SUBARU

Confidence in Motion

Technician Reference Booklet

Subaru Select Monitor Diagnostic Systems

AUTOMOTIVE Youth Educational Systems PROUD PARTNER

WE SUPPORT PROFESSIONAL CERTIFICATION THROUGH THE National Institute for AUTOMOTIVE SERVICE EXCELLENCE

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This Technical Reference Booklet (TRB) is designed to be used in a classroom environment or as a guide for self study.
The TRB is not intended to be used as a supplement or substitute for the Subaru Service Manual. Always consult the appropriate Service Manual when performing any diagnostics, maintenance or repair to any Subaru vehicle.

Subaru of America, Inc. reserves the right at any time to make changes or modifications to systems, procedures, descriptions, and illustrations contained in this book without necessarily updating this document. Information contained herein is considered current as of March 2016.

Table of Contents

Subaru Select Monitor Diagnostic Systems

Introduction

Welcome to the Subaru Select Monitor Diagnostics Systems training course. This course will provide structured hands on exercises with the Subaru Select Monitor III (SSMIII), Subaru Diagnostic Interface (SDI), Subaru Select Monitor 4 (SSM 4), and the Denso Scan Tool Interface (DSTi).

Classroom lecture, supported with a Select Monitor Simulator, will provide the knowledge and practice required to successfully complete two tests on an actual vehicle in the training lab. These tests must be completed successfully to advance to the next segment of the class.

The grading components of the course include the following:

1. On-car SSMIII test
2. On-car SSM 4 test
3. On-line post test

A score of 80 percent or higher is required on each test.

Course Objectives

Upon successful completion of this course the student will be able to perform the following:

- Identify and operate the Subaru Select Monitor icons and interface devices
- Establish communications between a vehicle and the SSMIII
- Navigate and operate the diagnostic menus of the SSMIII
- Identify and operate the data display features of the SSMIII
- Perform diagnostic operations with the SSMIII
- Perform two way communications between the vehicle and SSMIII, including Flashwrite
- Navigate and operate the diagnostic menus of the SSM 4
- Identify and operate the data display features of the SSM 4
- Perform diagnostic operations with the SSM 4, including two way communications
- Operate the DST-i Oscilloscope

Subaru Select Monitor Diagnostic Systems

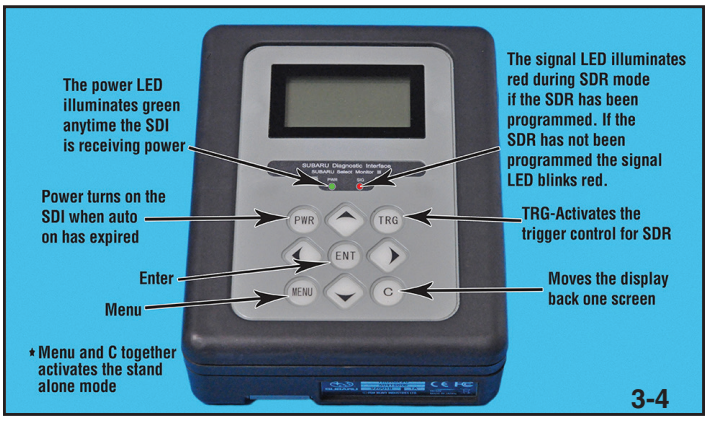
Icons and Interfaces

Timely and accurate diagnostics of Subaru vehicles depends on the technician's understanding of the vehicle and the correct use of the tools available. This training course will provide you with information and hands on experience with one of the most important tools you have access to, the Subaru Select Monitor diagnostic system.

Subaru Select Monitor III icon

Subaru Select Monitor 4 icon

The Subaru Select Monitor diagnostic system includes the Subaru Select Monitor III (SSMIII) and the Subaru Select Monitor 4 (SSM 4). Each Subaru Select Monitor consists of software packages (Subaru Select Monitor, Oscilloscope, and Flashwrite) that are installed into a host computer and depend on interface devices and cables that allow the host computer to communicate with the Subaru vehicle.



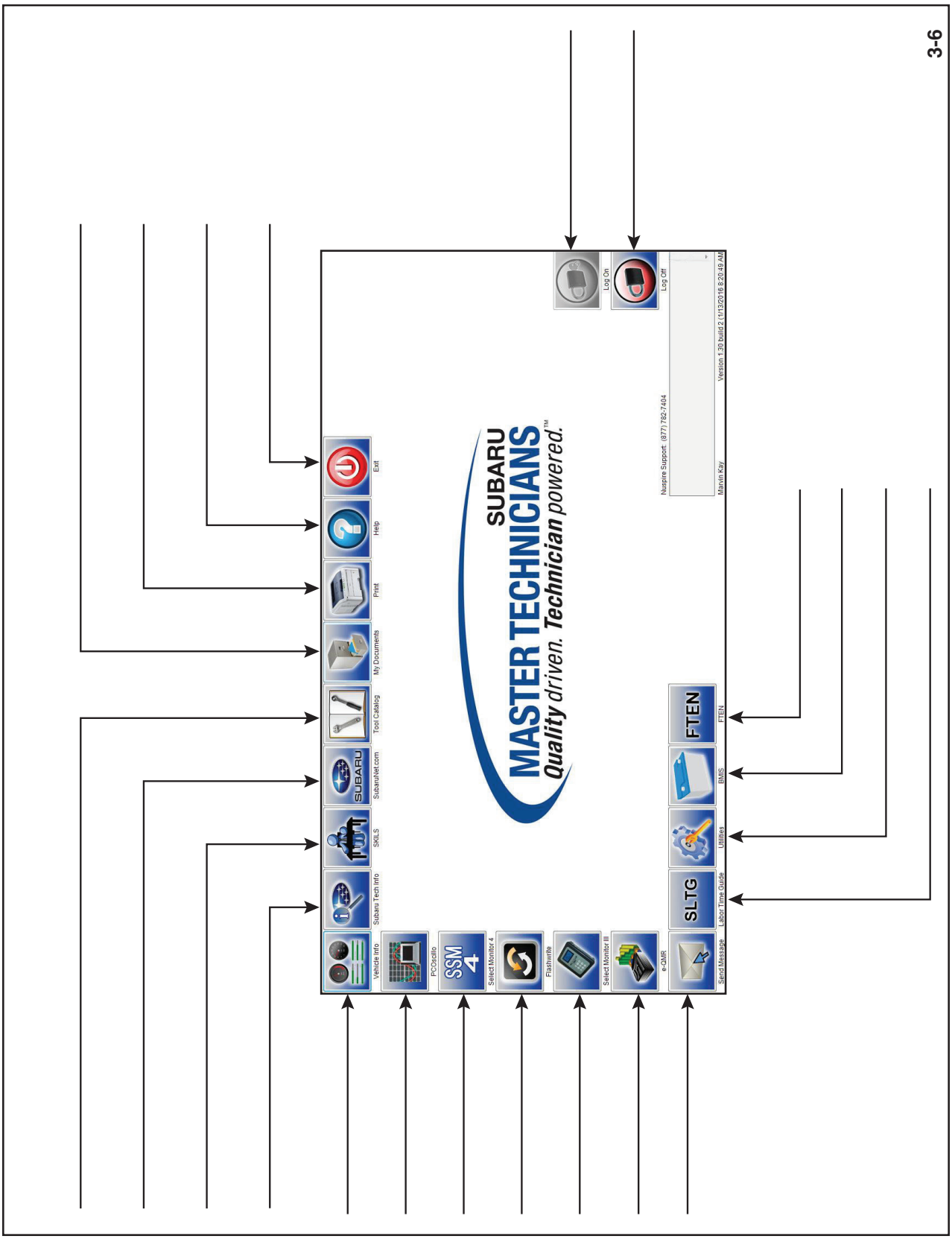
SDI Box

DST-i Box

The Subaru Select Monitor III (SSMIII) was introduced in 2005. The original interface device was the Subaru Diagnostic Interface (SDI) box. A newer interface device, the Denso Scan Tool Interface (DST-i), was introduced in 2015 to serve as the replacement for the SDI.

Subaru Select Monitor Diagnostic Systems

The host computer for the Subaru Select Monitor is usually equipped with a Graphical User Interface (GUI). The GUI provides access to other tools such as the Subaru Technical Information System (STIS), Vehicle Inquires, Emailing, and access to Subaru of America, Inc. websites.



Subaru Select Monitor Diagnostic Systems

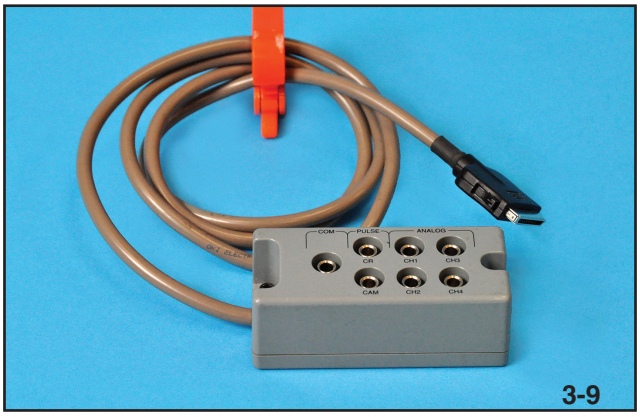
SDI

Additional functionality of the SDI includes Stand Alone SSMIII operation, Driving Recorder operation, and Oscilloscope interface. Check the Select Monitor WBT for details on these operations.

SDI

Open SDI with Oscilloscope Module

The SDI interface provides a peripheral connection for the installation of an oscilloscope module. The oscilloscope module allows for the installation of a 4 channel analog box.



Analog box

SD card

The analog box is equipped with ports that allow for monitoring of the crankshaft and camshaft sensors. Check the Select Monitor WBT for details on operation of the Detailed Roughness Monitor.

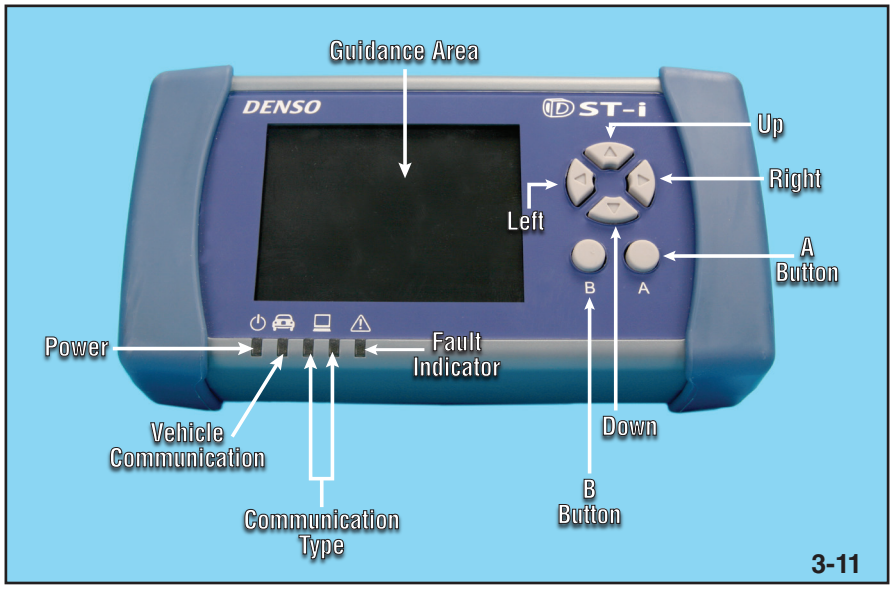
A 256MB SD card is installed on the SDI box that contains the firmware to operate the SDI box and stores saved data files when the SDI box is used in Stand Alone mode or as a Driving Recorder.

Note: Replacement parts and cables, including the oscilloscope module and analog box, are no longer available for purchase. If your SDI becomes damaged or is no longer operational, replace it with the DST-i.

Note: Before either interface device can be used with the SSMIII, the interface control must be set on the SSMIII software. Instructions for performing this task will be covered later in this TRB.

DST-i

The DST-i is equipped with six control buttons. The function of each button varies by the displayed information in the guidance area.



DST-i Controls and LEDs

Four light emitting diodes communicate operating conditions of the DST-i to the technician. The Power LED on status is a steady green. Vehicle Communications, (SSMIII or SSM 4 is communicating with the vehicle), flashes green. The Communication Type LEDs alternate between a blue flash on the left (Bluetooth) and a green flash on the right (USB) until communications are established. At that time either the blue or green LED will be on steady. The Fault Indicator LED will be a steady red if a fault with the DST-i exists.

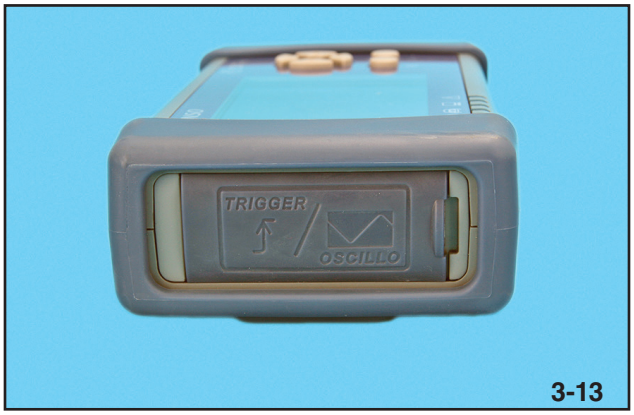
Note: Bluetooth communications between the DST-i and the SSM 4 host computer are not recommended. Bluetooth communications during reprogramming is not recommended as it may result in incomplete file transfer.

The top side of the DST-i is equipped with 3 connection ports. The center port is for connecting the Data Link Cable, which connects to the Data Link Connector on the vehicle. The port on the left, as pictured, is the USB cable connection, which connects to the SSM 4 host computer.

Top side view of DST-i

The port on the right, as pictured, is for an auxiliary power (12 volts DC) connection, ***(Do not use an AC/DC converter for auxiliary power).***

The Oscilloscope channel 1, channel 2, and DST-i ground connection ports are located on the left side of the DST-i. Keep the dust covers in place when the ports are not in use.

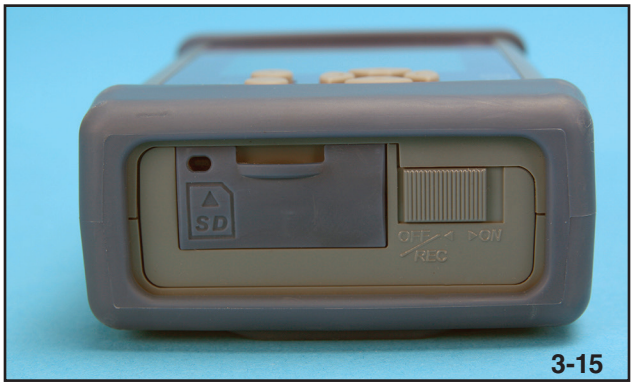


Dust Cover in Place

Channel 1, Channel 2 & Ground Connection

The right side of the DST-i is equipped with the Off/On switch and SD card slot.

Note: The dust cover has been removed from the SD card slot to improve photography, never remove the cover except to check or replace the SD card.

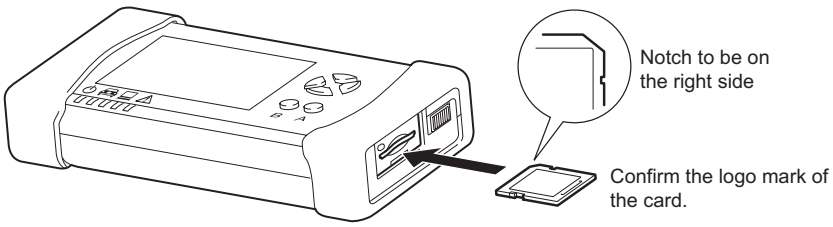


On/Off Switch, SD Card Slot

SD Card Inserted

The SD cards marked as the picture below are acceptable for use in the DST-i.

Always remove or install the SD card with the DST-i powered off.



Compatible cards	
SD	SDHC

The SD card must be installed with the notch to the right, as the picture above describes. 3-17

Inserting The SD Card

Note: The SD card is utilized to retain saved SSM 4 files when operating in Stand Alone mode.

Subaru Select Monitor Diagnostic Systems

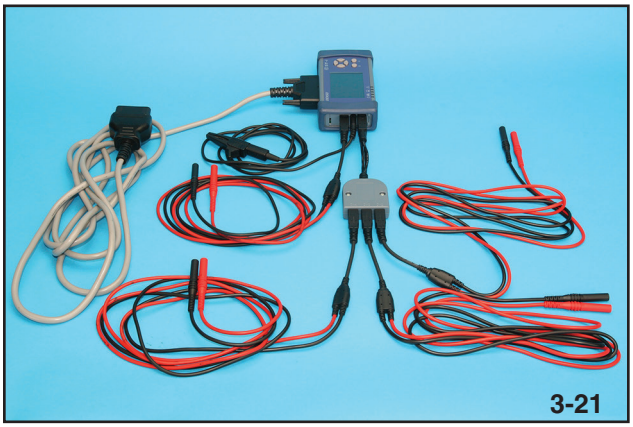
The DST-i oscilloscope and software are designed to provide up to four channels of voltage monitoring. The oscilloscope software is not associated with the SSM 4 software and is installed separately. Channel 1 and channel 2 oscilloscope lead connections are located on the left side of the DST-i.

Left side of DST-i

Oscilloscope Lead Connections

A four channel adapter connects to the channel 2 connection to enable channels 2, 3, and 4 for oscilloscope operation. The adapter is shipped with two additional oscilloscope leads and probes.

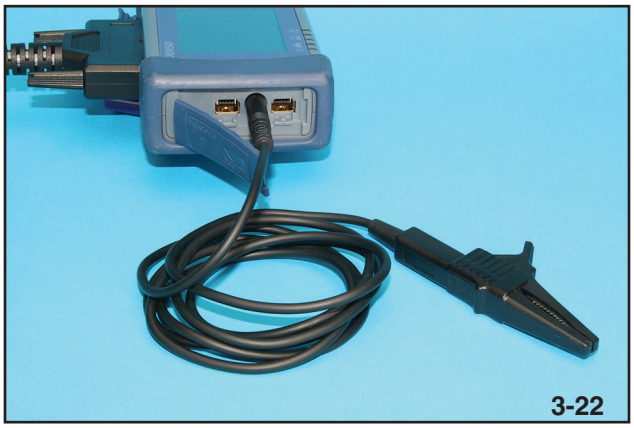
4 Channel Adapter



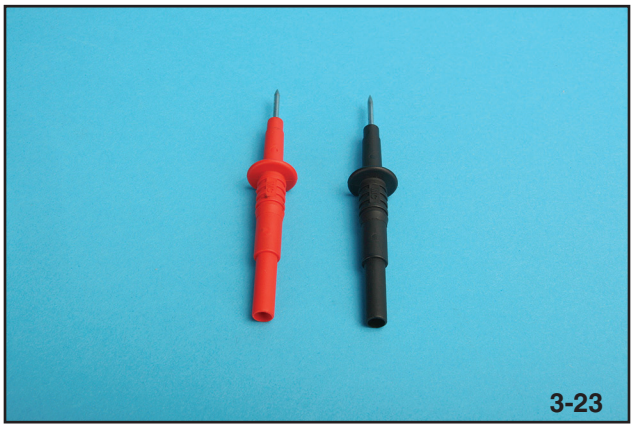
Oscilloscope Wiring

Care should be taken to maintain proper identification of the leads due to the common coloring of the wires. The oscilloscope can be powered by the DLC cable or the USB cable of the host computer. Stand alone operation of the oscilloscope is provided, but not recommend due to small display size and limited functionality.

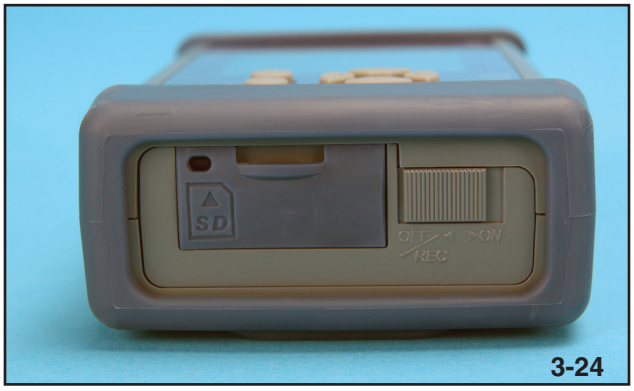
Always connect the DST-i grounding cable to chassis ground to prevent the USB cable from acting as oscilloscope ground.



DST-i Grounding Cable



Positive and Negative Probes



DST-i On Switch

Make all connections to the circuits to be monitored and turn on the DST-i (the switch is located on the right side of the DST-i).

TIPs article September 2015

Due to a limited supply of remaining Subaru Diagnostic Interface (SDI) boxes, SOA recommends in all applicable situations, Technicians should use the new interface, the Denso Scan Tool – interface (DST-i). The current SDI will remain on the required tool list until 2019 to allow service of 2003 and earlier Subaru vehicles as required by law. However, for all instances where an interface is needed to diagnose 2004 and newer vehicles, the DST-i should be used. It is recommended that the SDI box be secured and stored in a safe place and to be used only when needed on pre-2004 vehicles thereby avoiding unnecessary wear and tear.

DST-i Applications: Subaru Select Monitor III software (SSMIII) – The DST-i can be used in combination with SSMIII software for all 2004 to 2015 vehicles.

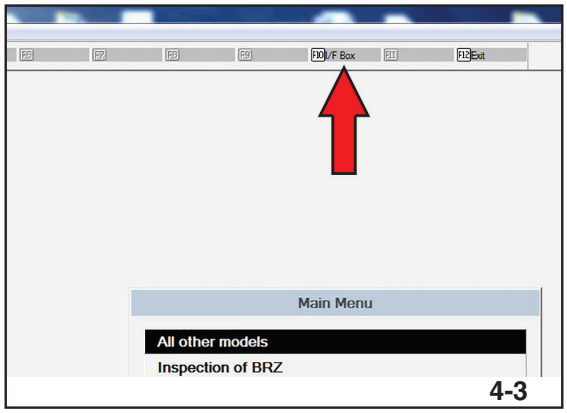
(From the SSMIII main menu, use the F10 button to select the proper interface.) Subaru Select Monitor 4 software (SSM 4) – The DST-i must be used in combination with SSM 4 software for all 2016 and newer vehicles.

Summary – When using the SSMIII software and an interface on 2007MY to 1997MY, the interface must be the SDI.

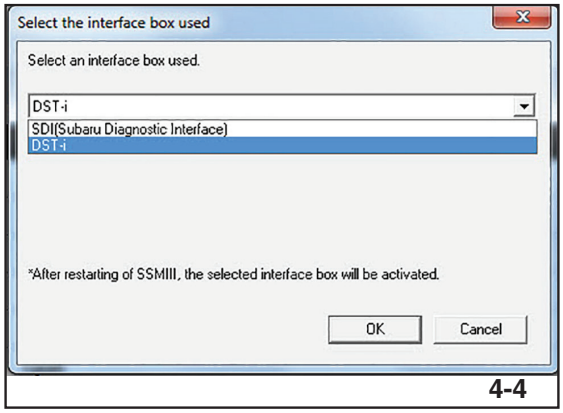
Establishing Vehicle Communications with the SSMIII

Subaru Select Monitor III (SSMIII)

Activate the SSMIII software and click the F10 button on the display or press the F10 button on the host computer.



Selecting Interface Box



SSMIII Interface Control

Select the desired interface device and click “OK”. Close the SSMIII software and restart. The SSMIII will now operate with the selected interface. This procedure must be performed again if the interface device is changed.

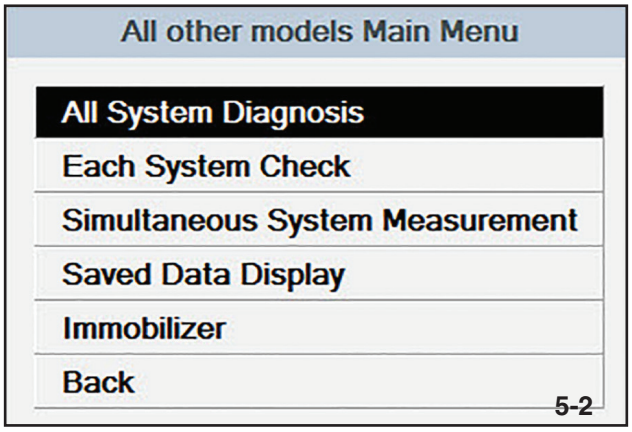
NOTES:

Subaru Select Monitor Diagnostic Systems

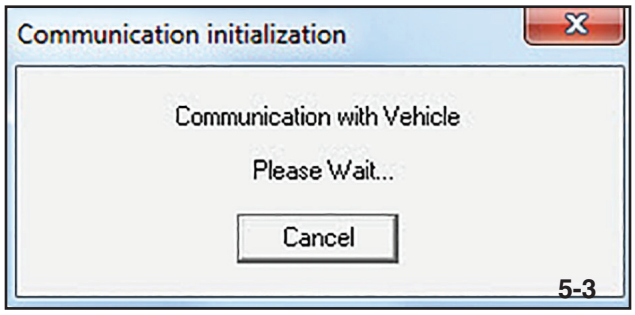
Subaru Select Monitor III Diagnostic Menus

All Systems Diagnosis

The "All Systems Diagnosis" of the SSMIII checks for any existing DTCs and performs a circuitry test of all systems' input and output values.



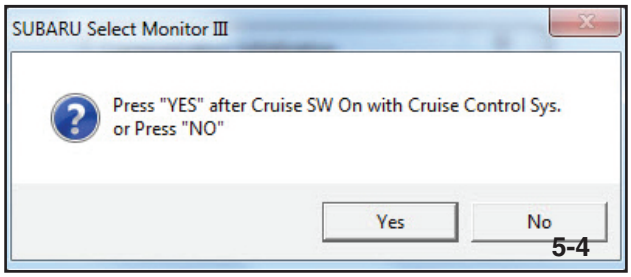
Main Menu



Communication Initialization

Click on the "All Systems Diagnosis" option.

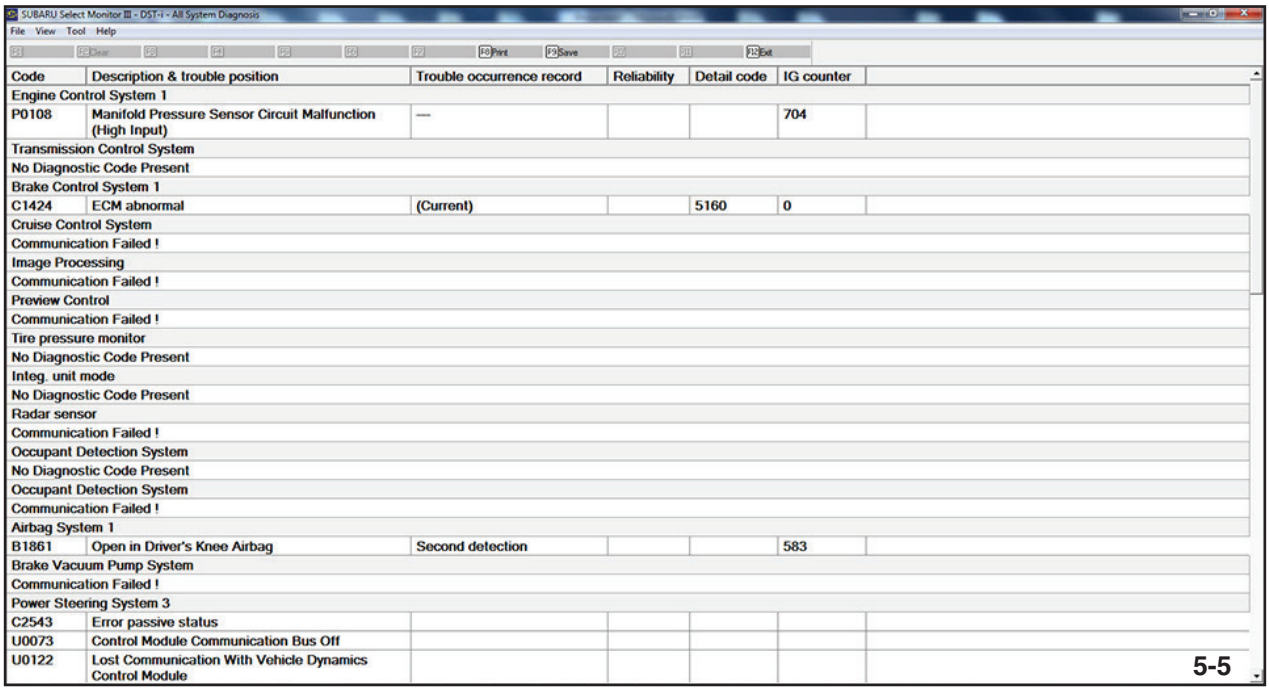
The SSMIII requires several minutes to check each system. A list of all reporting systems can be found on the main menu.



Cruise to ON

Note: Turn on the Cruise Control and Air Conditioning, (models with AC systems that communicate with the Select Monitor), before performing "All Systems Diagnosis".

Subaru Select Monitor Diagnostic Systems



Code	Description & trouble position	Trouble occurrence record	Reliability	Detail code	IG counter
Engine Control System 1					
P0108	Manifold Pressure Sensor Circuit Malfunction (High Input)	—			704
Transmission Control System					
No Diagnostic Code Present					
Brake Control System 1					
C1424	ECM abnormal	(Current)		5160	0
Cruise Control System					
Communication Failed !					
Image Processing					
Communication Failed !					
Preview Control					
Communication Failed !					
Tire pressure monitor					
No Diagnostic Code Present					
Integ. unit mode					
No Diagnostic Code Present					
Radar sensor					
Communication Failed !					
Occupant Detection System					
No Diagnostic Code Present					
Occupant Detection System					
Communication Failed !					
Airbag System 1					
B1861	Open in Driver's Knee Airbag	Second detection			583
Brake Vacuum Pump System					
Communication Failed !					
Power Steering System 3					
C2543	Error passive status				
U0073	Control Module Communication Bus Off				
U0122	Lost Communication With Vehicle Dynamics Control Module				

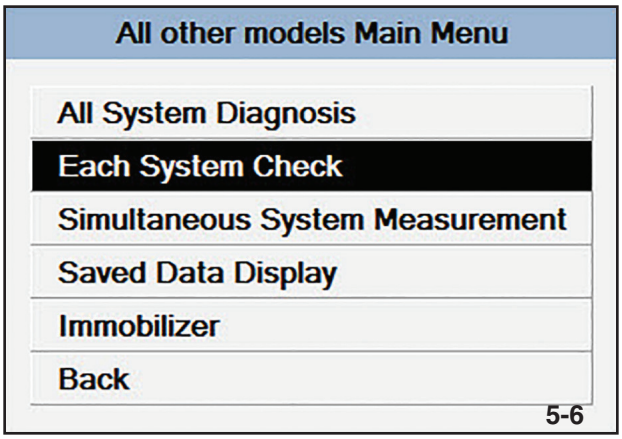
All Systems Diagnosis

Always save the results of the "All Systems Diagnosis". Always check each individual system of a Diagnostic Trouble Code (DTC) and save the Freeze Frame Data (FFD). This will assist in diagnosis of the condition that created the Diagnostic Trouble Code (DTC).

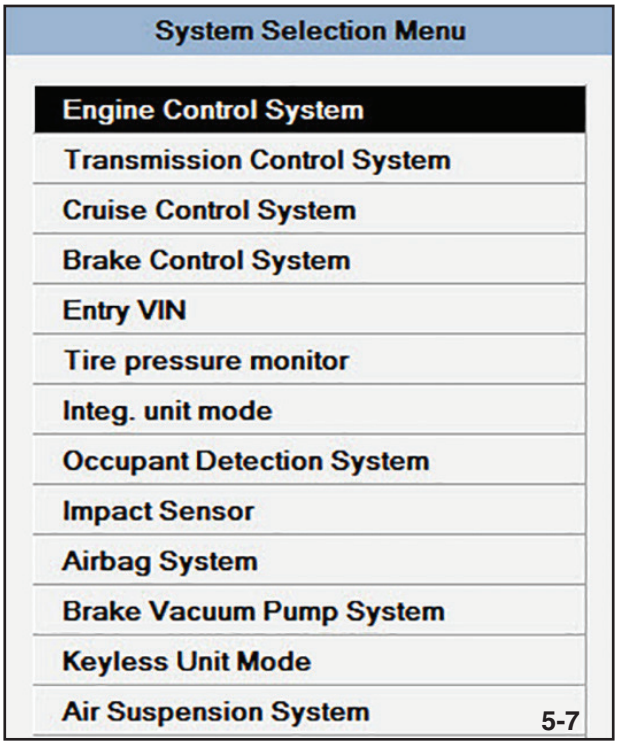
Each System Check

"Each System Check" provides access to all available options for each system.

Note: The Subaru Select Monitor III is a global diagnostic tool and the total list of available vehicle systems may not be equipped on each vehicle.



Each System Check



System Selection Menu

Click on "Each System Check" to enter the System Selection Menu.

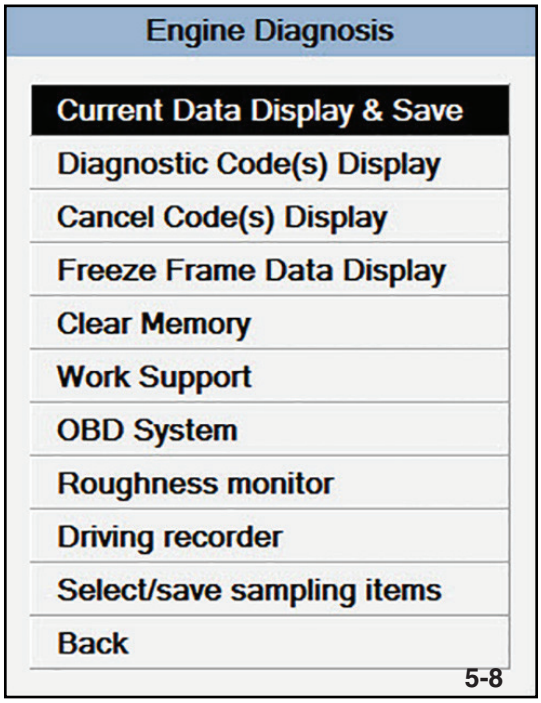
Click on the desired system.

Failure to communicate with a specific system means that the system is not functioning properly or is not equipped on that vehicle.

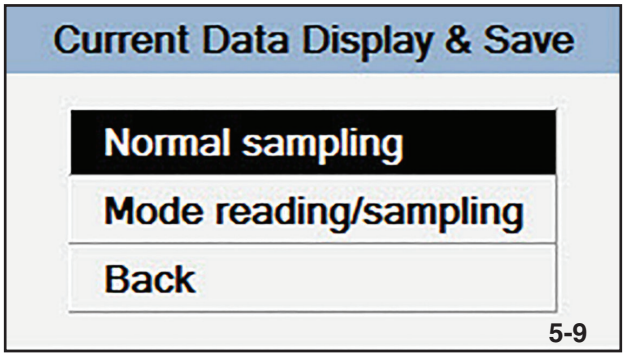
Subaru Select Monitor Diagnostic Systems

Current Data Display and Save

"Current Data Display and Save" allows data of a system to be viewed and saved. The data can be opened in Normal sampling or Mode reading and sampling.



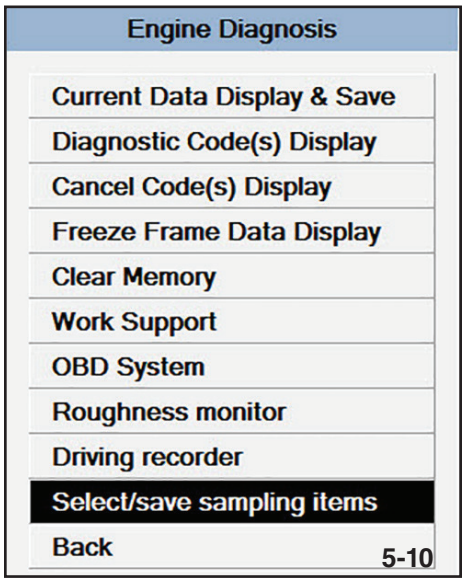
Current Data Display and Save



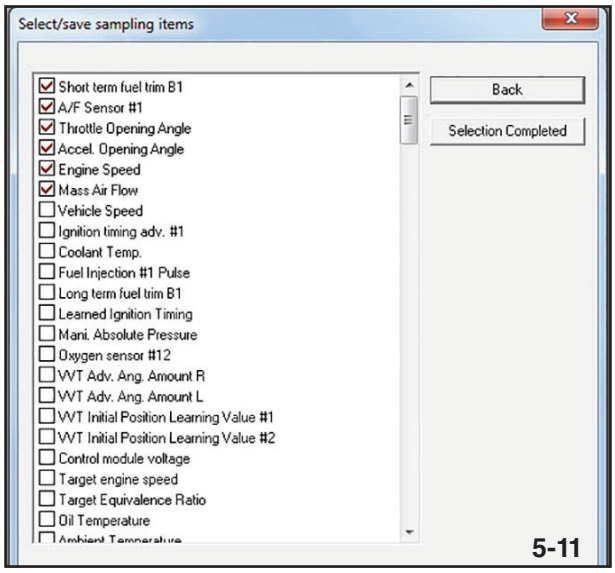
Sampling Options

Normal view displays every parameter identification (PID) available for that system. Data will begin to be displayed and recorded as soon as the "Normal View" is selected. Mode reading and sampling displays preselected PIDs and is dependent on selections made in the "Engine Diagnosis Menu".

Click on “Select/Save Sampling Items” to begin creating a mode file.

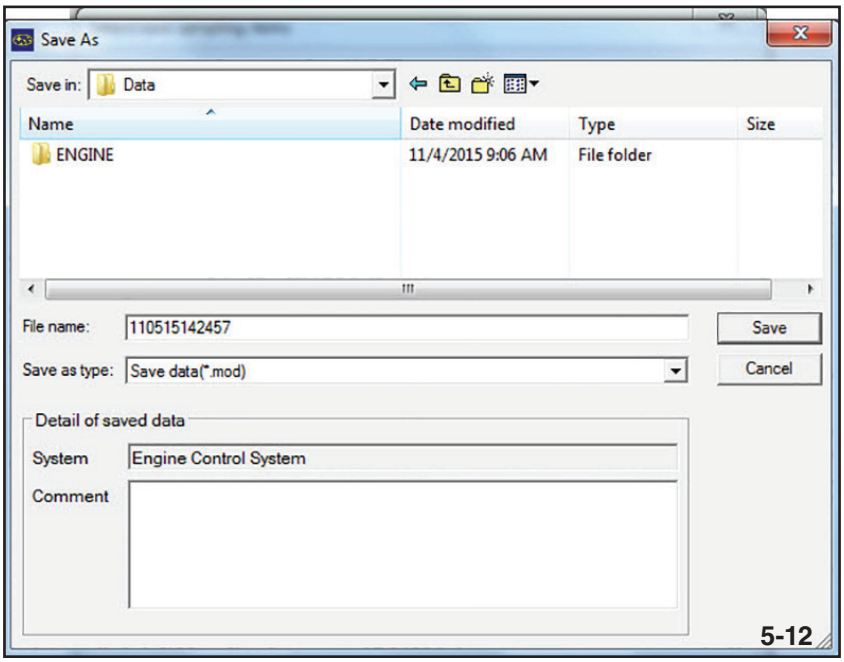


Engine Diagnosis Menu



Creating Mode File

The next screen will allow selection of PIDs that will be displayed during the use of the mode file. Select the desired PIDs, keeping in mind that the sampling rate is faster with fewer PIDs. Click on “Selection Completed” after selecting the desired PIDs.

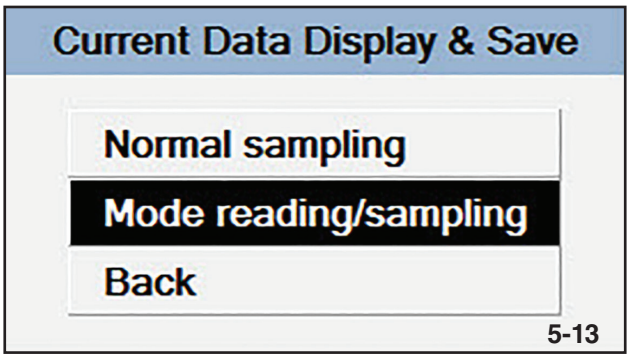


Saving Mode File

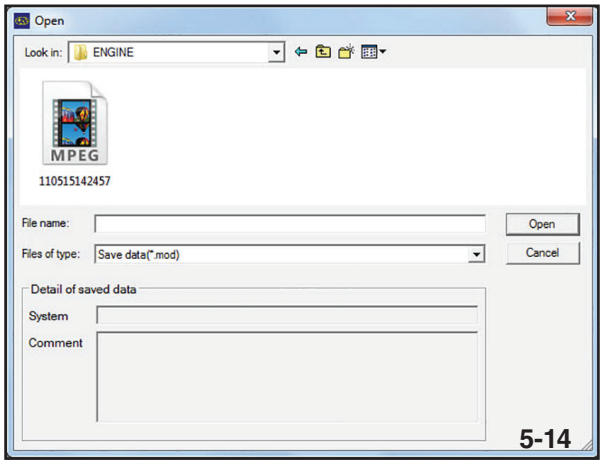
Save and name the mode file. When using mode files, select PIDs that display information for given systems or vehicle conditions.

Note: Mode files should not be used until a problem with a system or an objectionable vehicle condition has been identified. Always have a saved data file with all data saved for reference.

Return to “Current Data Display and Save” and select “Mode reading and sampling”.

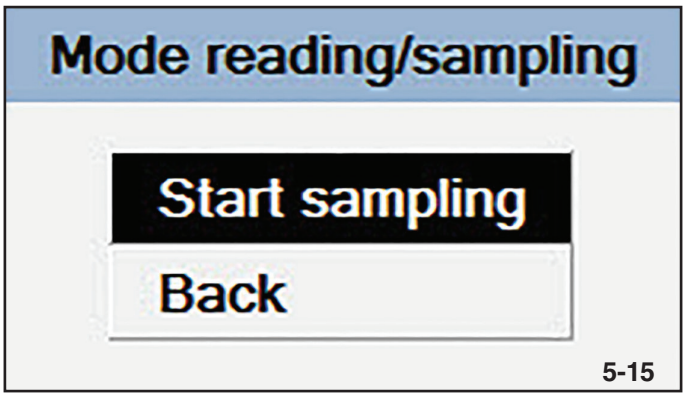


Selecting Mode File Use



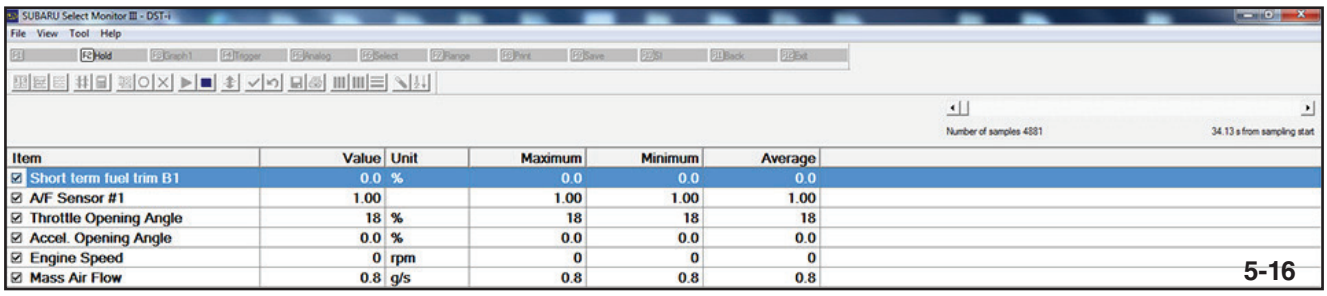
Selecting Mode File

The Select Monitor software will then open the folder for the Mode file. Click on the desired mode file and a new dialogue box will open that allows the mode file to be activated.



Start Sampling

Click on “Start Sampling” to begin viewing live data.



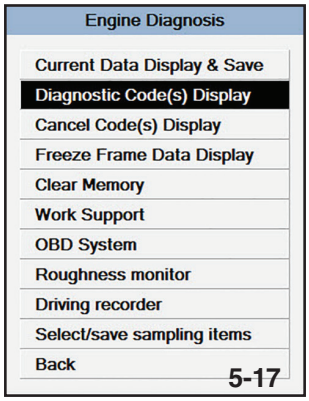
Mode File PIDs

Note: PIDs not included in the mode file will not be viewed or recorded, however, if you click “Back” or use the hot key, F11, the entire PID list will become active. This will allow for viewing and recording of all PIDs.

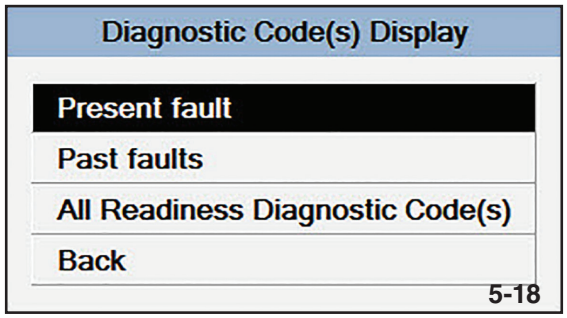
NOTES:

Diagnostic and Freeze Frame Displays

"Diagnostic Codes(s) Display" is selected from the "Engine Diagnosis" menu. Options available include: "Present Faults", "Past Faults", and "All Readiness Diagnostic Code(s)".

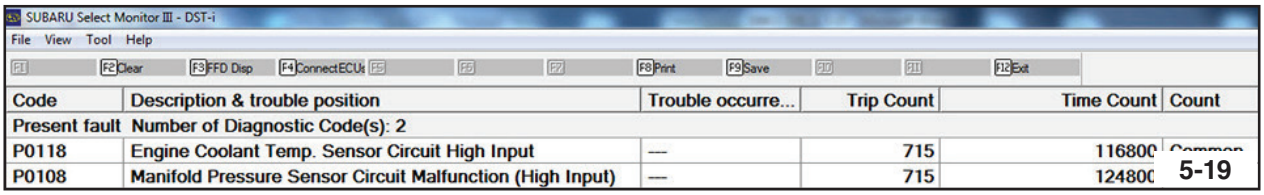


Engine Diagnosis Menu



Present Fault

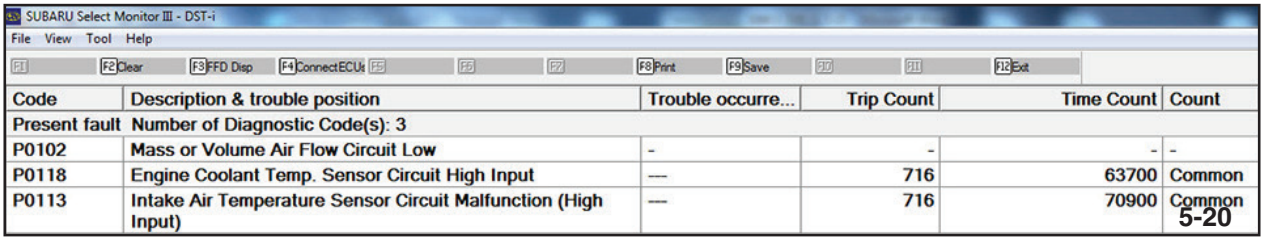
"Present Faults" are DTCs that are currently existing and are displayed in order of the preset Diagnostic Trouble Code (DTC) priority check process programmed into the Engine Control Module (ECM). **For example;** in the case where a DTC for the Engine Coolant Temperature Sensor P0118 is generated and then a Diagnostic Trouble Code (DTC) for the Manifold Absolute Pressure Sensor P0108 is generated, the P0118 will appear first on the list.



Code	Description & trouble position	Trouble occurre...	Trip Count	Time Count	Count
Present fault	Number of Diagnostic Code(s): 2				
P0118	Engine Coolant Temp. Sensor Circuit High Input	—	715	116800	Common
P0108	Manifold Pressure Sensor Circuit Malfunction (High Input)	—	715	124800	

Fault List 2 DTCs

If the Diagnostic Trouble Code (DTC) for the Engine Coolant Temperature Sensor P0118 is generated first and then a DTC for the Mass Air Flow Meter is detected (loose connector) P0102 and P0113 (Intake Air Temperature Sensor), the Mass Air Flow Meter P0102 would be first on the list, followed by Engine Coolant Temperature Sensor P0118 and finally the Intake Air Temperature Sensor P0113.

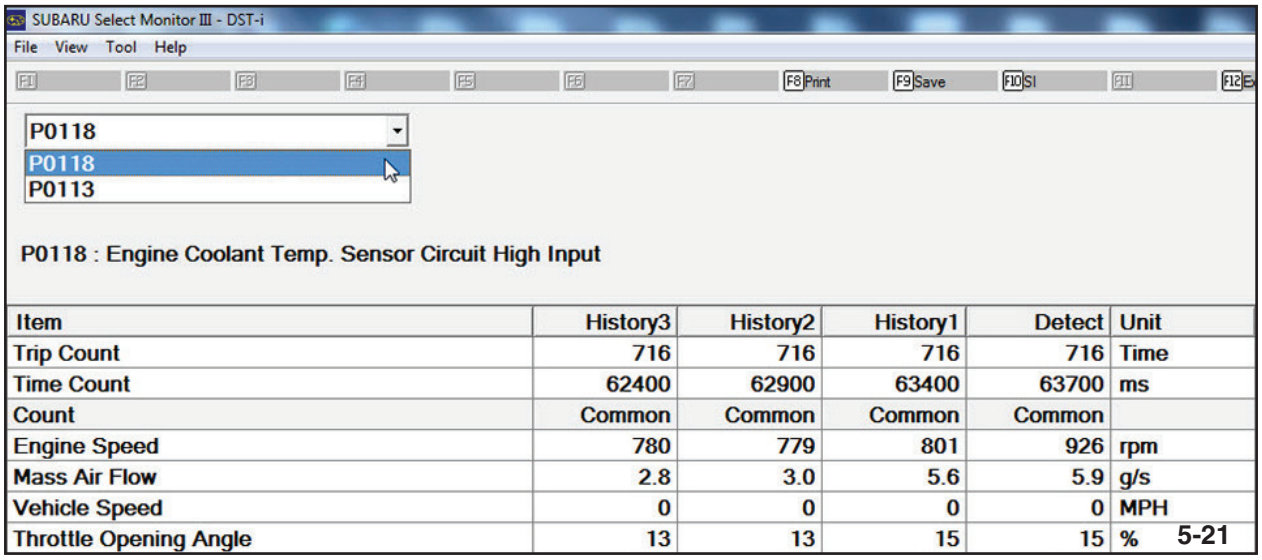


Code	Description & trouble position	Trouble occurre...	Trip Count	Time Count	Count
Present fault	Number of Diagnostic Code(s): 3				
P0102	Mass or Volume Air Flow Circuit Low	-	-	-	-
P0118	Engine Coolant Temp. Sensor Circuit High Input	—	716	63700	Common
P0113	Intake Air Temperature Sensor Circuit Malfunction (High Input)	—	716	70900	Common

Fault List 3 DTCs

When viewing the list of DTCs, information regarding the Trip count, Time count, and Count (type) are displayed. Any other information appearing in the top of the list table is not applicable and is not supported (Trouble Occurrence Record). Trip count identifies the trip or ignition cycle of the vehicle when the DTC was generated. Time count is the number of milliseconds of the trip or ignition cycle when the DTC was generated. Count (type) is referring to the integrated clock of the BIU. If the Count says Common, then the DTC is using the BIU as the time reference.

