MITSUBISHI MOTORS

M.U.T.-III Owner's Manual

Multi Use Tester

< Ver. 7.0 >

Heart-Beat Motors

MITSUBISHI MOTORS

Foreword

This manual explains M.U.T.-III: functions, operating procedures, and other related information.
By reading this manual you will obtain a basic understanding of M.U.T.-III and Vehicle Communication Interface (hereafter abbreviated as V.C.I.) functions and methods of operation. Because there are differences in M.U.T.-III methods of operation due to the vehicle electronic control system, be sure to read this manual and Online Help prior to operation.
This manual was written based on the October 2006 version of the M.U.T.-III system.
Please note that the information herein may not always agree with your version of the M.U.T.-III system due to system specification changes and version upgrades.
Please take good care of this manual along with your M.U.T.-III product.

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For Your Safety

To ensure proper use of this product and prevent personal injury and property damage, various graphic displays are used in the user's manual. The graphic displays and respective meanings are described below.

Warning	Warning messages alert you to a procedure or practice which, if not followed correctly, could lead to death or serious injury.
Caution	Caution messages alert you to a procedure or practice which, if not followed correctly, could lead to serious injury and/or property damage.

Icon Examples	The symbol alerts you to a prohibited action. The symbol alerts you to an action that must be enforced.

Warning	
Drivers should not operate the unit while driving. • Operating the unit while driving may result in a traffic accident.	Do not plug in or unplug the power AC adapter with wet hands. • Doing so results in the risk of electric shock.
When using the cigarette lighter plug to supply power to the V.C.I. unit, be sure the power voltage supplied is DC32V or less. • Applying a voltage greater than DC32V results in the risk of fire. • M.U.T.-III as provided to dealers includes 12V accessory / cigarette lighter plug adapter to power M.U.T.-III during extended test drives.	Maximum voltage the V.C.I. can withstand is 40V. Do not use the V.C.I. on systems greater than the 32-volt system mentioned previously. • Violating this requirement results in the risk of a ground fault, damage and/or electric shock.

Warning

The V.C.I. screen is liquid crystal display or LCD. In the unlikely event that the display breaks due to impact, do not let your skin come in contact with the LCD fluid.

- If your skin comes in contact with the LCD fluid, wash your skin thoroughly with water. If skin rash or abnormality occurs seek medical attention from a doctor.

Do not use the unit if the power AC adapter plug or cord is damaged or plugging into the outlet is loose.

- Use under such conditions may result in electric shock, an electric short and/or fire.

Be sure to hold the harness connector when disconnecting from the vehicle. Do not disconnect the harness by pulling on the cord.

- Pulling the cord rather than the connector may result in damage to the lead wire inside the cord, thereby causing a short and possibly starting a fire.

Unplug the power AC adapter from the outlet when the unit is not in use.

- Failure to do so may result in injury, burns, electric shock caused by insulation deterioration, or fire due to a short circuit.

Warning

When the harness is connected to the V.C.I., be sure to check the top and bottom of the connector and connect the harness perpendicularly to the connector of the V.C.I.
Connecting at an angle may result in bending of the pins of the connector.
Check for the secure connection of the harness before tightening of the screw locks.

- **The bent pin may contact the connector case, thereby causing an electric short which leads to damage to the V.C.I.**

Please Note

Do not expose the PC or V.C.I. to direct sunlight or high temperatures, or leave the unit in sun-heated cars. Such action may result in system failure.

Store the PC and V.C.I. in a dry environment at room temperatures.

Moving the PC and V.C.I. to a location with a very different temperature and humidity than that of the previous location may result in external or internal condensation. Caution is required.

Protect the PC and V.C.I. from exposure to elements such as rain, dirt, dust, food and liquids.

Be careful when handling the PC and V.C.I. Dropping the units may result in damage.

Do not expose either unit to engine oil, gasoline, antifreeze or battery acid. Also, do not clean the PC or V.C.I. case using solutions such as thinner or benzene. Doing so may result in deterioration of the case surface.

Prior to connecting the M.U.T.-III main harness between the V.C.I. and vehicle, turn the IG switch to OFF.

- Connecting the V.C.I. harness with the IG switch ON may damage the V.C.I. programming.

Use only the power AC adapter included with the PC (or approved replacement), power cigarette plug, other probes, main harness and other cables.

- Use of unspecified parts may result in damage or malfunction due to excess voltage or insufficient contact.

The LCD display of this unit turns off when the supplied voltage is less the DC 8V. This is not an error.
The power supplied should be from 8VDC to 32VDC.

Keep all V.C.I. connectors and openings away from dirt and static electricity. Exposure to dirt and static electricity may result in malfunction and damage.

Chapter 1 Product Overview

1-1. Precautions

Service Work Precautions

- Be sure to follow all basic service work precautions when using M.U.T.-III during vehicle inspection and service work.
- For detailed information regarding service work precautions, refer to the service instruction manual of each vehicle.

Work Precautions

- When performing vehicle inspection work at the work site with the engine running, either use an exhaust gas discharger or ventilate the area sufficiently.
- When working on a vehicle, be sure to apply the parking brake and set wheel chocks in place to prevent the car from moving.

Driving Precautions

- If you wish to use M.U.T.-III while driving the target vehicle, first verify that all parts are properly assembled.
- While driving, always have an assistant operate M.U.T.-III.
- Be sure that the M.U.T.-III main harness and other cables will not interfere with driving.
- Install and remove the PC and V.C.I. with the vehicle parked, IG switch OFF.

