbols and phrases that are used to describe the data. This chapter presents a list to help decipher some of the terms used for dealing with heavy vehicle event data recorders.

NIST National Institute for Standards and Technology (http://www.nist.gov/)

RTC Real Time Clock

Bibliography