The Trip Count and Time Count will only be displayed for the first two DTCs generated. This also applies to the data available for viewing in Freeze Frame.

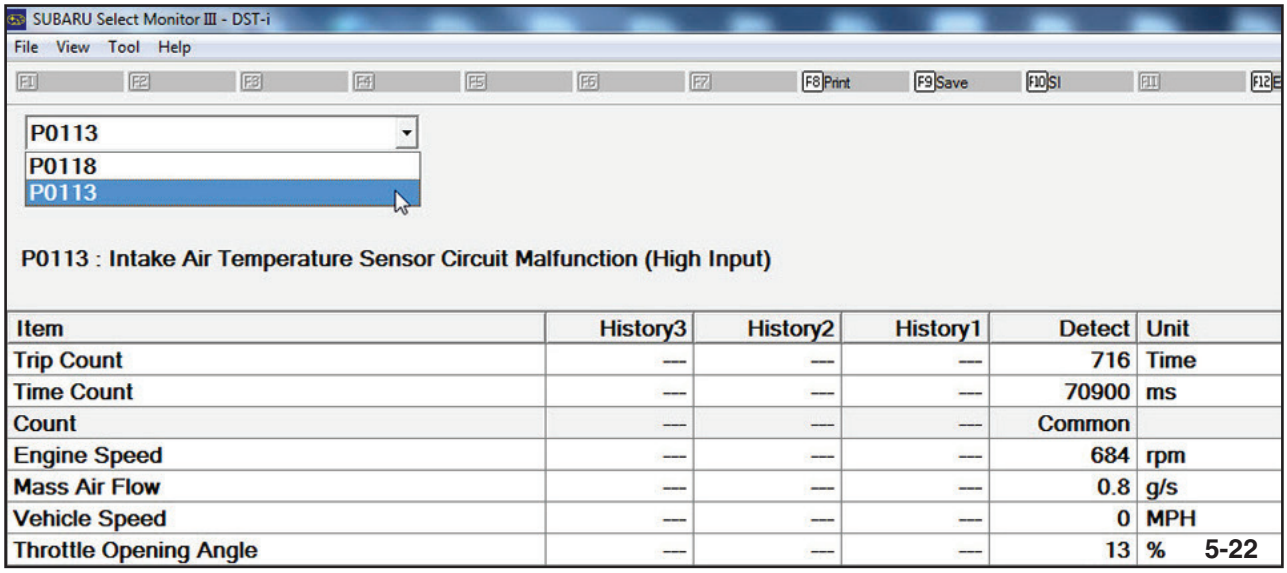


Item	History3	History2	History1	Detect	Unit
Trip Count	716	716	716	716	Time
Time Count	62400	62900	63400	63700	ms
Count	Common	Common	Common	Common	
Engine Speed	780	779	801	926	rpm
Mass Air Flow	2.8	3.0	5.6	5.9	g/s
Vehicle Speed	0	0	0	0	MPH
Throttle Opening Angle	13	13	15	15	%

5-21

Freeze Frame 1st DTC

Freeze Frame Data (FFD) is the vehicle and system operating data at the time a DTC is generated. It includes all PIDs of that system. Included with the Freeze Frame Data (FFD) for the first (and only first) DTC is the history of that system's operation before the Diagnostic Trouble Code (DTC) was generated and the instant in time when the Diagnostic Trouble Code (DTC) was generated. The time intervals of history are unique to each DTC. The usual spacing is 500 milliseconds between samplings. Detection through History 3 represents 1.5 seconds. This information can provide guidance for diagnostics for determining if a DTC is the result or cause of a drivability or system condition.



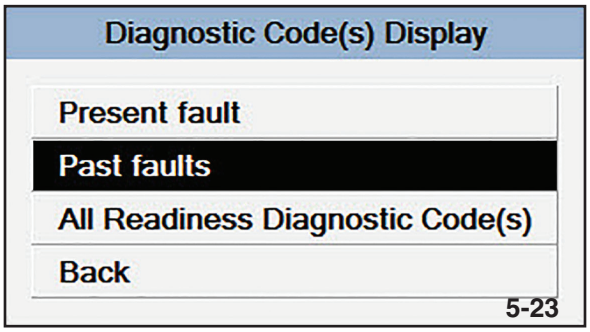
Item	History3	History2	History1	Detect	Unit
Trip Count	---	---	---	716	Time
Time Count	---	---	---	70900	ms
Count	---	---	---	Common	
Engine Speed	---	---	---	684	rpm
Mass Air Flow	---	---	---	0.8	g/s
Vehicle Speed	---	---	---	0	MPH
Throttle Opening Angle	---	---	---	13	%

5-22

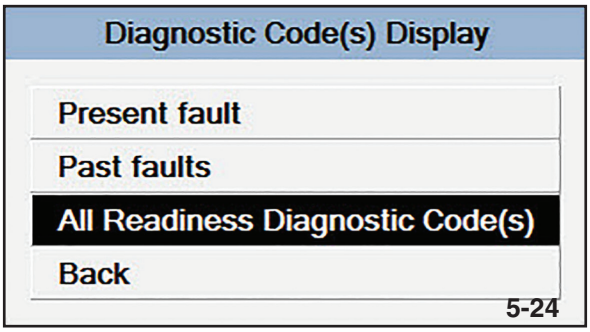
Freeze Frame 2nd DTC

Subaru Select Monitor Diagnostic Systems

"Past Faults" are DTCs in memory and currently do not exist. The Freeze Frame Data (FFD) and History data rules are the same as "Present Faults".

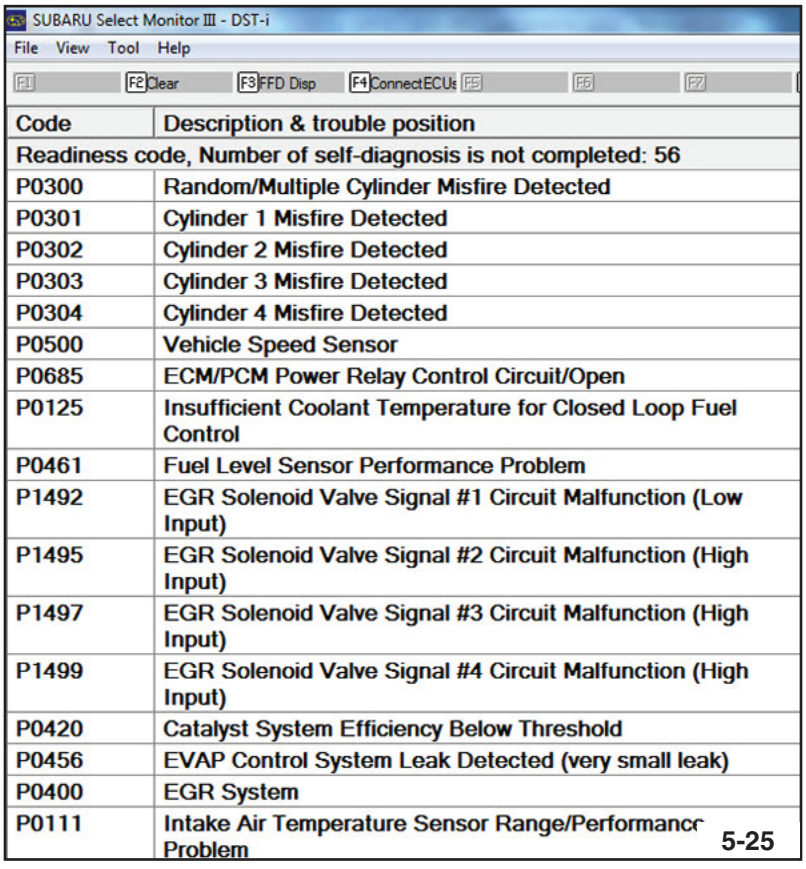


Past Fault



All Readiness Code(s)

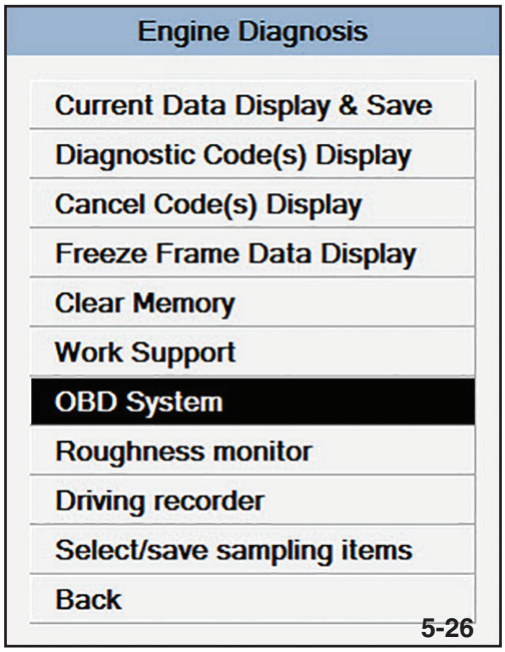
"All Readiness Diagnostic Code(s)" displays a list of DTCs, organized by ECM priority check process and disappear as each DTC is checked.



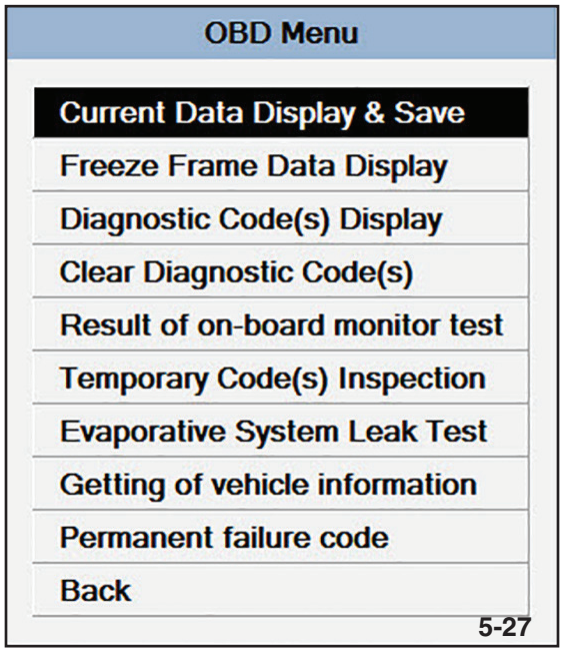
Readiness Codes

Subaru Select Monitor Diagnostic Systems

The “OBD Menu” is selected from the “Engine Diagnosis” menu and provides options that allow for viewing of data and activation of the Evaporative Leak Check Module.

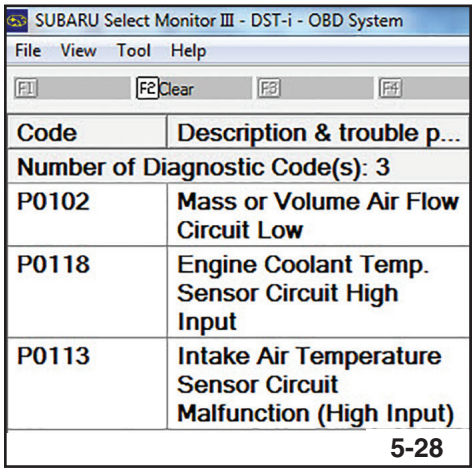


Engine Diagnosis Menu



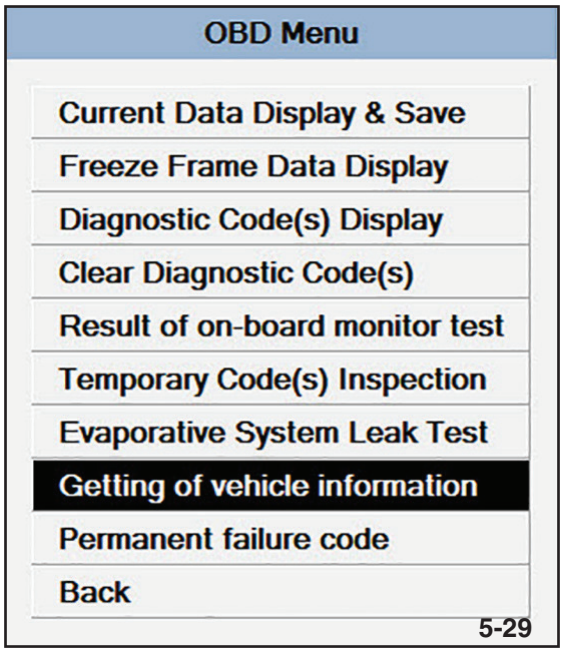
OBD Menu

Options that allow for viewing of DTCs do not include History data.

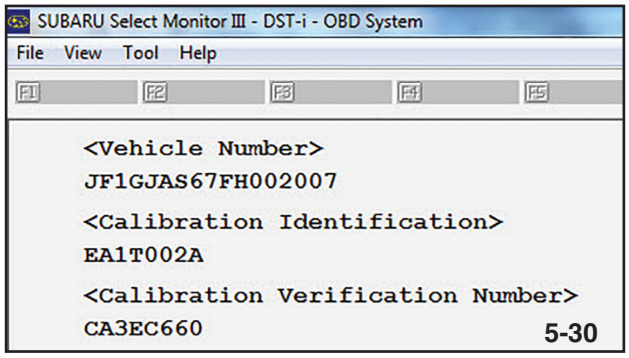


OBD DTCs

Always refer back to “Each System Check” to view History data of a DTC.



OBD Menu



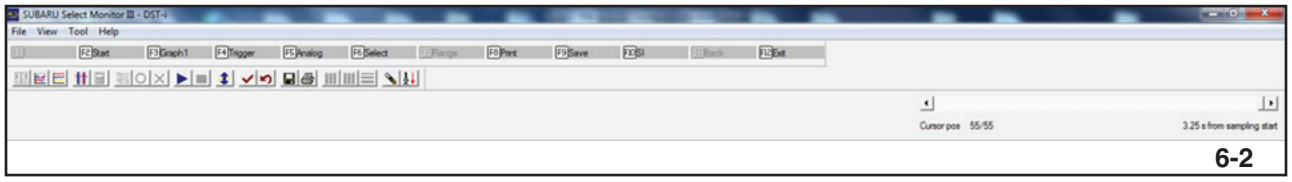
Calibration Verification Number (CVN)

"Getting of vehicle information" allows for viewing of the Vehicle Identification Number, Calibration Identification Number (CID) and Calibration Verification Number (CVN) of the ECM. These numbers are used to check for current programming and confirmation of Reflash or reprogramming of an ECM.

Subaru Select Monitor Diagnostic Systems

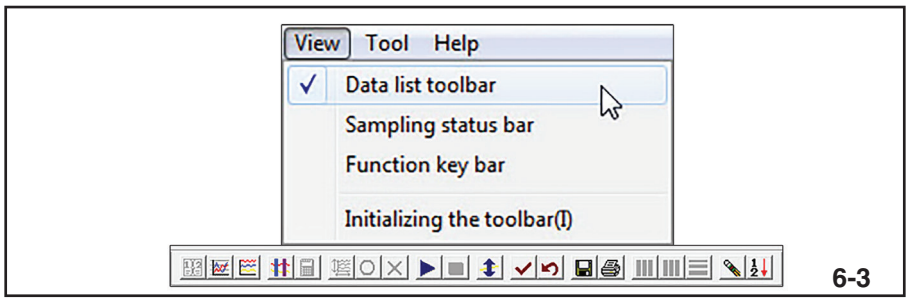
Select Monitor III Diagnostic Menu Display Features

Controlling and organizing data while performing diagnostics will lead to correct and timely repairs of a vehicle condition.



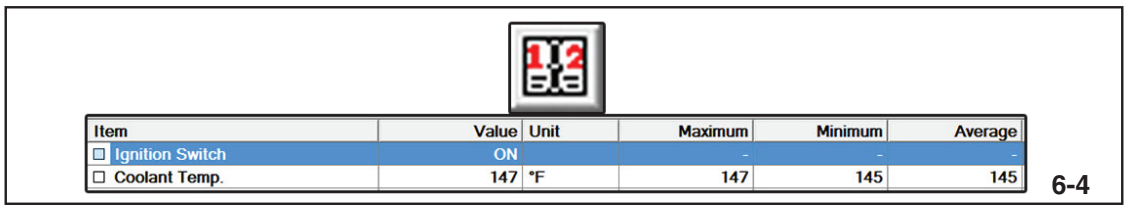
Subaru Select Monitor III Controls

The Select Monitor III diagnostic display features provide many options with multiple controls that allow changes in the display to best suit the vehicle condition and the technician.



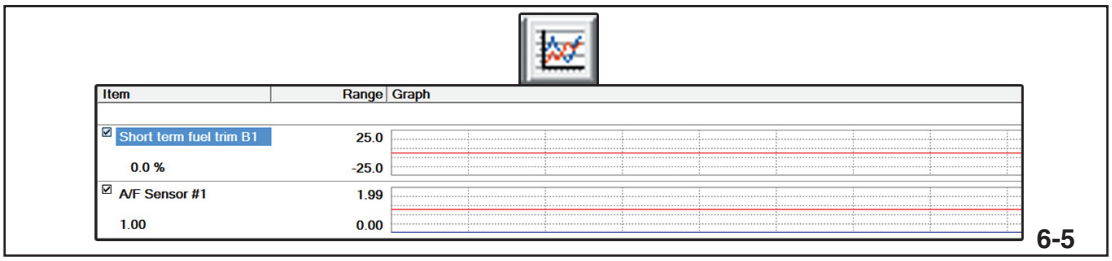
Data List Tool Bar

The Data List Tool Bar allows data to be viewed in Snapshot View, or in two types of graphs, Graph 1 or Graph 2. The icons on the Data List Tool Bar will gray out while the data is being viewed in that mode. The following icons are shown in the inactive state for visual clarity along with samples of the displayed data while active.



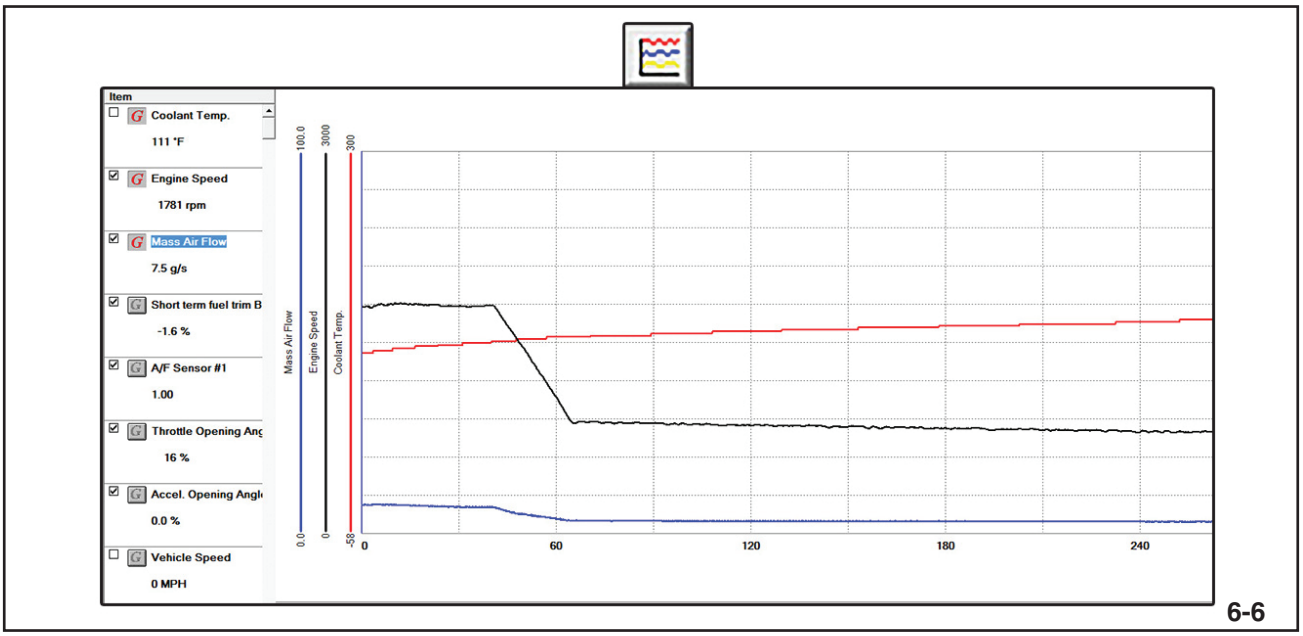
Snapshot View

Snapshot view displays numerical or digital data (on/off signals).



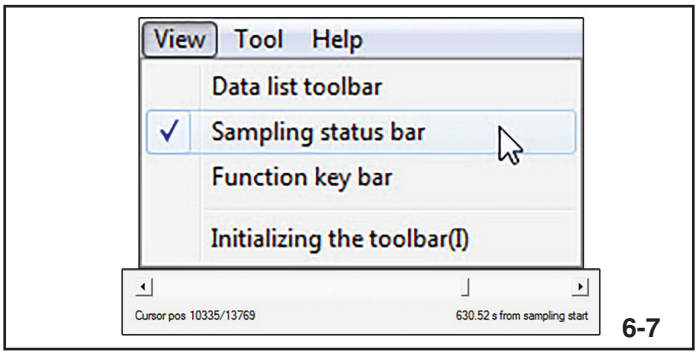
Graph 1

Graph 1 displays one PID per graph.



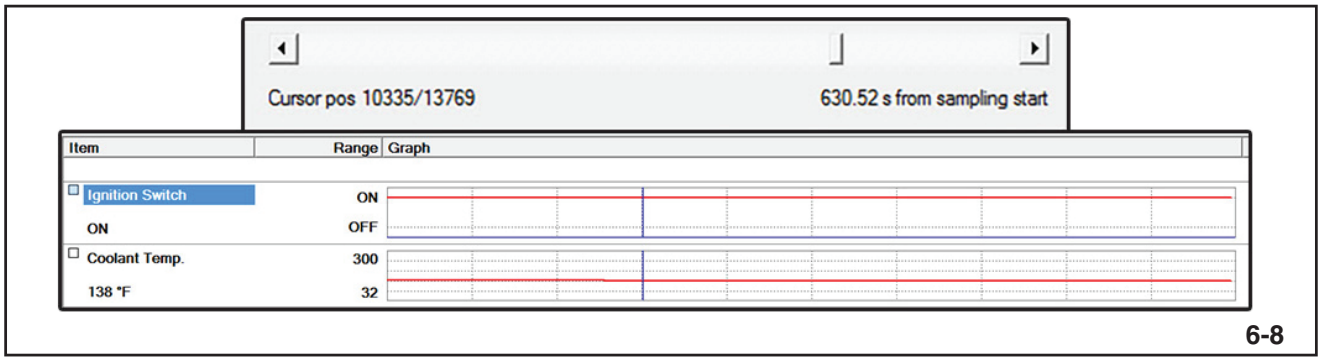
Graph 2

Graph 2 displays up to 8 PIDs on a single graph.



Sampling Status Bar

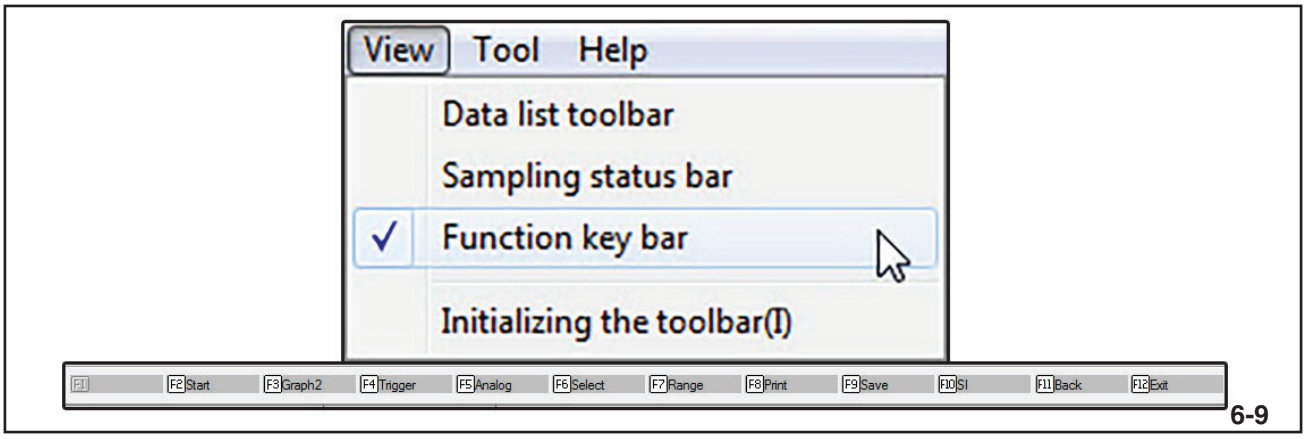
The Sampling Status Bar displays the number of samples taken and the time of the recorded data sampling.



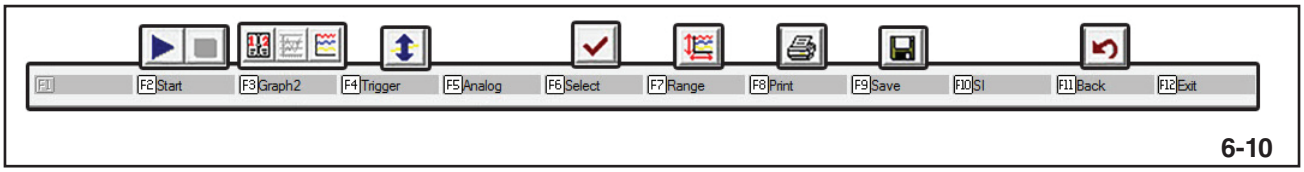
Sampling Status Bar with Data

It also allows for fast scrolling through the data after the data acquisition has been placed on hold.

The Function Key Bar is the row of hotkeys that allow for fast controlling of the Select Monitor software.



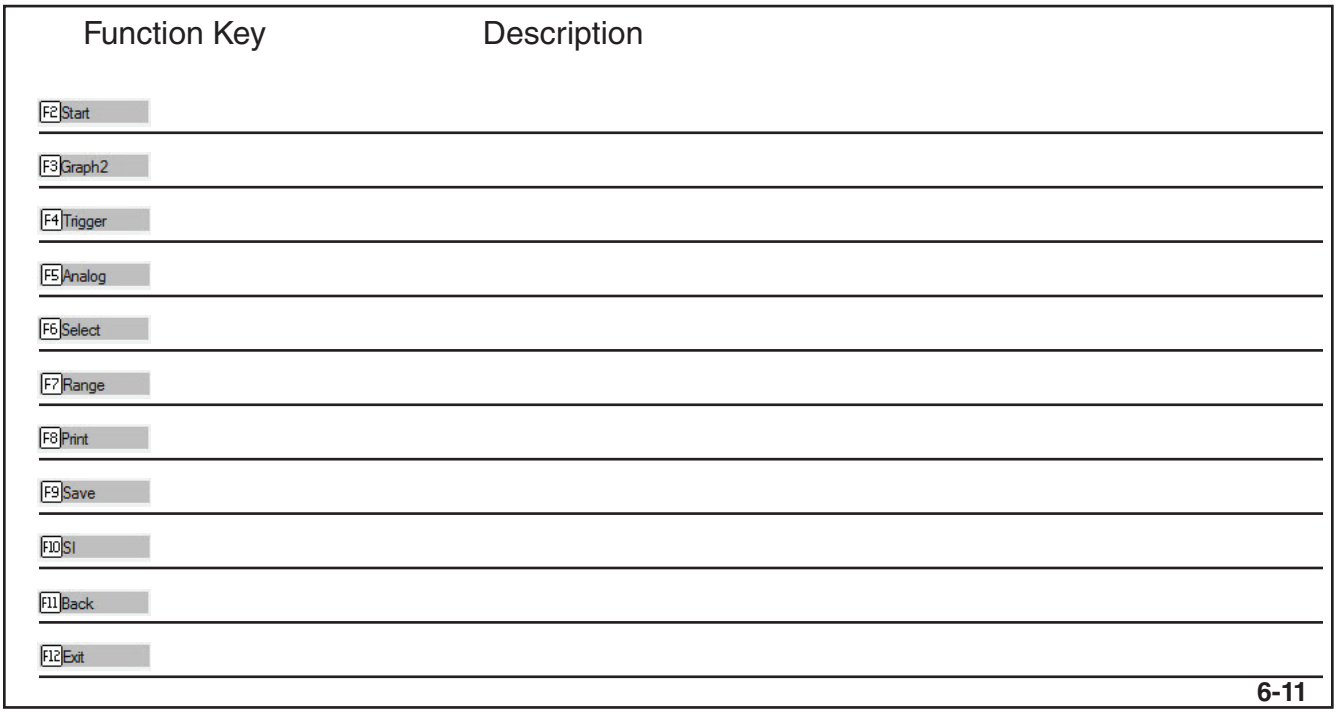
Function Key Bar



Function Key Bar and Data List Tool Bar

Corresponding icons also appear in the data list tool bar.

Fill in the description of each Function Key



Description of F Keys

Subaru Select Monitor III On Car Test

This lab sheet is a test. Each student team will be required to display and explain results from the following:

Skill Check

- All system diagnostic check
- Save a list of All DTCs
- Save Freeze Frame Data
- Evaluate current data
- Save Data files
- Clear DTCs

1. Perform an “All system diagnostic check”.

   Record any DTCs found. _____

   _____

2. Save the file and rename according to the initials of your team members. Navigate through the saved data to locate the file.

3. Review the engine Freeze Frame Data (FFD) of each DTC. Save the Freeze Frame Data (FFD) and rename the file according to the initials of your team members.

4. Start the engine and allow it to warm up for 5 minutes. Evaluate the current data. Outline your diagnosis of the vehicle in the space provided below. Include possible causes and results of any problem(s) found.

   _____

   _____

   _____

   _____

5. Save the current data and rename the file according to the initials of your team members.

6. Clear the DTCs. (Note: Your Instructor will repair the vehicle first).

Subaru Select Monitor III On Car Practice

This lab sheet is not a test. Each student team will be required to display and explain results from the following:

Skill Check

- Idle Speed Control Check
- EGR Valve Check
  - (If EGR is not available go to number 2a.)
- Radiator Fan Relay Check
- CPC Solenoid Check

1. Navigate to “Active Test” and perform an Idle Speed Control check. What is the minimum and maximum RPMs allowed during the test?

   _____

2. Return to “Active Test” and perform an EGR Valve Check. **Do not stall the engine.** How can you determine if the EGR valve is operating? _____

   _____

   a. Return to Active Test and select Injection Stop Mode (Injector 1).

      Select “Engine Speed” from the list of available PIDs.
      Start Injection Stop Mode (Injector 1)

      What happens to Engine RPM when Injection Stop Mode is enabled?

      _____

      What does the ECM do to the injector during Injection Stop Mode?

      _____

3. Return to “Active Test” and perform a “Radiator Fan Relay check.” What is the operating speed of the fan motor?_____

4. Return to “Active Test” and perform a “CPC Solenoid Valve check.” How can you determine if the CPC Solenoid Valve is working correctly?

   _____

   _____

NOTES:

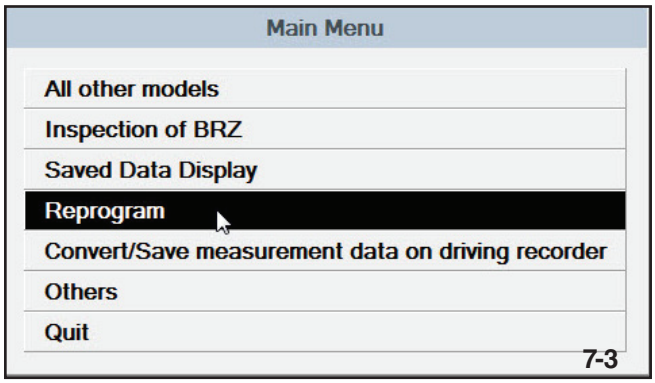
Subaru Select Monitor Diagnostic Systems

Reprogramming

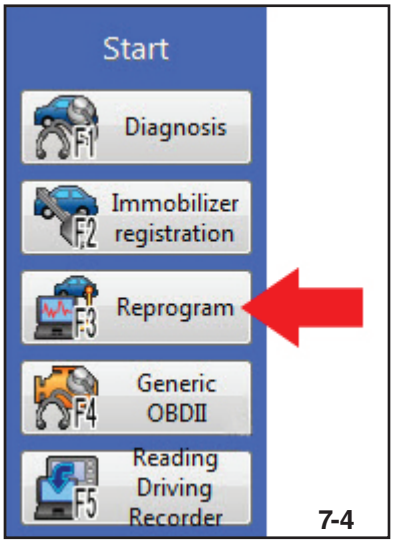
Reprogramming of a vehicle system's control unit is accomplished by using the Flashwrite program found on the Graphical User Interface (GUI) of the Subaru Diagnostic System.

GUI

Flashwrite can also be accessed by clicking on "Reprogram" in the SSMIII or SSM 4 Main Menu.

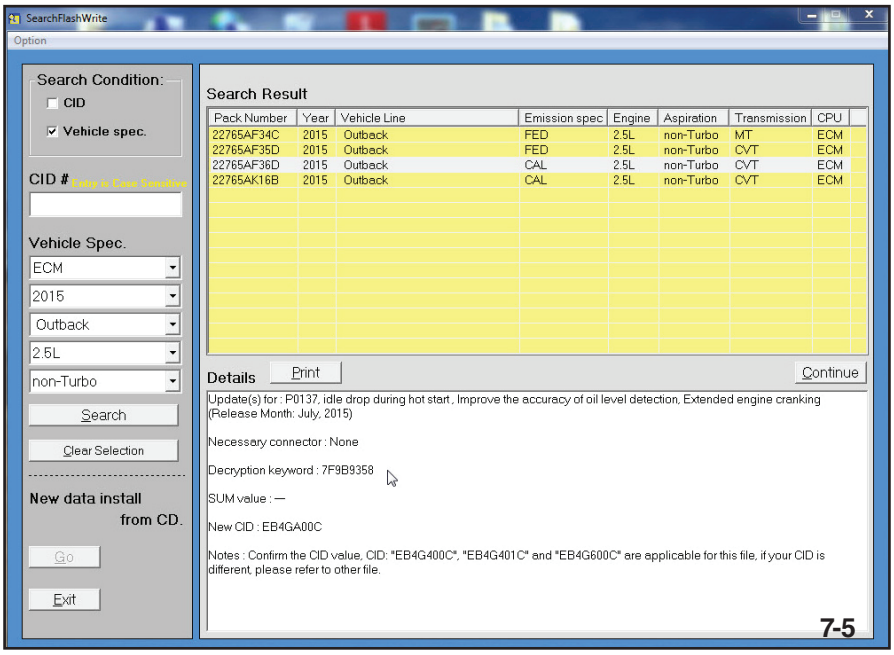


SSMIII Main Menu



SSM 4 Main Menu

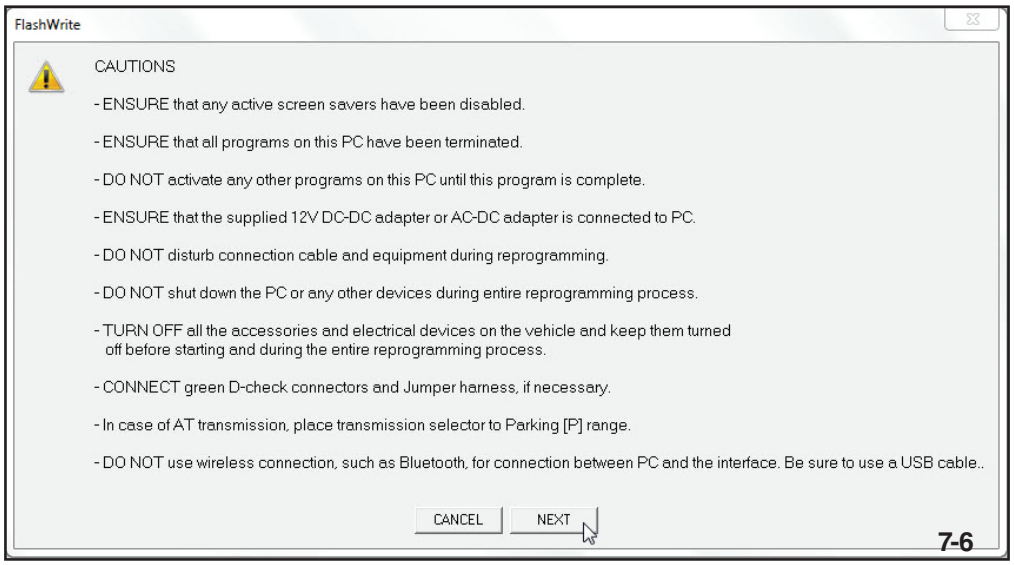
When Flashwrite opens it allows for the search condition for a PAK file by the Calibration Identification Number (CID) or vehicle specifications.



Decryption Keyword

After selecting the PAK file, the details area provides a description of the result of the new PAK file and the Decryption keyword. Copy the Decryption keyword so that it can be pasted into place later in the reprogramming process.

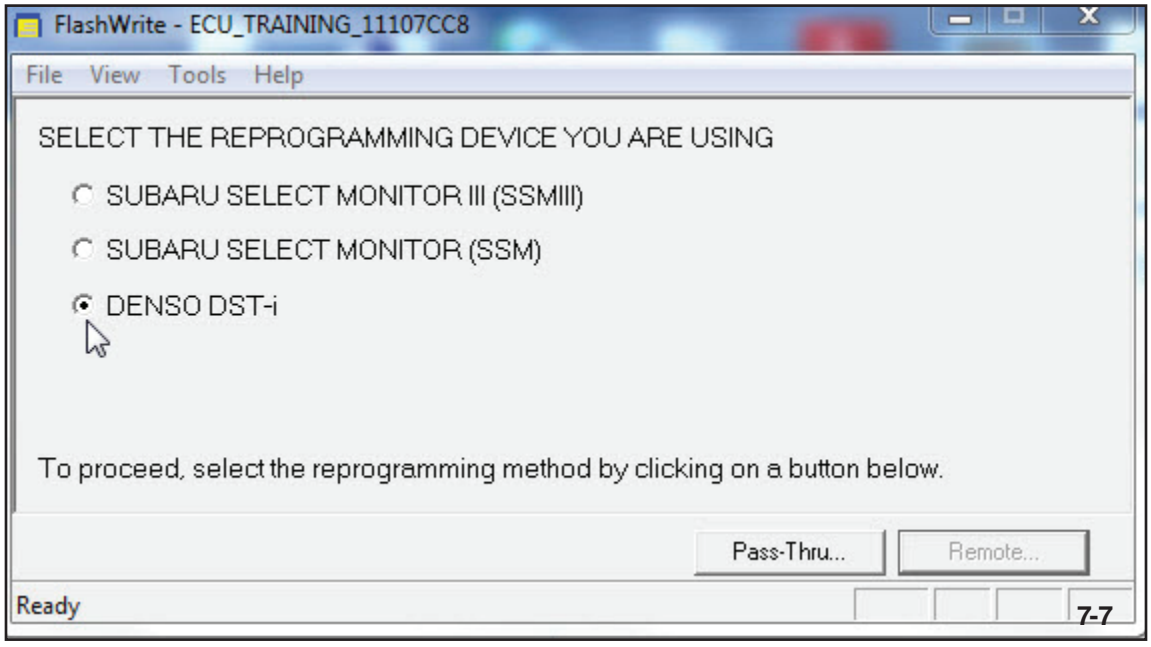
Note: Always make a note (write on repair order) the number of the new PAK file. This will allow you to go back to it if an error occurs during the reprogramming process.



Cautions

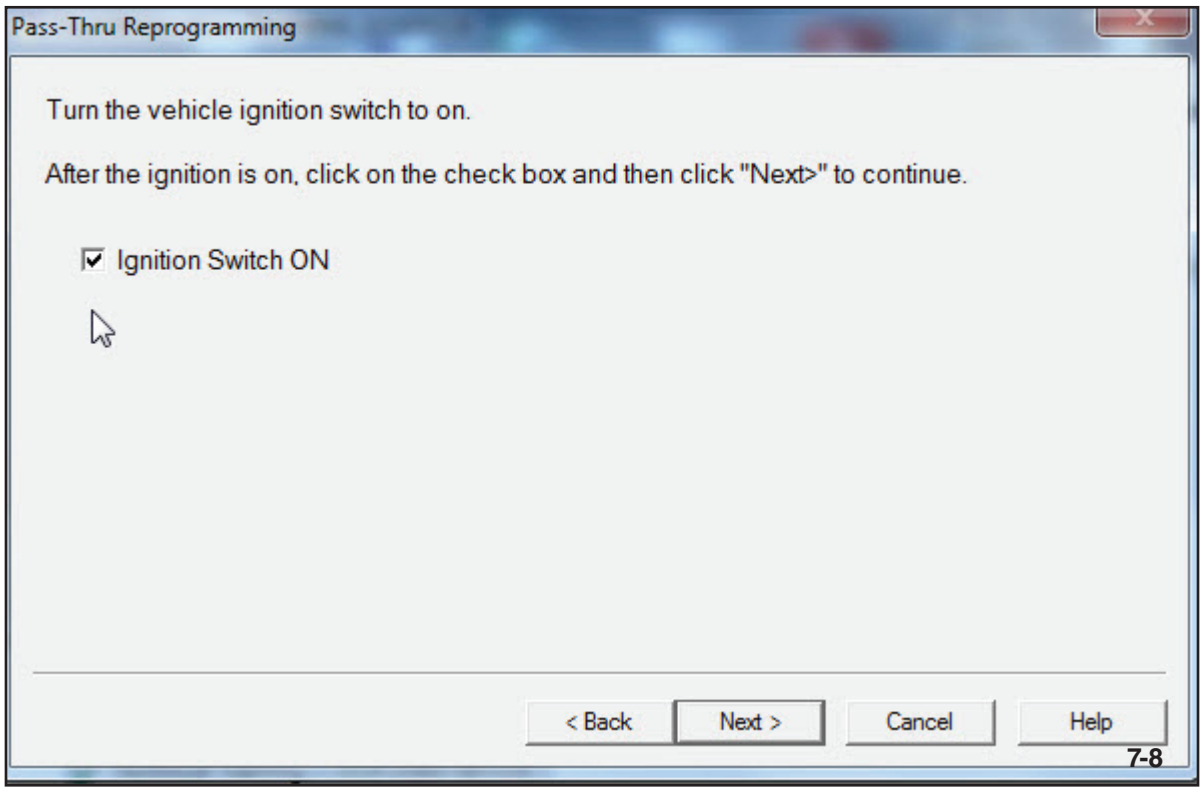
Follow all instructions and cautions. Click “Next” after all instructions and cautions have been completed or observed.

Next, select the interface device being used during reprogramming.



Interface Selection

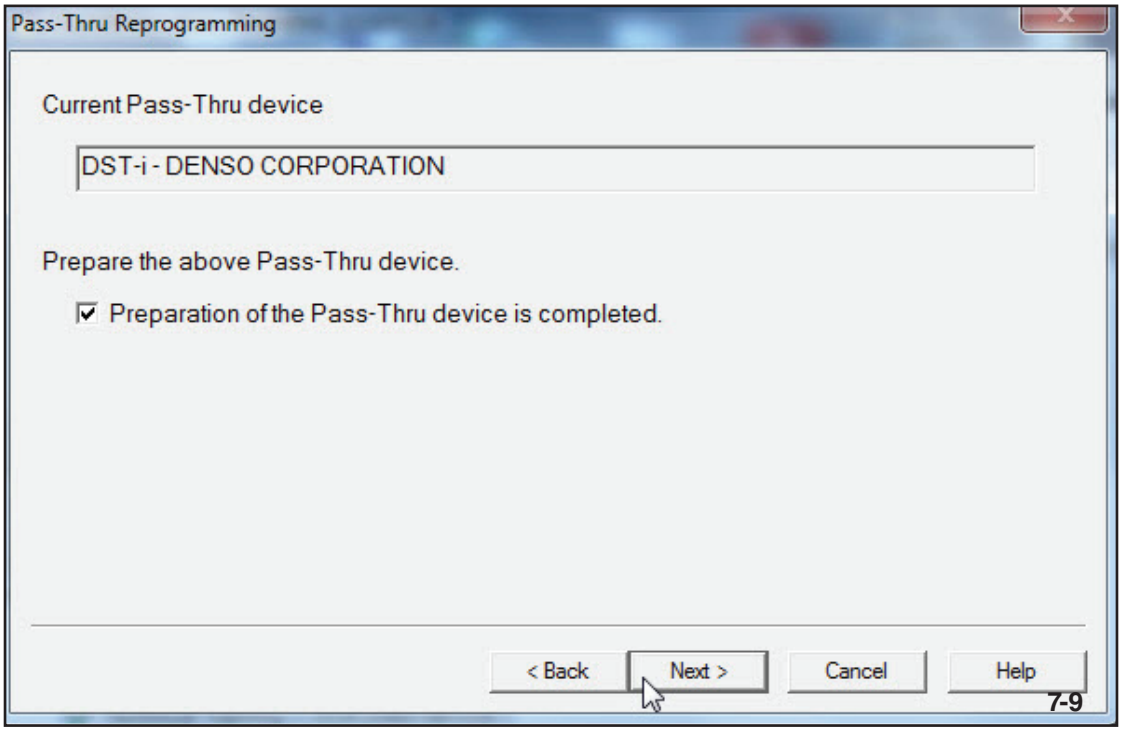
Follow all on screen instructions. Turn the ignition switch to on.



Ignition Switch ON

Clicking “Next” before completing a displayed step will result in an error that will disable the control unit.

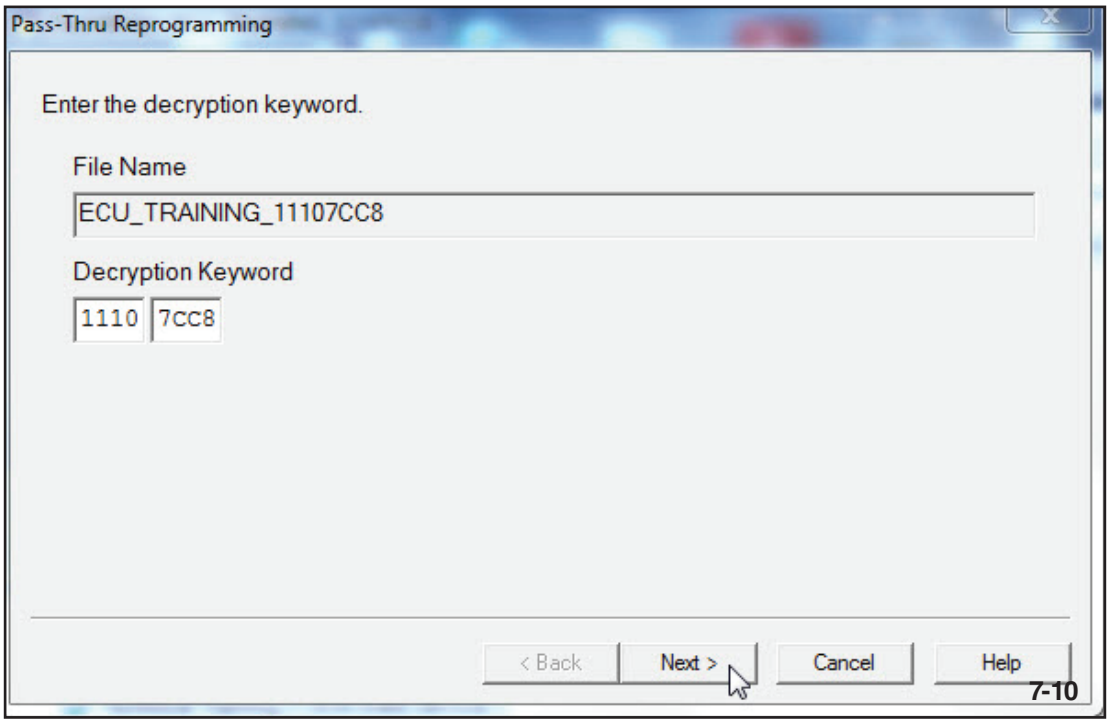
Double check the interface device and make sure the device has been turned on.



Preparation of the Pass-Thru device is completed

Click “Next” to continue.

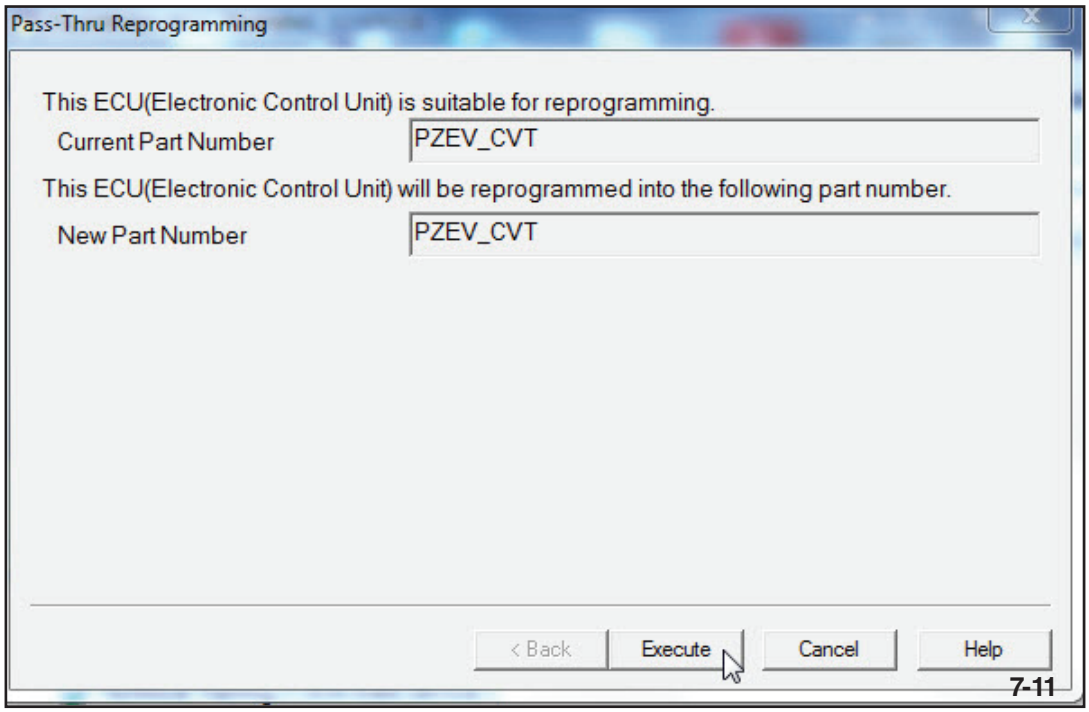
Paste in the Decryption keyword.