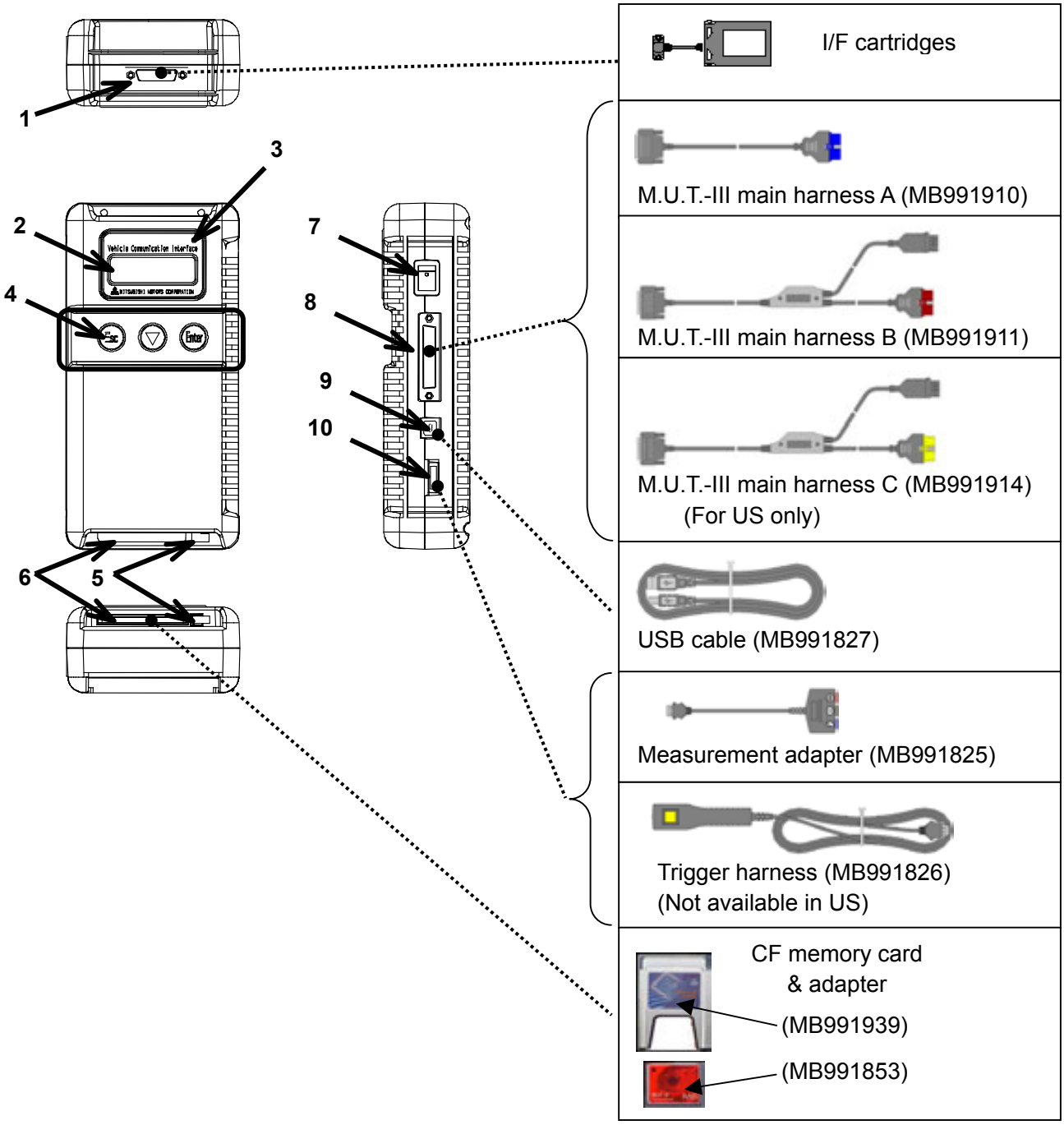
PC Usage Limitations

Do Not Install Software on the PC

- The M.U.T.-III PC is a special service tool. Do not install any software other than M.U.T.-III software onto the unit. Installation of other software results in the risk of M.U.T.-III system failure.
- Any unauthorized software will not be supported. Technical support for units with unauthorized software will be charged additional technical support fees to return the unit to its authorized state of operation.
- All unauthorized software will be erased with each new upgrade.

1-2. V.C.I. Outline Drawing and Component Names

The names of the V.C.I. components are indicated in the figure below.



<<Component Names>>

1. I/F cartridge terminal
2. LCD screen
3. Indicator lamp
4. Operation button
   (Used with V.C.I. functions)
5. Memory card removal lever
6. Memory card insertion port
7. Power switch
8. Main harness terminal
9. USB terminal
10. Trigger terminal

1-3. M.U.T.-III Components Explanations

(1) **Vehicle Communication Interface (V.C.I.)** (MB991824)

A communication interface used to connect the vehicle ECUs and the PC.

1. When connected with the PC
   - Vehicle diagnosis (Interactive fault diagnosis)
   - SWS communication & CAN communication support
   - Drive recorder
   - ECU reprogramming
   - Volt, Ohm, measurement
   - Fuel pressure measurement (Not available in US)

2. When used with the V.C.I. unit (disconnected from PC)
   - V.C.I. Stand-alone diagnosis
   - Drive recorder
   - ECU reprogramming
   - Volt, Ohm measurement
   - Belt Tension measurement

(2) **Memory Card**

Stores data for ECU reprogramming, drive recorder, etc. This is a standard, off-the-shelf memory card. The one provided (with reprogramming data) is a Compact Flash memory card (MB991853) inserted into the CF card adapter (MB991939).

(3) **M.U.T.-III Main Harness A** (MB991910)

Used when connecting the V.C.I. with vehicles that have only one 16-pin diagnosis connector.

- Supports fault diagnosis and ECU updating on the above-described vehicles
- Supports the CAN communication system

(4) **M.U.T.-III Main Harness B** (MB991911)

Used when connecting V.C.I. with vehicles that have a 16-pin + 12-pin or 16-pin + 13-pin diagnosis connector.

For models equipped with only 12-pin (or 12-pin + 12-pin) diagnosis connector, connect the M.U.T.-II adapter harness (MB991498) to the end of this harness in the same as M.U.T.-II, and power is supplied from the cigarette lighter socket.

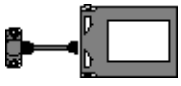
(5) **M.U.T.-III Main Harness C** (MB991914) (For US only)
Used when connecting the V.C.I. with vehicles that have the 420A engine and F4AC1 transaxle.

(6) **USB Cable** (MB991827)
Used to connect the PC to the V.C.I.

(7) **Trigger Harness** (MB991826) (Not available in US)
A harness with a trigger button used to manually insert a trigger point for data acquisition from the drive recorder function during data recording.

(8) **Measurement Adapter** (MB991825)
An adapter used to connect the V.C.I. and measurement probe for voltmeter and ohmmeter readings.
Or used when outputting Simulated Vehicle Speed with a vehicle whose diagnosis-connecter cannot receive vehicle speed signal.

(9) **Measurement Test Leads** (MB991499)
Test leads used for voltage and / or resistance measurement.
Test leads MB991499 acquire quality replacement test leads from Radio Shack or similar electronics stores.



(10) **I/F Cartridge**
Used to implement special functions that cannot be implemented with the V.C.I. unit alone. The following I/F cartridges used with M.U.T.-II can be used with M.U.T.-III as well:

- SWS I/F cartridge
- Daimler-Chrysler Corporate I/F cartridge

1-4. Harness Connection Method

Recommended harness connection sequence

[1] Start the PC.