Decryption Keyword

Click “Next” to continue.

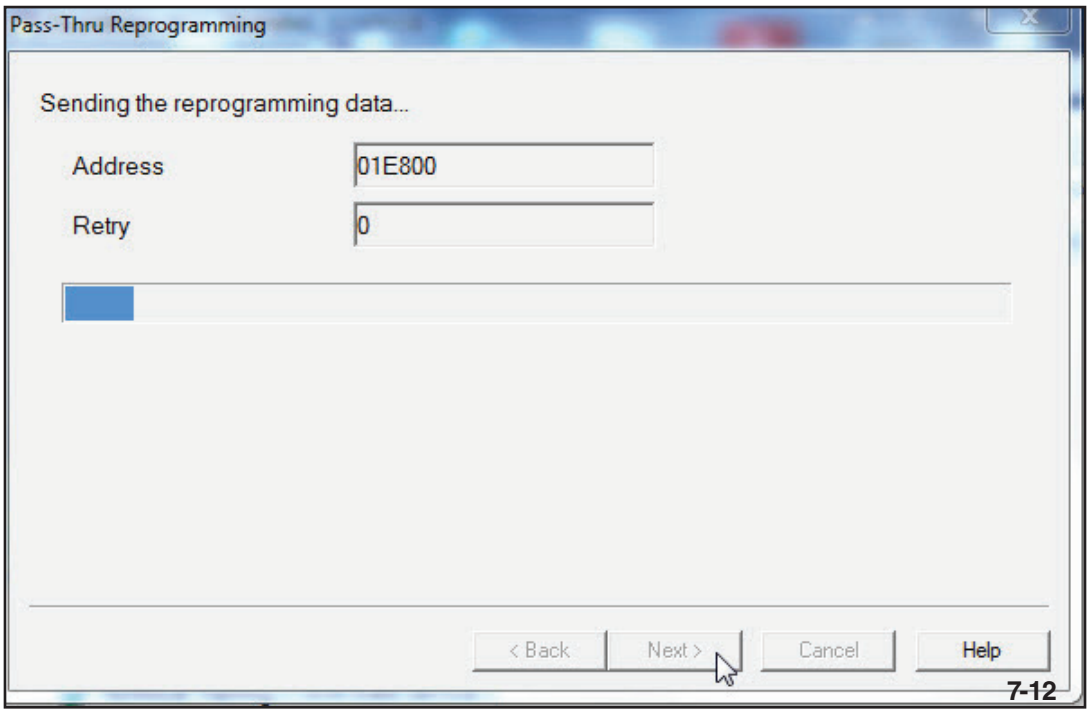
The next screen displayed will show the current part number and the new part number (as defined by the new PAK file). Click on “Execute” to begin the actual reprogramming.



Part Numbers

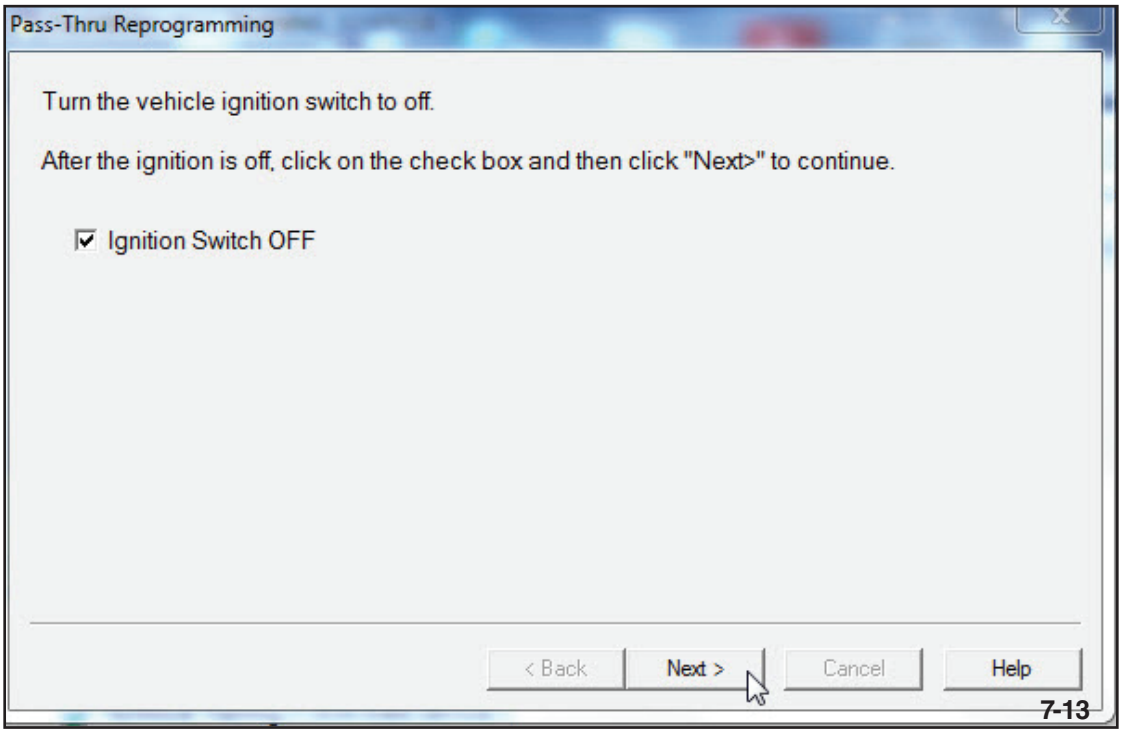
Note: This display was taken from a training simulator designed for continued reprogramming and does not represent part numbers from an actual vehicle.

The next display will show the progress of loading the new data for the control unit.



Sending Reprogramming Data

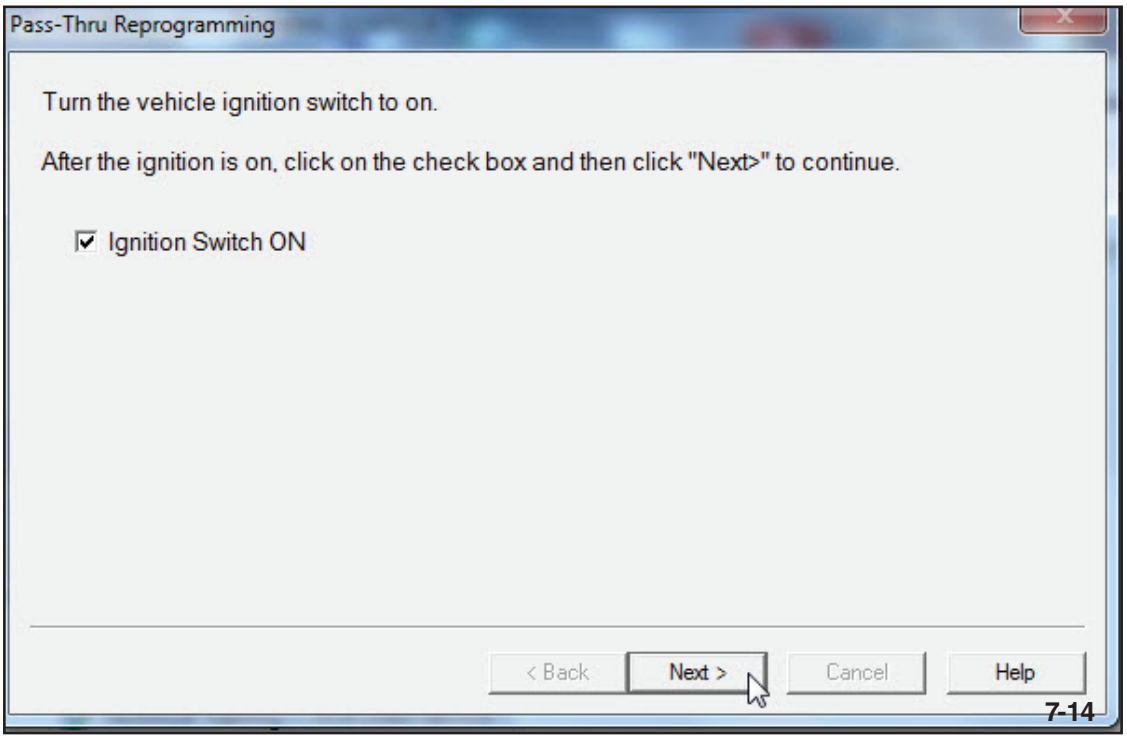
Continue following all on screen instructions. Be sure to complete each step before checking the box next to the instruction.



Ignition Switch OFF

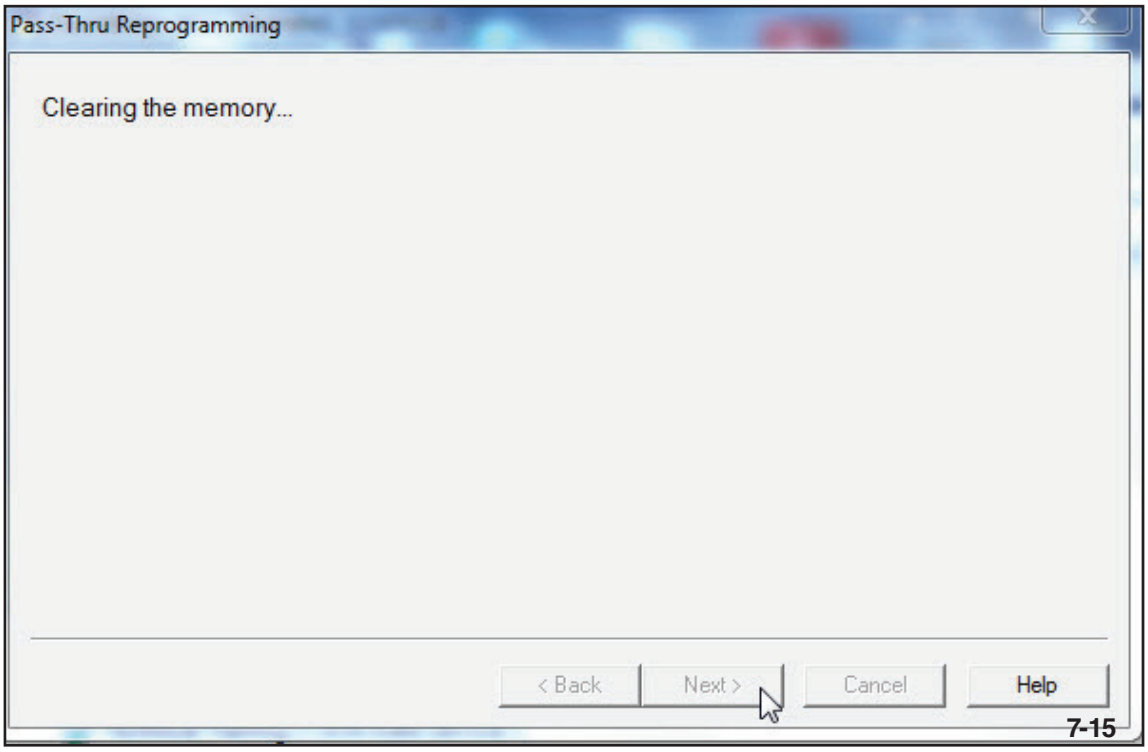
Click “Next” to continue.

Turn on the ignition switch, check the box, and click “Next” to continue.



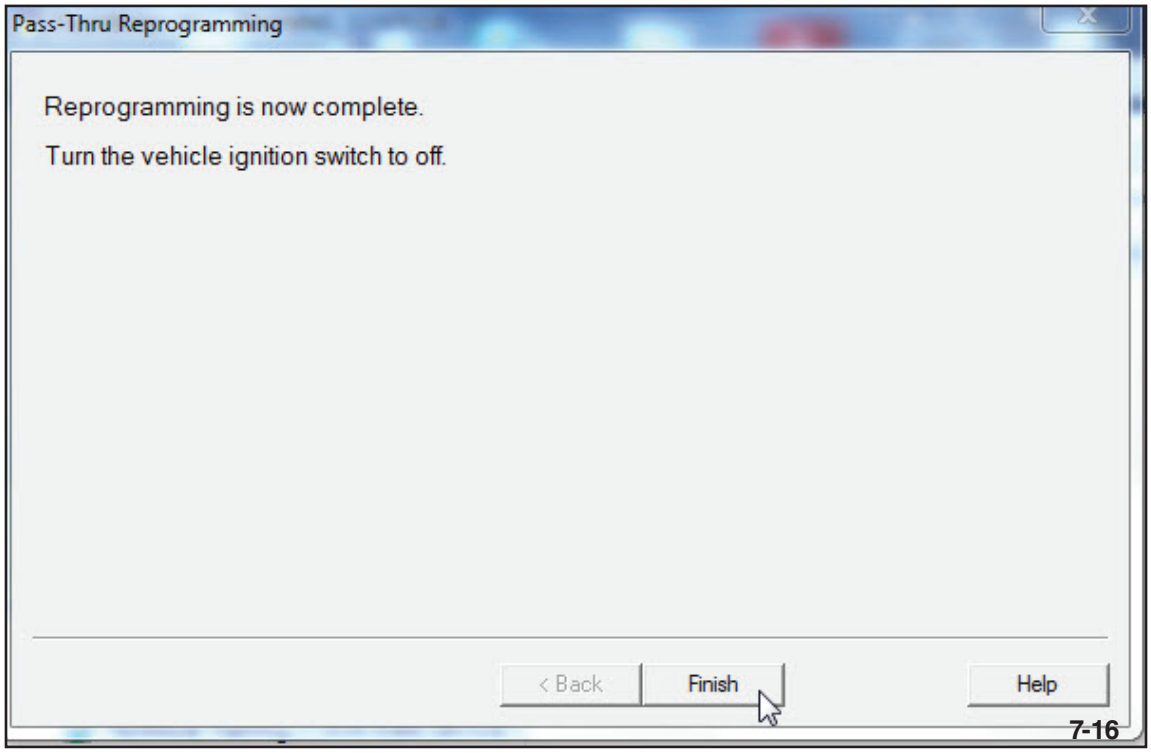
Ignition Switch ON

Diagnostic Trouble Codes (DTCs) can be generated during the reprogramming process. This step removes the false DTCs.



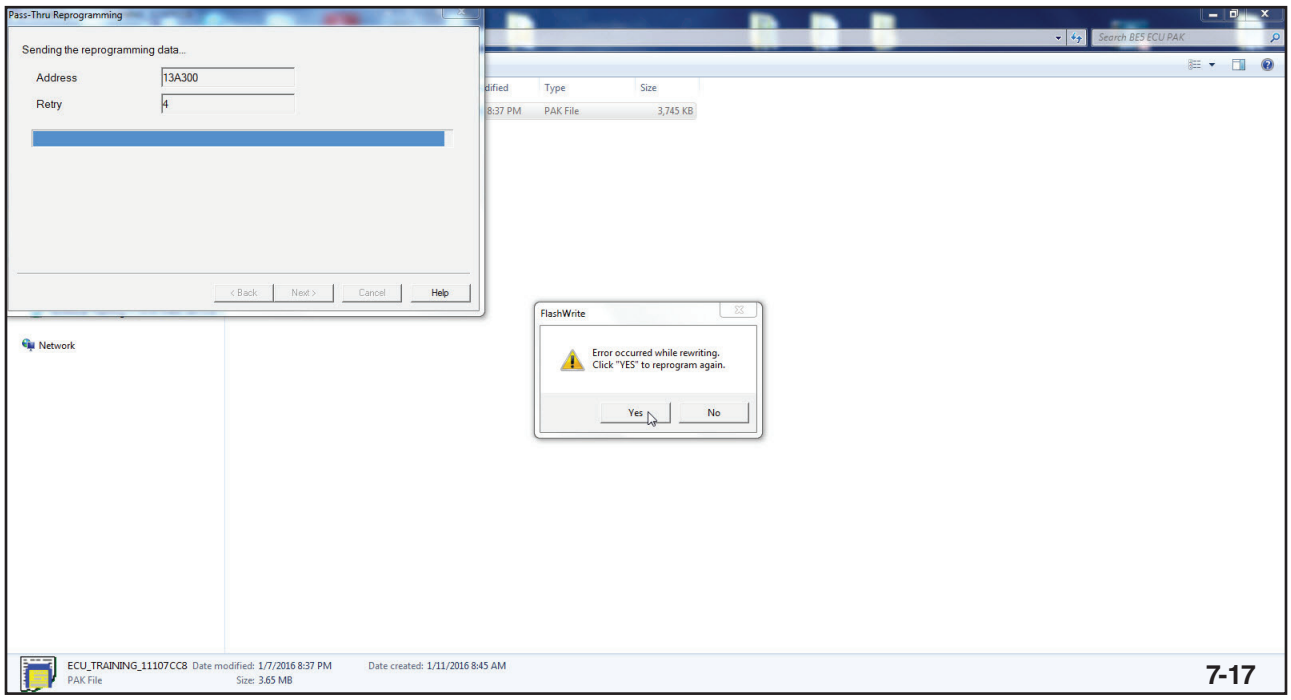
Clearing The Memory

Turn the ignition switch off and click “Finish”.

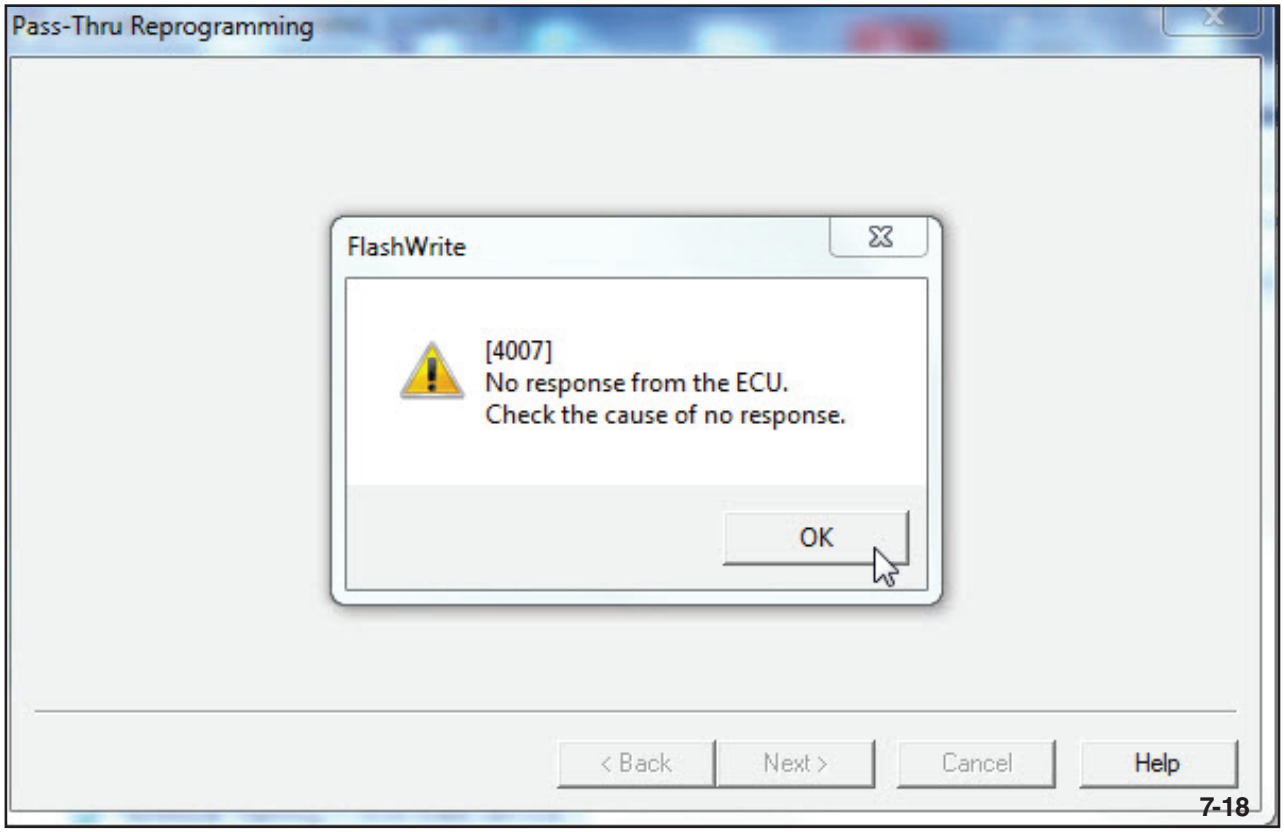


Turn Ignition Switch OFF

If an error occurs during reprogramming, a dialogue box will be displayed with a Flashwrite border.

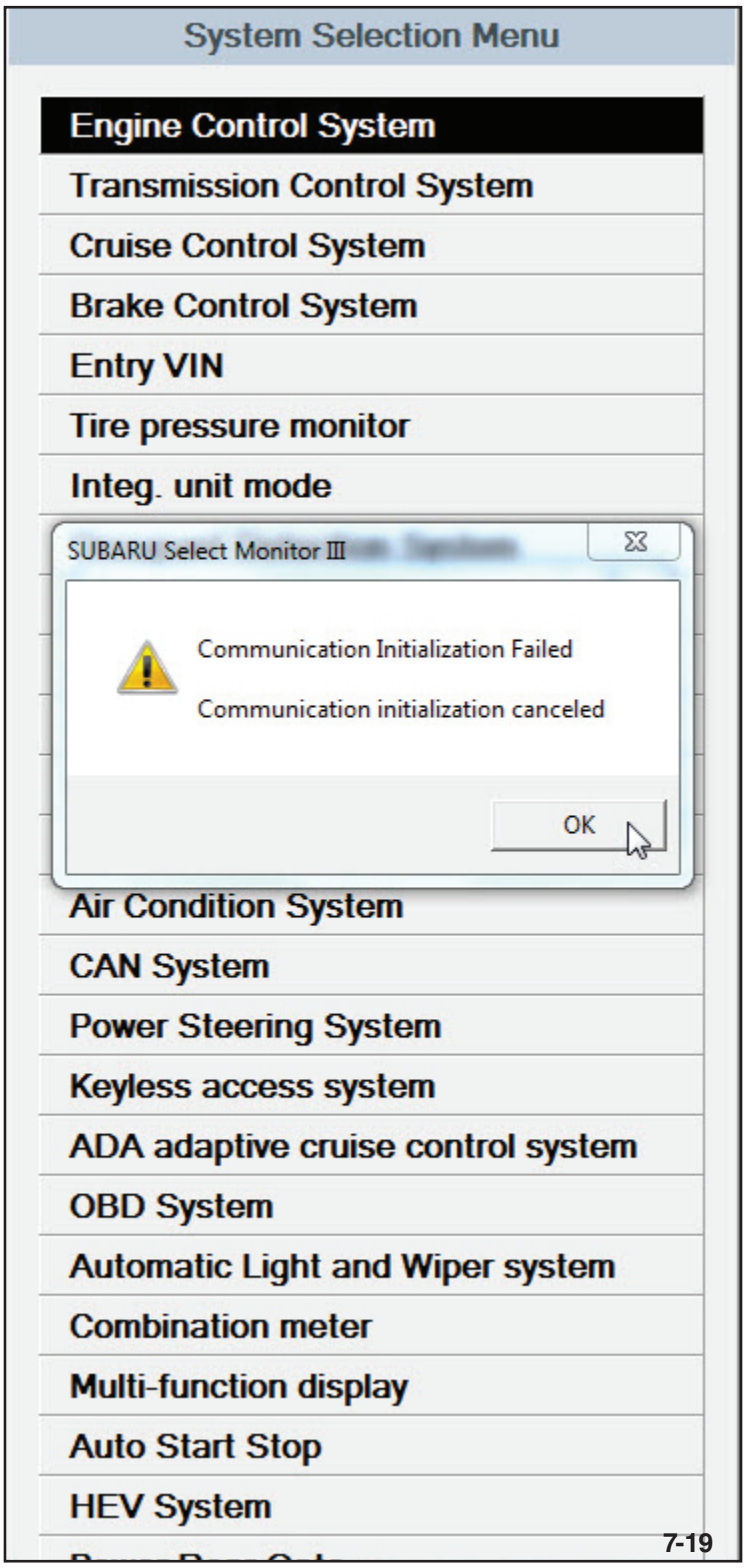


Error



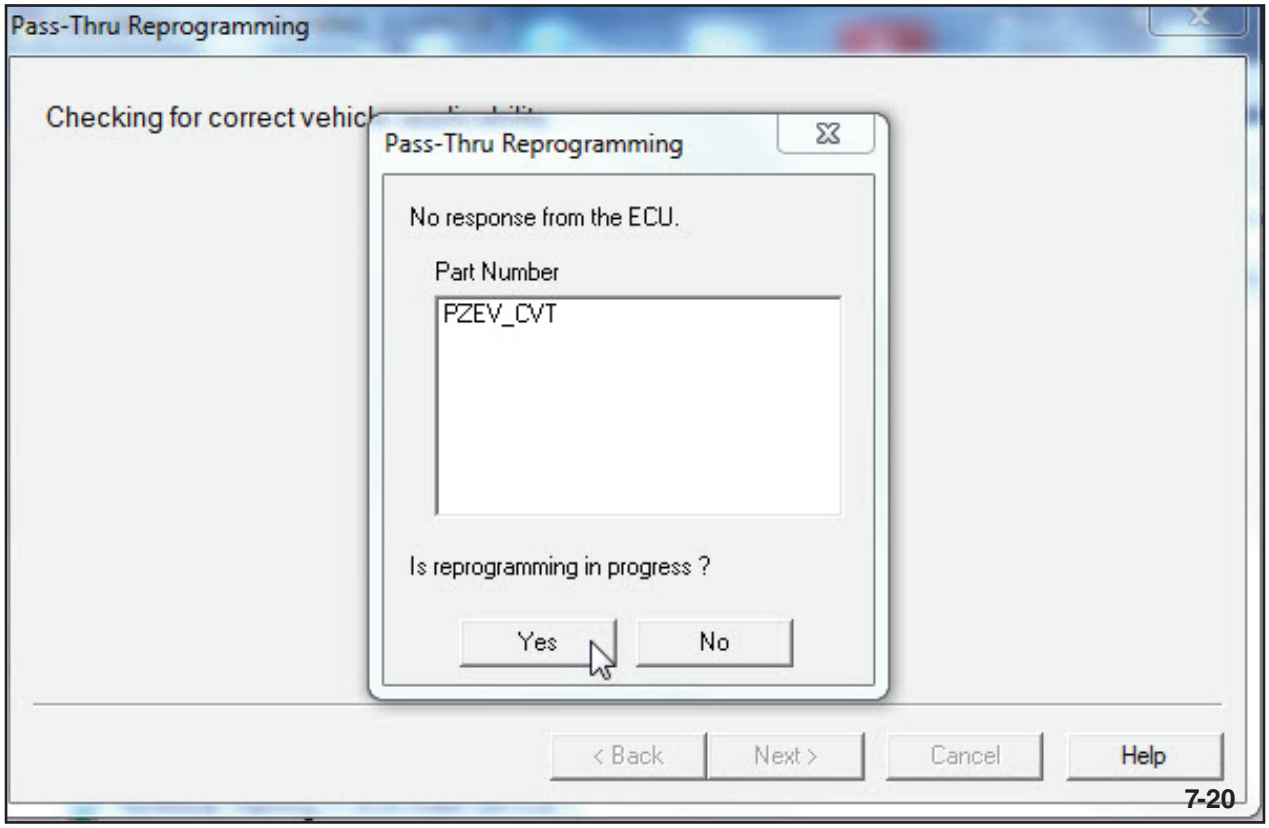
[4007]

This will result in no communications from the control unit.



Communication Initialization Failed

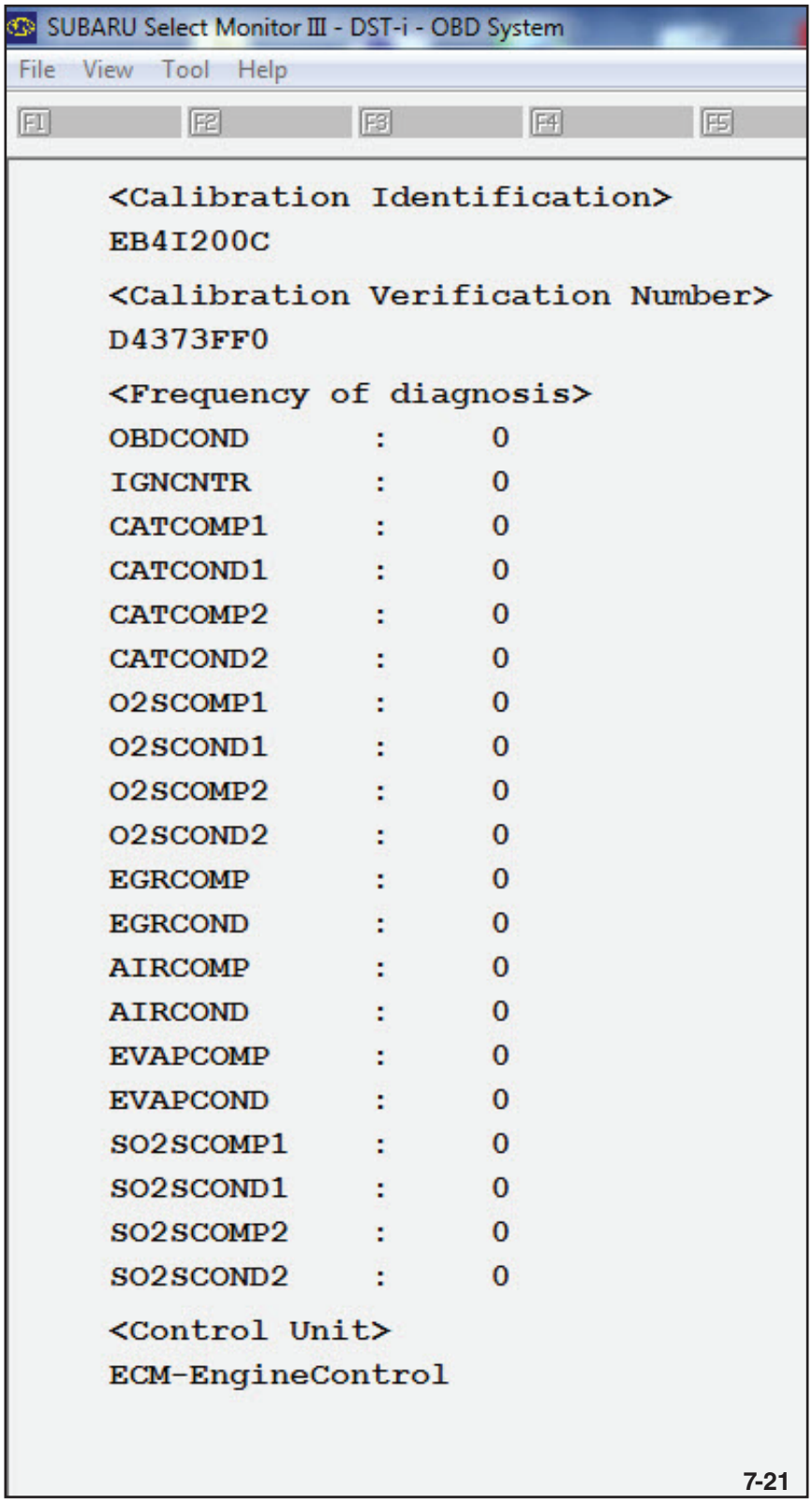
Correct the condition by reentering Flashwrite and select the same PAK file being used when the error occurred. Follow all displayed instructions. Always answer “Yes” when asked, “Is reprogramming in progress? “.



No Response from the ECU

Always confirm communications with the control unit upon completion.

Record the new Calibration Identification Number (CID) and Calibration Verification Number (CVN) on the repair order.



CID and CVN

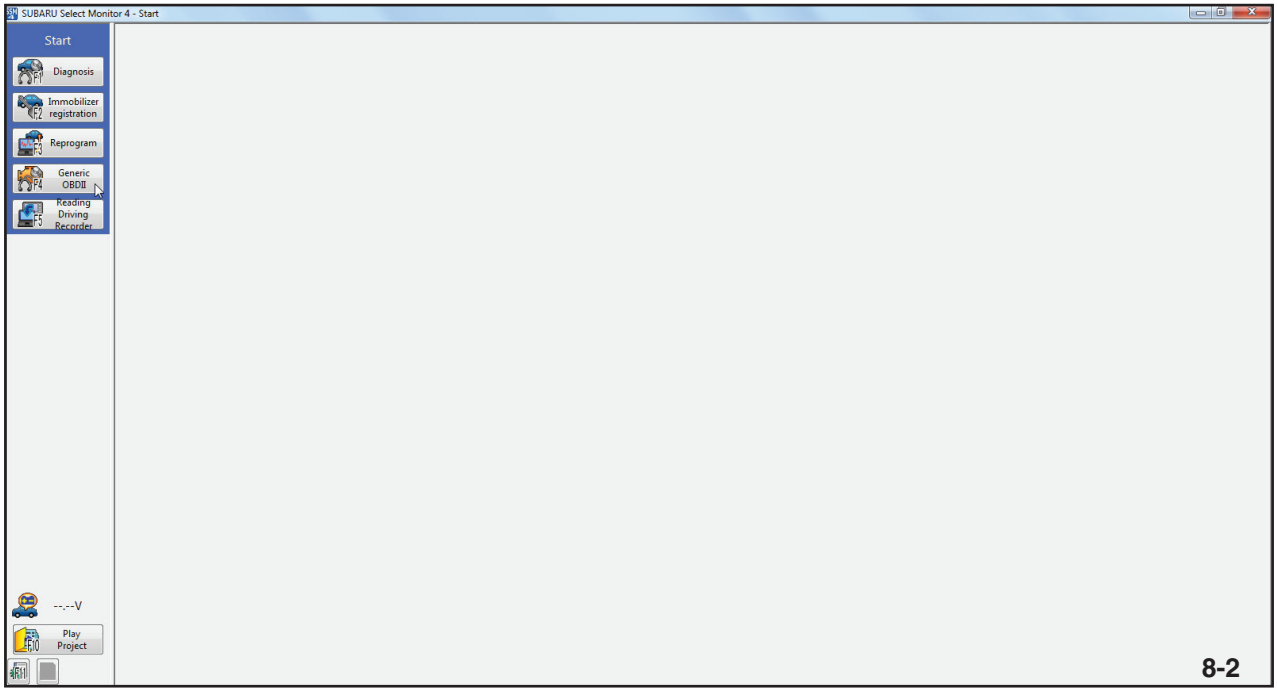
These numbers maybe required on a warranty claim.

NOTES:

Generic OBDII of the Subaru Select Monitor 4

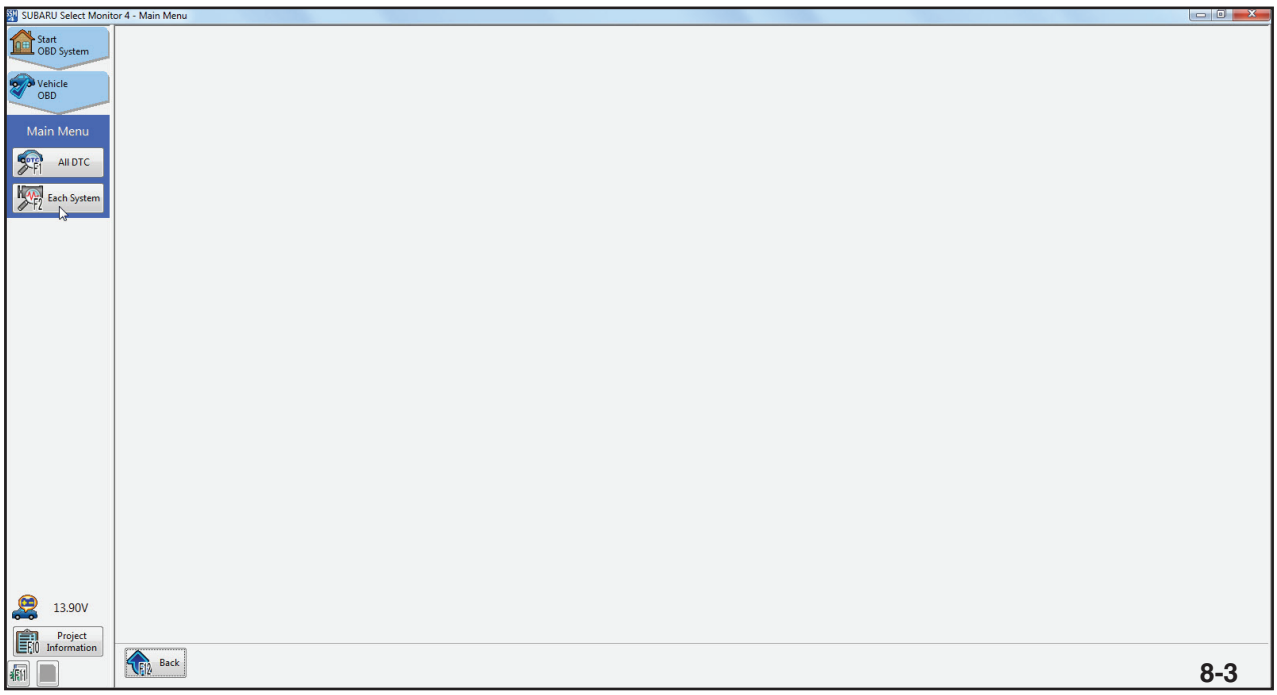
Generic OBDII provides data and function tests for vehicle systems that monitor and control OBDII operations of the vehicle.

Click on “Generic OBDII”.



Generic OBDII

Next click on “Each System”

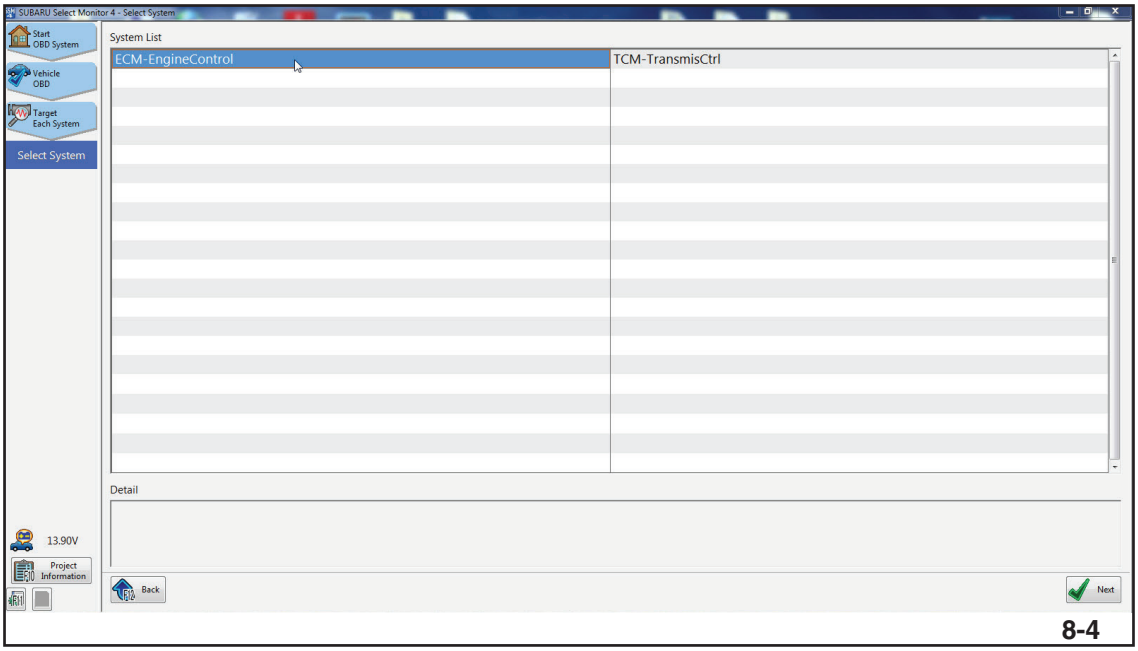


Each System

Subaru Select Monitor Diagnostic Systems

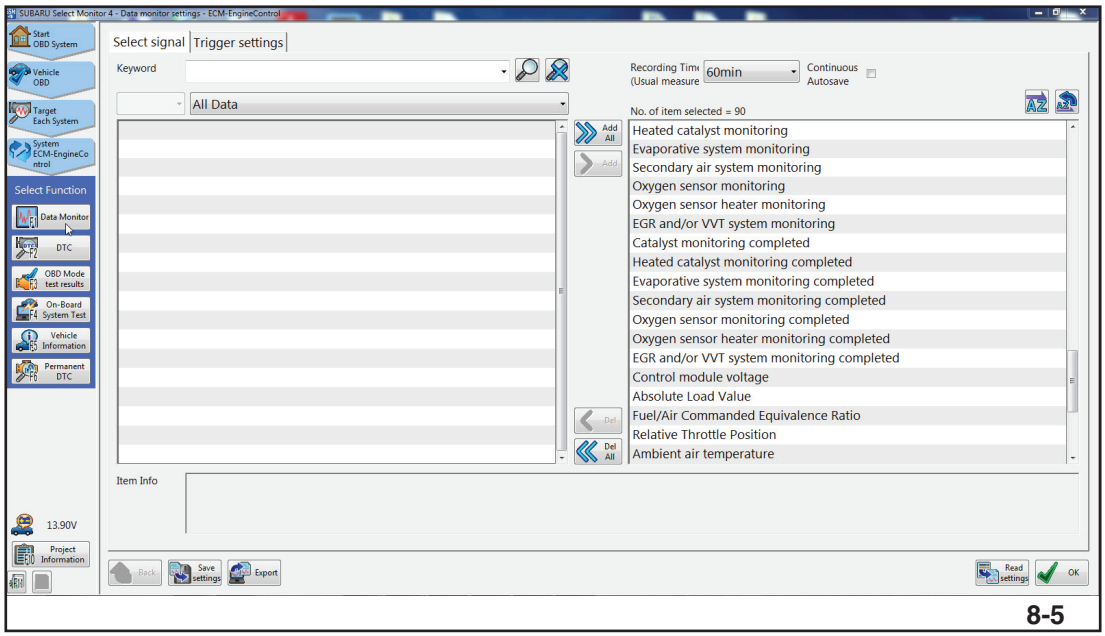
The next display will provide a list of all vehicle systems associated with OBDII.

Note: The example provided is from an off car Select Monitor simulator, containing only 2 control units.



Select System

The next display allows selection of data monitoring, viewing of DTCs, testing of the evaporative system, and viewing of the Calibration Identification Number (CID) and Calibration Verification Number (CVN) of the system's control unit.

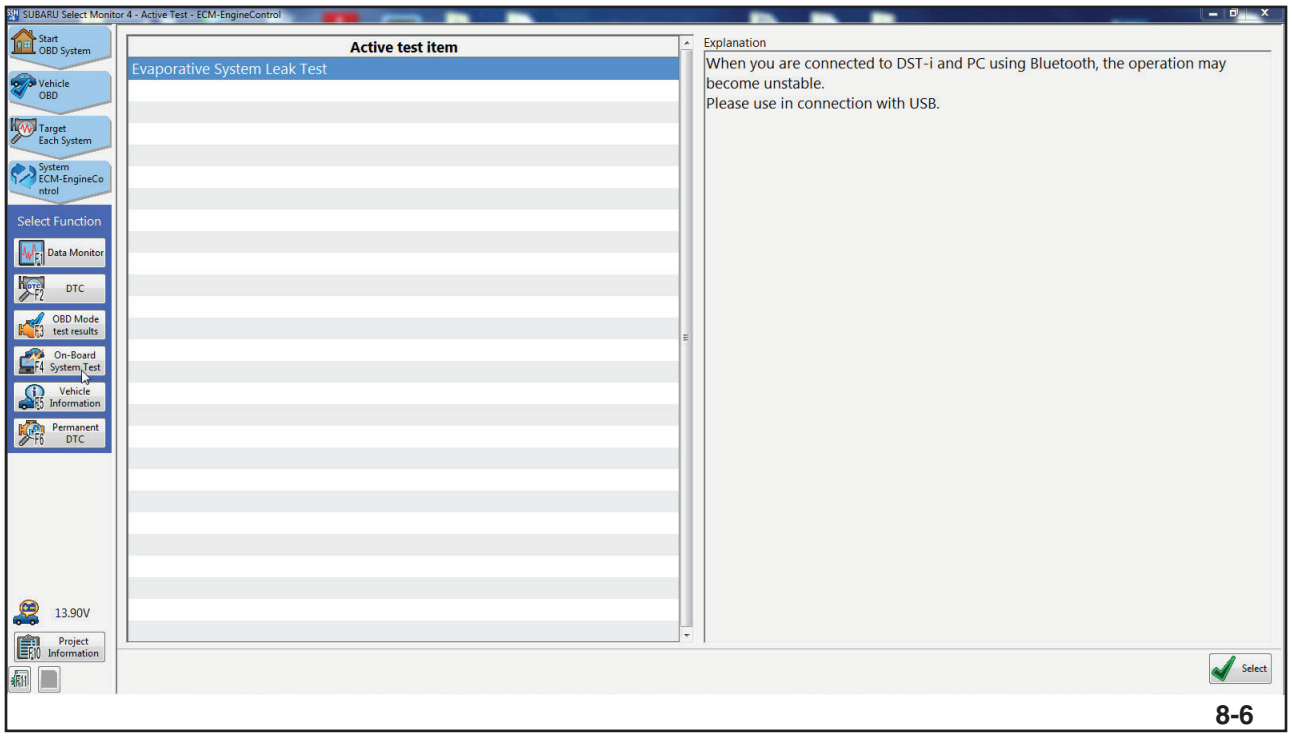


Data Monitor

Information for OBD monitors and operating PIDs can be viewed by selecting "Data Monitor".

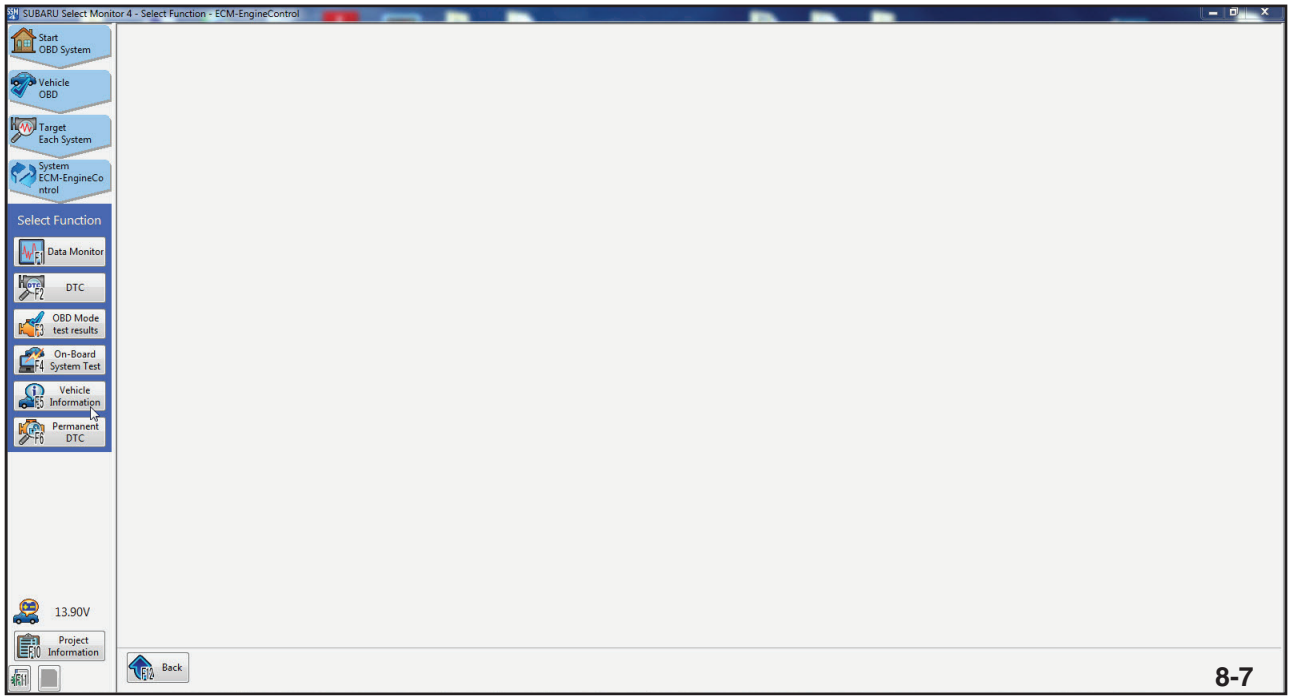
Subaru Select Monitor Diagnostic Systems

Selecting “On-Board System Test” allows testing of the Evaporative Leak Check Module and evaporative system. This system was introduced in 2011 and was gradually phased into all models.