[2] While the PC is starting, connect the USB cable to the V.C.I.

[3] After the PC boots to the M.U.T.-III main screen, connect the USB cable to the PC.

Note: Disconnect the USB cable from the V.C.I. after the PC has shut down. However, if the USB cable is disconnected during use, a warning message indicating device disconnection such as that shown in Figure 1 appears. Close the message display by pressing the OK button.

[4] Select the appropriate M.U.T.-III main harness. Connect it to the V.C.I.

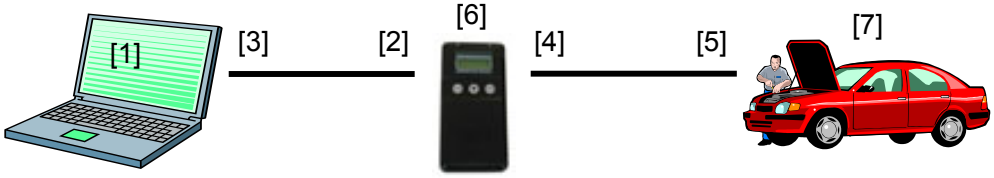
[5] Connect the M.U.T.-III main harness to the vehicle diagnosis connector. See Figure 2.

Note: Disconnect the harnesses by performing the above steps in the reverse order.

[6] Turn the V.C.I. power switch ON and verify that the indicator lamp located in the upper right area of the LCD screen is green.

[7] Turn the vehicle ignition switch ON, and begin the diagnostic process from the M.U.T.-III system screen.

Note: In case the version of V.C.I. and the firmware version of V.C.I., which are mismatch, a dialog box appears on PC screen, and the V.C.I. version upgrade process begins. This upgrade typically only occurs once per M.U.T.-III system upgrade. Normal V.C.I. upgrades take about 1 minute. If a version upgrade error occurs, restart the V.C.I. by turning V.C.I. power OFF then, while pressing the Esc button, turn the V.C.I. power switch ON and begin the diagnostic process again.



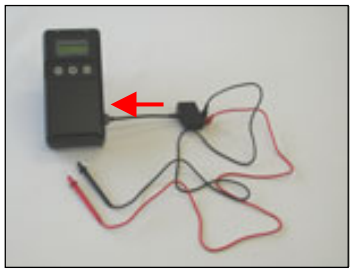
<Fig. 1>

<Fig. 2>

<Connecting the Trigger Harness>

Connect the trigger harness to the V.C.I. trigger terminal.
(Not available in US)

<Connecting the Measurement Adapter and Measurement Probe>



Connect the measurement adapter to the V.C.I. trigger terminal. Insert the measurement leads to the adapter. For best results, match the test lead colors with those on the adapter.

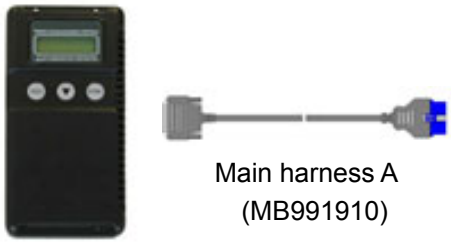
1-5. Combination Chart of Harness and Vehicle

Use of the M.U.T.-III main harness A, B or C (US only) is determined by the type of diagnosis connector installed in the vehicle.
The main harness, indicated with “O”, is used in combination with another harness indicated with “●” depending on the vehicle and work to be performed. ECU update used below means ECU reprogramming.

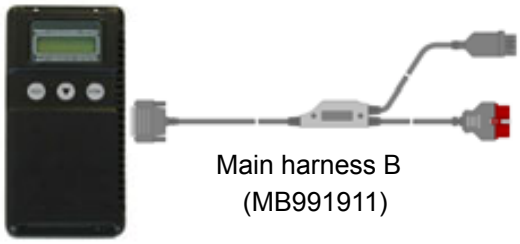
Vehicle Diagnosis Connector / Diagnostic Function \ Harness Name		01 M.U.T.-III Main Harness A	02 M.U.T.-III Main Harness B	03 M.U.T.-III Main Harness C	04 Conventional Vehicle Inspection Adapter Harness	05 ECU Update Adapter Harness
16Pin	Fault diagnosis	O				
	ECU update	O				
16Pin&12Pin	Fault diagnosis		O			
	ECU update		O			
12Pin	Fault diagnosis		O		●	
	ECU update	-	-	-	-	-
16Pin&13Pin	Fault diagnosis		O			
	ECU update		O			●
Vehicle with 420A Engine and F4AC1 Transaxle	Fault diagnosis			O		
	ECU update	-	-	-		

	Harness Name	Illustration
01	M.U.T.-III Main Harness A MB991910	
02	M.U.T.-III Main Harness B MB991911	
03	M.U.T.-III Main Harness C MB991914 (For US only)	
04	Conventional Vehicle Inspection Adapter Harness (M.U.T.-II adapter harness) MB991498	
05	ECU Update Adapter Harness MB991855	

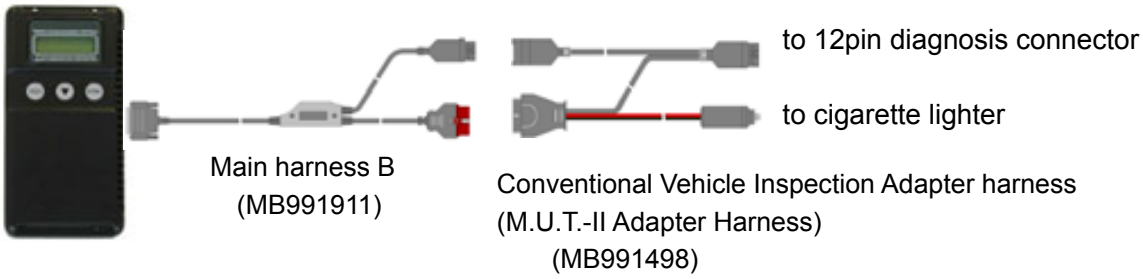
Vehicle diagnostic connector - 16pin type



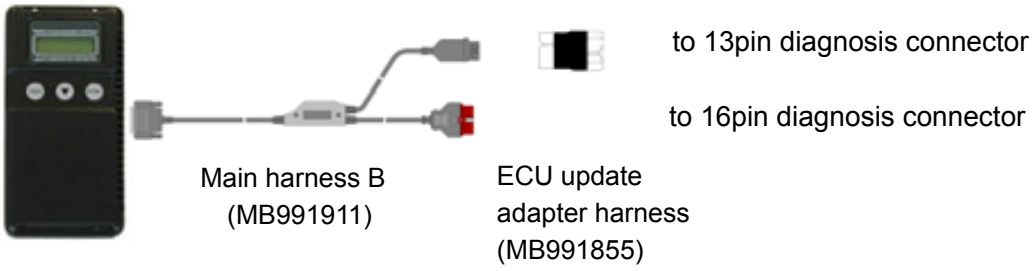
Vehicle diagnostic connector - 16pin type + 12 pin type



Vehicle diagnostic connector - 12pin type



Vehicle diagnostic connector - 16pin type + 13 pin type



Chapter 2 M.U.T.-III Functions

2-1. Basic Functions

Can be used with all vehicle installed electronic control systems (with built-in diagnostic functions) from model year 1984.

Function	Synopsis
DTC readout	Reads various diagnostic codes and displays the codes by name and number.
Data List	Reads RAM data inside ECU and displays the data in digital and graphic form. (Available with ECUs that support serial communication only)
Actuator tests	Permits forced operation or shutdown of various types of actuators that is required for service. (Available with ECUs that support serial communication only)
Simulated vehicle speed	Outputs vehicle speed signal to appropriate ECUs facilitating diagnosis without travel.
Drive Recorder	Permits recording and displaying arbitrary service data that is determined for an arbitrarily specified time.
Voltmeter	Permits measurement of DC voltage within the range of 0- ±40V using the voltage measurement function.
Ohmmeter	Permits measurement of resistance within the range of 0-100KΩ using the resistance measurement function.
SWS Diagnosis	Permits SWS diagnosis using the SWS monitor kit (MB991806).
CAN Bus Diagnosis	Identifies CAN bus failures that occur in vehicle that is subject to the diagnosis and narrows down a cause.
ECU Reprogramming	Permits updating programs in ECU for system version upgrade.
Electronic service information	Displays with Service manual data. In addition, the system supports interactive fault diagnosis. The Interactive Diagnosis permits user to use both the scan tool viewing functions and service manual troubleshooting procedures. (Not available in US and Australia)
Tension meter	Permits measurement of belt tension using Belt tension meter set (MB991668).
Fuel pressure meter	Permits measurement of fuel pressure using a pressure gauge set (MB991637 / MB991981), and displays it on PC. (Not available in US)
Fuel consumption measurement	Permits more precise measurement of fuel consumption by measuring injection quantity of fuel injector.

2-2. V.C.I. Functions

<When V.C.I. and PC are connected>

2-2-1. Fault Diagnosis

The system diagnoses faults by receiving instructions from the PC and communicating with the vehicle-installed ECU. When the system is connected to the PC, V.C.I. keys are disabled.

[Start Screen]

*When the USB cable is connected to the system, the screen illustrated on the left appears.

The screen indicates the flow of signals between the PC (P) and V.C.I. (V) using “P → V” and “P ← V”.

2-2-2. Fuel Pressure measurement (Not available in US)

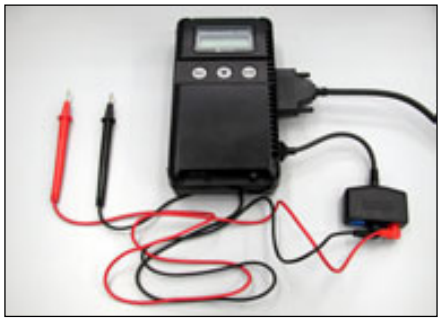
The system analyzes faults by measuring fuel pressure using the Pressure gauge set (MB991637 or MB991981).

{Pressure gauge for LP: MB991655 or MB991979
for HP: MB991708 or MB992007}

The V.C.I. reads the fuel pressure, which is converted into voltage value by the pressure gauge. Then the system converts it back to pressure value and displays it as text or graph on PC screen. (refer to 10-2-1.)

<With the V.C.I. only>

2-2-3. Measurement Function - Voltmeter / Ohmmeter



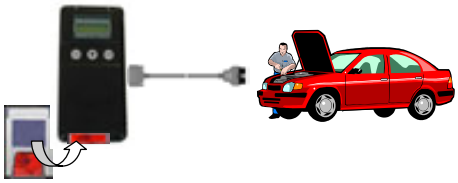
The system reads the voltage/resistance value from the trigger terminal and displays the value on the V.C.I. LCD screen.

1. Connect the measurement adapter to the V.C.I., connect the test leads to the adapter.
2. Connect the appropriate main harness to the V.C.I., and then to the vehicle diagnostic leak connector and turn the V.C.I. power switch ON.
3. Press ▼ button to select Voltmeter or Ohmmeter in the Main Menu (see the illustration on the left), and press the Enter (Enter) button to begin measurement.

Note:

- Permits measurement of DC voltage within the range of 0-±40V.
- Permits measurement of resistance within the range of 0-100KΩ.
- Permits displaying the value as text or graph on PC screen by connecting the V.C.I. to PC. (refer to 10-2-2.)

2-2-4. V.C.I. Stand-alone Diagnosis



You can read out DTCs with V.C.I. stand-alone by using a memory card, which is storing a diagnostic data transferred from PC. There is no need to carry PC or USB cable on the diagnosing vehicle. (For detailed operation, see 4-4)

1. Transfer the diagnostic database file into a memory card. (4-4-1)
2. Insert the memory card into V.C.I., then connect the V.C.I. and the vehicle with an appropriate main harness.
3. Start reading out DTCs from vehicle-installed ECU by V.C.I. stand-alone. (4-4-2)

Note:
Until a new database file will be distributed, you do not have to operate above step1. Please proceed just step2 and 3.

Chapter 3 Operating M.U.T.-III

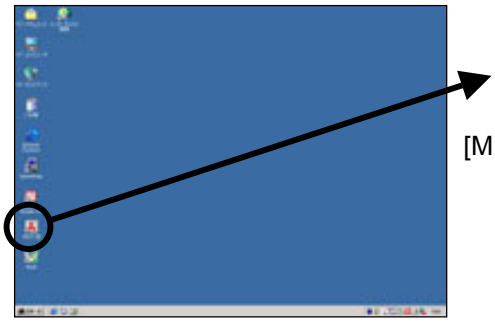
3-1. Starting and Shutting the M.U.T.-III System

3-1-1. Starting the M.U.T.-III System

[Starting the PC]

1. Please turn on the power of M.U.T.-III PC.
   (Refer to the instructions of M.U.T.-III PC for details.)

[To start up M.U.T.-III System]



2. Double-click the M.U.T.-III icon displayed on the desktop to start up the system.

[M.U.T.-III icon]

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3-1-2. Shutting Down the M.U.T.-III System

[Close the M.U.T.-III System]

1. Press button on each diagnostic screen to return to the STV Top Menu screen (illustrated on the left).
   Then press button on this screen to go to the M.U.T.-III Start screen.