On-Board System Test

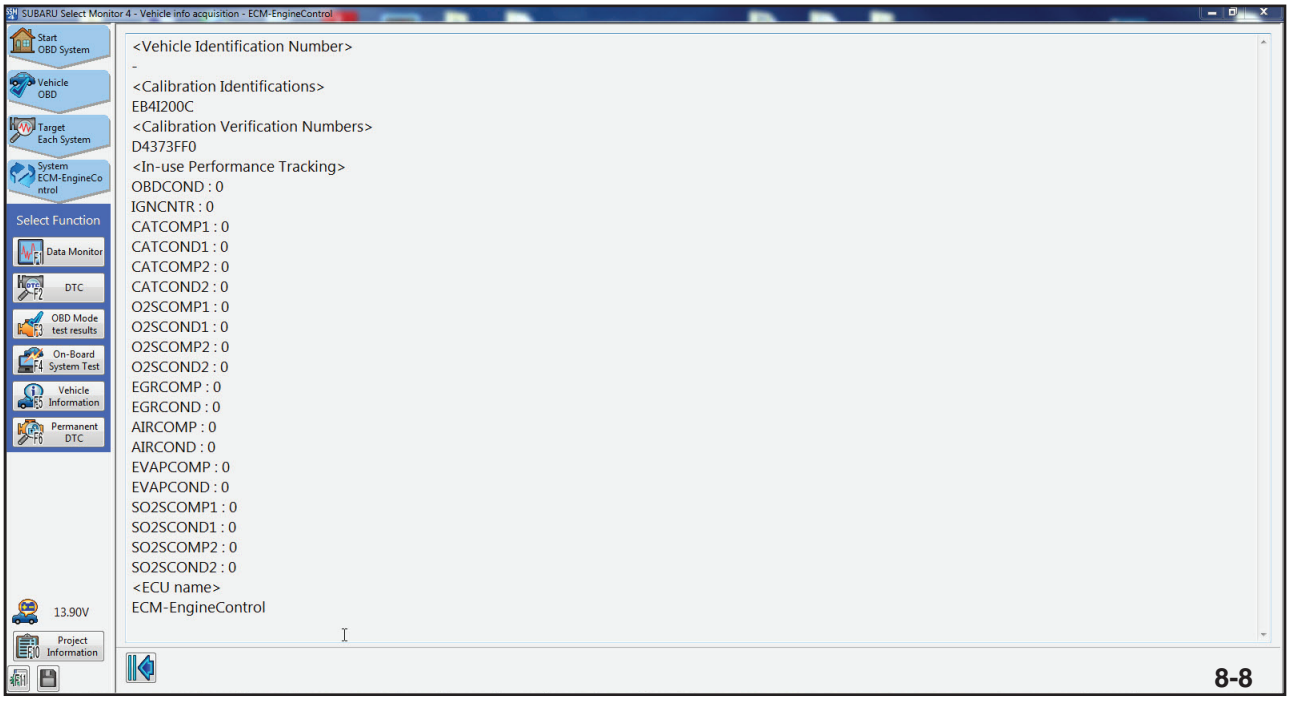
Vehicle Information displays the Calibration Identification Number (CID), and the Calibration Verification Number (CVN), of a system’s control unit.



Vehicle Information

Subaru Select Monitor Diagnostic Systems

Always check and record these numbers before and after a control unit reflash, control unit replacement, and after replacement of a major component. The numbers may be required for entry of a warranty repair.



CID and CVN

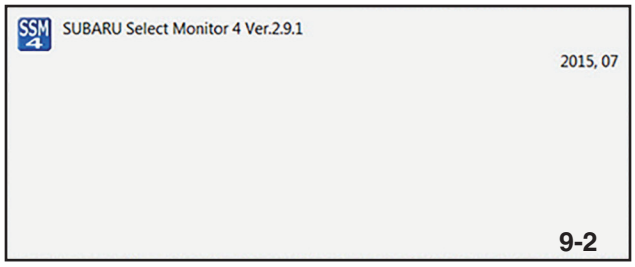
Preparing for Subaru Select Monitor 4 Operation

Connect the DST-i to the vehicle by connecting the DLC cable to the DLC connector on the vehicle.

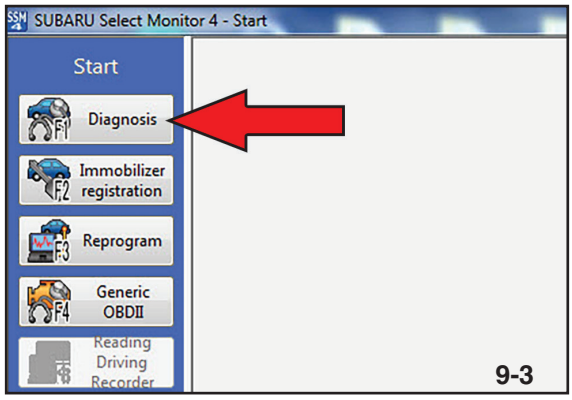
Connect the DST-i to the SSM host computer with the USB cable. Turn the ignition switch to the "On" position.

Turn on the DST-i.

The decision to use the SSMIII or SSM 4 will be decided by the Select Monitor software.



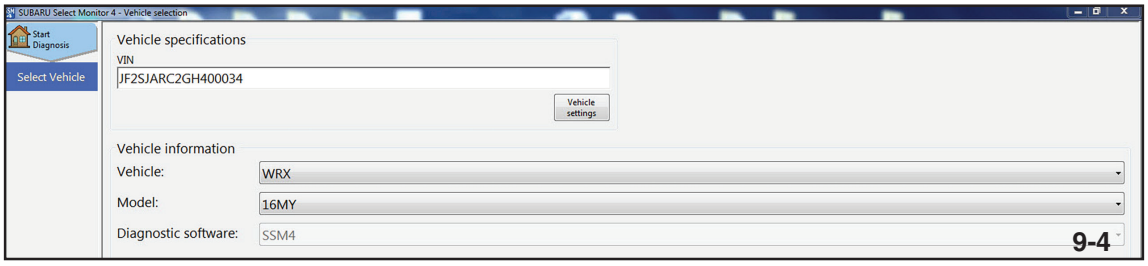
SSM 4 Version Screen



Diagnosis

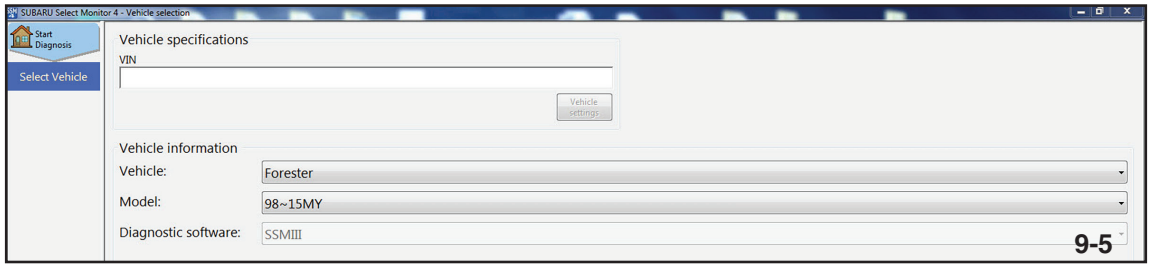
Click on "Diagnosis" to activate the automatic vehicle identification number recognition software of the SSM 4.

If the vehicle is 2016 model year, the VIN will automatically populate in the VIN field of the display.



2016MY Or Newer Vehicle Selection

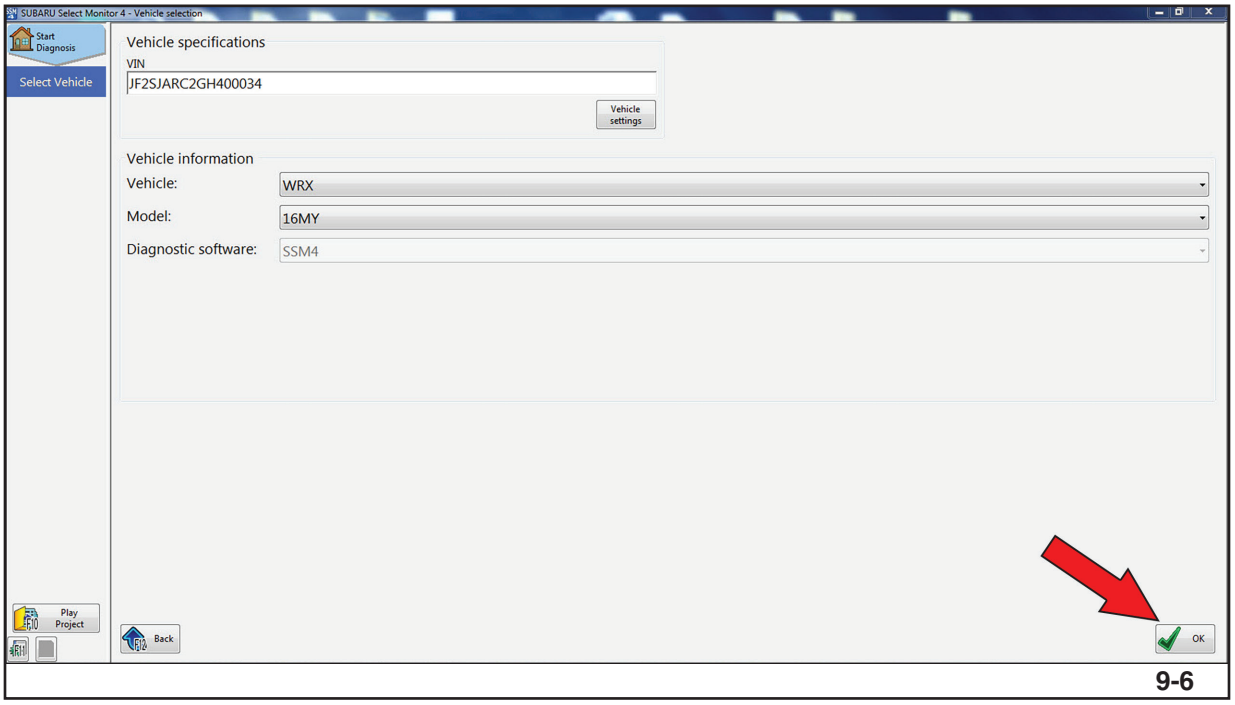
If the vehicle is 2015 model year or prior, the vehicle and model will need to be manually selected by using the pull down menu at the end of the vehicle and model fields (this will activate the SSMIII software, ***no benefit is gained from manually typing in the VIN as the SSMIII files are date and time stamped for identification).***



2015MY or Earlier Vehicle Selection

Subaru Select Monitor Diagnostic Systems

Click “OK” to advance to the “Start Diagnosis” display of the SSM 4 or home screen of the SSMIII.



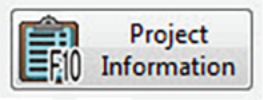
“OK” To Advance

The “Start Diagnosis” display icons must be understood before using the new SSM 4. Each icon will now be identified and then described in detail.

All DTC F1	Performs a check for all DTC’s, current or past, in all control units. The F1 button on the host computer is an alternate control for this function.
Each System F2	Allows diagnosis and work support of each system on the vehicle. The F2 button on the host computer is an alternate control for this function.
Multiple System F3	Allows viewing of data of multiple vehicle systems (3 maximum). Data can be intermingled among systems. The F3 button on the host computer is an alternate control for this function.
Combined Scope/PID Data F4	Allows voltage measurements and data to be viewed at the same time. One or more analog voltage measurements from the DST-i are possible. The F4 button on the host computer is an alternate control for this function. This feature will not be activated until oscilloscope software has been added to the host computer
CAN bus check F5	Allows the CAN bus configuration of the selected vehicle to be viewed. This function provides no diagnosis. The F5 button on the host computer is an alternate control for this function.

9-7

Icon Description 1



Stores and organizes all saved data files. Each VIN is assigned a folder and becomes a project (Project Information). Each saved file for that vehicle is stored in this folder, named by the date and time of day.

Allows access to options that provide file management, SSM 4 DST-i set up, and version/help. The F11 button on the host comptuter is an alternate control for this function.

Allows data to be saved after stopping of acquisition

Moves the SSM 4 back one screen

9-8

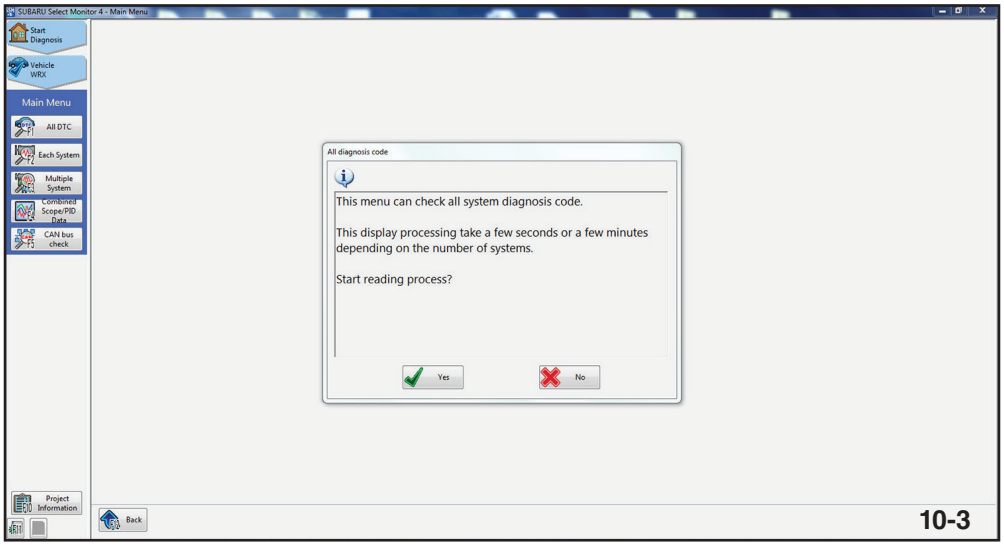
Icon Description 2

NOTES:

F1 All DTC

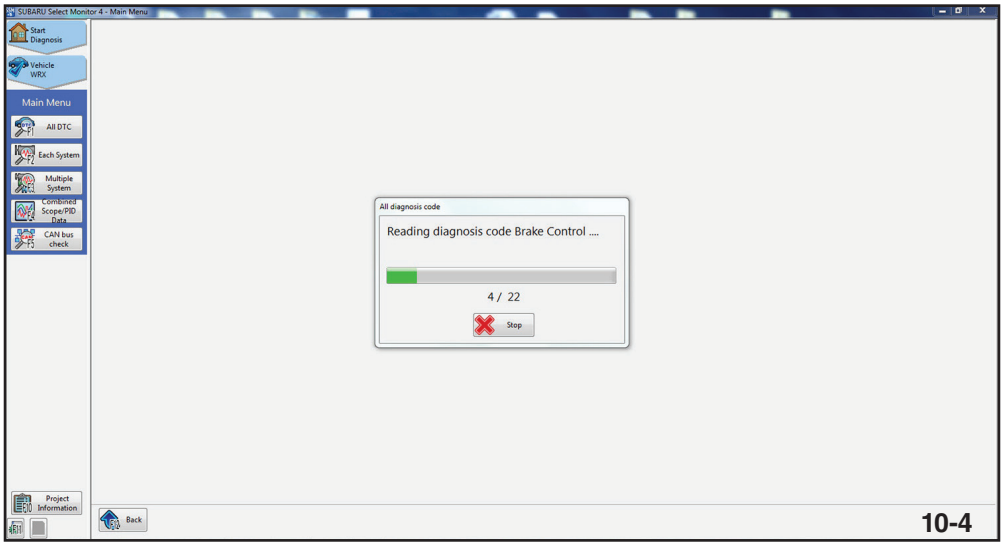
F1 All DTC Icon

The display of the "All DTC" check indicates the Time stamp and Ignition counter information at the time the DTC was memorized. A "Clear Memory" function has been added to this screen and allows all DTCs to be cleared simultaneously. Do not clear the DTCs until the Freeze Frame Data (FFD) has been saved. Saving of the Freeze Frame Data (FFD) is performed automatically, as the DTCs for each individual system are checked. Click "Yes" to begin the "All DTC" check.



All DTC Check

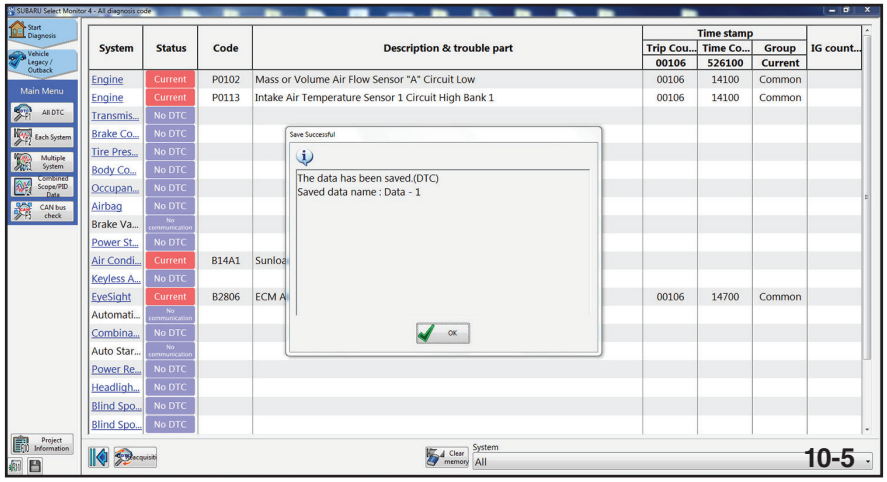
A dialogue box will show the progress of DTC checks and the number of systems that require checking.



All DTC Check Progress

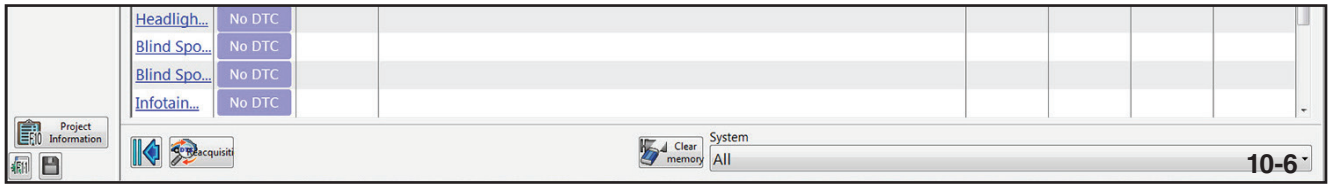
Upon completion of the checks, all DTCs will be displayed and automatically saved.

CAUTION: The saved DTCs do not include Freeze Frame Data (FFD). Do not use the "clear all" function until each DTC is checked in its own system, and the Freeze Frame Data (FFD) is saved.



DTC Check Saved

The display can be scrolled up and down as well as shuffled to the left or right. Each column of data can be expanded or collapsed by moving the cursor over the vertical bars and holding down the mouse button and moving the bars to the desired areas. On this display four codes are present. The first 3 codes, regardless of the conditions, will always receive a trip count, time count, and group indicator. The group indicator will read "Common" if the operating time for that system is common to the BIU. In this case, P0102 and P0113 have the earliest time count. The condition that created these codes is the probable reason that created the DTC with the later "Time Count". Always trouble shoot the DTC with the earliest time count first.



Reacquisition Control

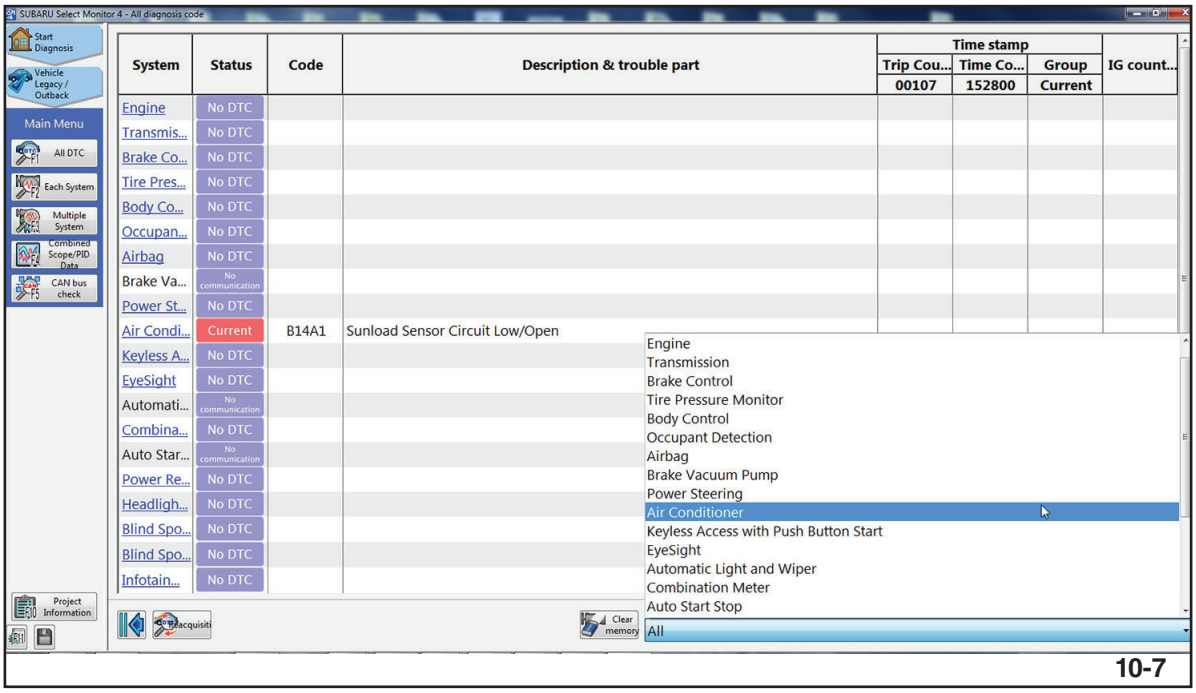
The "Clear Memory" control is located in the lower center of the display.

A "Reacquisition" function control is located in the lower left corner of the display. This allows all DTCs to be rechecked without leaving the current display.

CAUTION: The saved DTCs do not include Freeze Frame Data (FFD). Do not use the "clear all function" until each DTC is checked in its own system, and the Freeze Frame Data (FFD) is saved.

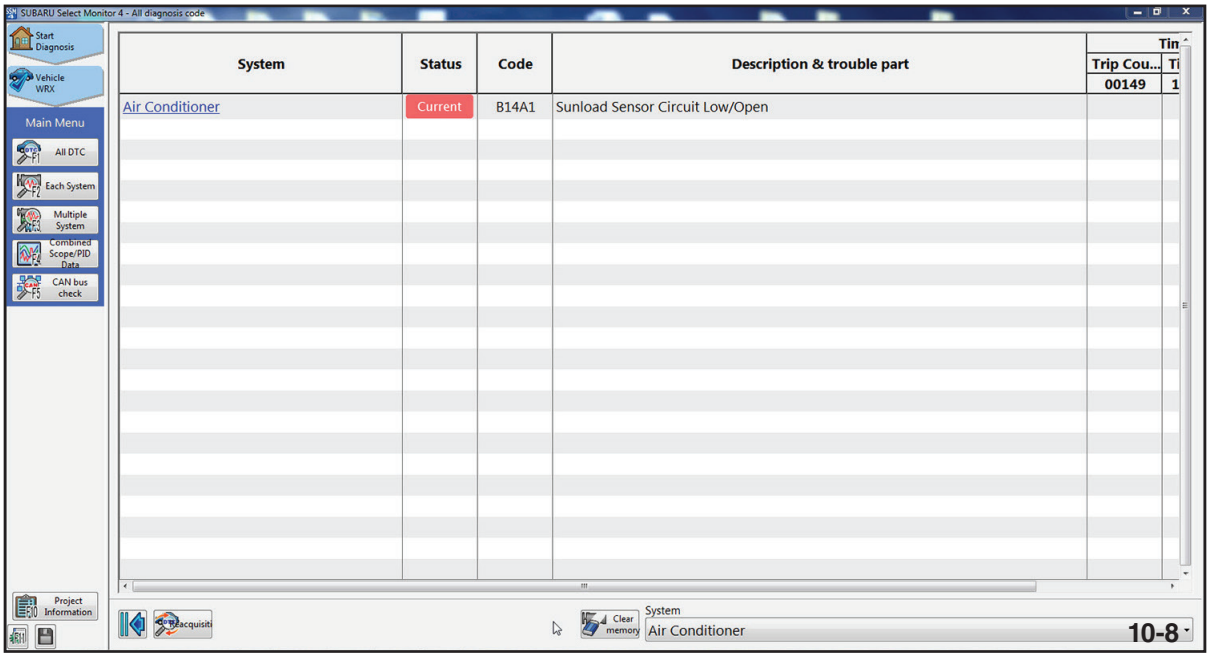
Subaru Select Monitor Diagnostic Systems

Clicking on the “System” button on the lower right of the display allows the DTCs of each system to be viewed separately; however, no individual manipulation of those DTCs can be performed.



System Button

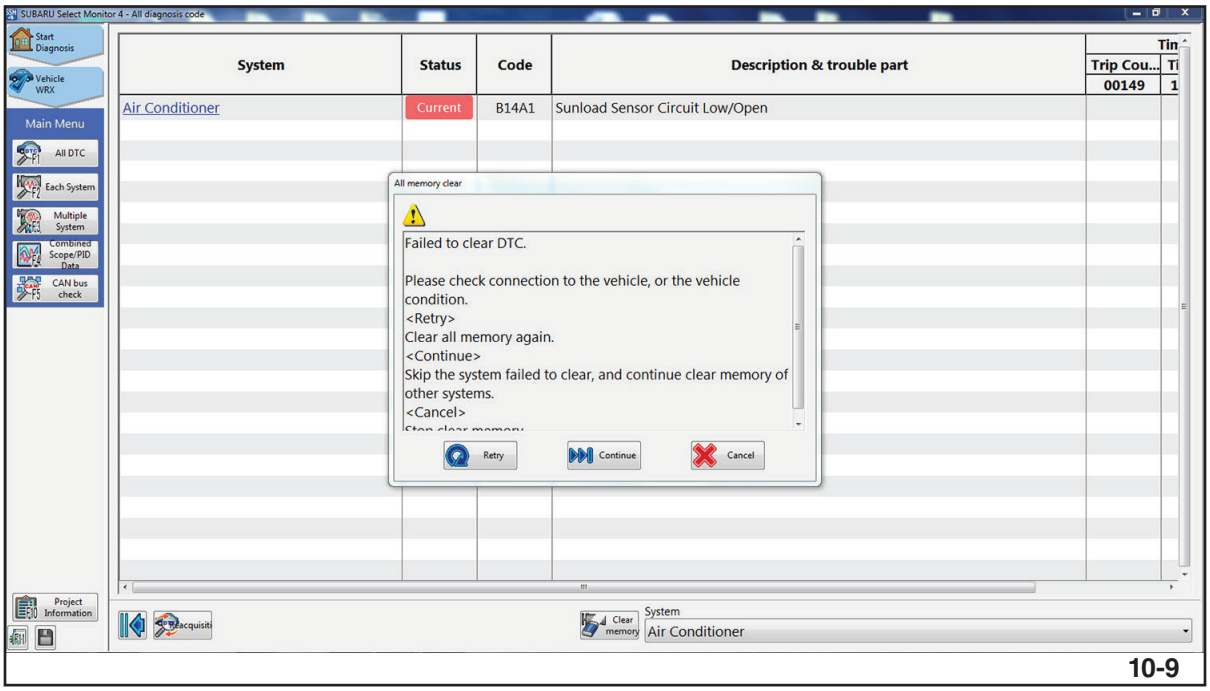
Clicking on “Clear Memory” will still result in all DTCs being cleared.



Air Conditioner DTCs

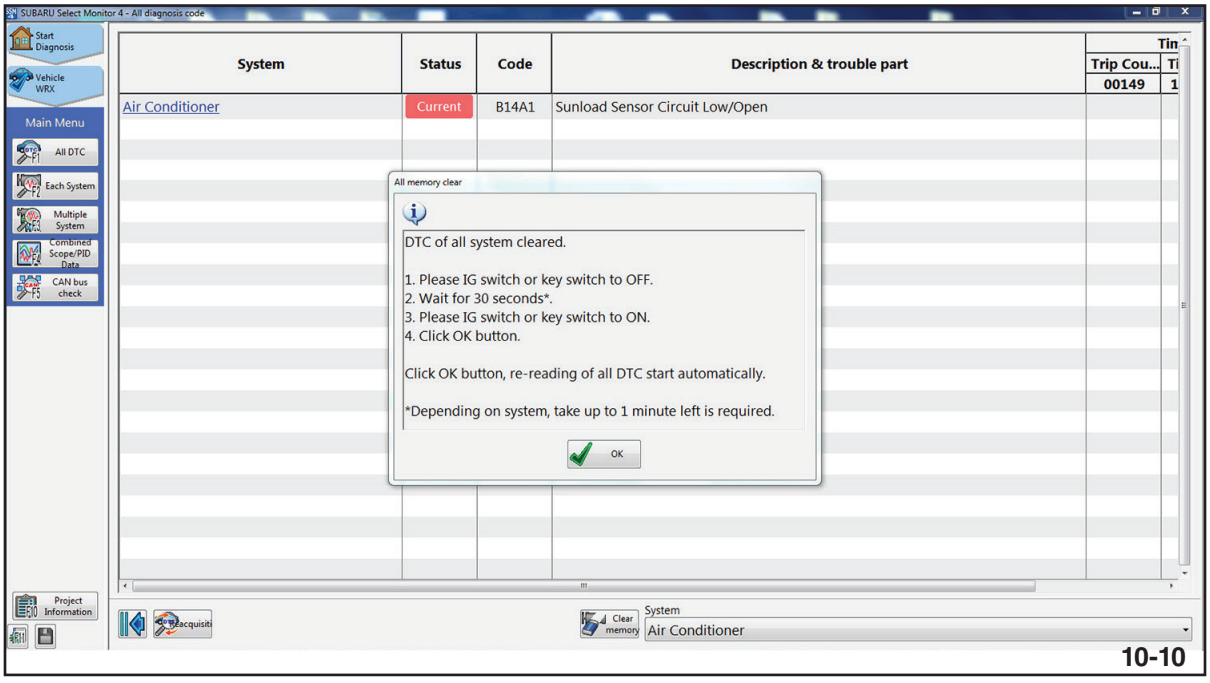
If a DTC exists because of a current problem, the following dialogue box will be displayed. Click “Continue” to check the remaining systems.

Subaru Select Monitor Diagnostic Systems



Failed To Clear

If the DTCs are cleared, follow the instructions on the displayed dialogue box to complete the memory clearing procedure.

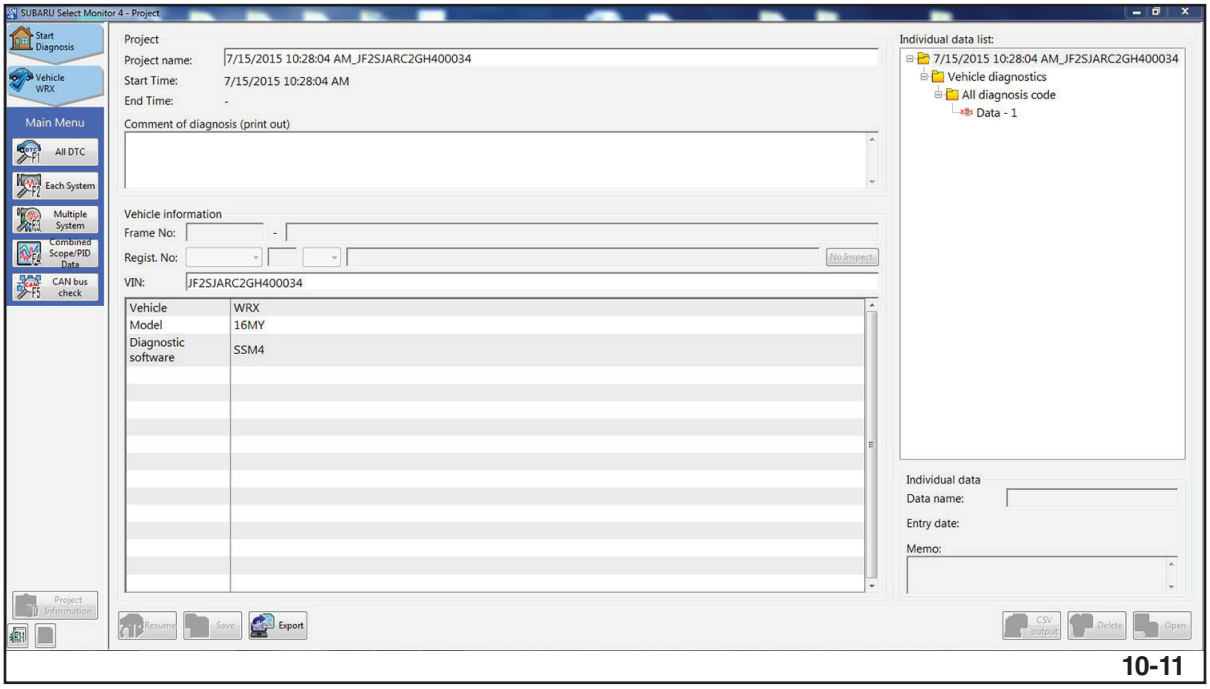


DTCs Cleared

The saved DTCs can be viewed by clicking the Project Information tab in the lower left corner of the display.

The files are named by VIN and the time of day the file was created.

Note: Additional information on "Project Information" and saved data files will be presented *later* in this TRB.

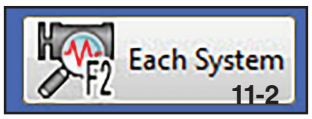


Project Information

NOTES:

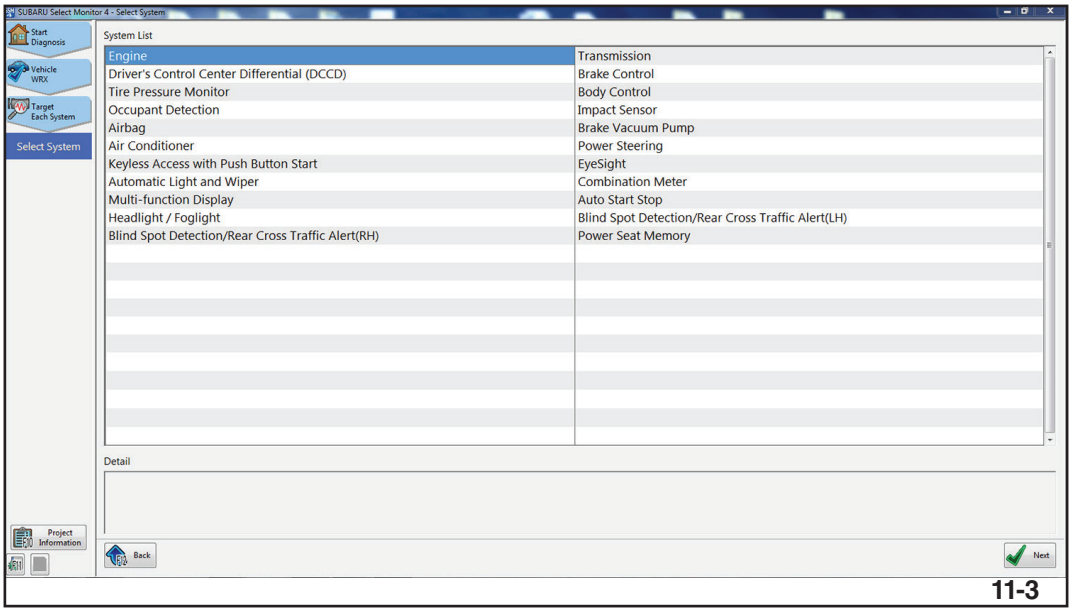
Subaru Select Monitor Diagnostic Systems

F2 Each System



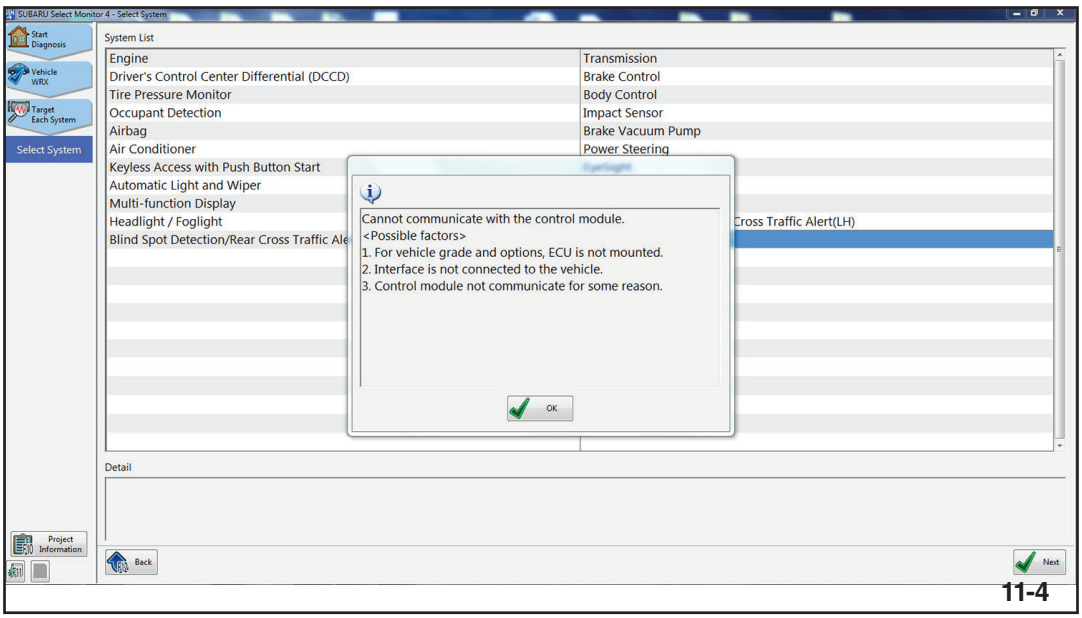
F2 Each System Icon

"Each System" allows selection of a single system for diagnosis. The list is global and will include systems that are not currently installed on the vehicle being serviced.



Each System

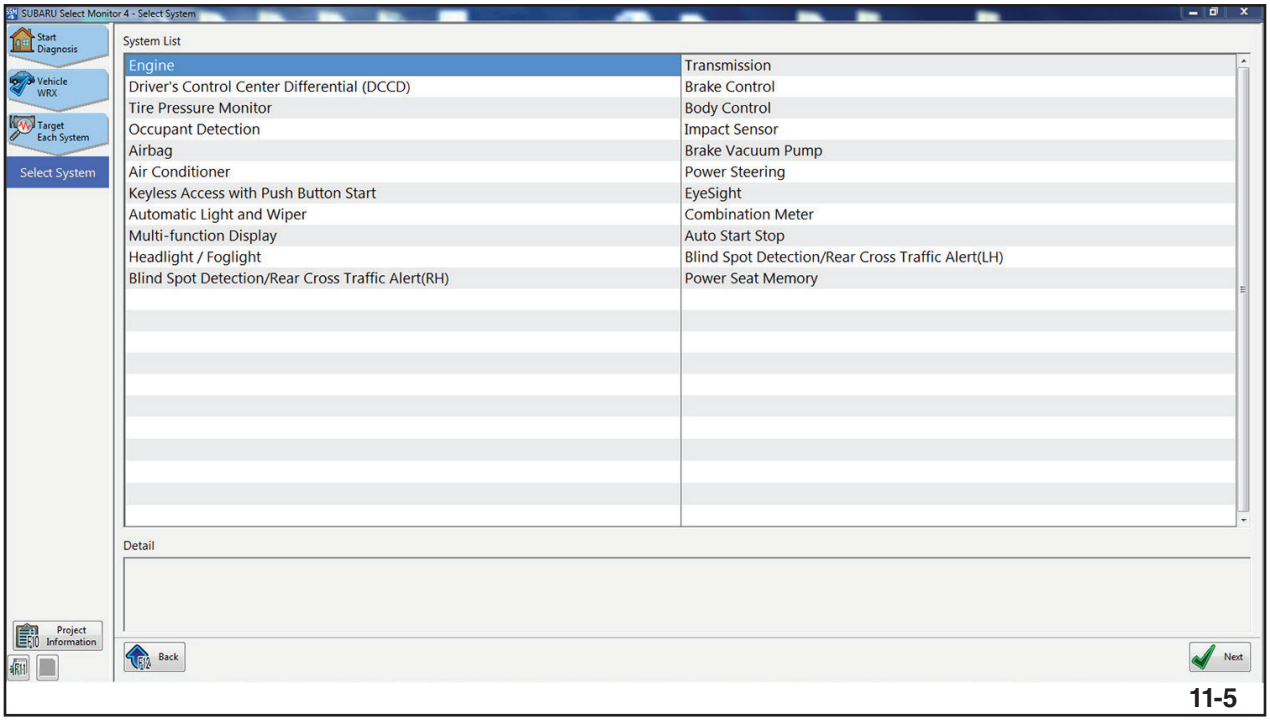
Clicking on a system that is not equipped on the vehicle being serviced will display the following dialogue box, provided the "Next" button on the lower right of the display has been clicked.



Cannot Communicate

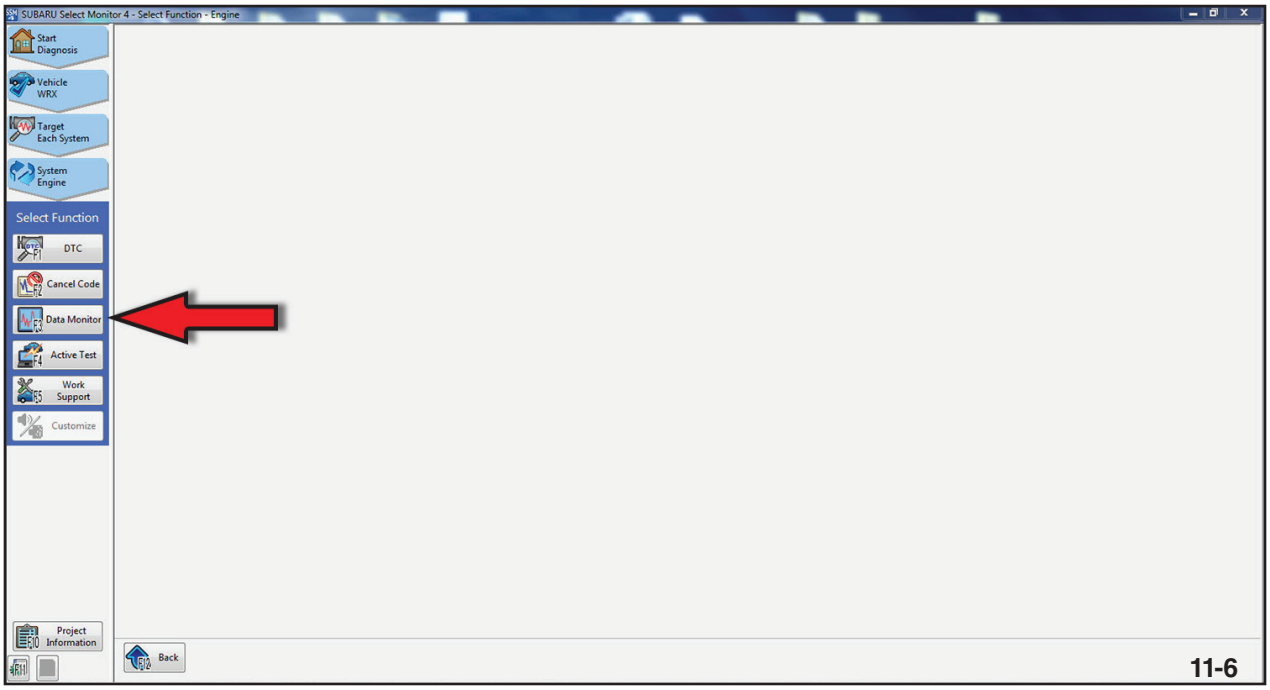
Subaru Select Monitor Diagnostic Systems

To view the data stream or Parameter Identification Displays (PIDs) of a system, click on the system to be diagnosed and click the “Next” button on the lower right of the display.



Selecting System

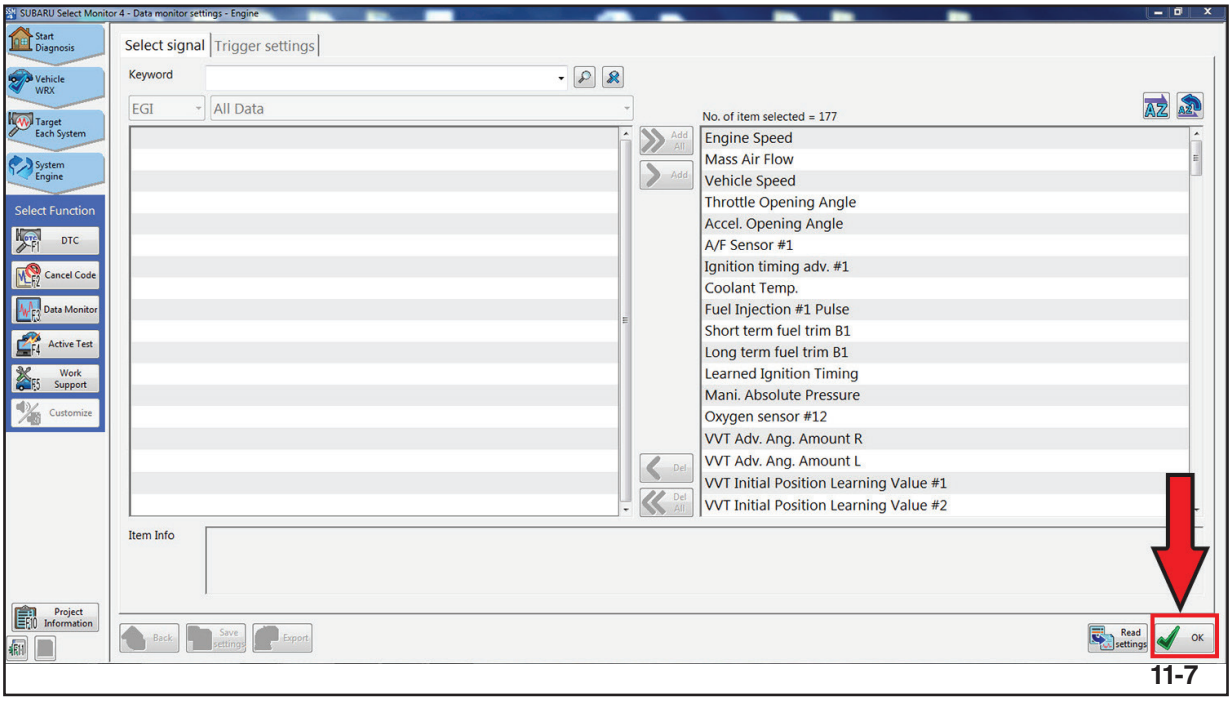
Click “Data Monitor” on the “Start Diagnosis” display, located along the left edge of the display.



Data Monitor

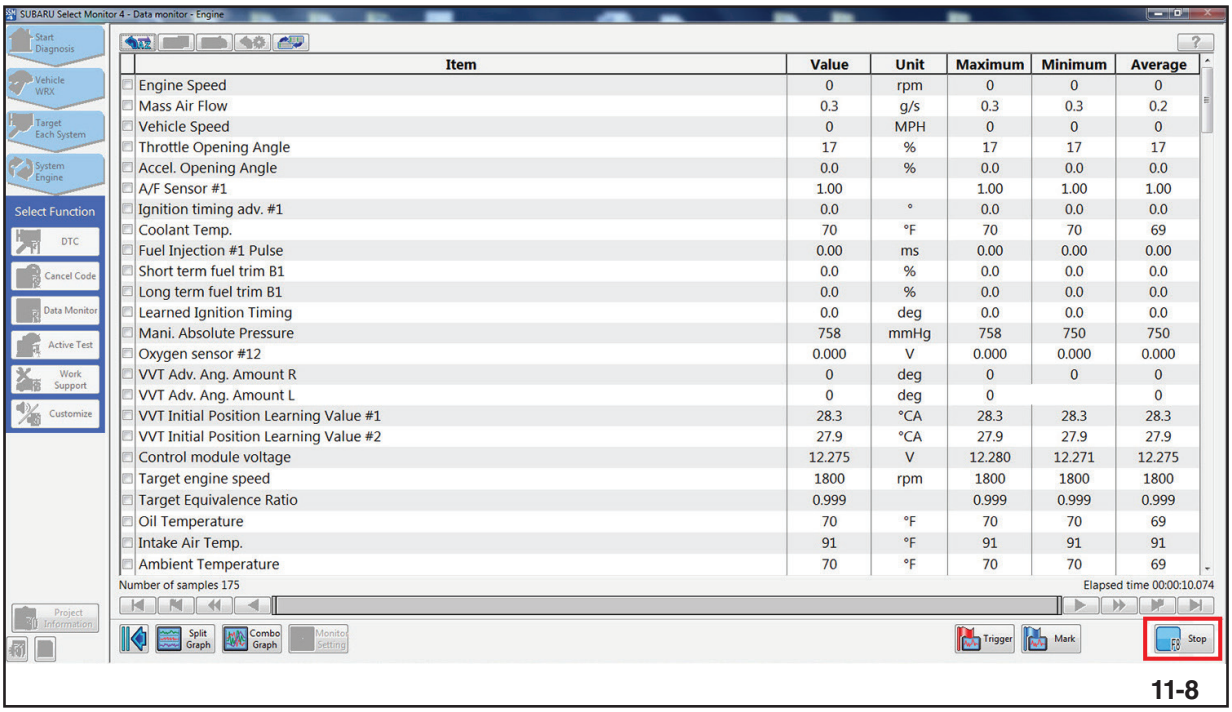
The SSM 4 is designed to capture a sample of all data before any selection of Parameter Identification Displays (PIDs) can be performed.

Click “OK” on the lower right corner of the display.



OK

The SSM 4 will now begin recording and displaying all data. Selection of individual Parameter Identification Displays (PIDs) can be accomplished by clicking “Stop” in the lower right corner of the display.

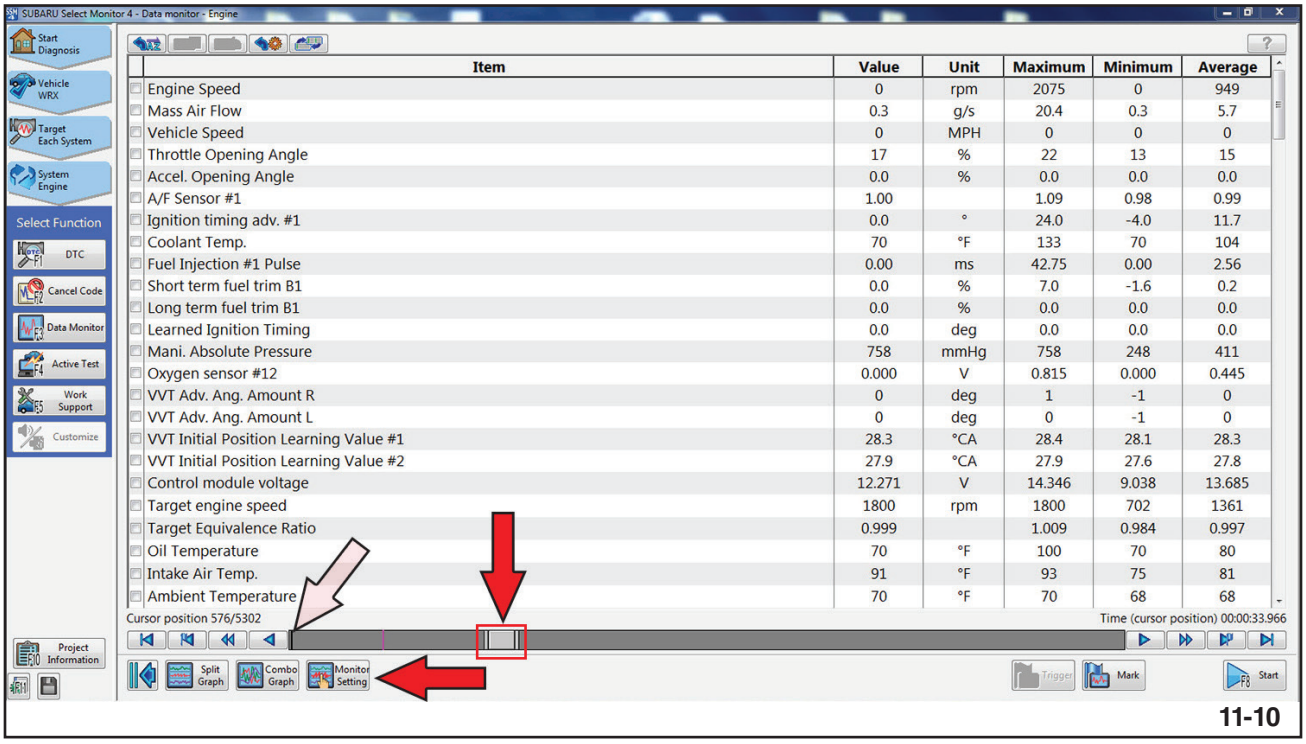


Stop

Note: The SSM 4 places a halo or dotted box in the "Mark"control of the Data Monitor display after the acquisition of data has begun. The space bar activates the "Stop" command if pressed and places a Mark or flag in the data recording. The halo or dotted box can be moved from one control to another by using the Tab or Arrow keys on the keyboard, allowing the space bar to activate that control.

Halo Indicator

The sampling status bar along the bottom edge of the display only functions in graph mode. The cursor indicator controls the reading of recorded data.

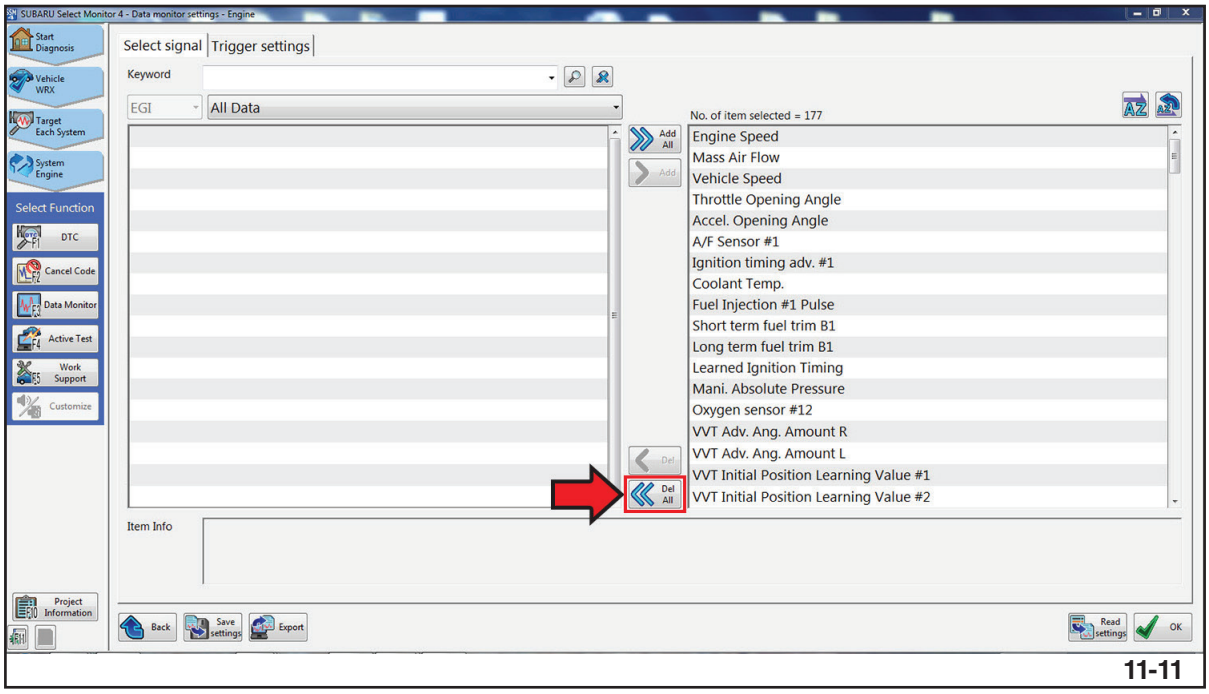


Sampling Status Bar

Click "Monitor Setting" in the lower left corner to select individual Parameter Identification Displays (PIDs).

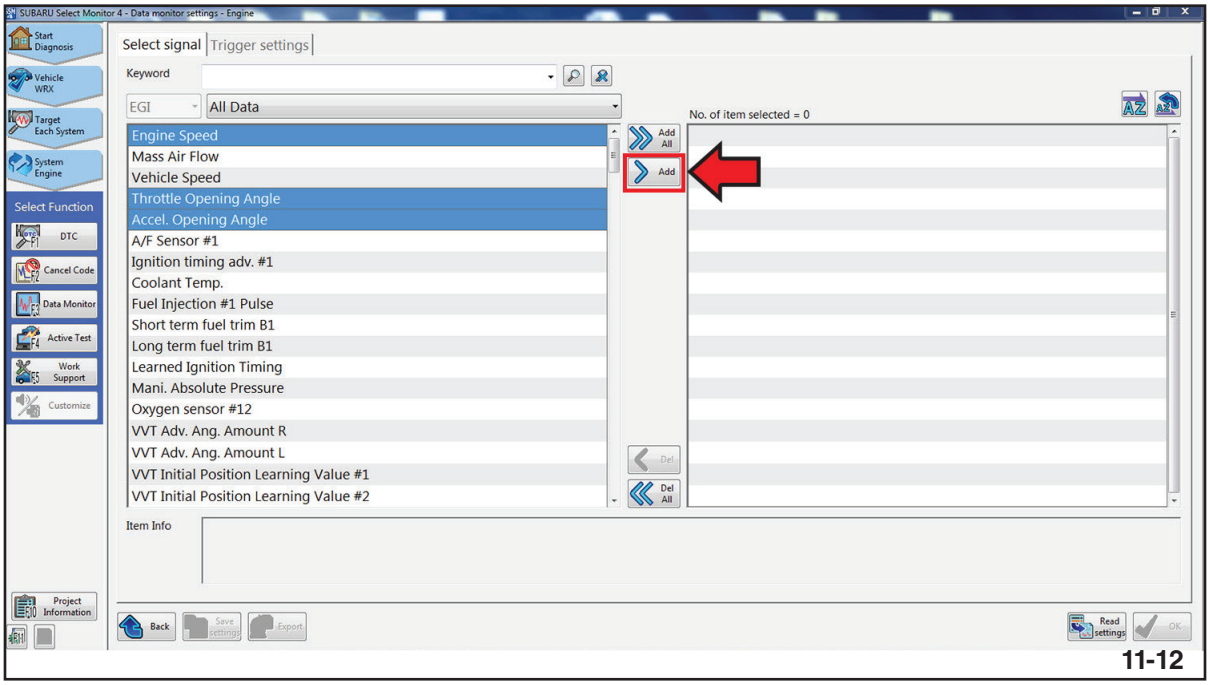
Subaru Select Monitor Diagnostic Systems

The SSM 4 requires that all Parameter Identification Displays (PIDs) be de-selected by clicking "Del All" (Delete All), button located in the lower middle of the display.



Delete All

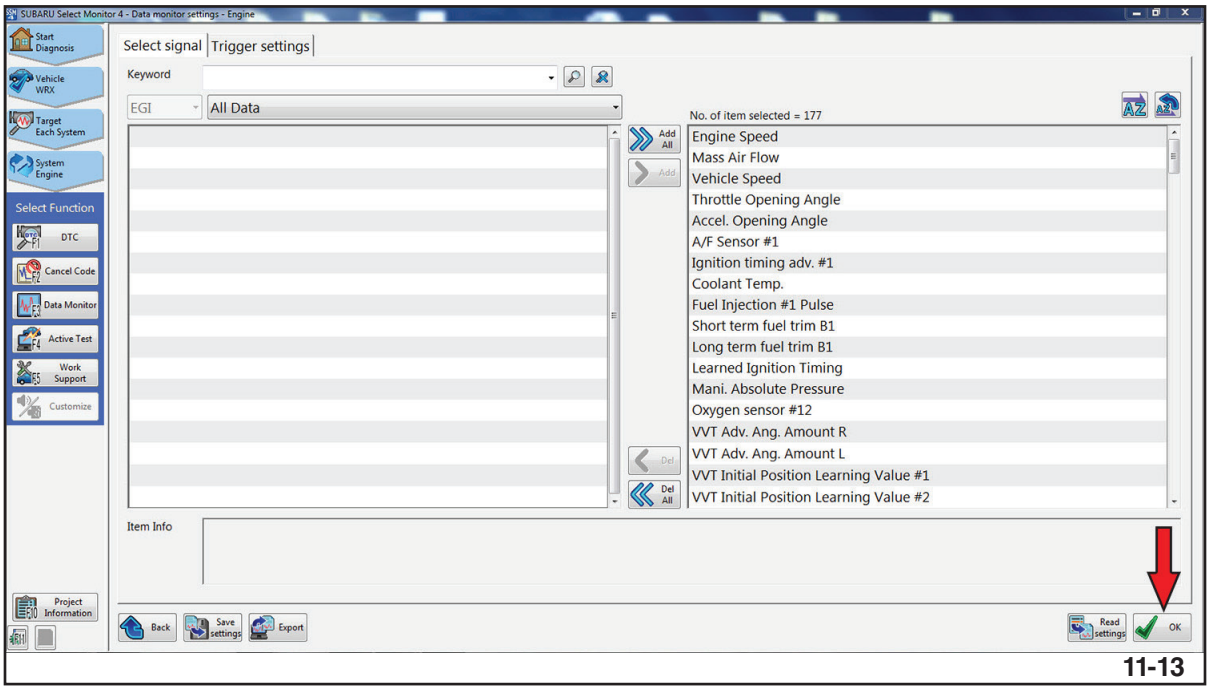
The list of all deleted Parameter Identification Displays (PIDs) will now be displayed on the left of the display.



PID Selection

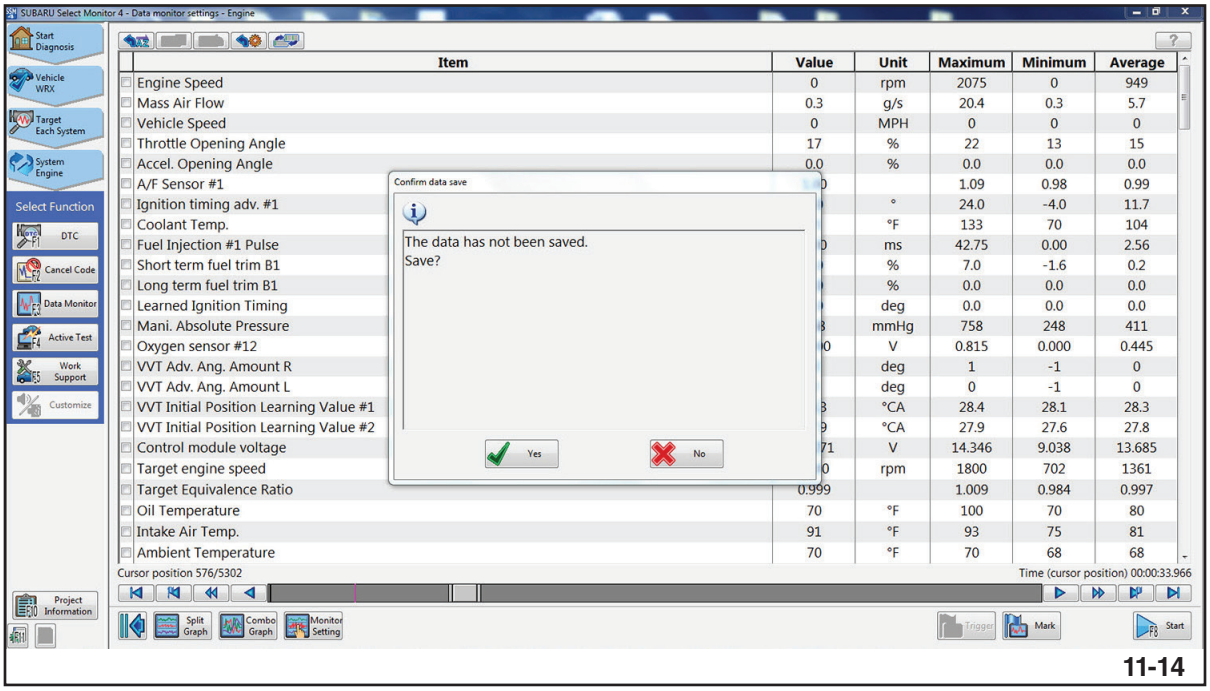
Click the desired PID(s) or use the new feature, "Keyword", located at the upper left of the display.

If manual selection of PID(s) is performed, click the "ADD" button located in the center of the display. Then click "OK" to continue.



OK

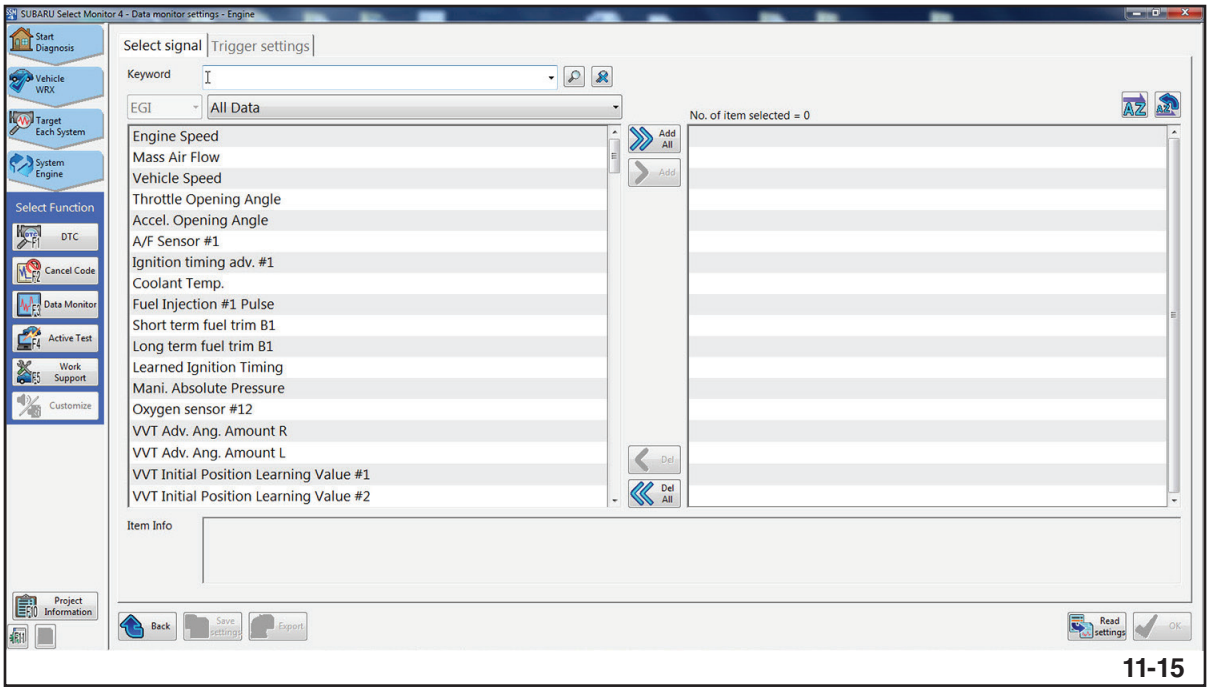
A dialogue box will appear to warn the user that the original data has not been saved. Save the data or continue by clicking "Yes" or "No".



Confirm Data Save

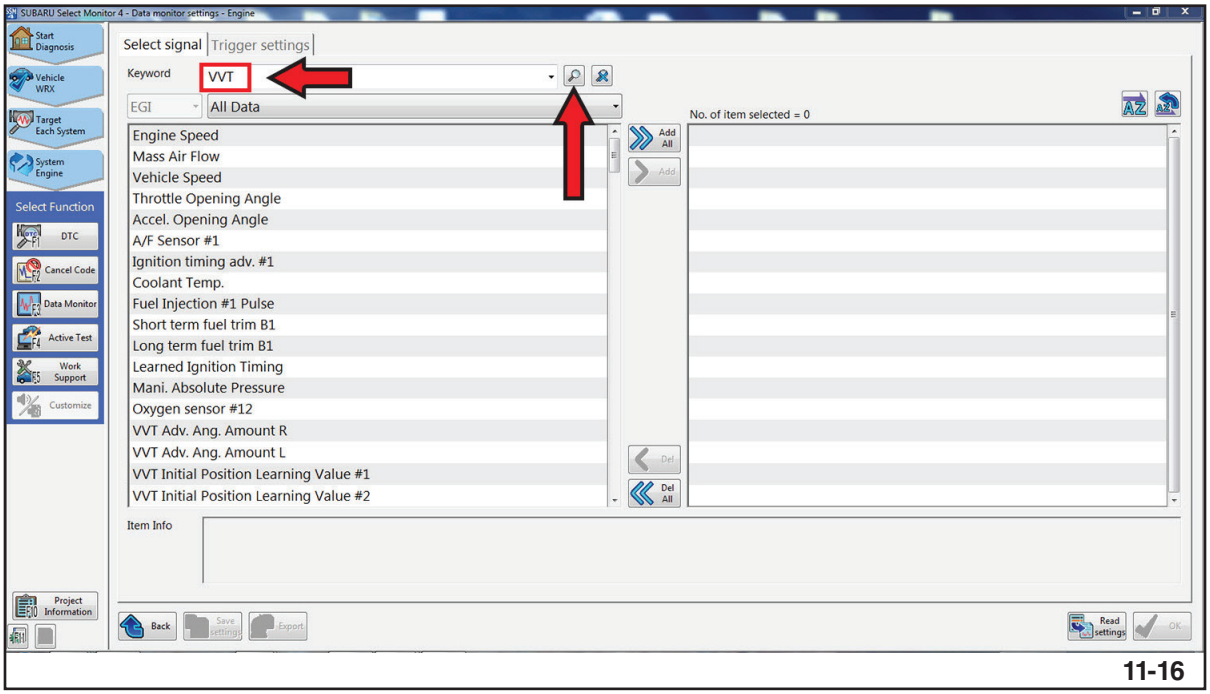
If a related group of PID(s) or a specific PID is desired, use the new feature, “Keyword” , located at the upper left of the display.

The keyword entered must be identical to the Parameter Identification Displays (PIDs) spelling or appearance.



Keyword Entry

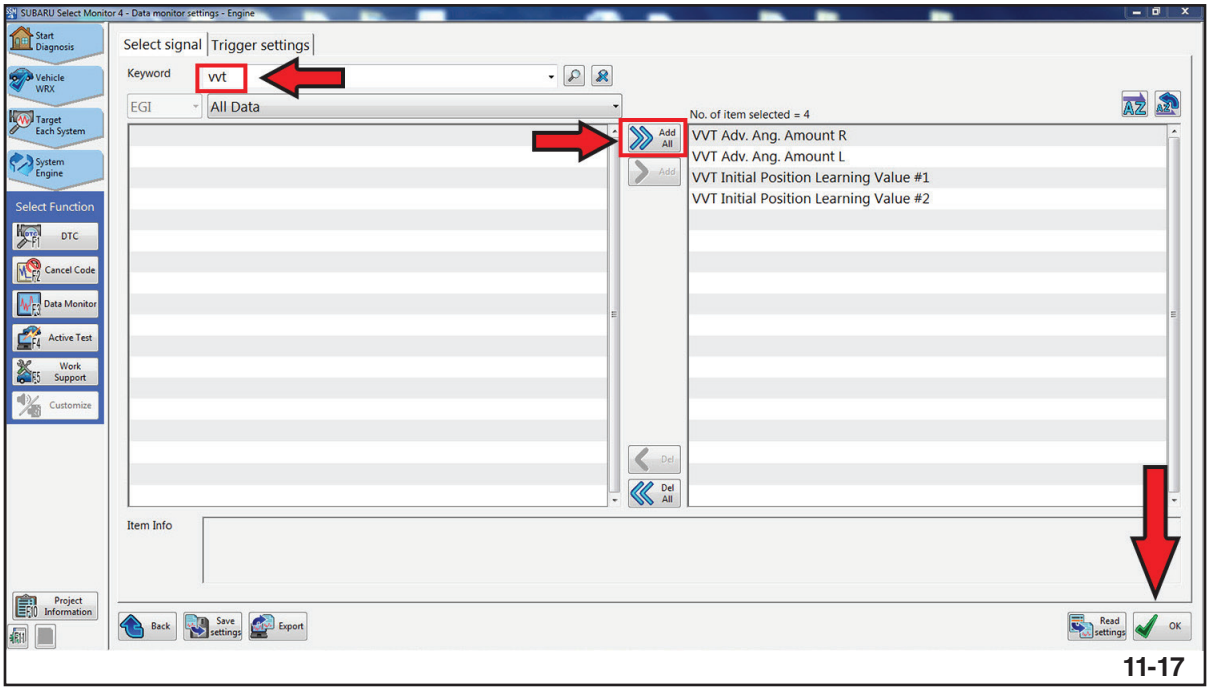
In the example provided, VVT has been entered.



Keyword Search

Click the magnifier icon located next to the right of the keyword to continue.

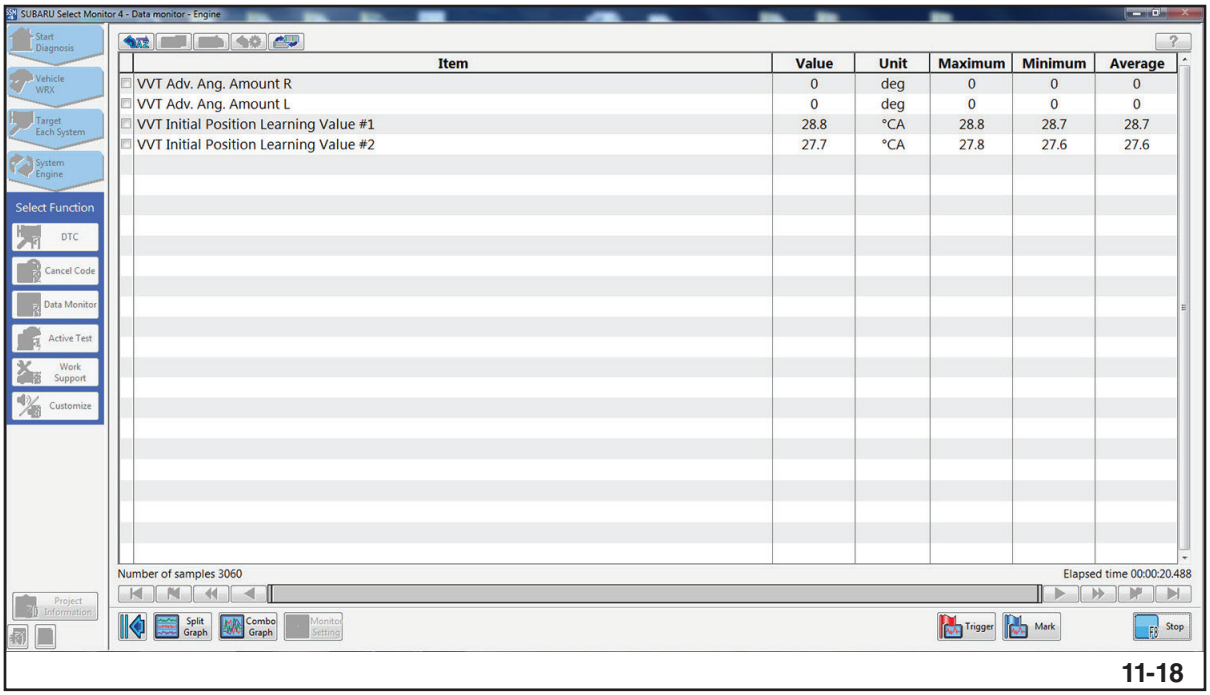
All Parameter Identification Displays (PIDs) with VVT in the title will now be displayed. (Keyword can be upper or lower case letters).



Begin Acquisition Of Keyword PIDs

Click the “Add All” button located at the top center of the display.

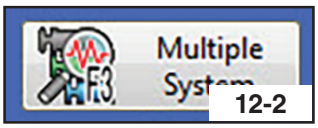
All of the VVT Parameter Identification Displays (PIDs) will now move to the right side of the display. Click “OK” on the lower right side to continue.



Recording Data

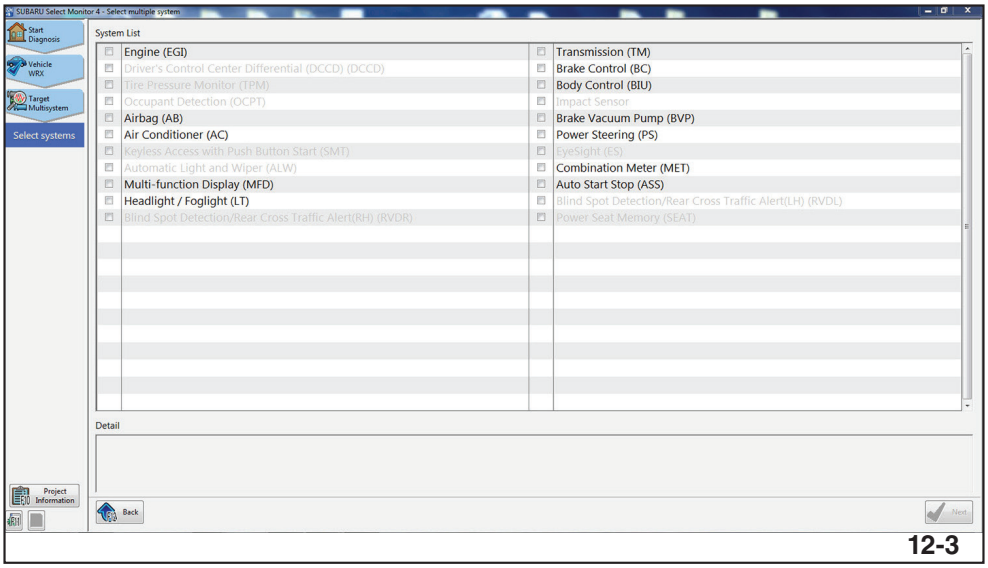
The SSM 4 will now begin recording the data.

F3 Multiple System



F3 Multiple System Icon

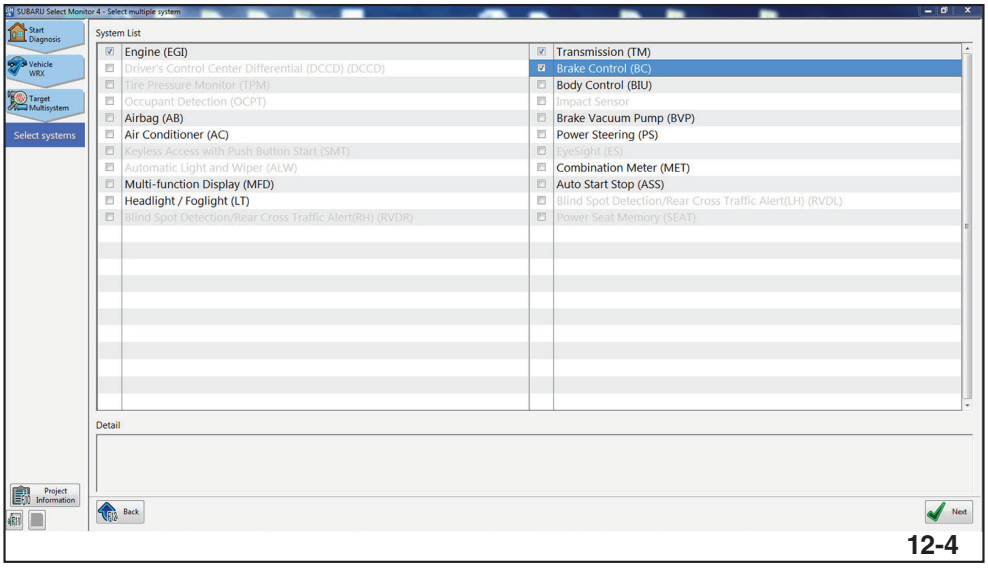
Clicking on “Multiple System” allows up to three systems to be checked simultaneously. The data from one system can intermingled with the others.



Multiple System Selection

Begin by clicking on the check box of the three systems to be checked.

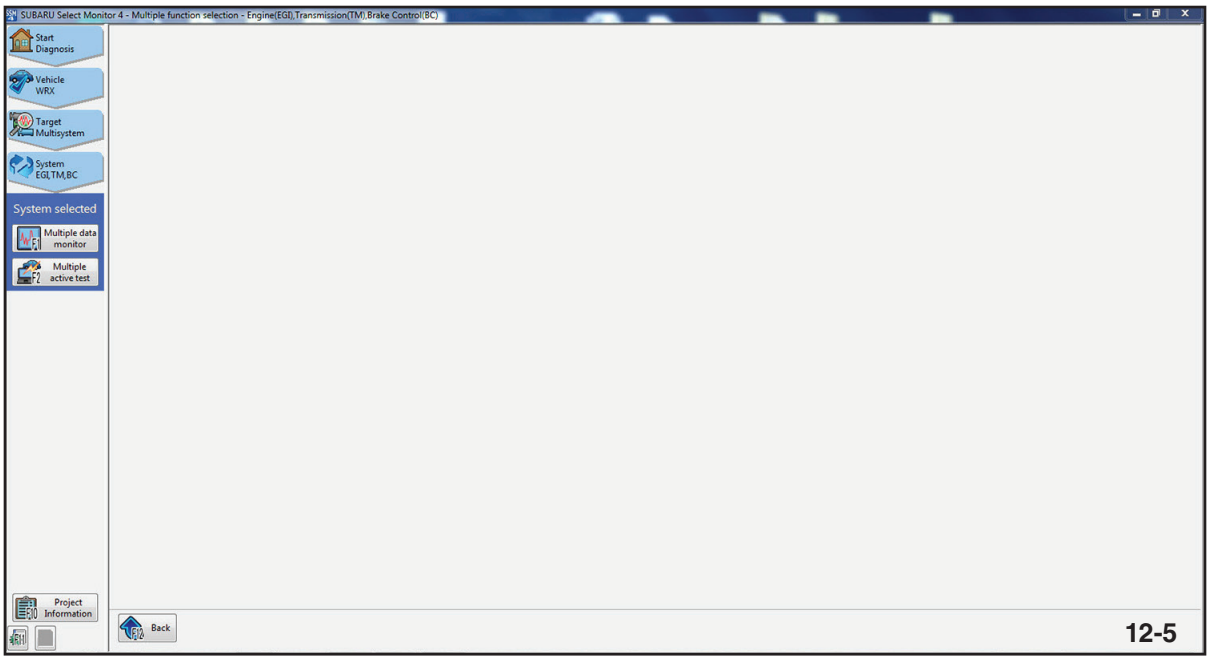
(The check box must be checked).



Multiple Systems Selected

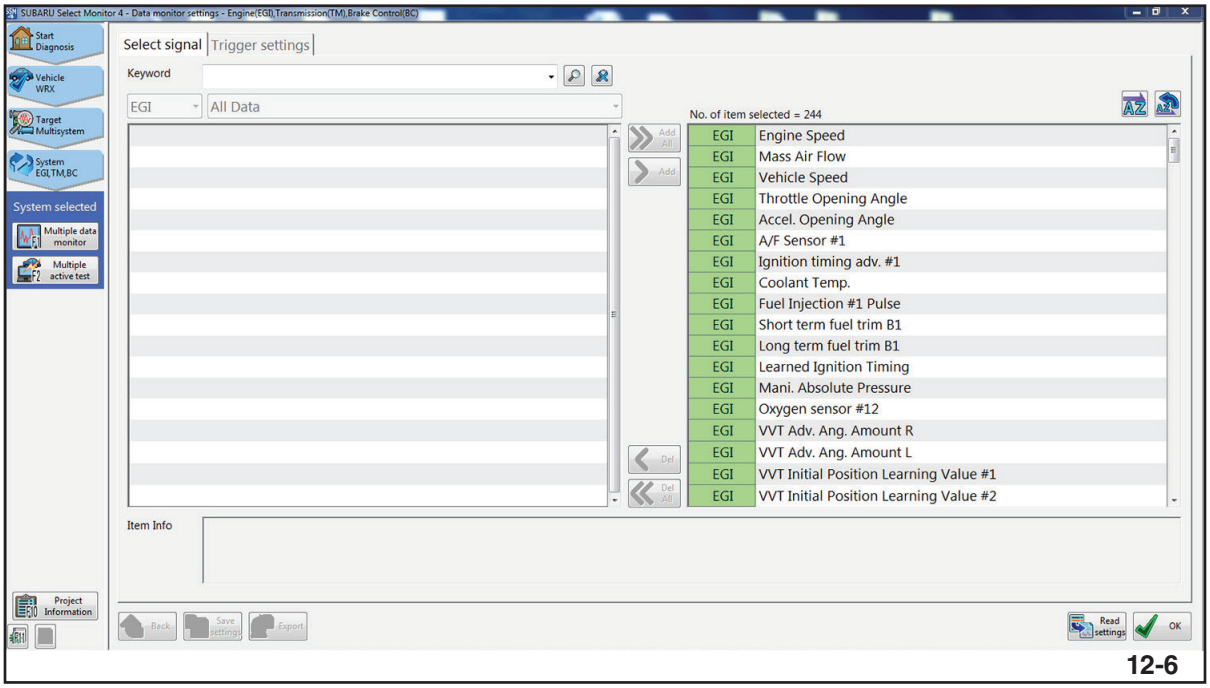
Click “Next”.

Click “Multiple Data Monitor”.



Data Monitor

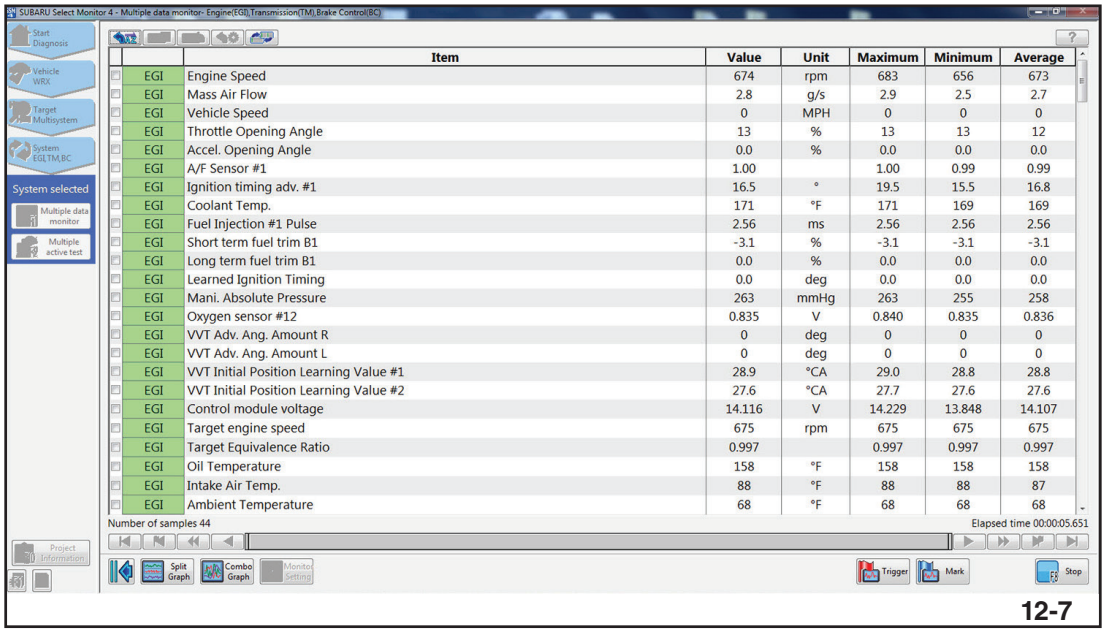
The Parameter Identification Displays (PIDs) from all three systems will be displayed on the right of the display. Scroll down the right column to view all Parameter Identification Displays (PIDs).



Multiple Systems OK

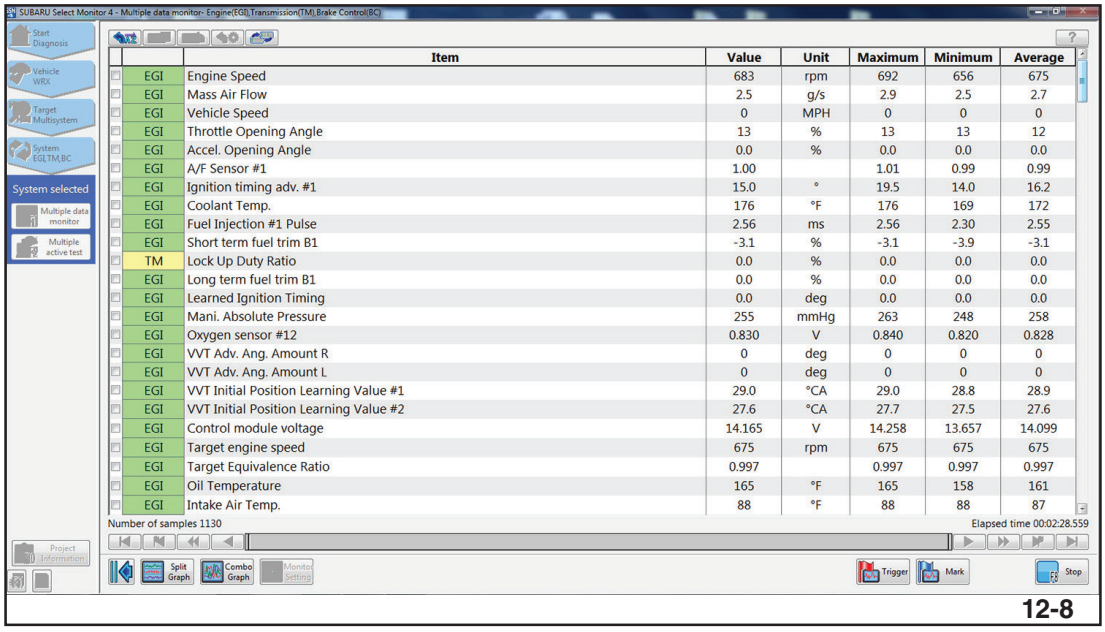
Click “OK” to begin data recording.

Click on a PID to activate the wheel (scrolling) control of the mouse.
Otherwise use the scroll control on the right edge of the display to monitor all PIDs.



Scroll Control

A PID from one system can be moved into another, but only as far as the currently displayed data. If the data needs to be moved further up or down the screen, the PID must be moved to the top or bottom of the display and the screen advanced to allow the PID to be moved further.

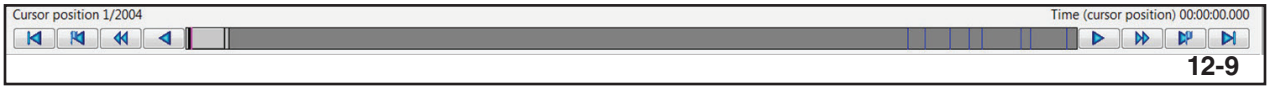


Initialize Order

Clicking on the "AZ" icon (Initialize Order), returns the PID to its normal position.

While the data is being recorded, the "Mark" icon can be used to place a mark in the data recording.

The positions of the mark or marks can be viewed in the Sampling Status Bar on the bottom edge of the display. "Marks" may also be entered using any number or letter key.

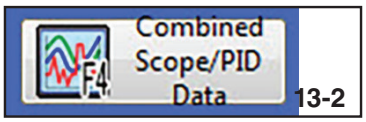


Marked Data Indicators

The controls for viewing the Marked data can be operated only after data acquisition has stopped.

The data can be viewed in Normal and Graph views. (Switching from Normal view to Graph views is allowed during data acquisition).

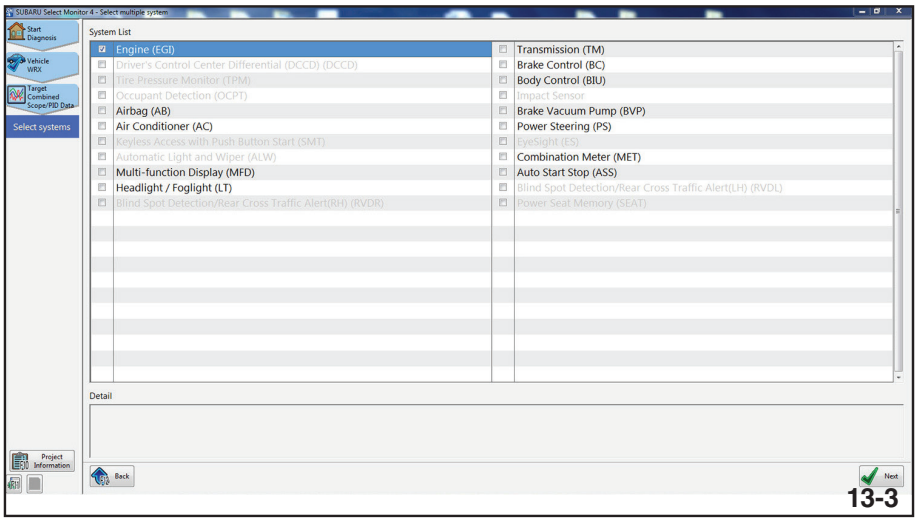
F4 Combined Scope PID Data



F4 Combined Scope PID Data Icon

"Combined Scope/PID Data" allows up to four channels of simultaneous voltage checks to be performed while viewing the data stream of a selected system.

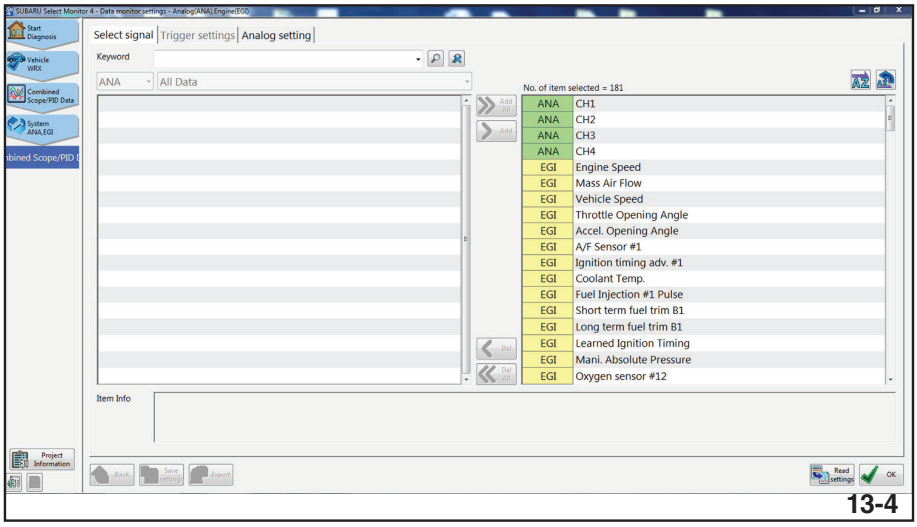
Place a check mark in the box next to system to be monitored.



Combined Scope PID Data System Selection

Click "Next" after selecting the system. Channel 1 through 4 of the DST-i oscilloscope will be displayed along with the Parameter Identification Displays (PIDs).

Note: The DST-i is shipped with leads for channels 1 and 2 only.

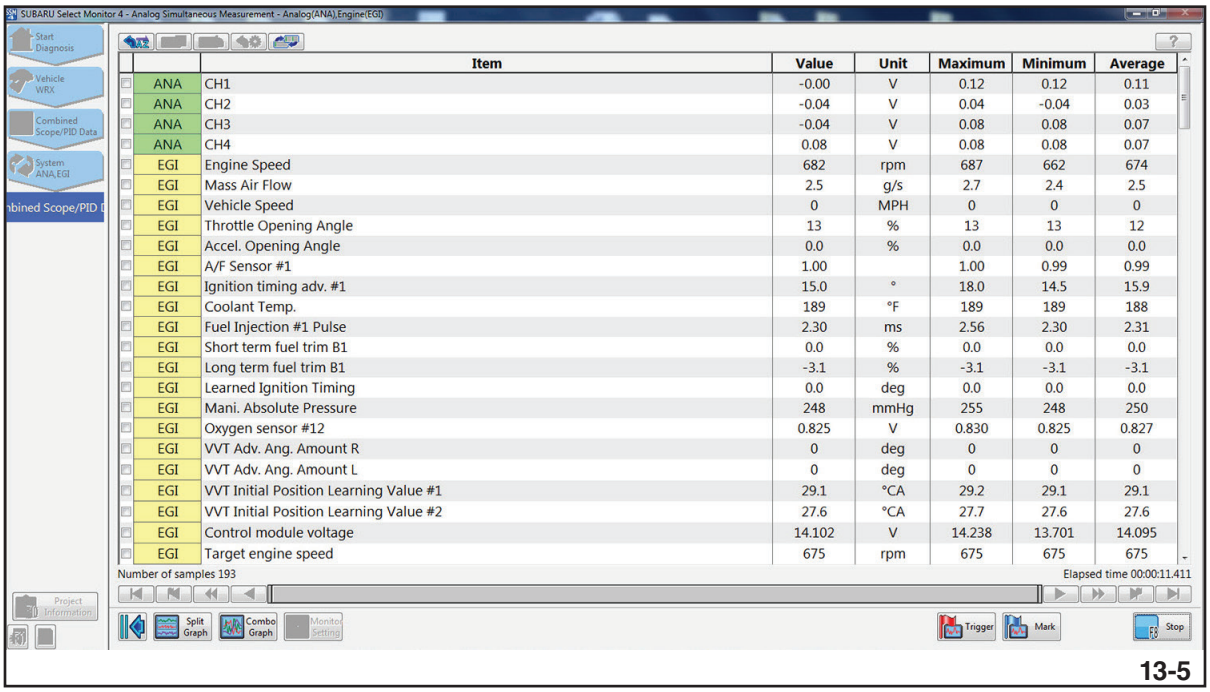


ANA And Engine System

Connect one or more channels to the desired circuits and click "Ok" to begin data sampling.

The ANA channels of the “Combined Scope/PID Data” will typically display a small cycling voltage value before connecting the leads to a voltage source. This condition should be considered a normal operating characteristic and must be considered when evaluating the recorded ANA channel(s) input.

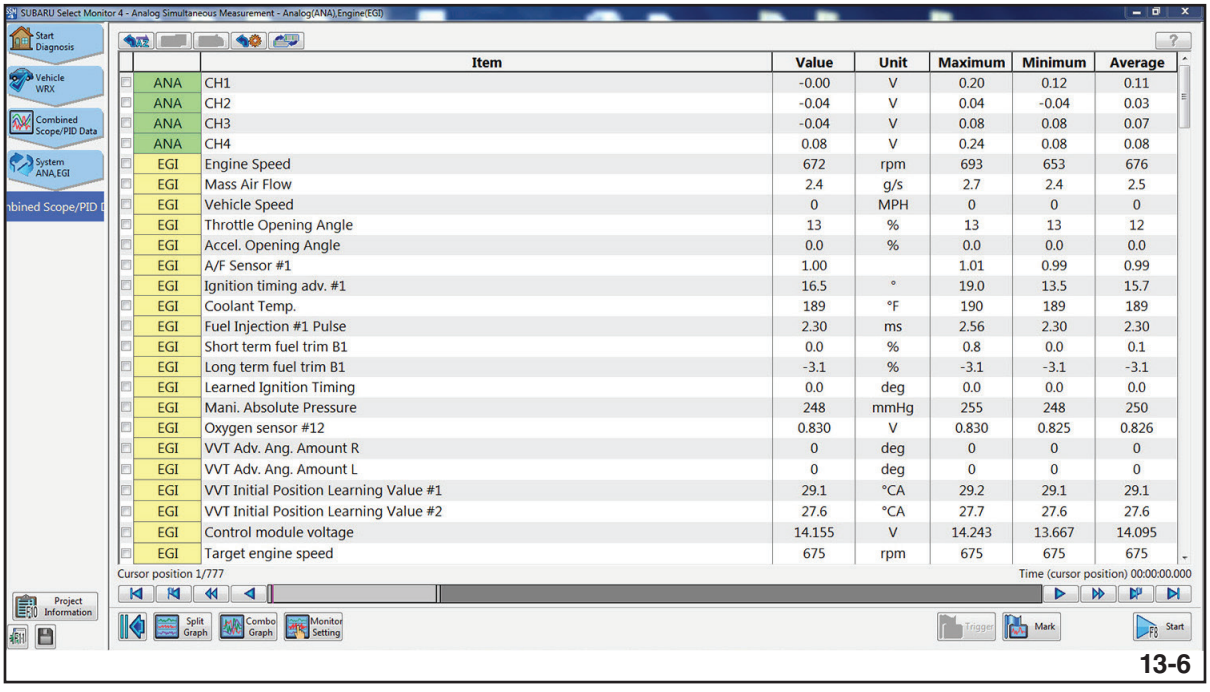
Click on “Stop” to hold the data acquisition.