2. Press **Exit** button displayed on the lower right portion of the M.U.T.-III Start screen. M.U.T.-III system will close.

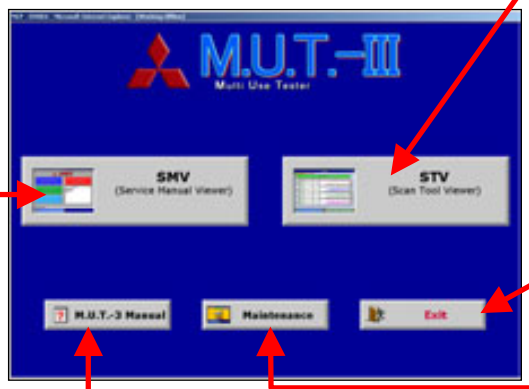
[Shutting down the PC]

3. Click the Windows **Start** button (lower left portion of the screen), and select "*Shut Down*".

4. Select "*Shut down*" from the pull-down menu, and press the **OK** button.

3-2. Screen Explanations

< M.U.T.-III Start Screen >



Starts **"Scan Tool Viewer (STV)"** system.
This manual contains information for proper operation of this system.
Press this button first to start various interactive diagnoses.

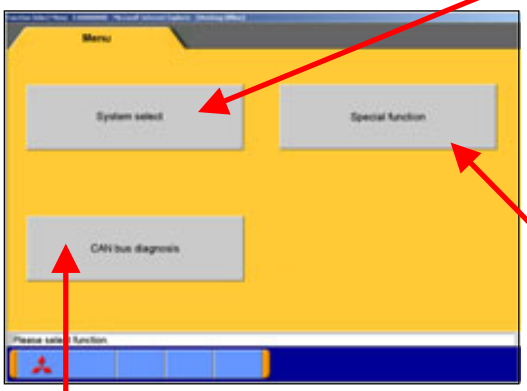
Exits the M.U.T.-III system.
(refer to 3-1-2.)

To set option settings, e.g. displaying language. (refer to 3-4.)

Shows "M.U.T.-III Owner's Manual".
(refer to 3-5-2.)

Starts "**Service Manual Viewer (SMV)**".
For detailed operation procedure, click the SMV MANUAL bookmark on the left screen of Adobe Reader.

< STV Top Menu >



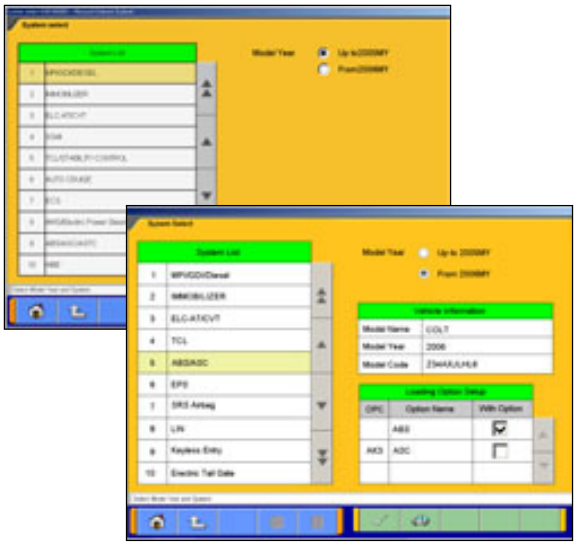
To diagnose vehicles by selecting each system (ECU).
e.g.
-Reading diagnostic trouble code
-Actuator test -Drive recorder

For detailed operation procedure, refer to 3-3-1.

-To display saved data
(Drive recorder, SWS monitor)
-V.C.I. Stand-alone Diagnosis (4-4)
-All DTCs Function (4-5)
-ECU reprogramming (Chapter 9)
-Measurement Function (Chapter 10)

Starts the CAN bus diagnosis.
refer to Chapter 8.

< System Selection Screen >

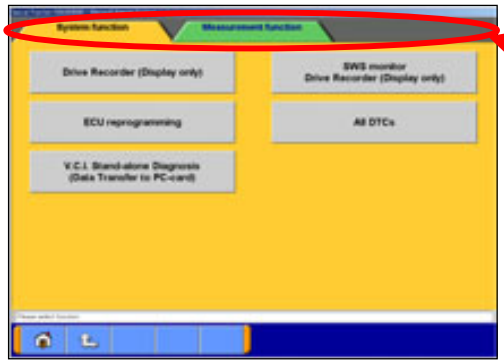


This screen is for specifying a system that you want to diagnose.

As operation procedure differs according to the vehicle's Model Year, please select "Up to 2005MY" (2004MY in EU) or "From 2006MY" (2005MY in EU) firstly.

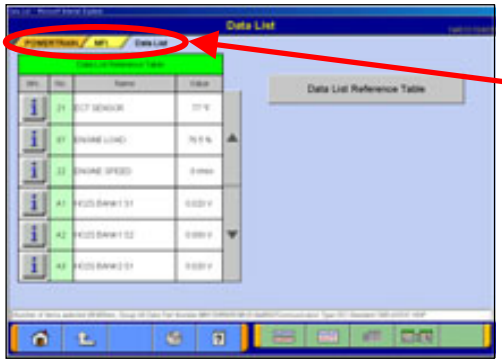
(refer to 3-3-1)

<Special Function Selection Screen>



The Special Function selection screen allows you to switch between major categories by selecting the tabs located on the upper part of the screen.