	Item	Value	Unit	Maximum	Minimum	Average
ANA	CH1	-0.00	V	0.12	0.12	0.11
ANA	CH2	-0.04	V	0.04	-0.04	0.03
ANA	CH3	-0.04	V	0.08	0.08	0.07
ANA	CH4	0.08	V	0.08	0.08	0.07
EGI	Engine Speed	682	rpm	687	662	674
EGI	Mass Air Flow	2.5	g/s	2.7	2.4	2.5
EGI	Vehicle Speed	0	MPH	0	0	0
EGI	Throttle Opening Angle	13	%	13	13	12
EGI	Accel. Opening Angle	0.0	%	0.0	0.0	0.0
EGI	A/F Sensor #1	1.00		1.00	0.99	0.99
EGI	Ignition timing adv. #1	15.0	°	18.0	14.5	15.9
EGI	Coolant Temp.	189	°F	189	189	188
EGI	Fuel Injection #1 Pulse	2.30	ms	2.56	2.30	2.31
EGI	Short term fuel trim B1	0.0	%	0.0	0.0	0.0
EGI	Long term fuel trim B1	-3.1	%	-3.1	-3.1	-3.1
EGI	Learned Ignition Timing	0.0	deg	0.0	0.0	0.0
EGI	Mani. Absolute Pressure	248	mmHg	255	248	250
EGI	Oxygen sensor #12	0.825	V	0.830	0.825	0.827
EGI	VVT Adv. Ang. Amount R	0	deg	0	0	0
EGI	VVT Adv. Ang. Amount L	0	deg	0	0	0
EGI	VVT Initial Position Learning Value #1	29.1	°CA	29.2	29.1	29.1
EGI	VVT Initial Position Learning Value #2	27.6	°CA	27.7	27.6	27.6
EGI	Control module voltage	14.102	V	14.238	13.701	14.095
EGI	Target engine speed	675	rpm	675	675	675

ANA And Engine Data

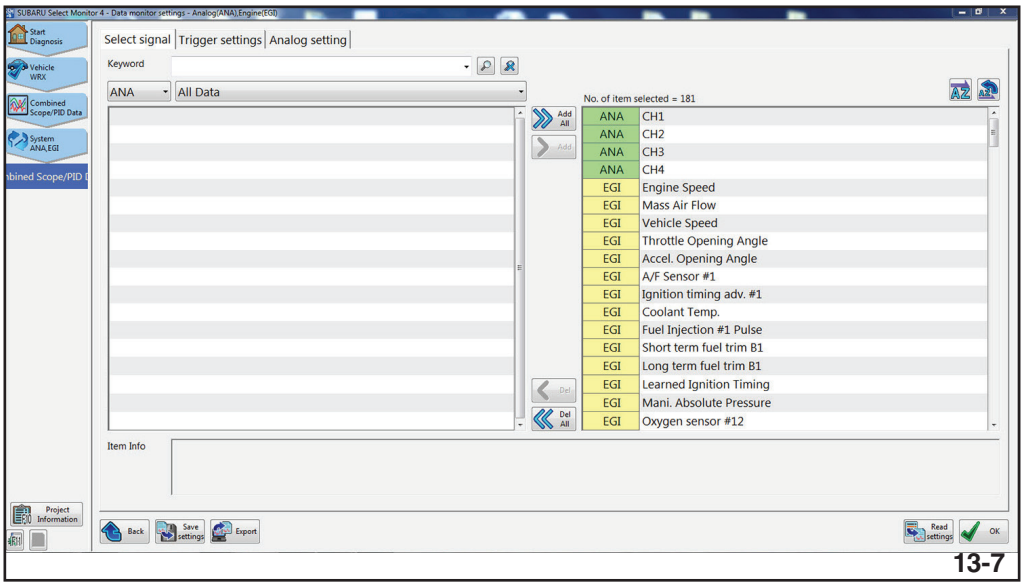
Click on “Monitor Setting” to adjust the voltage scale.



	Item	Value	Unit	Maximum	Minimum	Average
ANA	CH1	-0.00	V	0.20	0.12	0.11
ANA	CH2	-0.04	V	0.04	-0.04	0.03
ANA	CH3	-0.04	V	0.08	0.08	0.07
ANA	CH4	0.08	V	0.24	0.08	0.08
EGI	Engine Speed	672	rpm	693	653	676
EGI	Mass Air Flow	2.4	g/s	2.7	2.4	2.5
EGI	Vehicle Speed	0	MPH	0	0	0
EGI	Throttle Opening Angle	13	%	13	13	12
EGI	Accel. Opening Angle	0.0	%	0.0	0.0	0.0
EGI	A/F Sensor #1	1.00		1.01	0.99	0.99
EGI	Ignition timing adv. #1	16.5	°	19.0	13.5	15.7
EGI	Coolant Temp.	189	°F	190	189	189
EGI	Fuel Injection #1 Pulse	2.30	ms	2.56	2.30	2.30
EGI	Short term fuel trim B1	0.0	%	0.8	0.0	0.1
EGI	Long term fuel trim B1	-3.1	%	-3.1	-3.1	-3.1
EGI	Learned Ignition Timing	0.0	deg	0.0	0.0	0.0
EGI	Mani. Absolute Pressure	248	mmHg	255	248	250
EGI	Oxygen sensor #12	0.830	V	0.830	0.825	0.826
EGI	VVT Adv. Ang. Amount R	0	deg	0	0	0
EGI	VVT Adv. Ang. Amount L	0	deg	0	0	0
EGI	VVT Initial Position Learning Value #1	29.1	°CA	29.2	29.1	29.1
EGI	VVT Initial Position Learning Value #2	27.6	°CA	27.7	27.6	27.6
EGI	Control module voltage	14.155	V	14.243	13.667	14.095
EGI	Target engine speed	675	rpm	675	675	675

Monitor Setting

Click on “Analog setting” to access the adjustment display.

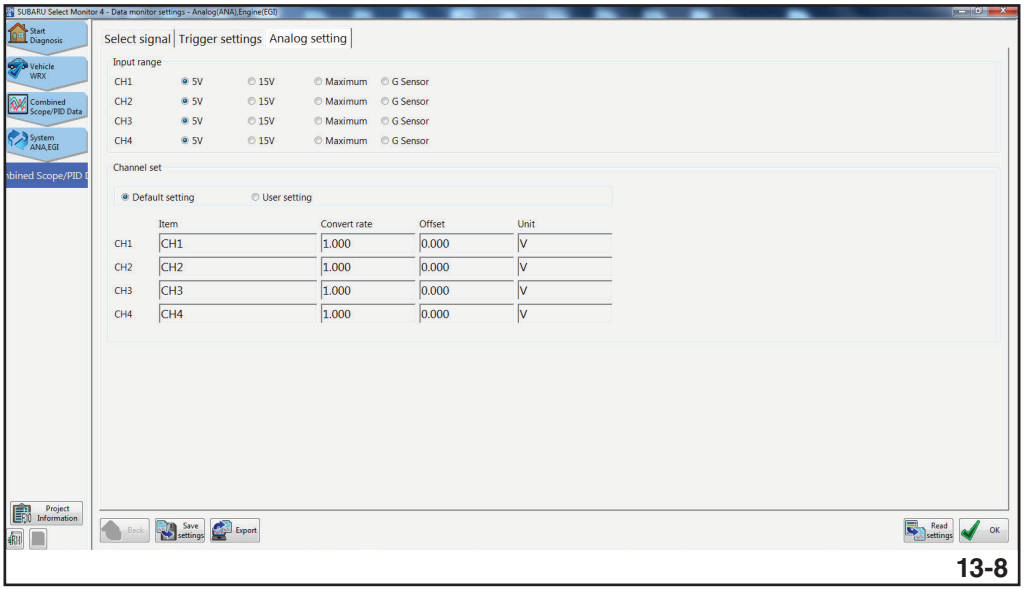


Analog Setting

Select the voltage scale that is the closest to the operating voltage range connecting to each channel. Click “Ok” to use these settings.

Note: Check the displayed voltage for each ANA channel before connecting to the signal to be monitored.

Note: Adjustment of the “Offset” by selecting “User Settings” will add to or subtract from the true voltage, and will not eliminate the small cycling voltage that is displayed when using the ANA channels.

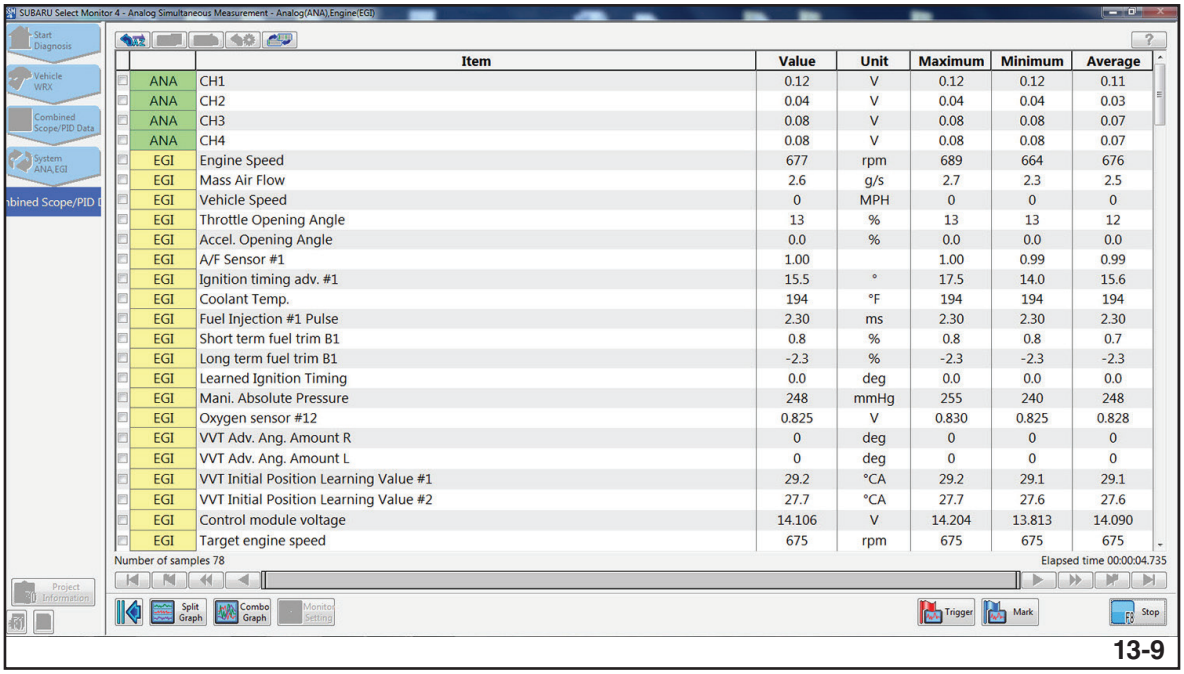


Input Range And User Settings

The new adjusted values will remain after exiting the SSM 4. Checking the adjusted values before using the ANA channels is a good practice to prevent misinterpretation of the voltage readings.

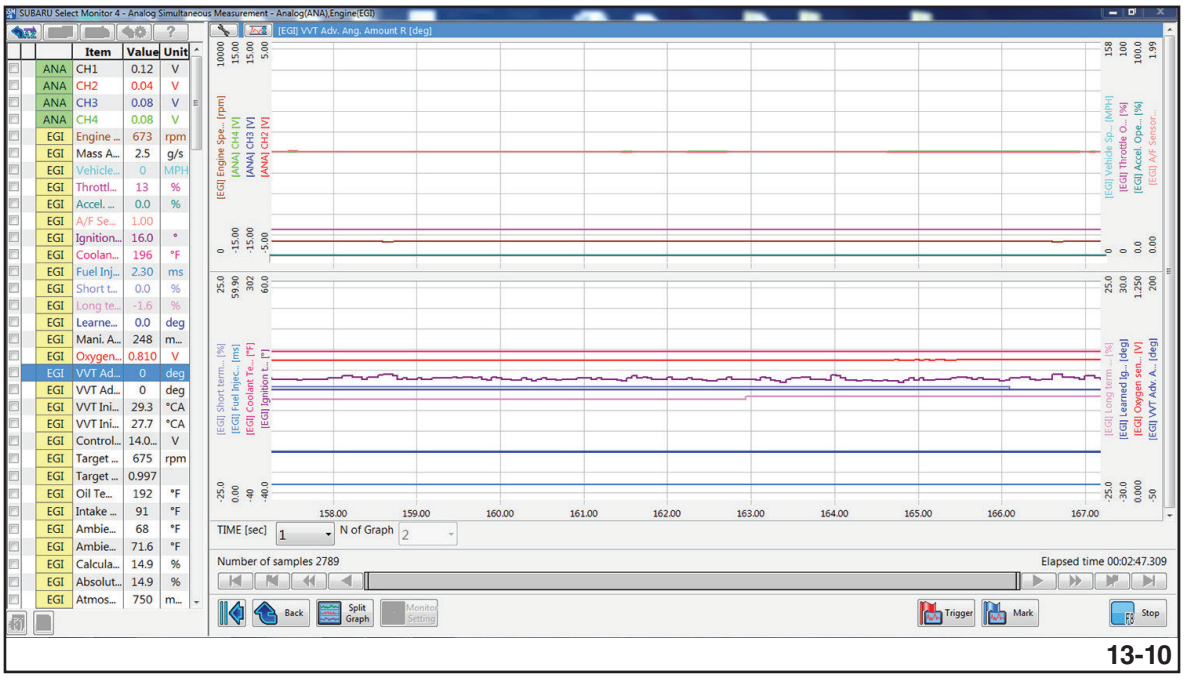
Subaru Select Monitor Diagnostic Systems

The data can be viewed in “List Display”, “Split Graph Display”, or “Combo Graph Display”. These options are also available for all systems and diagnostics.



	Item	Value	Unit	Maximum	Minimum	Average
ANA	CH1	0.12	V	0.12	0.12	0.11
ANA	CH2	0.04	V	0.04	0.04	0.03
ANA	CH3	0.08	V	0.08	0.08	0.07
ANA	CH4	0.08	V	0.08	0.08	0.07
EGI	Engine Speed	677	rpm	689	664	676
EGI	Mass Air Flow	2.6	g/s	2.7	2.3	2.5
EGI	Vehicle Speed	0	MPH	0	0	0
EGI	Throttle Opening Angle	13	%	13	13	12
EGI	Accel. Opening Angle	0.0	%	0.0	0.0	0.0
EGI	A/F Sensor #1	1.00		1.00	0.99	0.99
EGI	Ignition timing adv. #1	15.5	°	17.5	14.0	15.6
EGI	Coolant Temp.	194	°F	194	194	194
EGI	Fuel Injection #1 Pulse	2.30	ms	2.30	2.30	2.30
EGI	Short term fuel trim B1	0.8	%	0.8	0.8	0.7
EGI	Long term fuel trim B1	-2.3	%	-2.3	-2.3	-2.3
EGI	Learned Ignition Timing	0.0	deg	0.0	0.0	0.0
EGI	Mani. Absolute Pressure	248	mmHg	255	240	248
EGI	Oxygen sensor #12	0.825	V	0.830	0.825	0.828
EGI	VVT Adv. Ang. Amount R	0	deg	0	0	0
EGI	VVT Adv. Ang. Amount L	0	deg	0	0	0
EGI	VVT Initial Position Learning Value #1	29.2	°CA	29.2	29.1	29.1
EGI	VVT Initial Position Learning Value #2	27.7	°CA	27.7	27.6	27.6
EGI	Control module voltage	14.106	V	14.204	13.813	14.090
EGI	Target engine speed	675	rpm	675	675	675

List Display

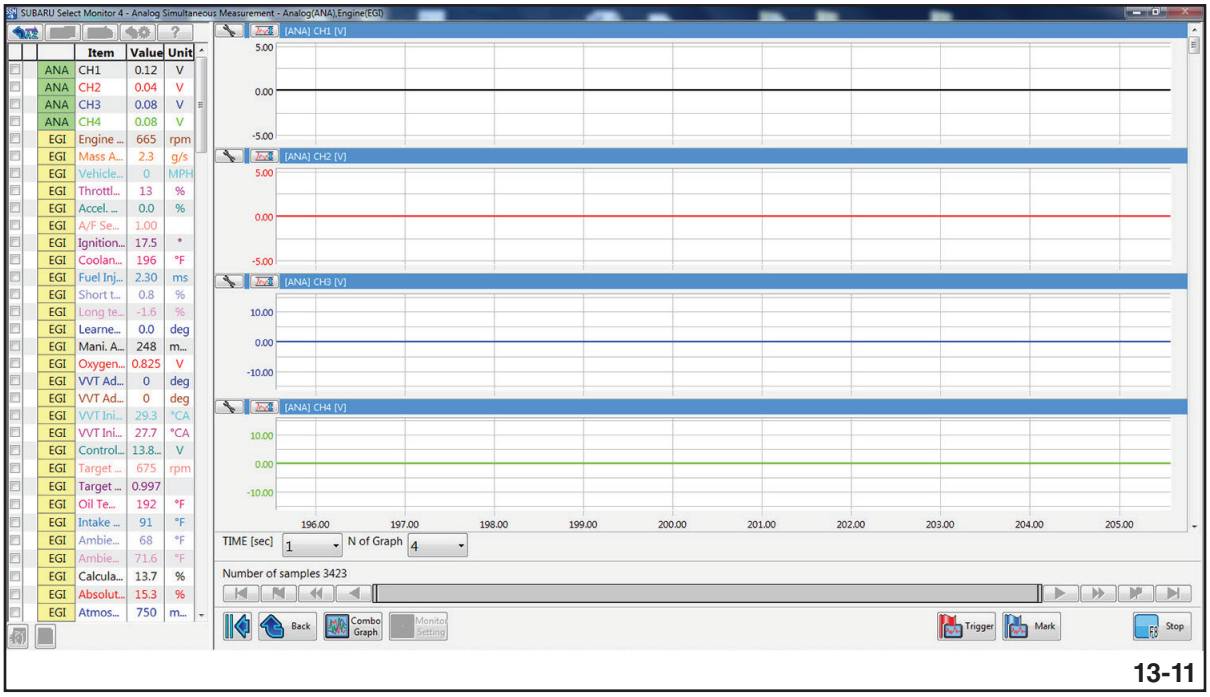


Combo Graph

The maximum number of PIDs in the Combo Graph display area is 8. Two graphs can be viewed simultaneously allowing for a total number of 16 PIDs to be viewed. Activate a PID to be viewed by double clicking on the PID. The color will change indicating that it is now on the graph.

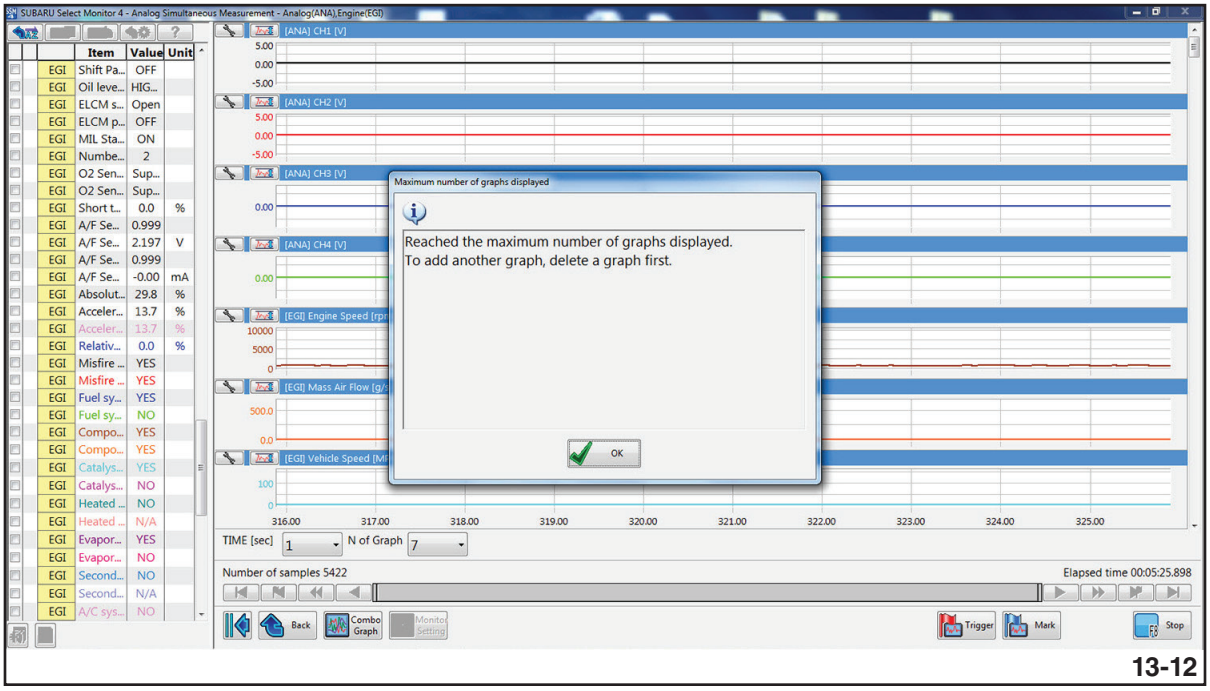
Note: A PIDs color is based from the set color of the graph line. Adjust the color of the graph line if the color of the PID becomes confusing.

The Split Graph PIDs are activated for viewing the same as the Combo Graph PIDs. Double click the PID to be viewed and it will change color to indicate it is on the graph.



Split Graph

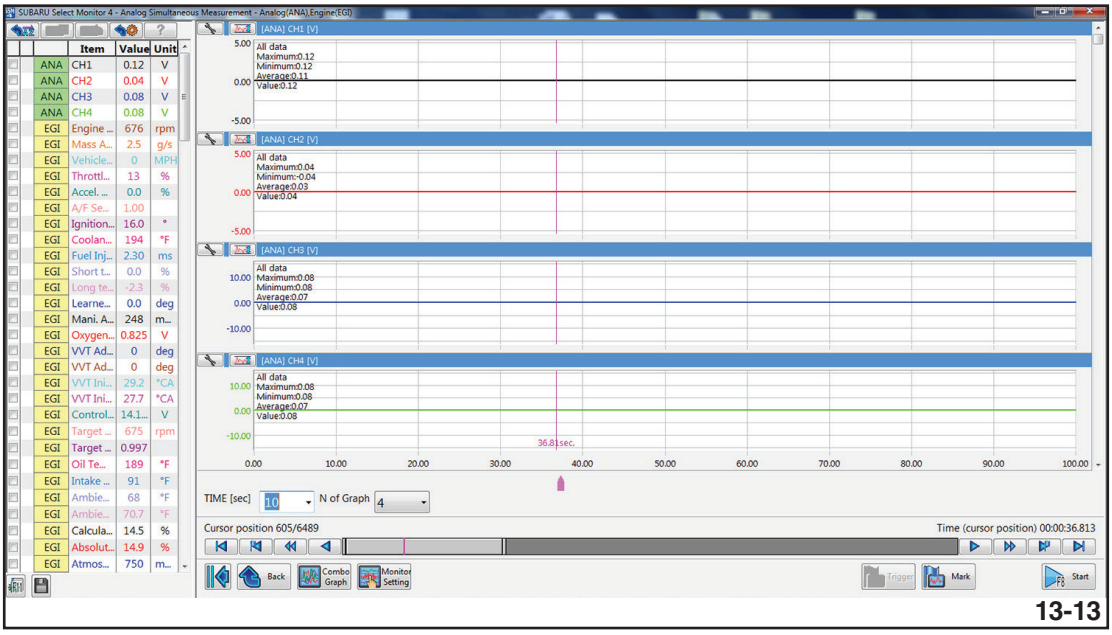
A maximum of 7 graphs can be viewed on the screen. A total of 150 PIDs can be selected at one time for Split Graph viewing.



Maximum Number Of Graphs Displayed

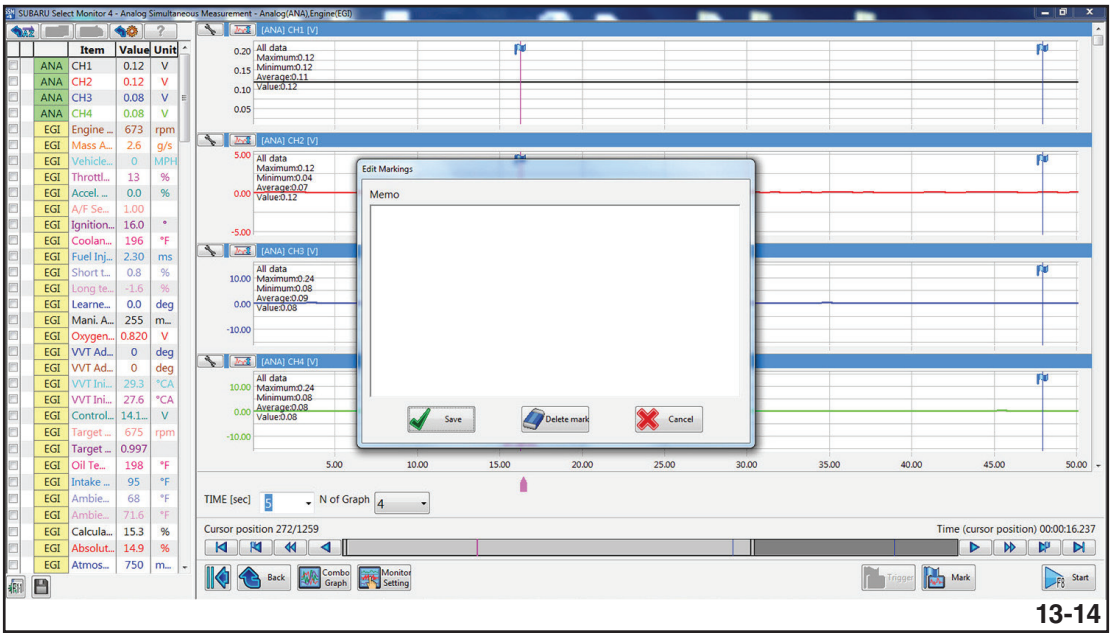
A dialogue box will be displayed if more than the maximum number of PIDs for graph viewing are selected.

The time base of the graph display can be adjusted from 1 to 60 seconds per division. The time control drop down menu can be used to adjust the time or the Sampling Status Bar can be used by compressing or expanding the Bar with the mouse cursor.



Graph Cursor And Sampling Status Bar

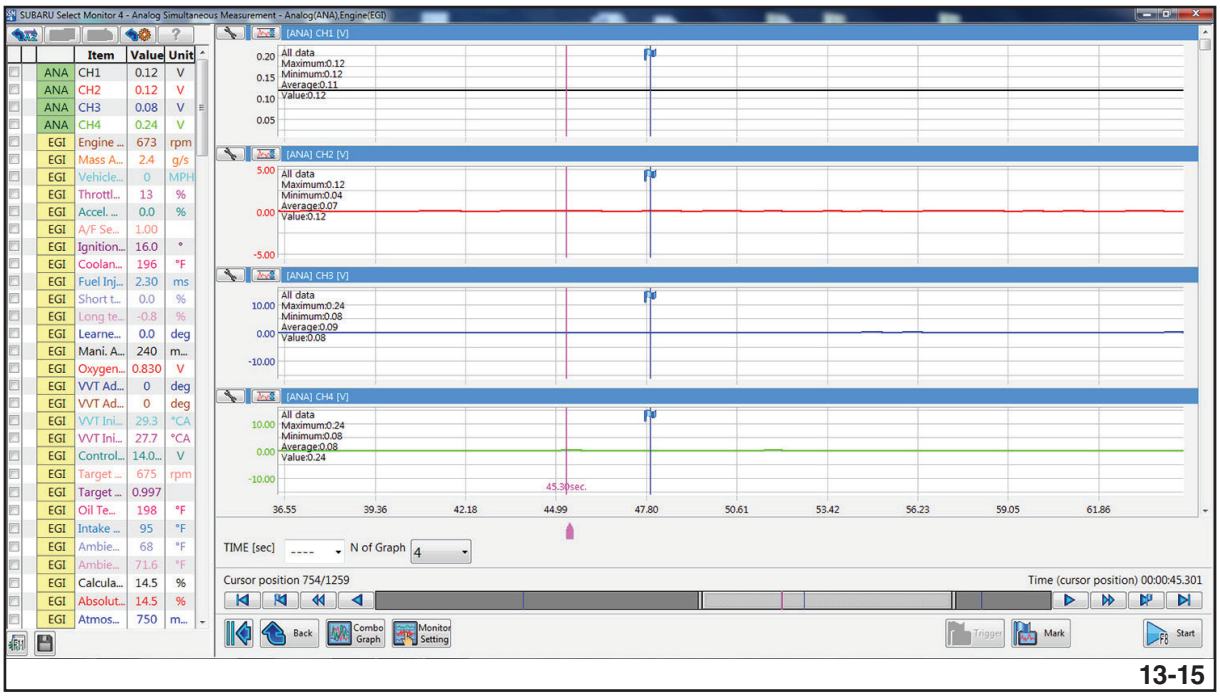
If marks were placed in the data, the number of marks and their locations will be displayed in the Sampling Status Bar. The flagged forward control on the lower right of the display can be used to advance to the next “Mark”. The flagged reverse control on the lower left of the display can be used to move back to a previous “Mark”.



Marked Data - Comments Box

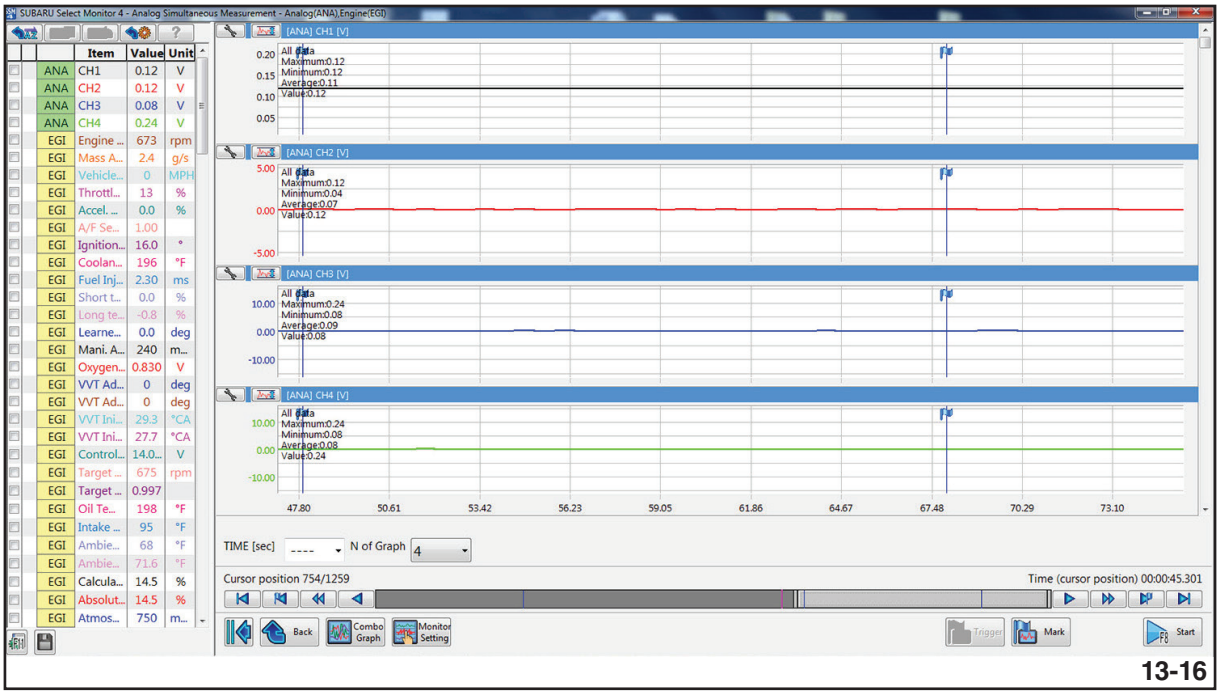
All marks can be edited for placement (removed or added), and comments for each “Mark” can be entered into a text box.

The graph cursor is moved using the mouse cursor.



Cursor

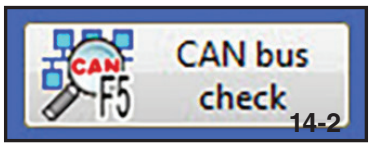
If the Sampling Status Bar is used to move the data beyond the display, which includes the graph cursor, the graph cursor cannot be accessed.



Cursor Off Screen

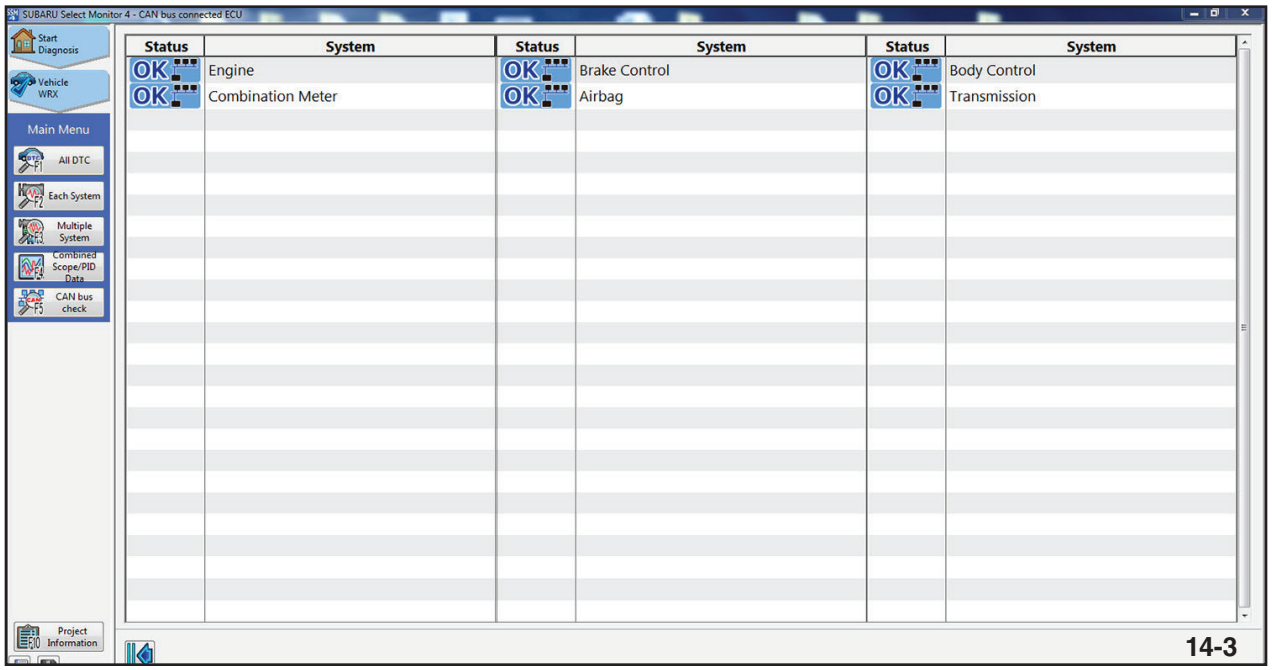
NOTES:

F5 CAN Bus Check



F5 CAN Bus Check Icon

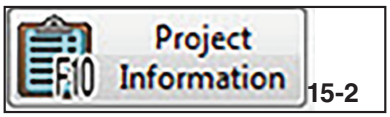
The “CAN bus check” provides a list of all systems that are connected to the CAN network of the vehicle. It does not provide any diagnostic information and will not indicate if a system is not communicating with the CAN network.



CAN Bus Check

NOTES:

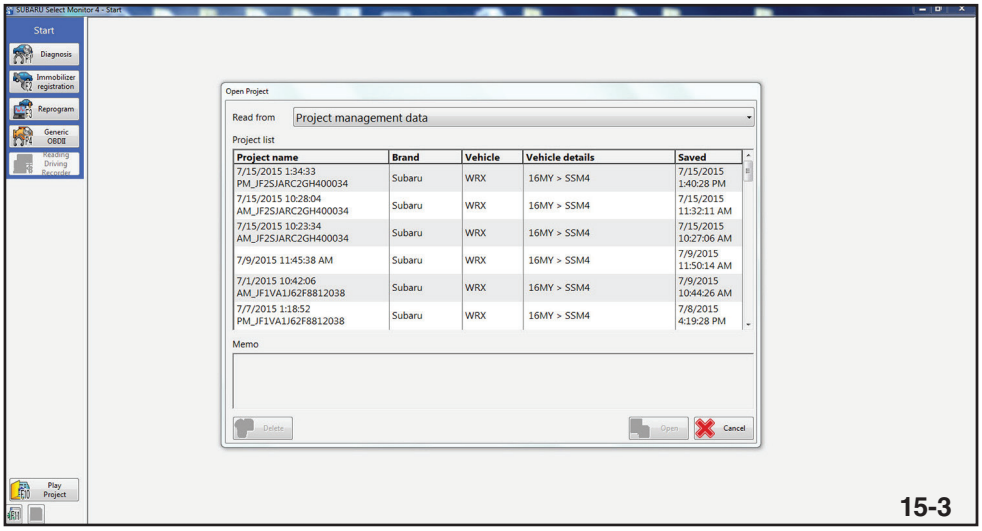
F10 Project Information



F10 Project Information

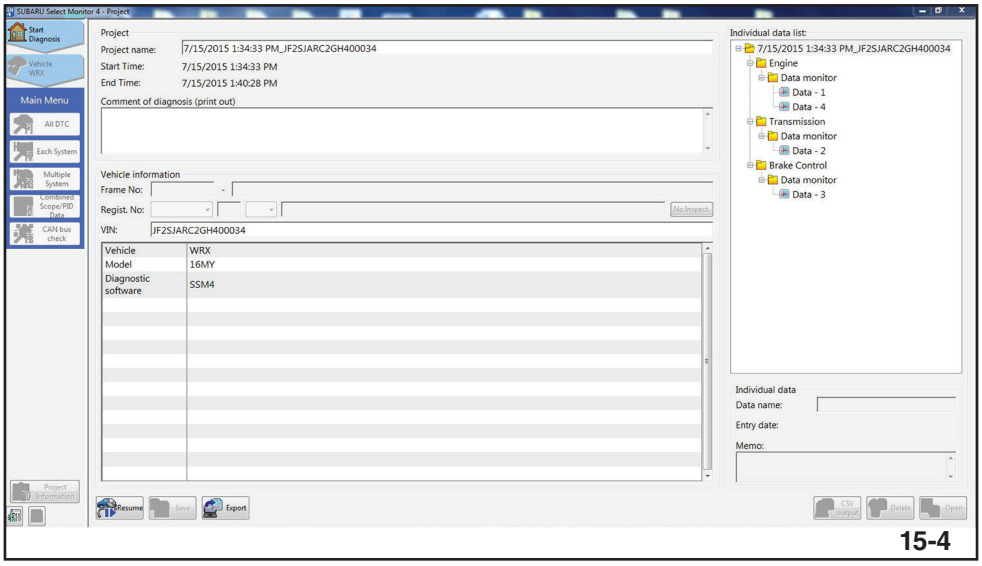
Stores and organizes all saved data files. Each VIN is assigned a folder and becomes a project (Project Information). Each saved file for that vehicle is stored in this folder, named by the date and time of day.

View the contents of the individual Project folders by clicking on the desired VIN.



Project Information

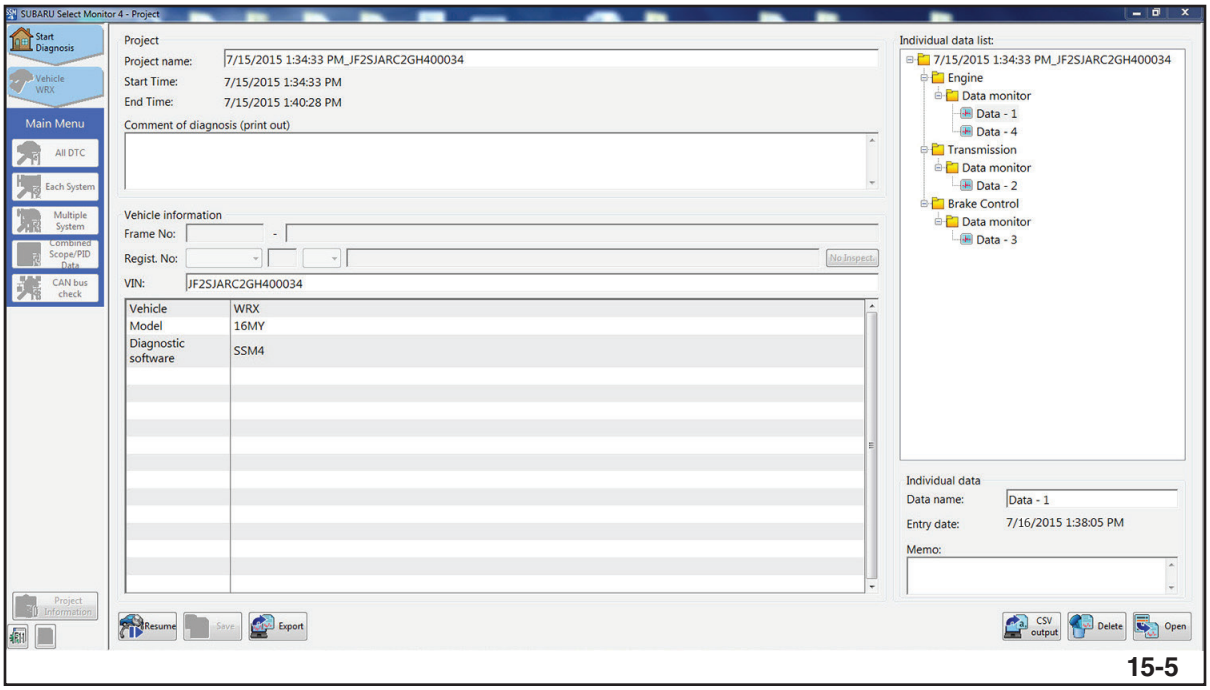
The VIN or Project folder contains all saved data for that vehicle, regardless of the date or system, until the folder is deleted. (Individual data list on top right side of display).



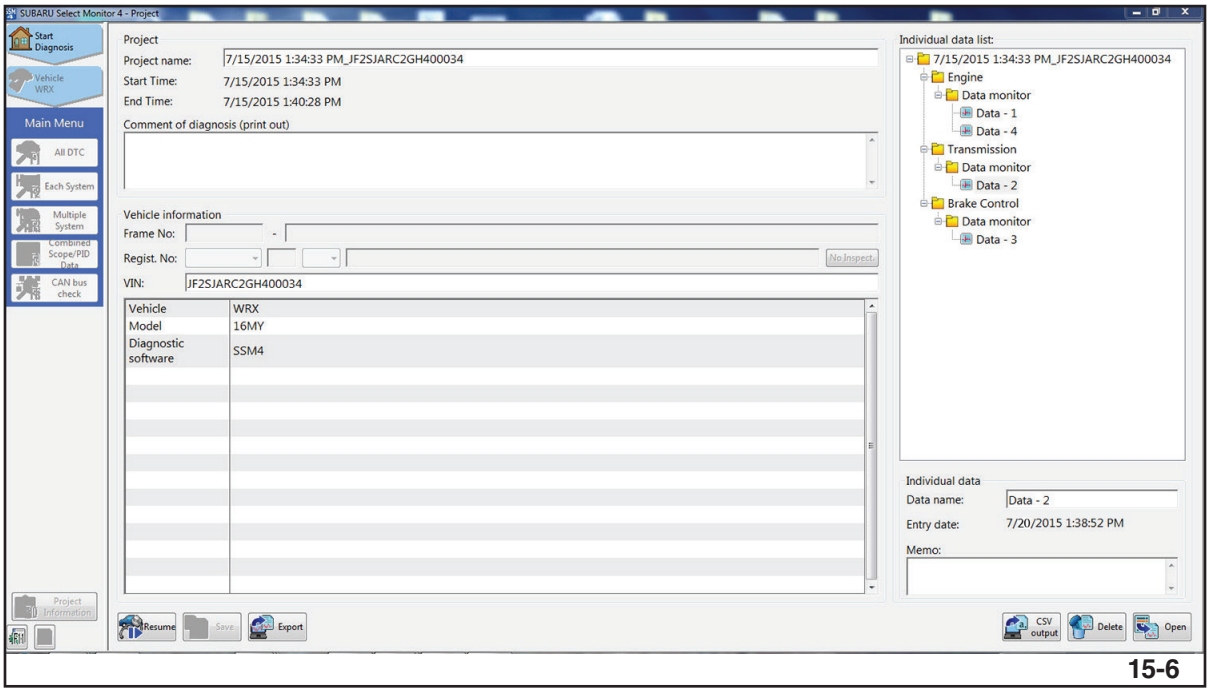
Project Files

The project folder will display the date the folder was created.

The individual files will display the date the file was created.

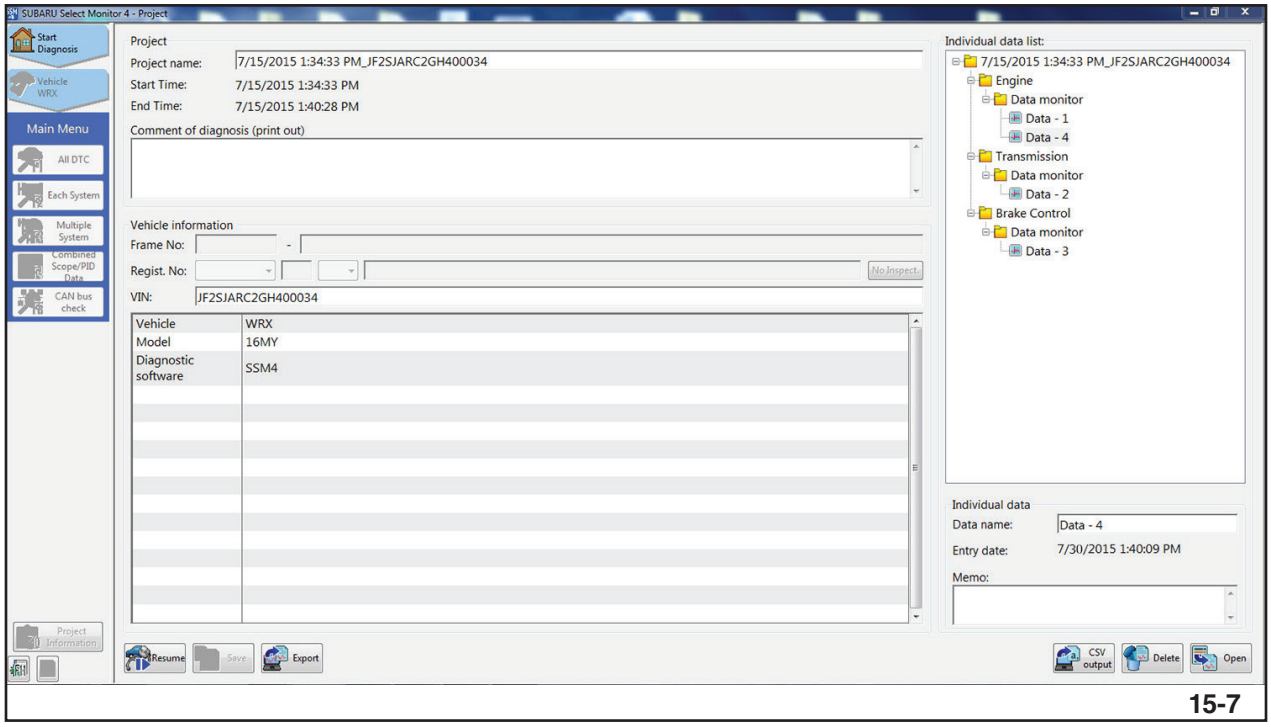


Data-1 7/16/2015



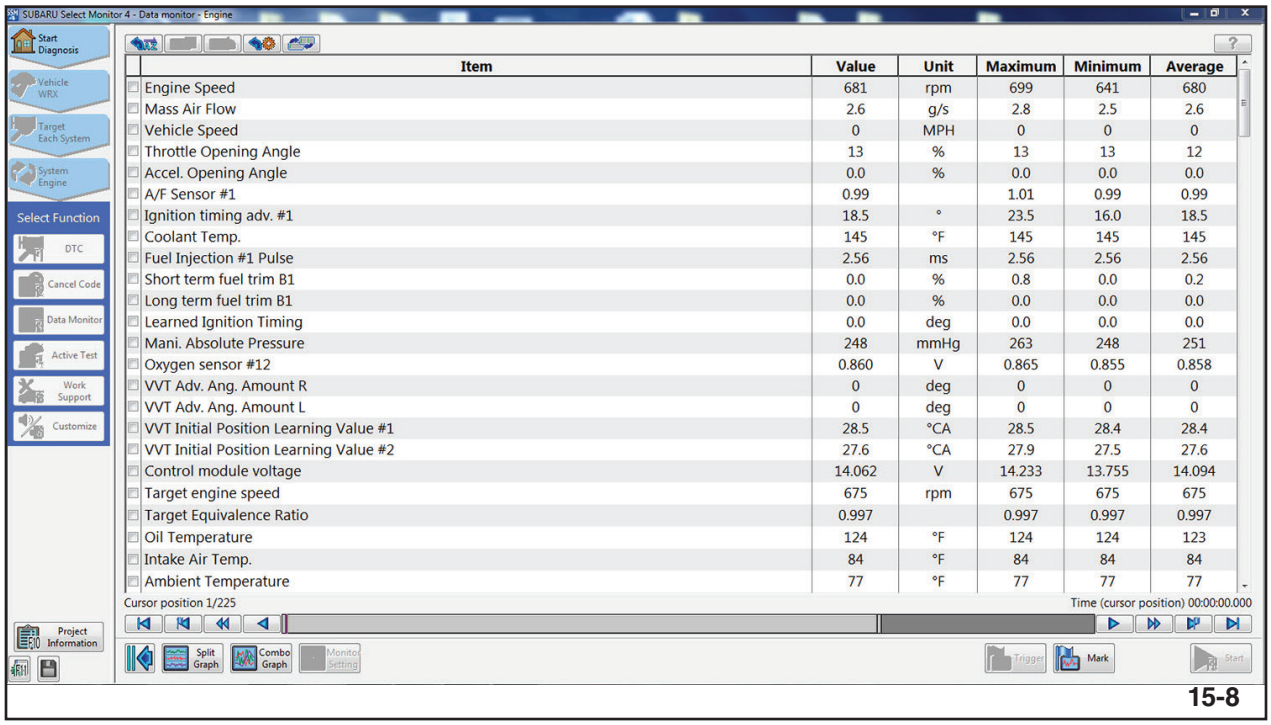
Data-2 7/20/2015

Click on the desired file. The date and time information, along with any previously saved comments, will be displayed.



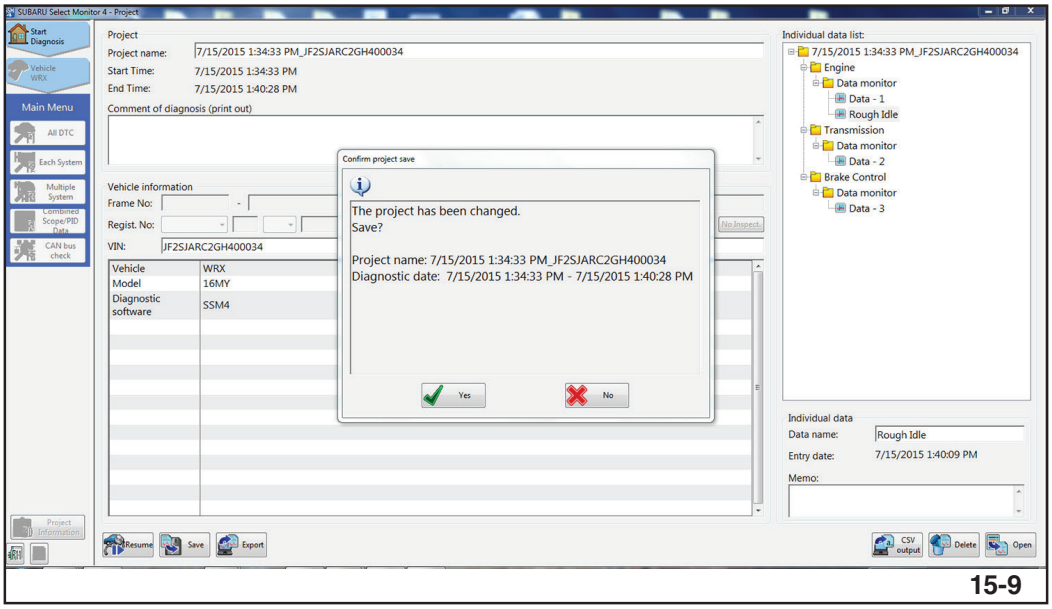
Data-3 7/30/2015

Click “Open” to view the data (bottom right corner).



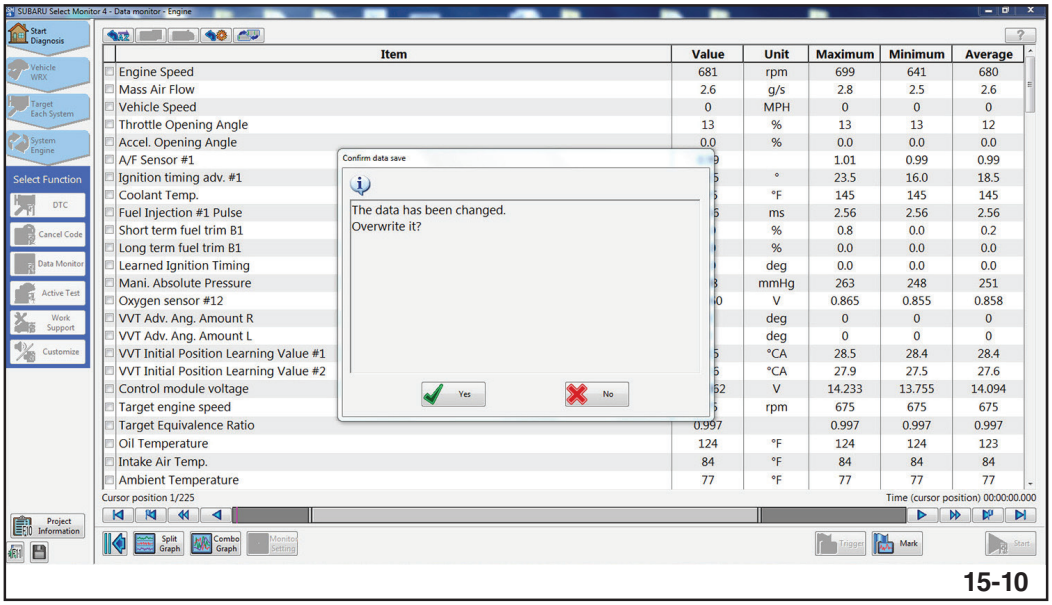
Opened File

The file can be renamed and saved. The new name will overwrite the previous date and time stamp, but the data will not be affected. Type the desired name of the file in the “Individual data” “Data name” box. As the new name is typed, it will appear on the Individual data list.



Renaming File

A dialogue box will be displayed after the name change when selecting another SSM 4 operation. Click “Yes” to save the new name.

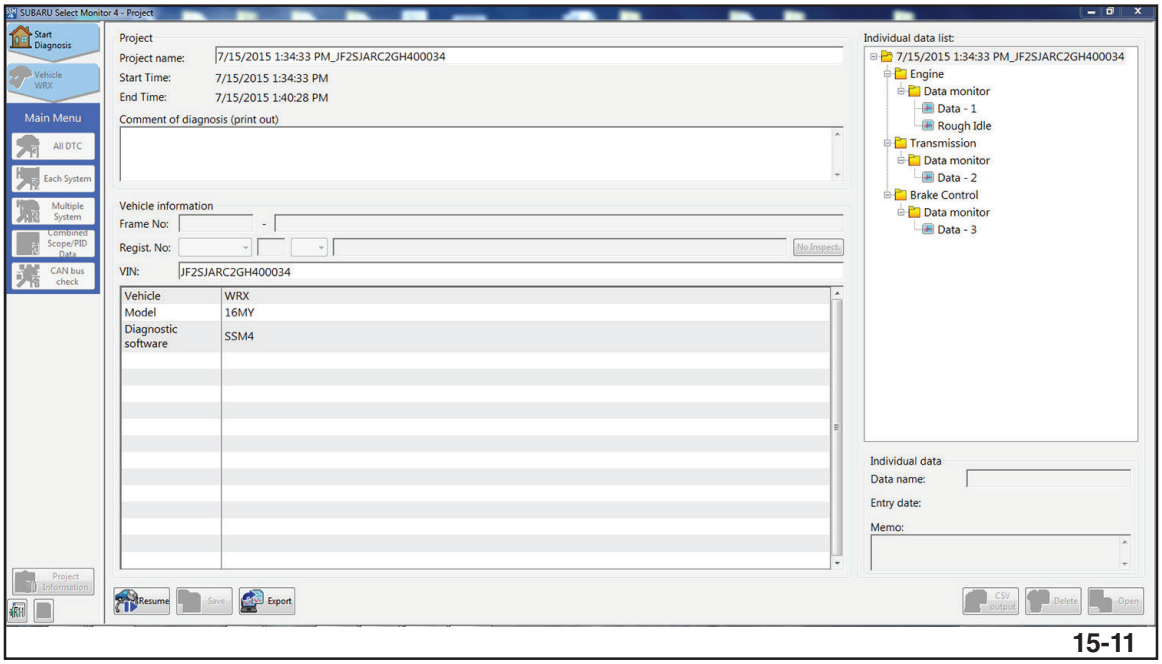


Confirm Data Save

If the Sampling Status Bar is manipulated during review of the saved data, a dialogue box will be displayed to ask if the data change should be saved. This is referring to the change in the time base setting and will not affect the saved data.

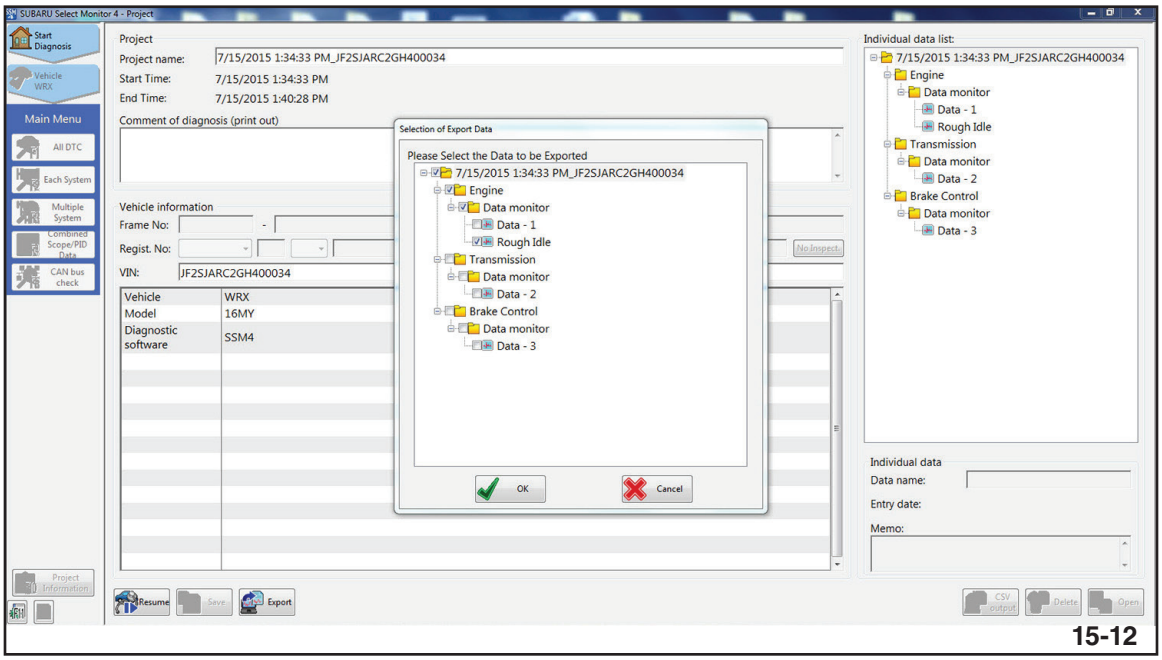
Note: The time base change is only affecting graph displays.

If emailing of an SSM 4 file becomes necessary, the email attachment size will have restrictions. The entire Project can be emailed if the size is not too large; however the best option is to email an individual data file.



Export

Select the Project that contains the individual data file and click “Export” (lower left of the display).



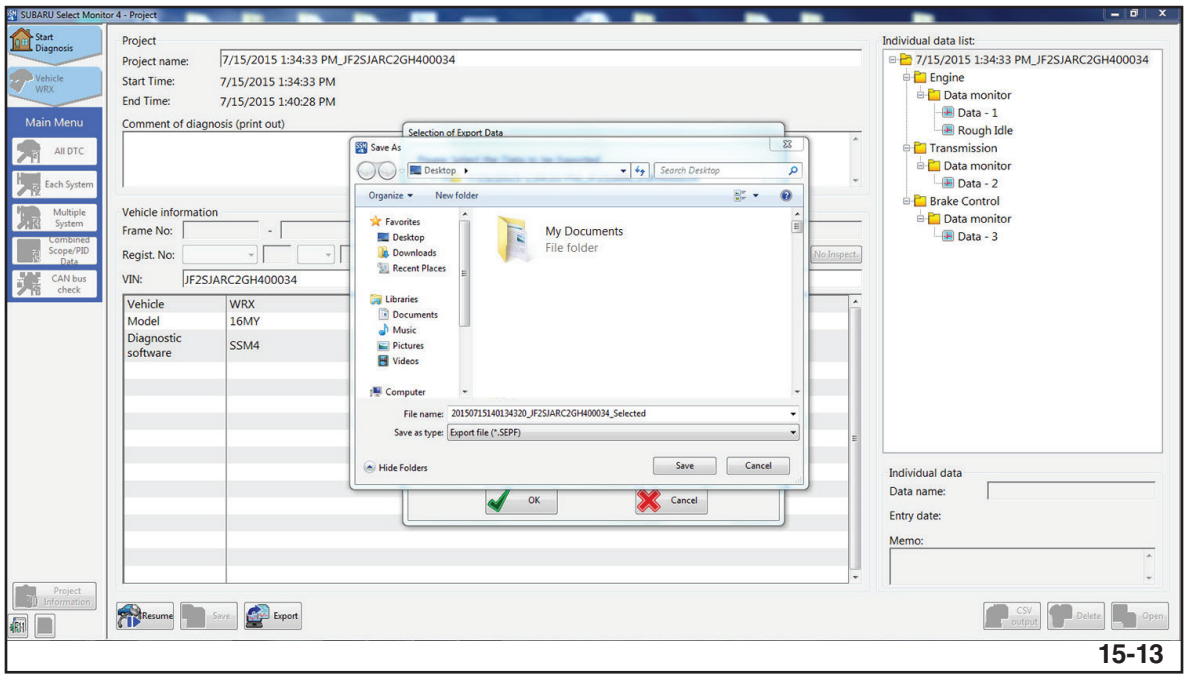
Export Selection

Uncheck the boxes of all files that do not need to be emailed or exported. Click “Ok” when finished.

Note: If the entire Project is being emailed, leave all boxes checked.

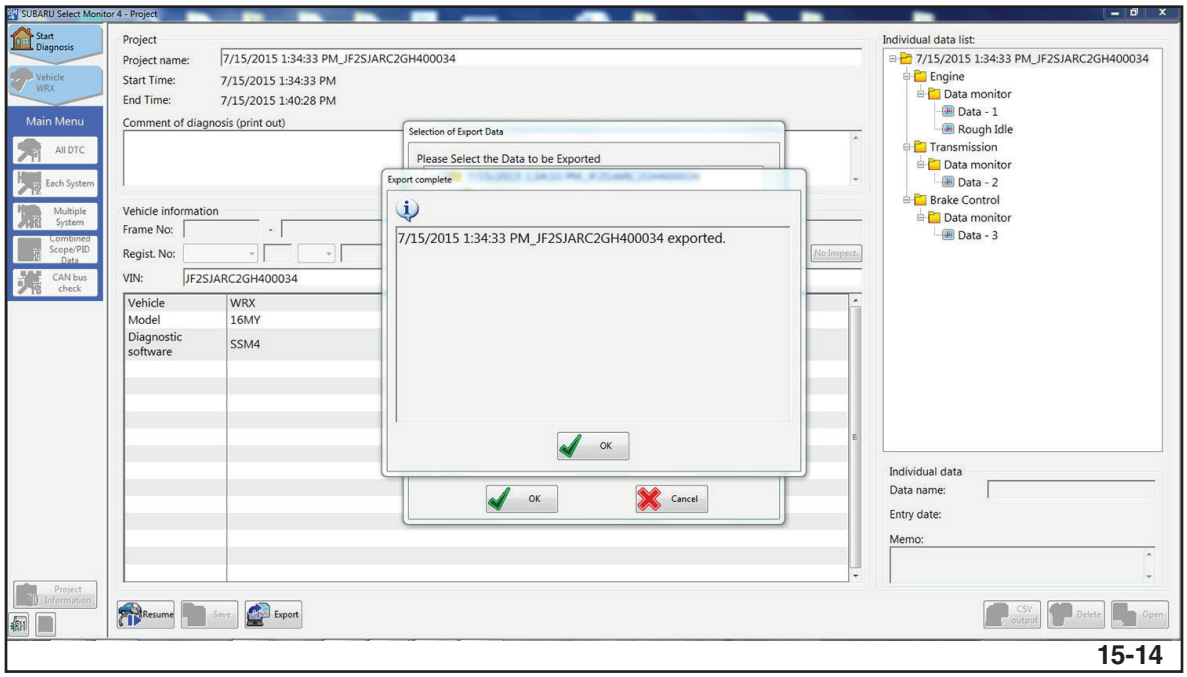
A dialogue box will be displayed to ask for the destination for the file. Select the destination and click “Save”.

Note: SSM 4 files will have a .SEPF extension.



Export Destination

A dialogue box will be displayed to indicate the file has been exported. When emailing the file, attach the file from the previously selected destination folder.



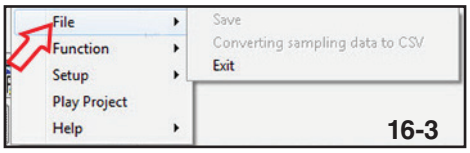
Export Confirmation

Note: A copy of the file will remain in the Project folder.

F11

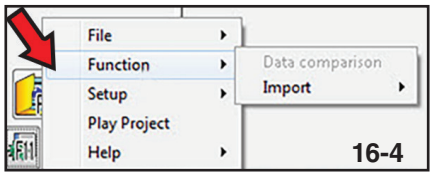
F11 Icon

Allows access to options that provide file management, SSM 4 DST-i set up, and version/ help. “File” allows data to be saved as a .SEPF file or .CSV data while on a diagnostic screen. An exit option is also provided that allows the user to exit the SSM 4 software.



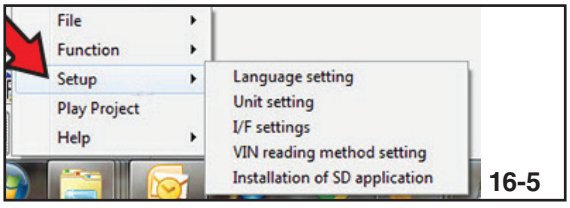
File

“Function” allows two sets of data to be compared to each other. This feature becomes active after working and saving data from a vehicle. Import allows files to be stored into the SSM 4 Project area.



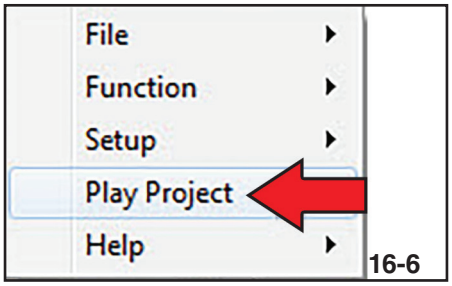
Function

“Setup” allows for changing of language, unit of measure, interface adjustment (DST-i), VIN detection, and updating of the SD card in the DST-i.



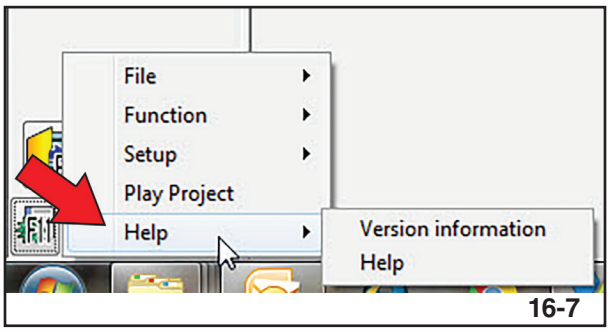
Setup

“Play Project” allows access to saved data files.



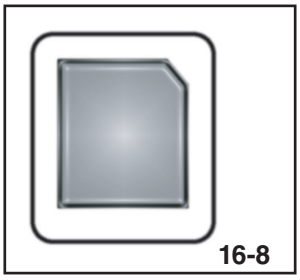
Play Project

"Help" provides software version identification and SSM 4 help in PDF format.



Help

Saves current data or changes to a file that is being reviewed.



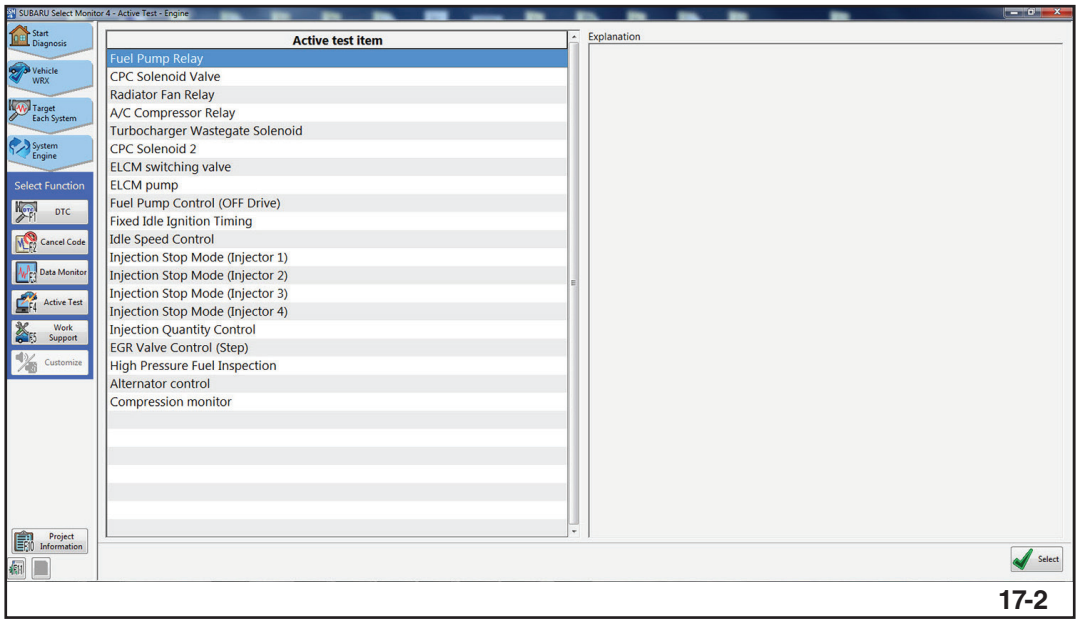
Save

Moves the SSM 4 back one screen.

Back

Active Test

Active test allows activation of solenoids and test operation modes of vehicle systems (model and system dependent).

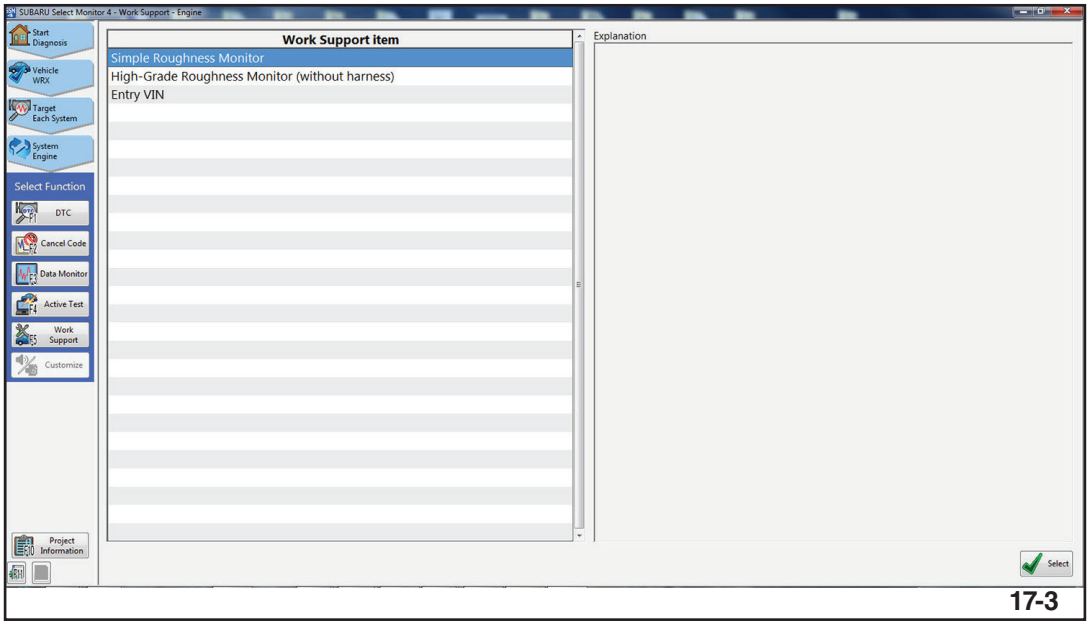


Active Test

The data for the system being tested can be monitored while the tests are being performed.

Work support

Work support provides additional tests and functions that are isolated to prevent unintentional execution (incorrect operation of these modes can create additional service work).



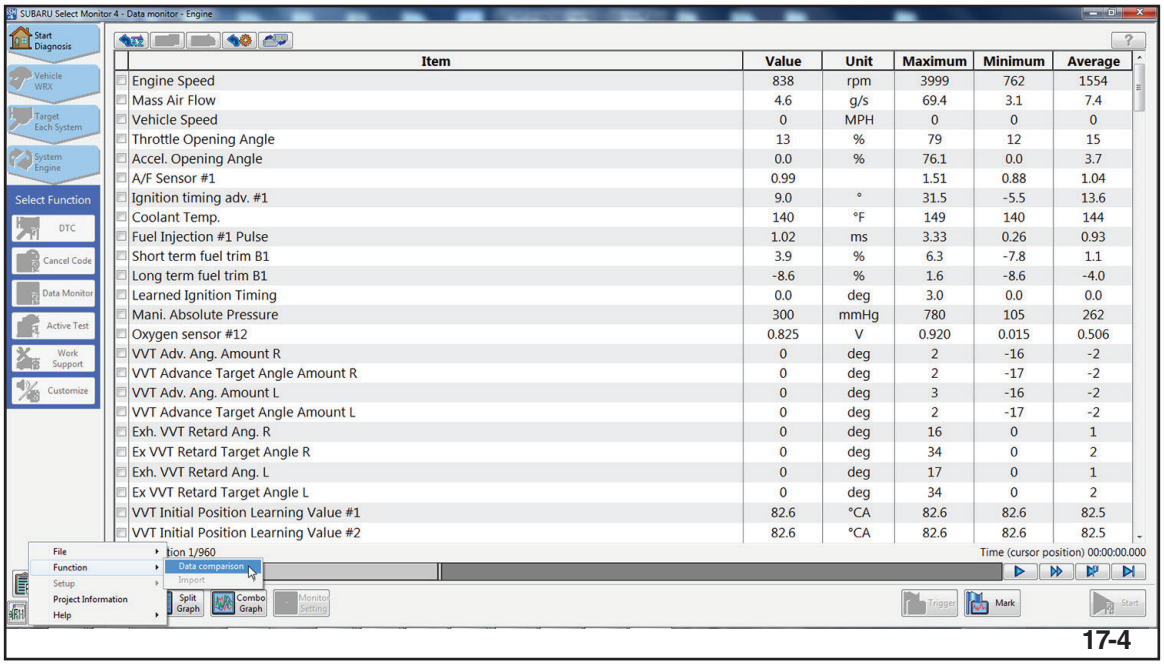
Work Support

Contents of Work Support are also model and system dependent.

Subaru Select Monitor Diagnostic Systems

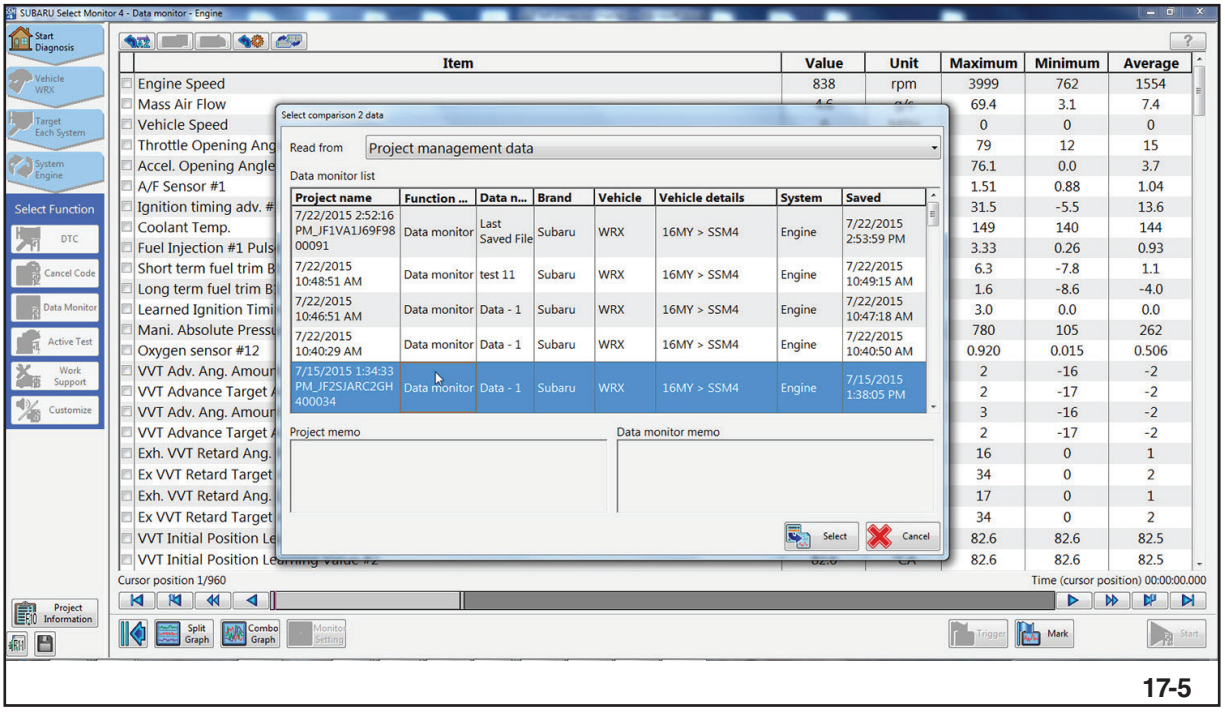
Data Comparison

Data comparison can be used to compare one saved file against another. Open the file in question and click on “F11” and “Function”. Click on “Data Comparison”.



Activating Data Comparison

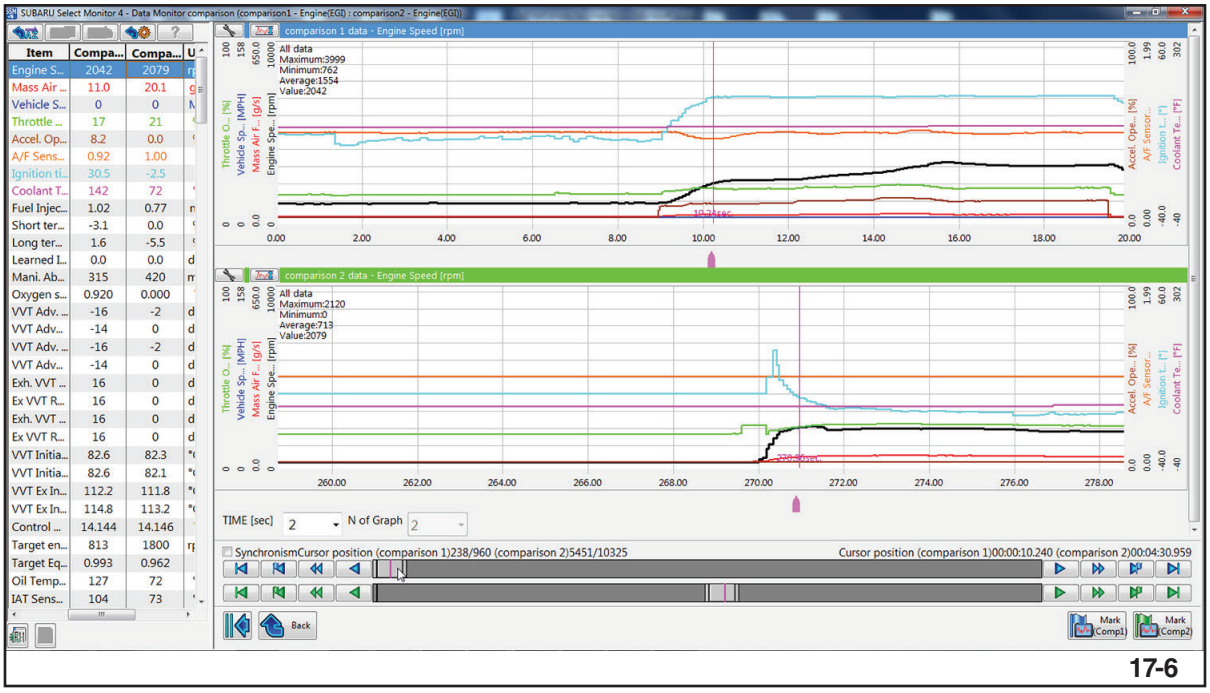
Locate the project that contains the file that will be used for comparison.



Locating Comparison File

Double click or open the file once it has been located.

The two files will be displayed in Combo Graph with the file in question on the top and the comparison file on the bottom.



Data Comparison

Analog data for the two files will be in two columns on the left vertical of the display. Column one is the file in question and column two is the comparison file. Time base controls and mark locators function as they did in normal graph modes.

Note: The Combo Graph display area cannot be altered.

Subaru Select Monitor 4 On Car Test

This lab sheet is a test. Each student team will be required to display and explain results from the following:

Skill Check

- All system diagnostic check
- Save a list of All DTCs
- Save Freeze Frame Data (FFD)
- Evaluate current data
- Save Data files
- Clear DTCs

1. Perform an “All system diagnostic check”.

   Record any DTCs found. _____

   _____

2. Save the file and rename according to the initials of your team members. Navigate through the saved data to locate the file.

3. Review the engine Freeze Frame Data (FFD) of each DTC. Save the Freeze Frame Data (FFD) and rename the file according to the initials of your team members.

4. Start the engine and allow it to warm up for 5 minutes. Evaluate the current data. Outline your diagnosis of the vehicle in the space provided below. Include possible causes and results of any problem(s) found.

   _____

   _____

   _____

   _____

5. Save the current data and rename the file according to the initials of your team members.

6. Clear the DTCs. (Note: Your Instructor will repair the vehicle first).

Subaru Select Monitor 4 On Car Practice

This lab sheet is not a test. Each student team will be required to display and explain results from the following:

Skill Check

- Idle Speed Control Check
- EGR Valve Check
  - (If EGR is not available go to number 2a.)
- Radiator Fan Relay Check
- CPC Solenoid Check

1. Navigate to “Active Test” and perform an Idle Speed Control check. What is the minimum and maximum RPMs allowed during the test?

   _____

2. Return to “Active Test” and perform an EGR Valve Check. Do not completely stall the engine. How can you determine if the EGR valve is operating? _____

   _____

   a. Return to Active Test and select Injection Stop Mode (Injector 1).

      Select “Engine Speed” from the list of available PIDs.
      Start Injection Stop Mode (Injector 1)

      What happens to Engine RPM when Injection Stop Mode is enabled?

      _____

      What does the ECM do to the injector during Injection Stop Mode?

      _____

3. Return to “Active Test” and perform a “Radiator Fan Relay check.” What is the operating speed of the fan motor?_____

4. Return to “Active Test” and perform a “CPC Solenoid Valve check.” How can you determine if the CPC Solenoid Valve is working correctly?

   _____

   _____

NOTES:

DST-i Oscilloscope

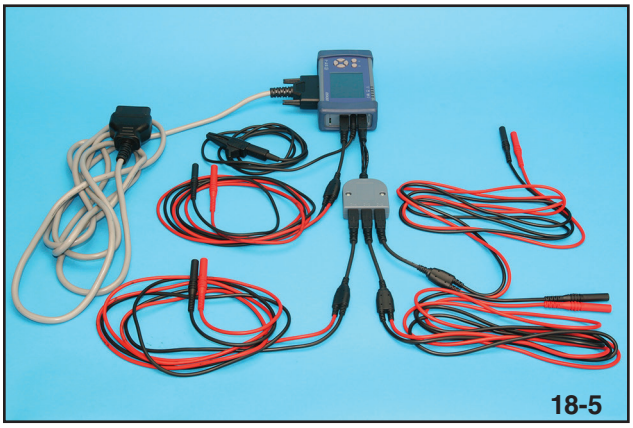
The DST-i oscilloscope and software are designed to provide up to four channels of voltage monitoring. The oscilloscope software is not associated with the SSM 4 software and is installed separately. Channel 1 and channel 2 oscilloscope lead connections are located on the left side of the DST-i.

Left Side of DST-i

Oscilloscope Lead Connections

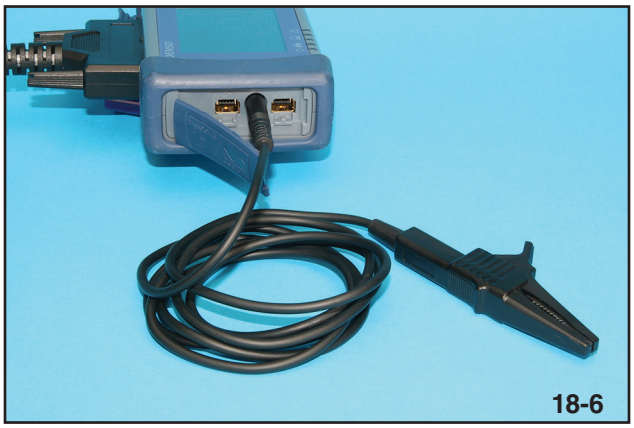
A four channel adapter connects to the channel 2 connection to enable channels 2, 3, and 4 for oscilloscope operation. The adapter is shipped with two additional oscilloscope leads and probes.

4 Channel Adapter

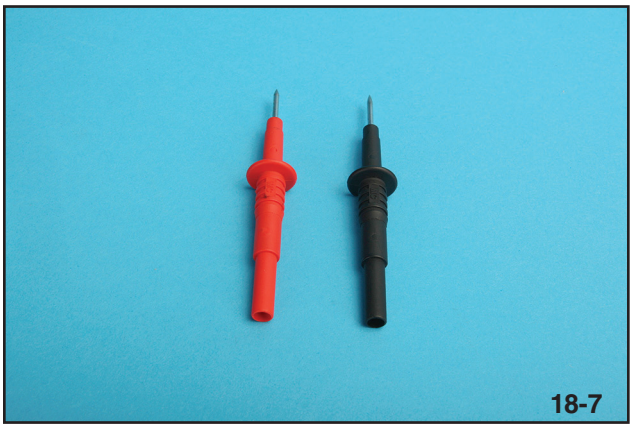


Oscilloscope Wiring

Care should be taken to maintain proper identification of the leads due to the common coloring of the wires. The oscilloscope can be powered by the DLC cable or the USB cable of the host computer. Stand alone operation of the oscilloscope is not provided.



DST-i Grounding Cable

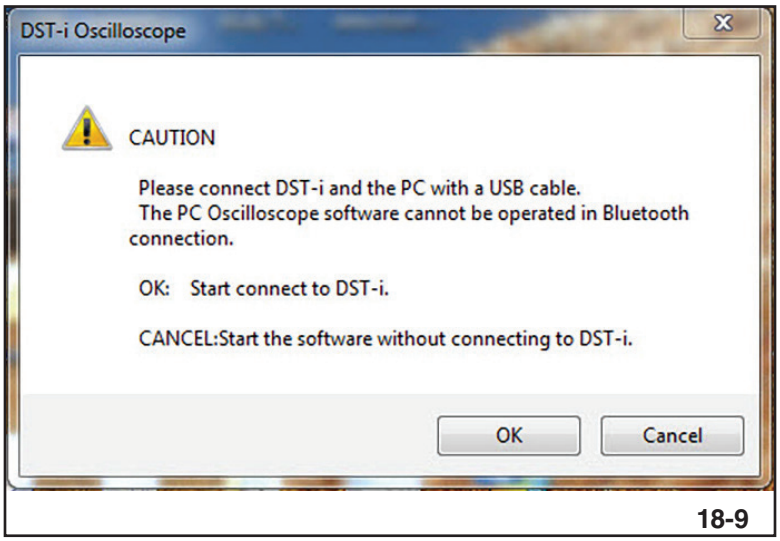


Positive and Negative Probes

Always connect the DST-i grounding cable to chassis ground to prevent the USB cable from acting as oscilloscope ground.

DST-i On Switch

Make all connections to the circuits to be monitored and turn on the DST-i (the switch is located on the right side of the DST-i).

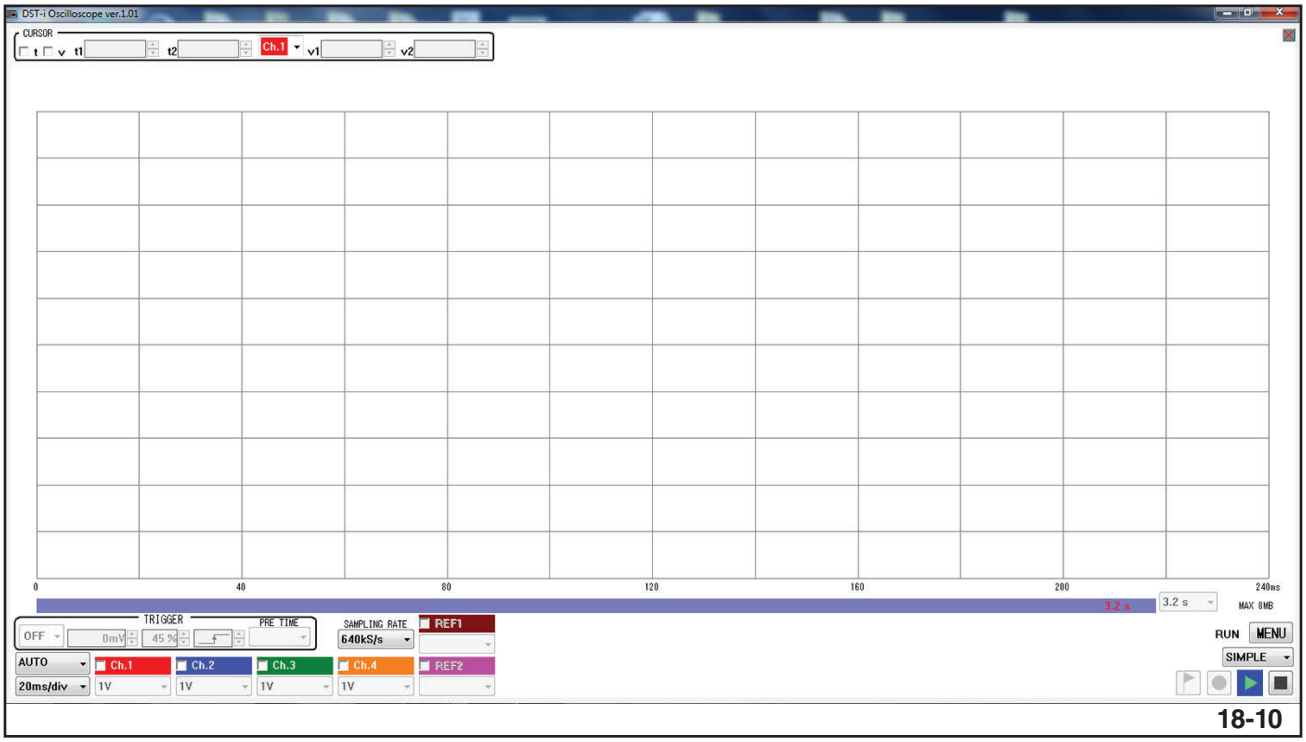


Start Up Screen

Click on the oscilloscope icon to begin. A dialogue box will be displayed, click “OK” to start the oscilloscope if the USB cable connection is complete. Saved files can be viewed without connecting to the DST-i by clicking on “Cancel”.

Note: Before using the oscilloscope the user must understand the operating characteristics and controls of the oscilloscope.

When the oscilloscope turns on it will begin to operate based on the settings of the previous session.

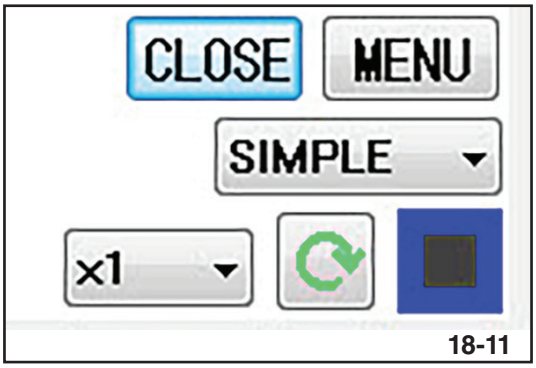


Oscilloscope Display

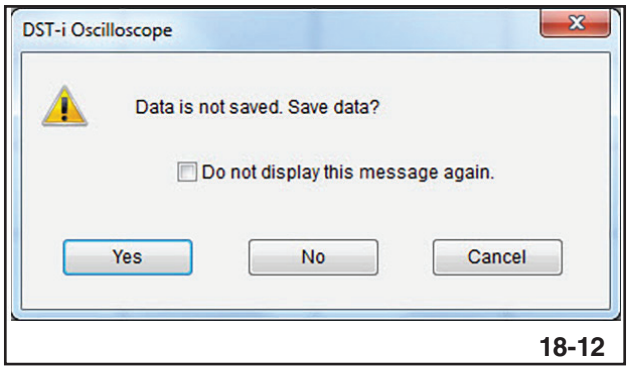
The oscilloscope should be stopped before any adjustments are set.

Click the indicated button on the lower right of the display to stop the oscilloscope.

Click “CLOSE”



Close Control Button



Save Data Option

Click “No” to return to the start up screen of the oscilloscope.

Note: This dialogue box will be displayed each time the oscilloscope is stopped. It is recommended to not disable the dialogue box as it serves as a reminder to save previously recorded files.

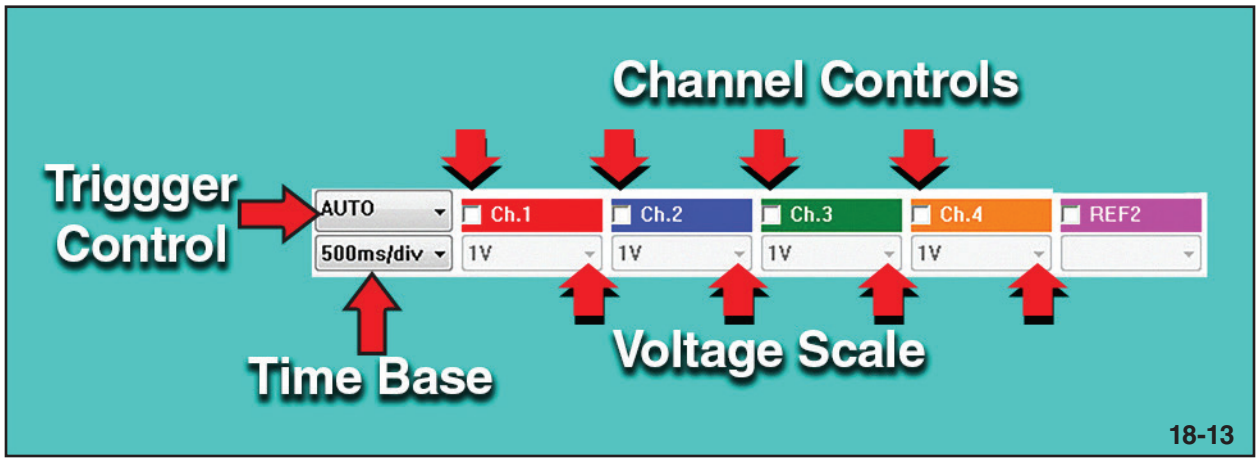
The following instructions provide guidance for basic oscilloscope operation.

Turn on the desired channel. The color of the channel box indicates the color of the oscilloscope pattern. The box must be checked to operate (clicking on anywhere on the box controls the on/off control for that channel).

Set the voltage scale to the operating voltage for that circuit.

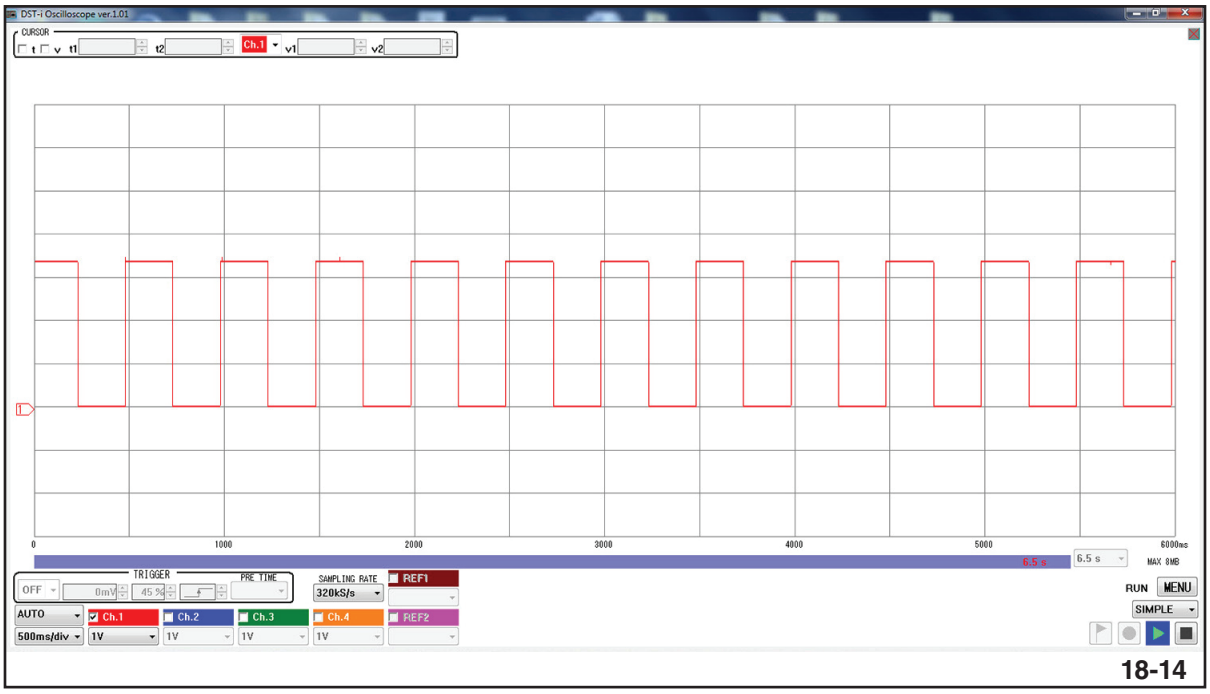
Set the time base as needed. Smaller times show greater detail and longer times allow for viewing of repeating events.

Set the trigger control to “Auto” for automatic.



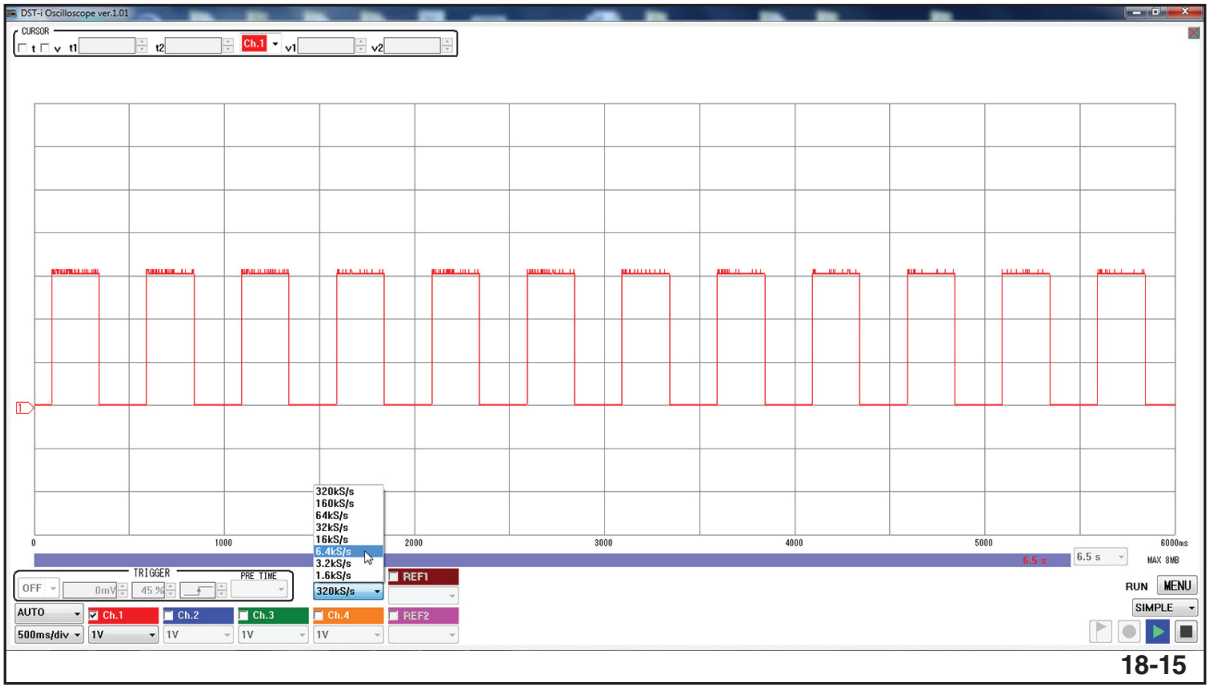
Oscilloscope Controls

The example provided is displaying a repeating DC voltage square wave. The time base is set for 500 milliseconds per division and the sampling rate is set for 320,000 samples per seconds. This fast sampling rate shortens the length of time the oscilloscope can record an event (signal). In this example, the maximum recording time is 6.5 seconds. After that time, the recording will be overwritten, always providing the last 6.5 seconds of an event until the stop button is pressed.