<Diagnostic Screen>



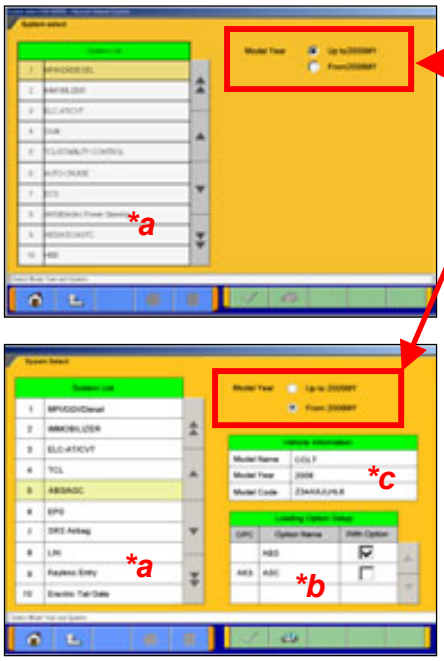
The diagnostic screen displays three titles in layer format, informing you what is being implemented on each system. The screen does not allow you to switch systems by selecting the upper title areas.

3-3. Basic Flow to Start Diagnosis

3-3-1. Basic Flow of System Select Diagnosis

(1) M.U.T.-III Start Screen
Press **STV (Scan Tool Viewer)** button on the M.U.T.-III Start Screen.

(2) STV Top Menu
Press **System Select** button on the STV Top Menu screen.



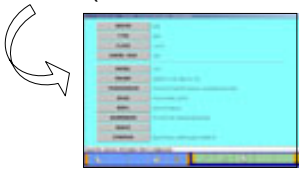
(3) System Selection Screen
Select either one of "**Up to 2005MY**" or "**From 2006MY**" for the Model Year of the vehicle you are diagnosing.
Then follow the each operation below.

✧ When selecting "**Up to 2005 MY**"

1. Select a system on the *System List* *(*a)*, and press ✓.
2. If the system has a loading option, the *Loading Option Setup* list *(*b)* will be displayed. Then, select an item having a box checked (✔) and press ✓ button.

✧ When selecting "**From 2006 MY**"

1. Confirm the contents of the *Vehicle Information* list *(*c)*.
   -When the contents are not describing the vehicle, press 🚗 to correct the information. (For details, refer to 3-3-2)



2. Select a system on the *System List* *(*a)*, and if the *Loading Option Setup* list *(*b)* is displayed, select an item having a box checked (✔). Then press ✓ button.

Note:
M.U.T.-III for EU countries, the options for Model Year is classified in "**Up to 2004 MY**" and "**From 2005 MY**".

[MPI/GDI/DIESEL 's Function Selection menu]

(4) Function Selection Screen

After System selection, the Function selection menu of the selected system appears. Select a button that you want to perform.

In the picture on the left shows the screen appears when the MPI/GDI/DIESEL system, which is a representative example, is selected. Details of each buttons are as follows.

Note:

As available functions differ between systems, there might be functions that will not appear when you select other system.

Check Chart For Problem Symptoms -- To view the Symptom Chart of Service Manual.

Self-diagnosis -- To read out or erase Diagnosis Trouble Codes from vehicle ECU. Also, you can read out the Freeze Frame data. (refer to 4-1.)

Simulated Vehicle Speed Output --To transmit simulated vehicle speed signal into the vehicle.

Data List -- To read the RAM data inside the ECU and displays the data in digital and graphic form. (refer to 4-2.)

Actuator Test -- To control the ECU output device. (refer to 4-3.)

Drive Recorder -- To record, display or analyze the ECU input / output signals which can be viewed using Data List function. (refer to Chapter 6)

Special Function -- To execute special functions specific to the selected system. For detailed operation other than Chapter 5, please utilize each Online Help function.

OBD-II Test Mode -- To read out "Monitoring test results" "Provisional DTC" and "ECU information", which are regarding Emission Related System, from ECU.

Readiness Test -- To read out the result of Readiness Test from ECU.

Voltmeter -- To measure voltage value using M.U.T.-III. (same operation as 10-2-2)

Ohmmeter -- To measure resistance value using M.U.T.-III. (same operation as 10-2-2)

Fuel Pressure Gauge -- To measure fuel pressure using a pressure gauge, and display the result on PC screen. (Not Available in US)

Check Mode -- To shorten sampling time of communication by changing the communication method between M.U.T.-III and ECU. This function is available in Data List, Drive Recorder and Actuator Test.

Emission Test -- To test the Evaporative Emission Control System of the vehicle.

Coding -- To write the vehicle equipment specifications into ECU.

SWS monitor (appears only when selecting "**SWS**" system) (refer to Chapter 7)

Pulse Check (appears only when selecting "**SWS**" system)
-- To confirm existence of the signal pulse to operate remote system on SWS communication line.

3-3-2. Vehicle Information Setting

Pressing button, on System Selection Screen or other vehicle-confirmation screen, displays the Vehicle Information Setting Screen. This screen allows you to modify the diagnosing vehicle information.

(1) Vehicle Information Setting Screen

-Currently selected information is displayed in each item's field. (Blank space means the information is not selected.)

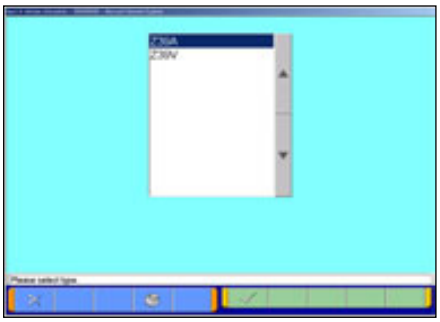
- **DESTIN**, **TYPE**, **CLASS** and **MODEL YEAR** are compulsory input.

--OK (Returns to the screen on which was pressed)

--Deletes whole information

--Displays history of settings as open options.

Press an item button to modify. -- to (2)



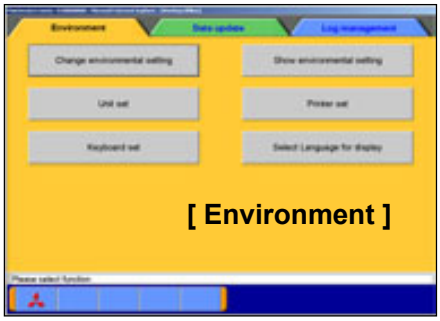
(2) The item's individual selection screen appears.

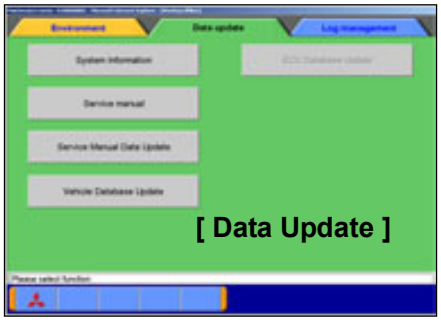
Apply appropriate information, then press button to return to the Vehicle Information Setting screen (1).