500 ms/div at 320K Samples Per Second

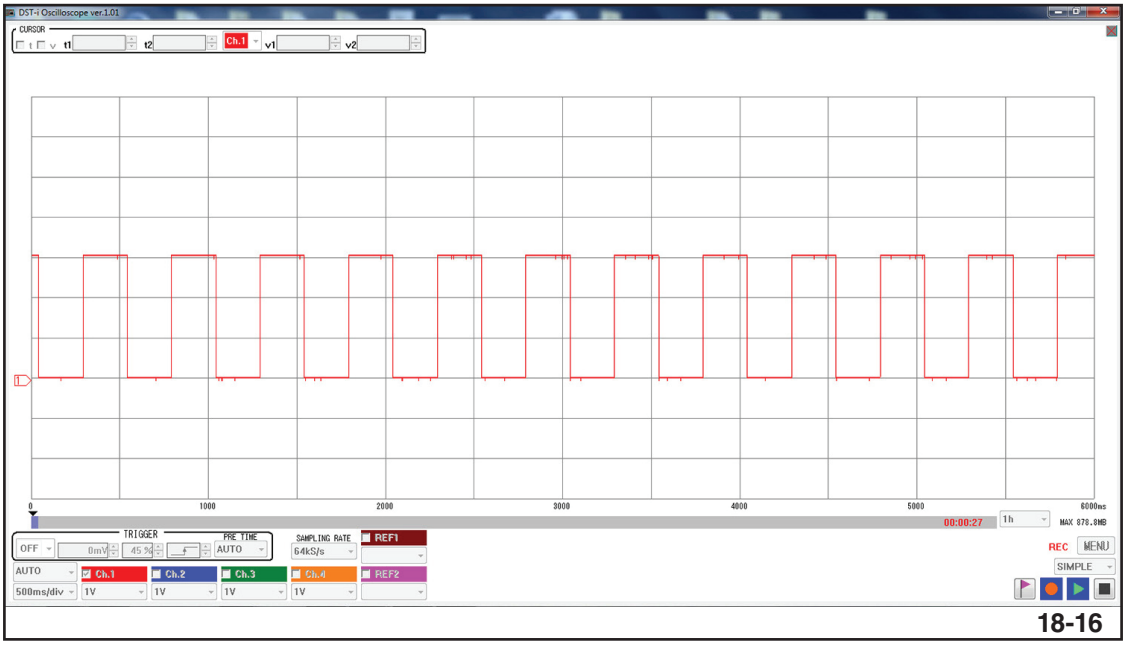
Increase the recording time by reducing the sampling rate.



Reduced Sampling Rate

Reducing the sampling rate to 64K per second increases the maximum recording time to 1 hour.

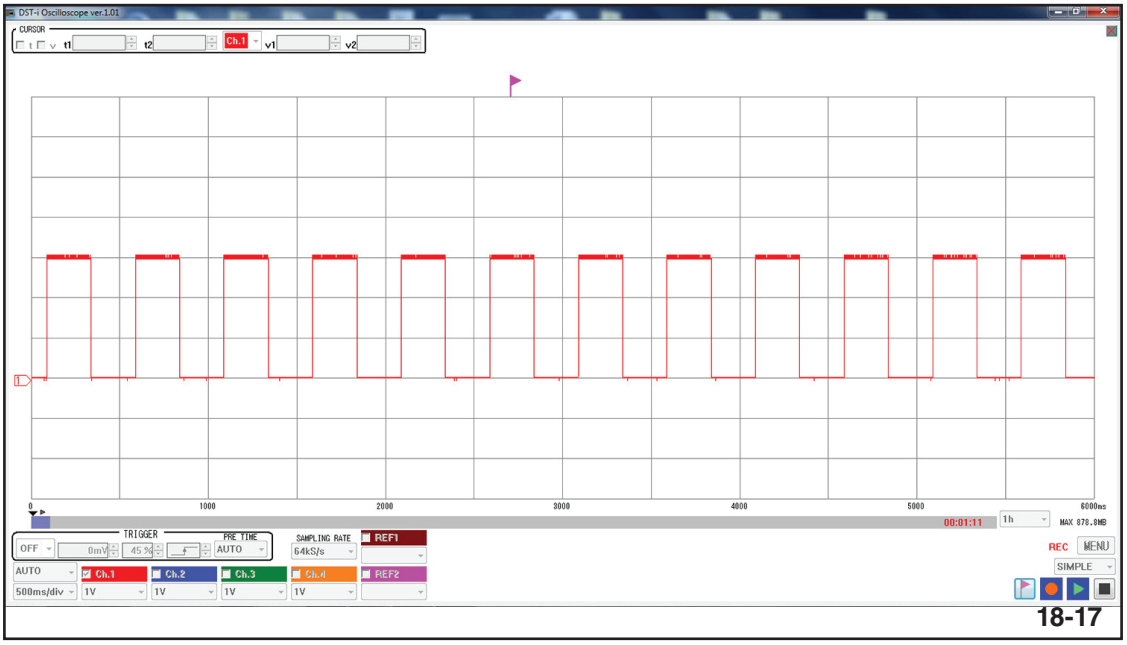
Note: The oscilloscope will automatically record the last 6 seconds of operation until the record button has been activated. Always press the record button to begin recording on all sampling rates lower than 160K per second.



Record Control Button

Click the “Flag” icon to place a mark in the recording for future study of the recorded event.

Note: The marked or Flagged data can be located in the sampling status bar. Scroll to each “Flag”to review the suspect data.



Flagged Data

Click on the “Stop” icon to stop the oscilloscope.

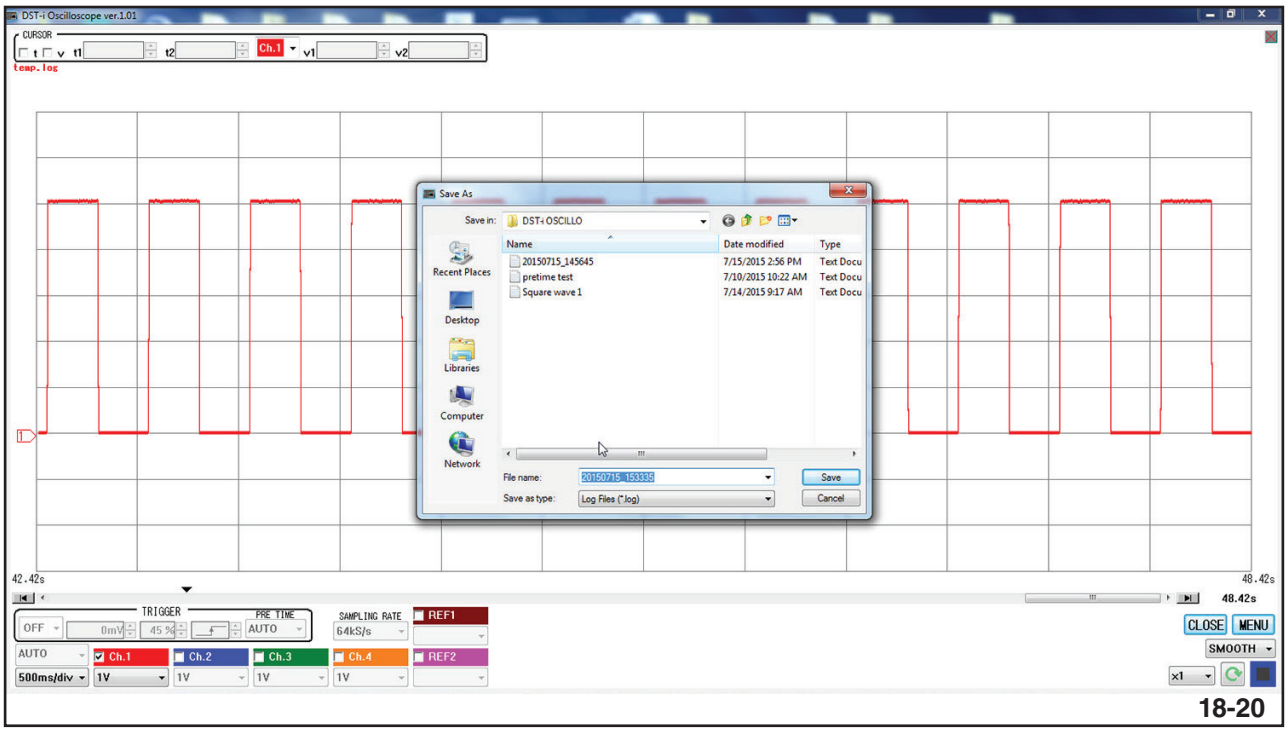
Stop Control Button

Click on “Menu” to save the recorded file.

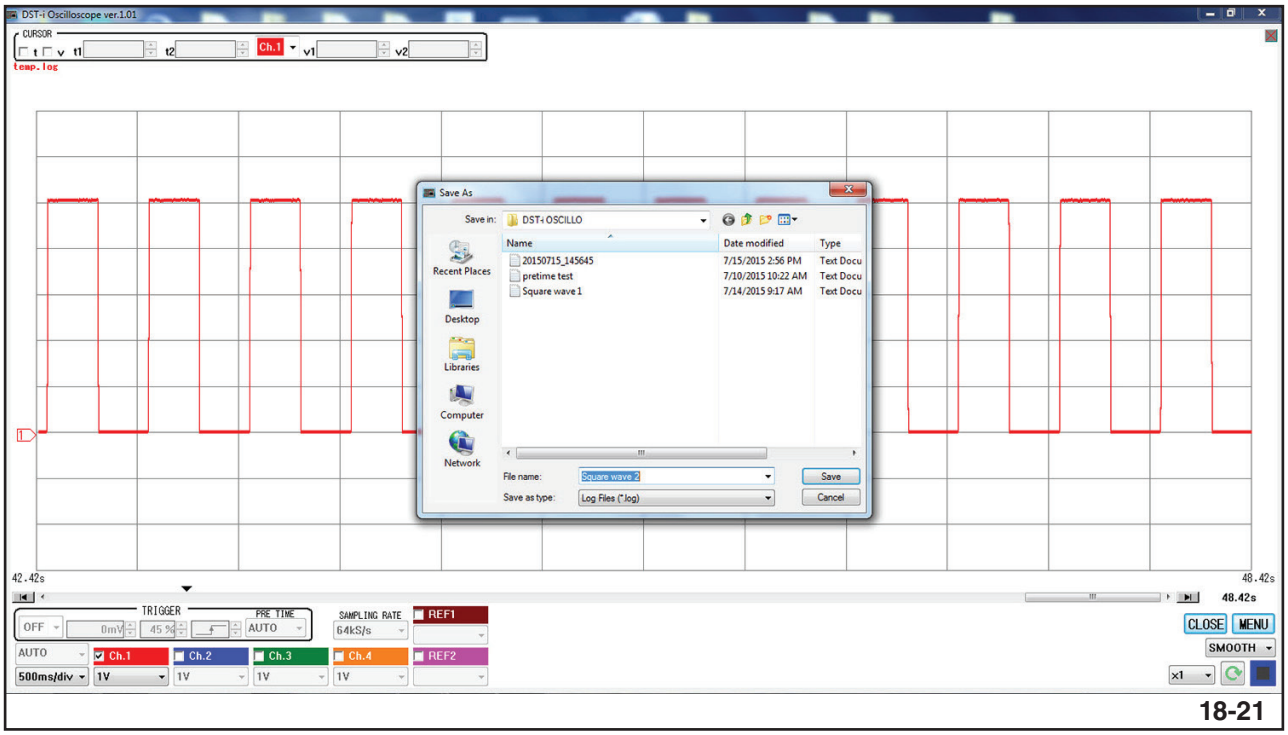
Note: The entire file or partial file can be saved.

Save Options

The file will be named by the time and date. You may rename the file as it is saved.



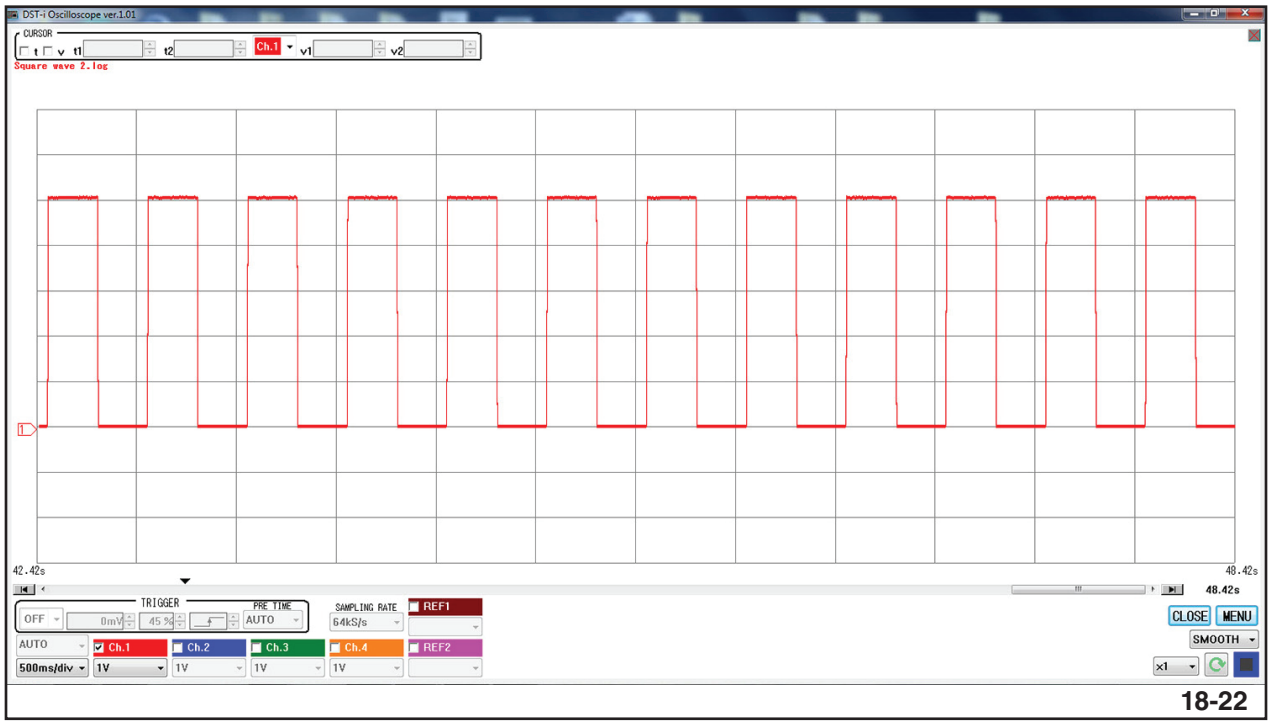
Default File Name



Renamed File

After the file has been saved, the oscilloscope will return to the original recording.

The name of the file will be displayed along the top left of the display.



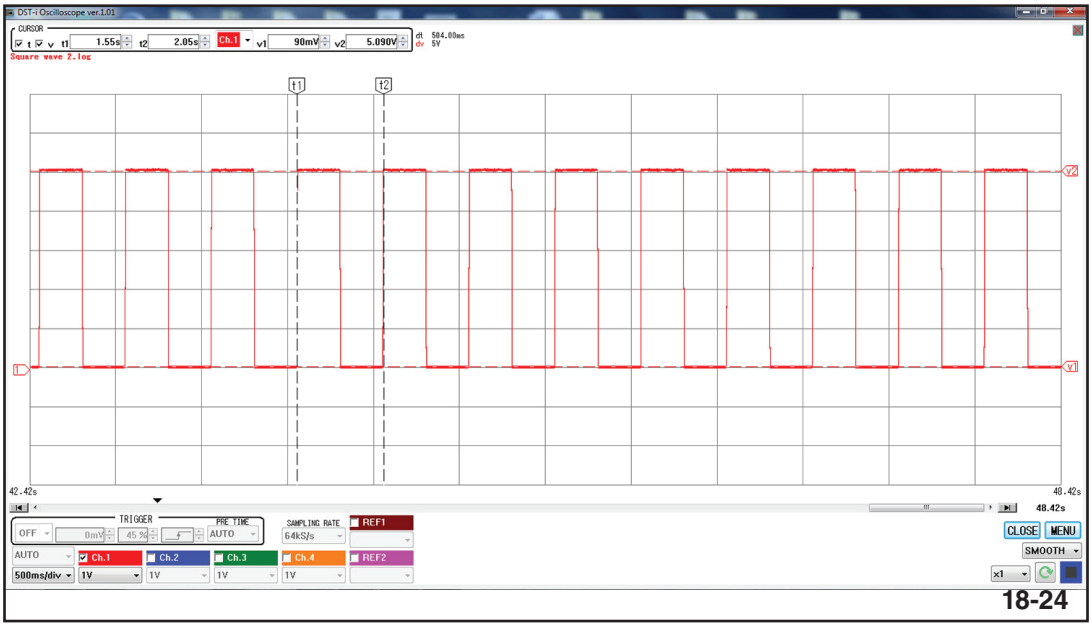
File Name Displayed

The time and voltage cursors must be turned on to study the values of the recorded event. Click on the “t” and “v”.

The time cursors form vertically and the voltage cursors form horizontally.

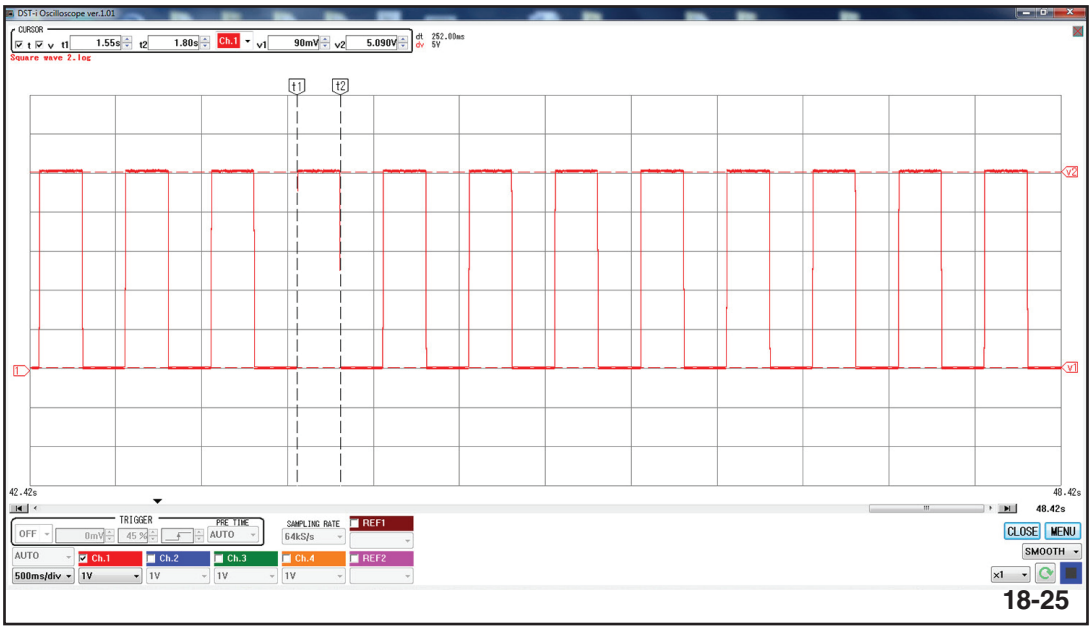
Time and Voltage Cursors

Click and hold the “v1” and move it to the bottom of the event or signal and click and hold the “v2” and move it to the top of the event or signal. This will allow for the checking of the total voltage value (dv).



Time Period And Total Voltage

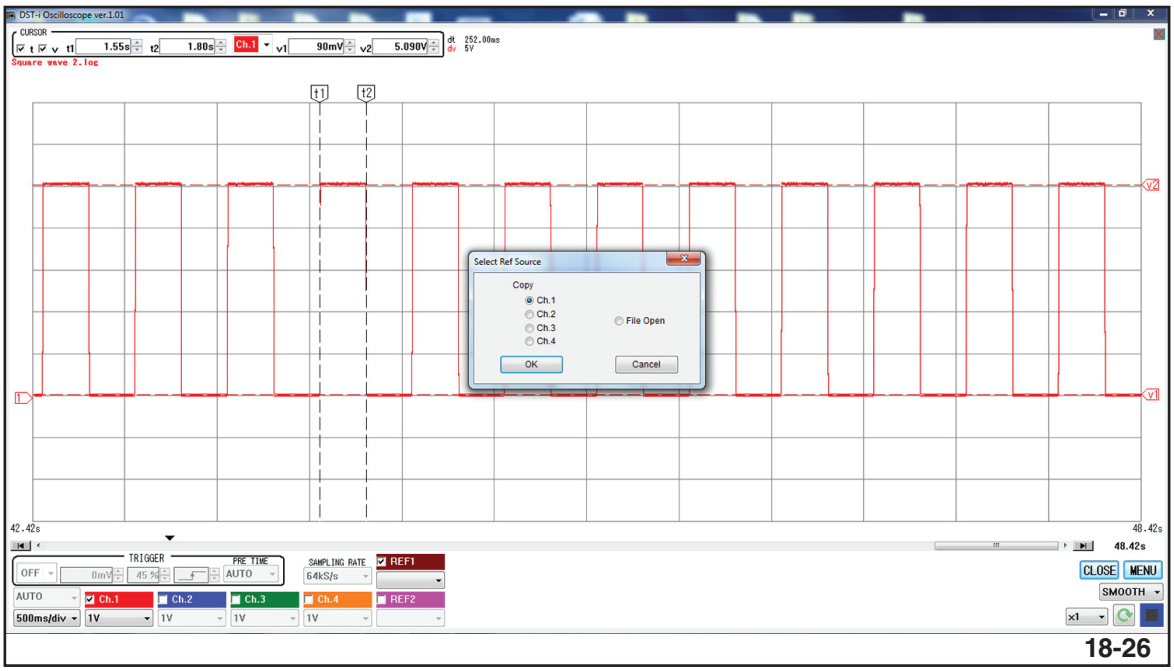
Click and hold “t1” and move it the beginning of the event or signal and click and hold the “t2” and move it to the where the event or signal begins again.



ON Time

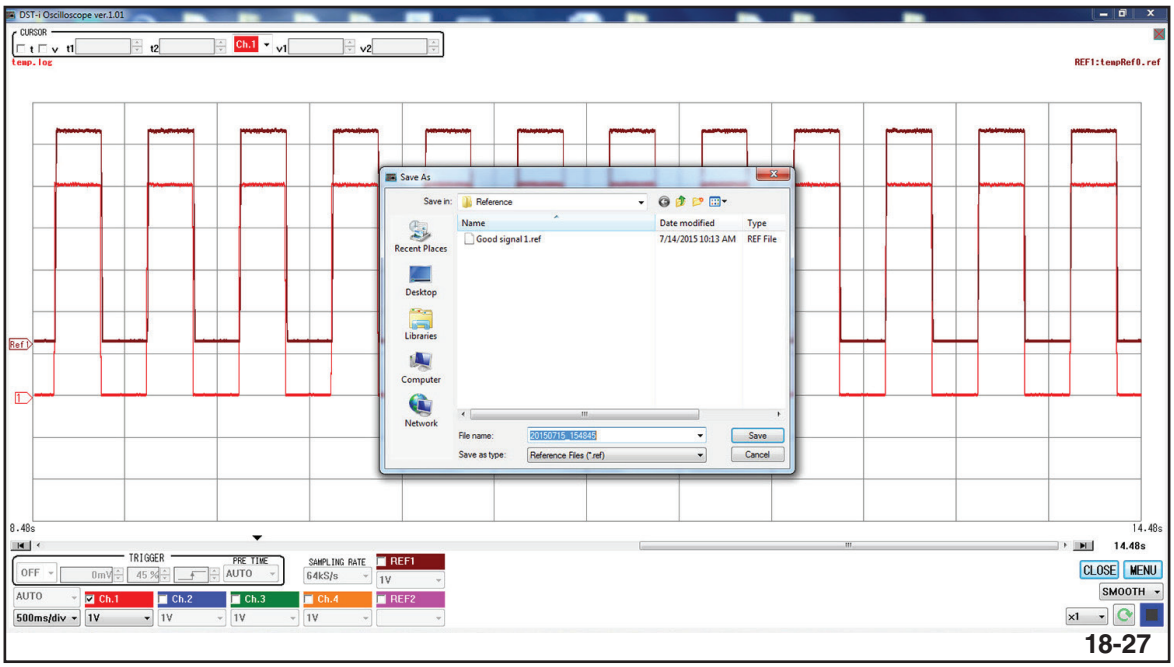
This will allow measurement of the period of the signal (dt). Record the time period and move “t2” over the on time of the event or signal. Record the “dt”. Calculate the on duty ratio by dividing the on time by the total time or time period (divide off time by the time period to determine off duty ratio).

A reference signal can be copied from a good signal or event for use in the future or to compare against a questionable signal or event. Click on “REF1” and dialogue box will be displayed to select a source for obtaining the copied image. The current image from channel 1 or a previously saved file can be used as the source.



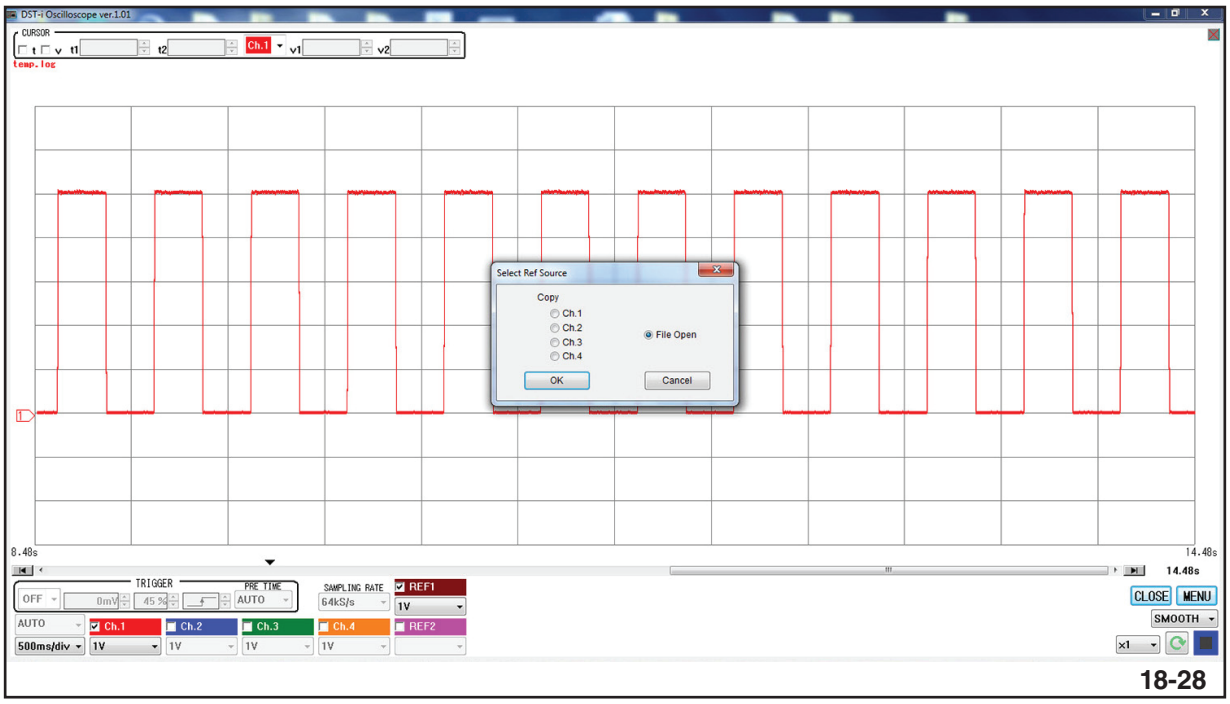
REF1

The copied image “REF1”, can be saved by clicking on “Close” and save. Rename the file for easy location the next time it is needed.



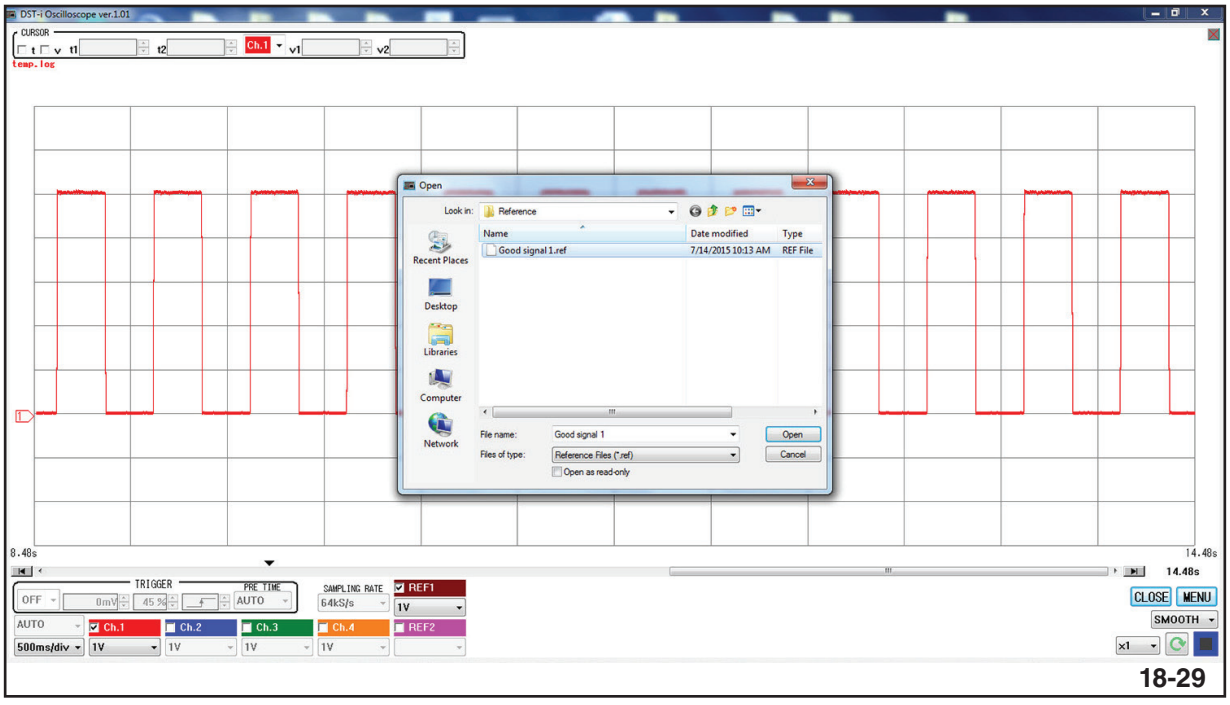
Saving REF1

To use a previously saved “REF1”, click on “File Open”.



Sourcing Reference File

Double click or open the reference file.



Opening Reference File

The name of the current oscilloscope image and the Reference image will be displayed along the top left and right of the display.

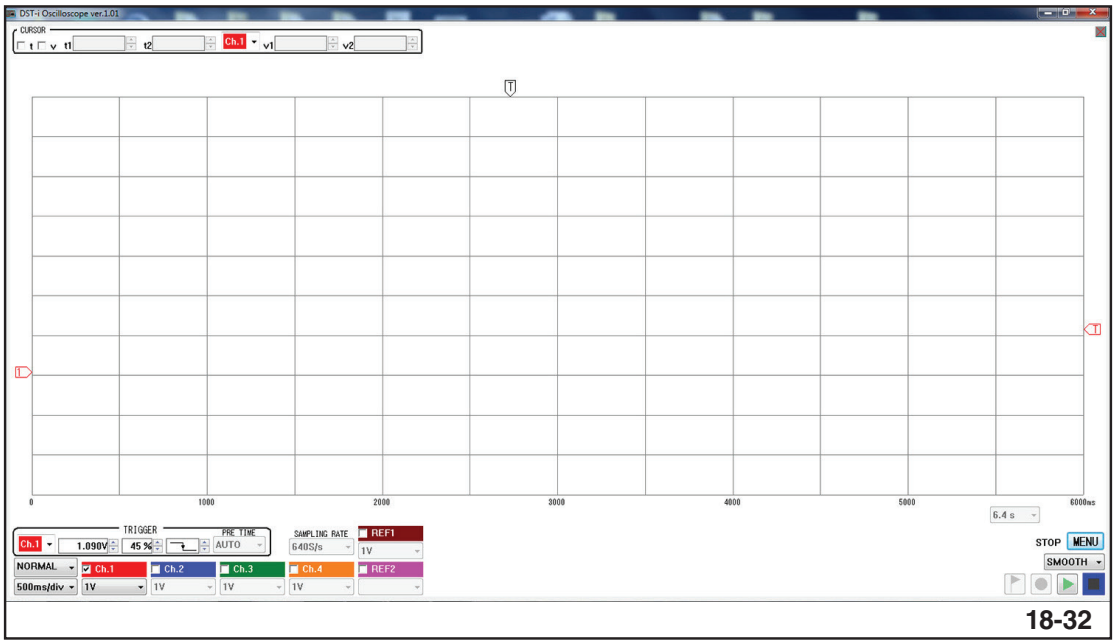
Displayed Reference File

Overlay the images for comparison.

Comparing Voltage Patterns

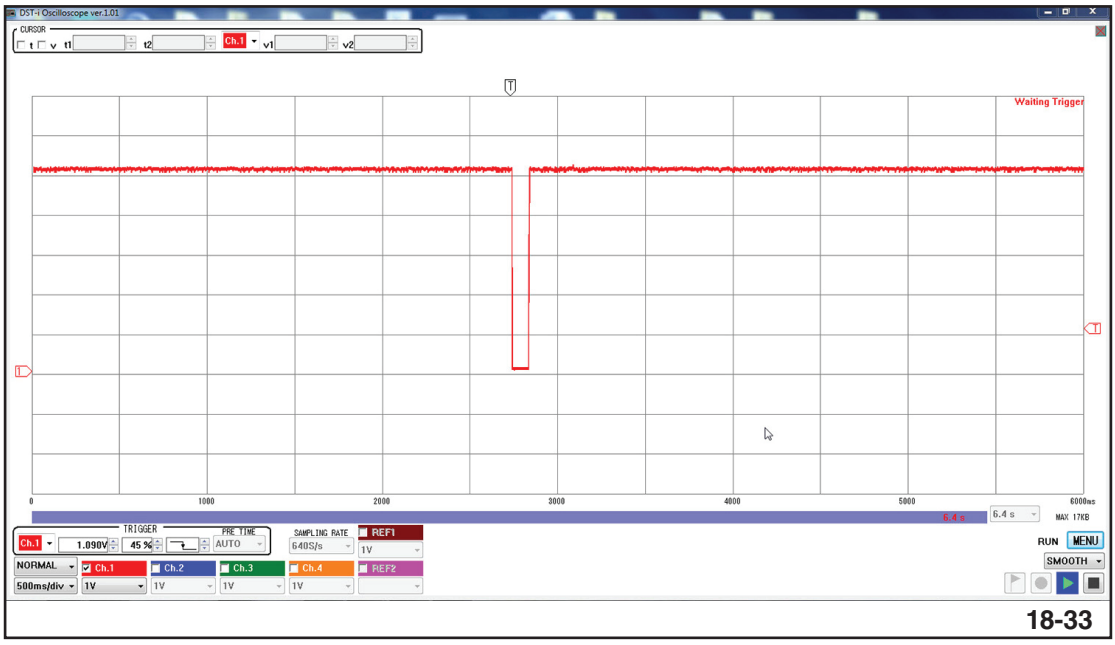
Setting a trigger

A trigger can be set to capture a suspect signal or event for an intermittent or unknown issue. To set the trigger, the condition of the circuit such as, “intermittent loss of power”, must be decided.



Trigger Type and Voltage Set

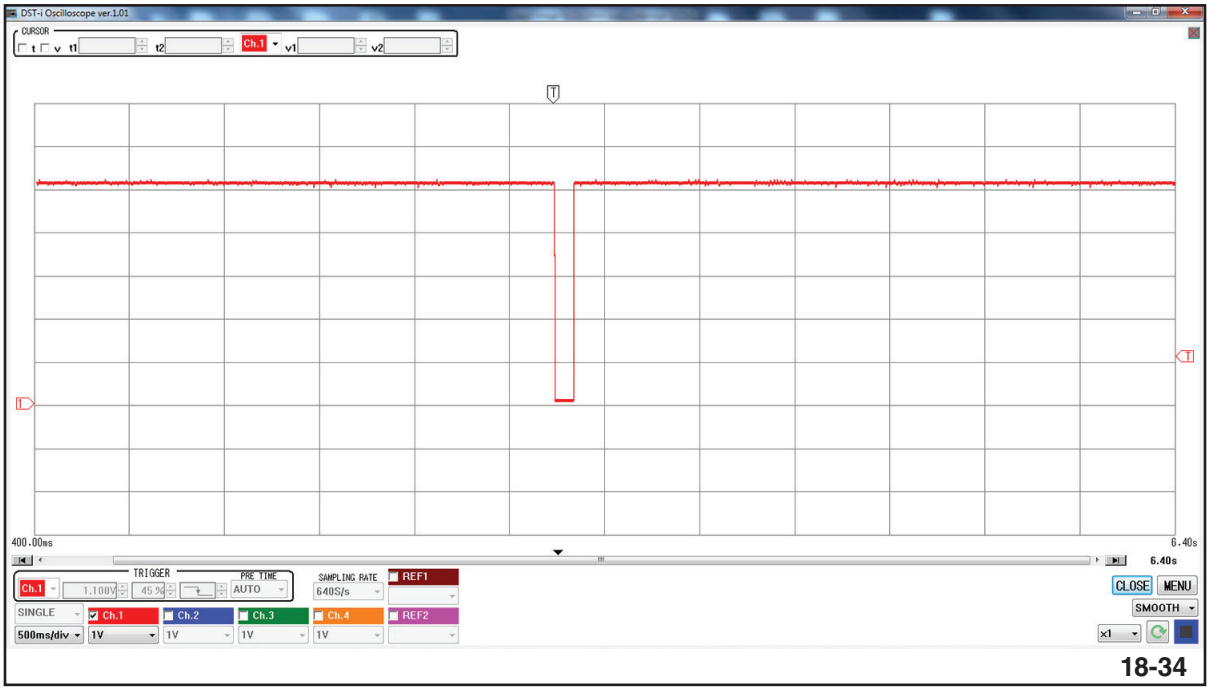
Now adjust the voltage level that sets the trigger. For loss of power, a value near zero should be selected. Next, select where on the display the captured signal will be displayed. This is represented by percentage, 50% is halfway across the display. Set the slope of the trigger downward. This refers to the voltage falling down to 1.090 volts before activating the trigger.



Normal Trigger Capture

In this example a “Normal” trigger has been selected. The trigger will clear and display the programmed trigger event over and over, until the stop icon is clicked.

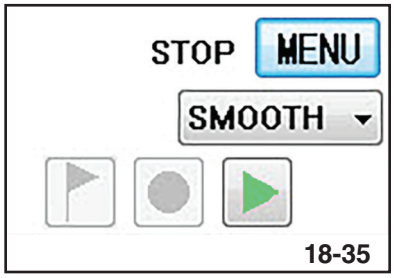
If the trigger is set to “Single”, the programmed trigger will capture and display the signal or event only once. The oscilloscope will need to be restarted to capture the signal or event again.



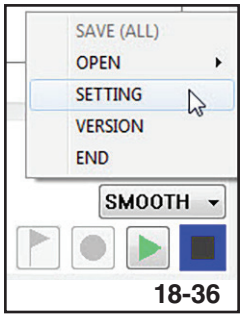
Single Trigger Capture

Supplemental Information

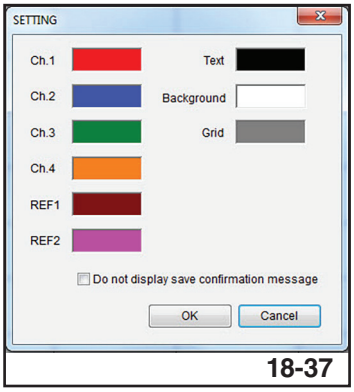
Oscilloscope color schemes can be changed by clicking on “Menu” and “Setting”.
Line, REF, Text, Background and Grid colors can be adjusted to fixed or customized colors.



Menu

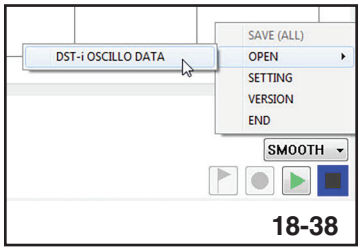


Setting



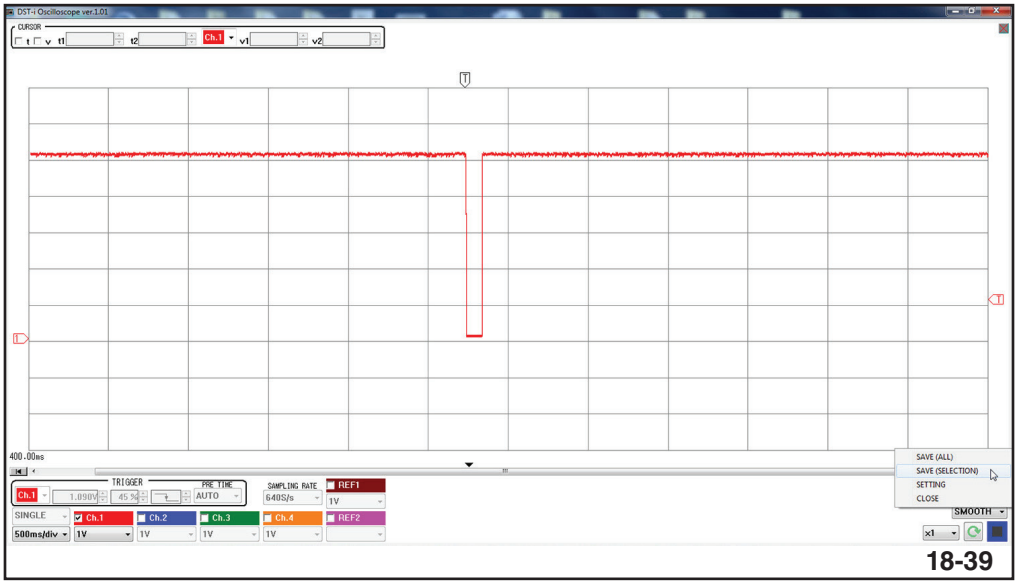
Adjustable Display Settings

Saved oscilloscope files (.log) can be accessed by clicking on “Menu”, “Open”and “DST-i OSCILLO DATA”.



Saved File Access

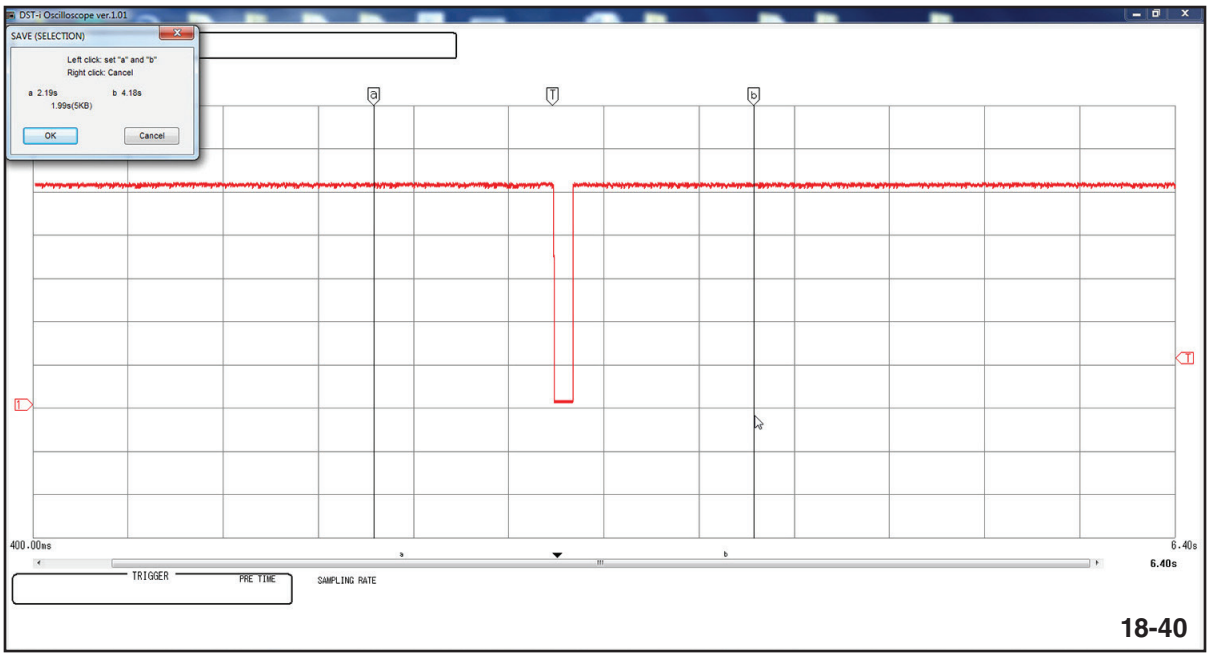
A partial oscilloscope pattern can be saved by clicking on “Menu” and “Save Selection”.



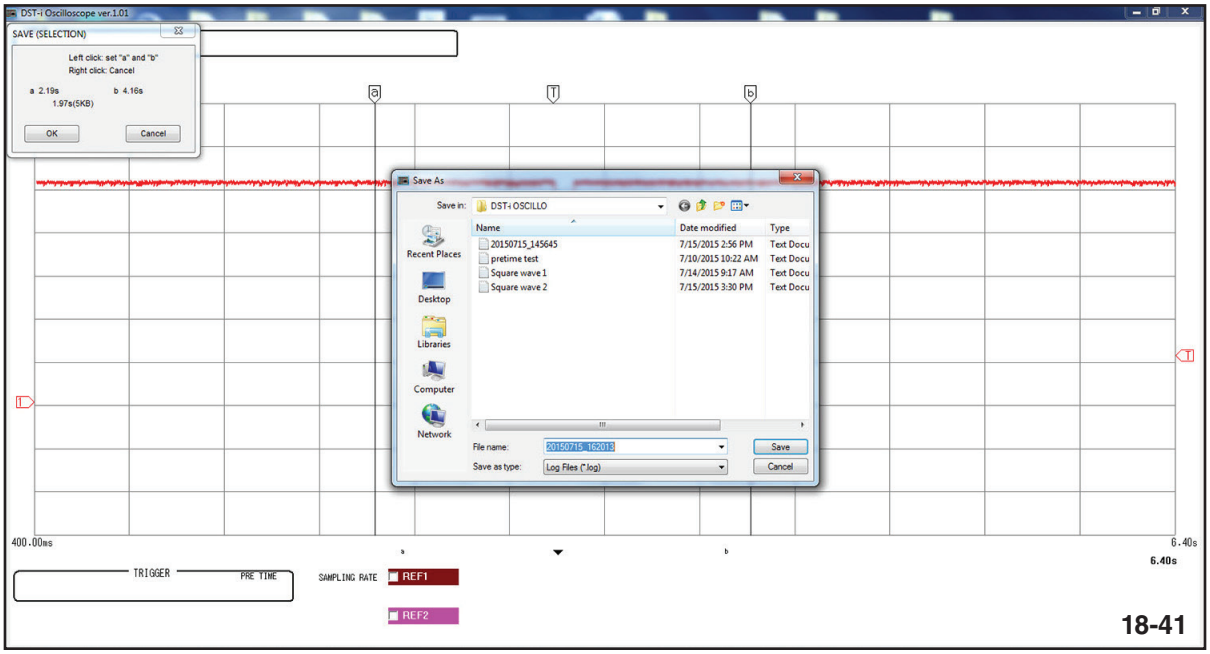
Save Selected Area Option

Follow the instructions on the dialogue box to place a point before and after a signal or event.

Click “OK” and rename the file and save.



Selecting Save Area

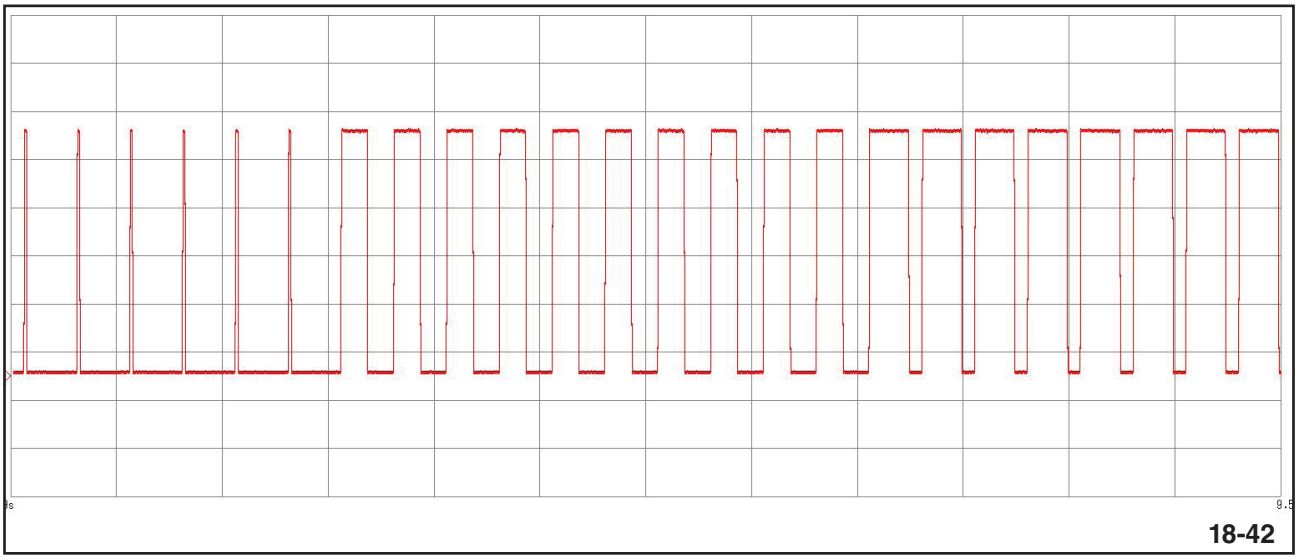


Saved Files

Pulse width modulation

Pulse width modulation (PWM) allows control of a components speed or current flow without wasting energy through rheostats or other resistance devices. Control is achieved by changing the on verses off time (duty ratio) of the controlling circuit. The frequency or time period of a cycle (on to off and back on) is usually fixed.

Circuits that are controlled with a positive signal speed up or increase current flow with more on time verses off time (duty ratio).



PWM

Circuits that are controlled with a negative signal speed up or increase current flow with more off time verses on time (duty ratio).

Calculate the frequency of the signal provided from the Instructor and record the value. _____

The pattern of the signal provided by the instructor is capable of providing 4 levels of control.

Calculate and record the duty ratio of each speed:

1. _____

2._____

3._____

4._____

NOTES:

SUBARU

MASTER TECHNICIANS

Quality driven. Technician powered.™

MSA5P2607C