3-4. Option Settings

3-4-1. Edit Option Settings

(1) Press **Maintenance** button on the lower portion of the M.U.T.-III Start Screen.





(2) Select a button corresponding to your purpose.

[Environment]

Change Environmental setting-- To set the driver, which the Service manual data should be installed.

Show environmental setting-- To view the settings.

Unit set-- To select US unit or metric unit, e.g. lbs : kg

Printer set-- To set output conditions of the printer. (3-4-2.)

Keyboard set-- To select row of keys: Alphabetical-order or QWERTY.

Select Language for display-- To select a language displayed in whole M.U.T.-III system and Service manuals. (Service manual will not be displayed unless the selected language has been downloaded.)

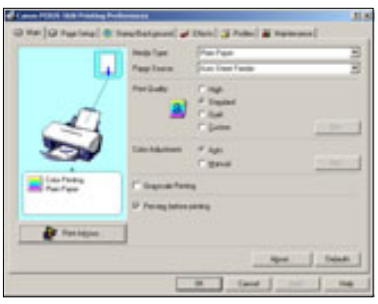
[Data Update]

System Information-- To view versions of installed software on the PC.

3-4-2. Set up Output conditions of Printer

(1) When pressing the **Printer set** button on 3-4-1(2), the "*Printer*" window illustrated on the left appears.
Select an appropriate printer icon and right-click it to open a pull-down menu; select "*Printing Preferences*…".

Note
-Set up conditions on this window will not be reflected.



(2) The "*Printing Preferences*" window of the selected printer appears. Please set output conditions e.g. page setup, and press OK button.

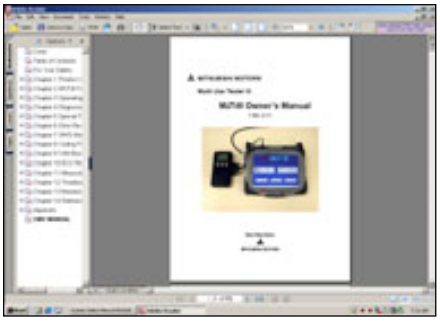
3-5. Useful Functions

3-5-1. Online Help Function

(1) The [?] button on each screen is the online help button for that screen.

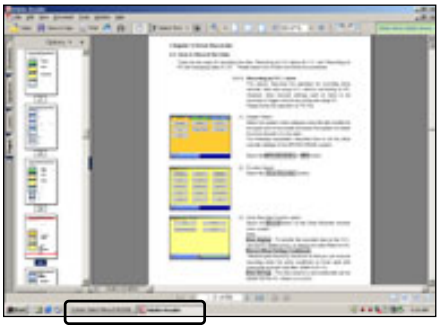
(2) The online help function allows you to view a general overview of each screen and refer to explanations of the various button functions. If you wish to move the screen up or down, select the applicable scroll button located on the right side of the screen.

3-5-2. Display "M.U.T.-III Owner's Manual"

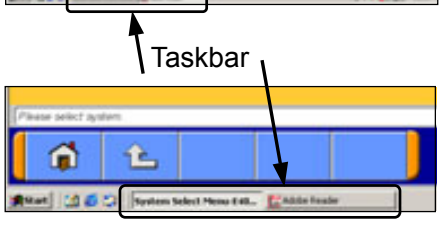


Press **M.U.T.-3 Manual** button at the lower-left portion of the M.U.T.-III Start Screen, then this Adobe Acrobat Reader "M.U.T.-III Owner's Manual" starts.

■ Select "*Bookmarks*" tab at far left of the window.
-When you select a title on the left column, you can jump into the corresponding page.
-When you click [+], it turns to [−], and titles in lower layer are displayed.



■ Select "*Pages*" tab at far left of the window, then miniature version of pages are displayed on the left column. It shows currently displayed page with red frame so that you can see where the page is.

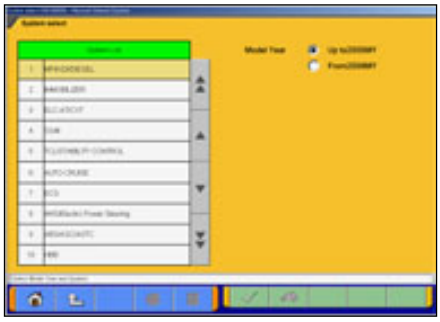


■ Selecting M.U.T.-III system or "*Adobe Reader*" appearing as buttons on the Taskbar switches between the system and the manual. You can hereby readily check this manual while operating M.U.T.-III system.

Chapter 4 Diagnosis Function

4-1. Diagnostic Trouble Code

4-1-1. Reading and Erasing Diagnostic Trouble Code (DTC)



(1) Select a system that you want to diagnose on the System Selection screen. (For instruction on how to select a system, refer to 3-3-1)

- In the explanation that follows, the method is explained using the MPI/GDI/Diesel system as a representative example.

Note:
If the engine is OBD, a check code appears.

(2) Press **Self-diagnosis** button.

The system automatically communicates with the vehicle ECU and obtains the diagnostic trouble codes (DTCs).

(3) Diagnostic trouble codes (DTCs) of the selected system, which is currently stored in the vehicle ECU, are listed.

DTC Procedures From Service Manual
--Switches the mode to interactive fault diagnosis mode. (refer to 4-1-2)

(Not Available in US, Australia)

Change Sensitivity --Allows you to increase the diagnostic code detection capability of the ECU or return the sensitivity level back to normal.

Erase DTCs --Deletes the diagnostic trouble codes.

Freeze Frame Data --Displays the Freeze frame data.

4-1-2. Interactive Fault Diagnosis Mode

(1) Press **DTC Procedures From Service Manual** button.

Note:
It is not necessary to select DTC code to be diagnosed..

(2) Vehicle Information Setting Screen

-Currently selected information is displayed in each item's field. (Blank space means the information is not selected.)

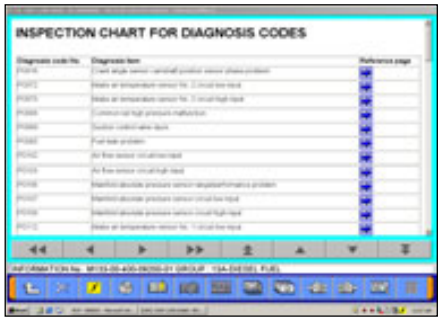
-**TYPE**, **CLASS** and **MODEL YEAR** are compulsory input.

--OK

--Deletes whole information

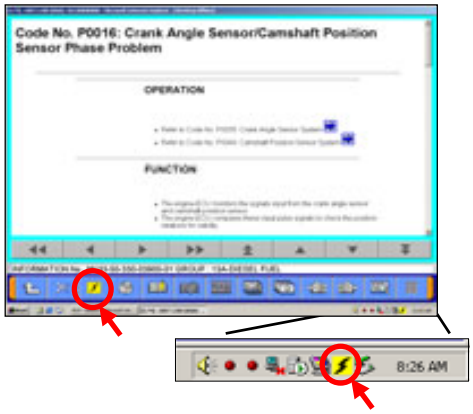
--Displays history of settings as open options.

Note:
In case you want to be Interactive diagnosis mode, Workshop Manual data has to be installed into PC..



(3) Diagnosis codes chart Screen

Diagnosis codes of the selected vehicle are displayed.
In order to diagnose for current DTC, press button to start troubleshooting.



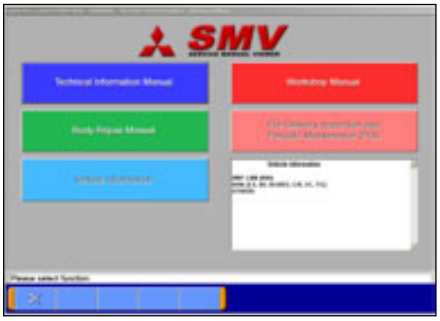
(4) Workshop Manual data of the selected DTC will be displayed.

Proceed in accordance with displayed procedure on Workshop Manual, press **Yes** button or **No** button to go to next step.

Press button to scroll the screen up and down, left and right movements.

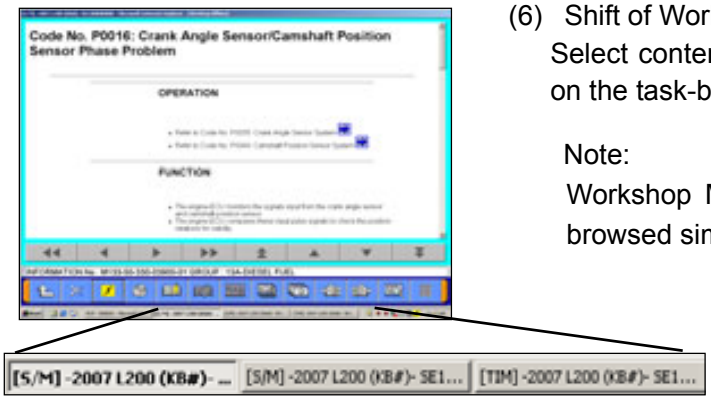
When you finished your operation, press button lower-left of the screen to close Workshop Manual screen.

On the Workshop Manual screen, another Workshop Manuals can also be started up by pressing button.
As it enables to browse multiple Workshop Manuals, so it is possible what Wiring diagram can be browsed while doing diagnosis each DTC. -- to (5)



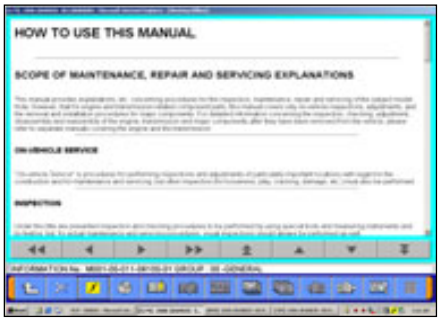
(5) Workshop Manual select screen
Select manual to be browsed.

Note:
Vehicle Information button is not activated.



(6) Shift of Workshop Manual
Select content you want from Workshop Manuals displayed on the task-bar button of the screen.

Note:
Workshop Manual in different kind of vehicles cannot be browsed simultaneously.



(7) On Workshop Manual Viewer
SMV that would be started up for the first time is called SMV(Main), and others are called SMV(Sub).
- When SMV(Main) will be closed by button, other SMV(Sub) will be also closed altogether.
- Each Workshop Manual(Sub) can be closed individually.
- Select content you want from Workshop Manuals displayed on the task-bar bottom of the screen.

4-2. Data List (Service Data monitor)

4-2-1. Display of Data List

(1) Displaying Text style

Press **Data List** button on the screen 4-1-1(2), and the left screen will be displayed.

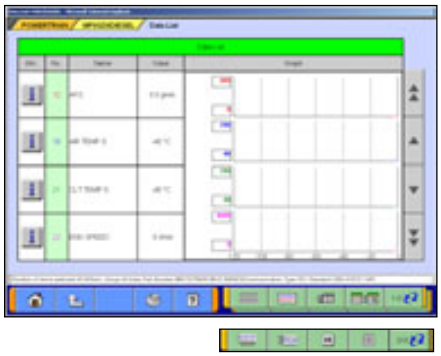
-- Select item -- to 4-2-2(1).

-- 4items/4Graphs display -- to (2)

-- 4items/View Graph (overwrite) -- to (3)

Data List Reference Table -- Displays “Data List Reference Table” of Service Manual to view normal value.

(Not available in US and Australia)



(2) Displaying Graphs 1

The graph screen displays the data of 4items/4graphs.

-- 4items/4Graphs display

-- 4items/View Graph (overwrite)

-- View Text

-- View1/2

-- Change Time Scale

-- Change Data Scale

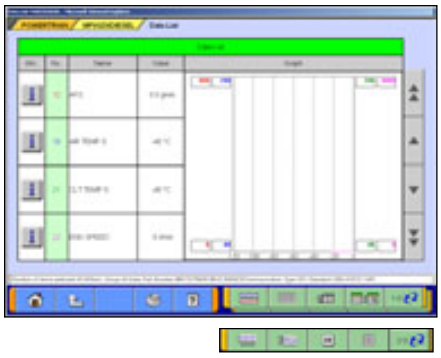
-- Pause -- to 4-2-2(2)

-- Start

-- View2/2

Note:

Record Data (button allows you to save the portion of Data List displayed on the graph)-- refer to 4-2-2(2)

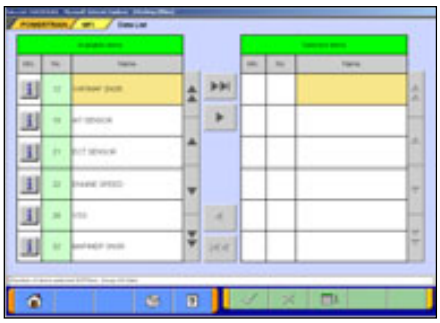


(3) Displaying Graphs 2

The data of displayed items are overlaid on a graph.

Available function buttons are the same as Graph 1.

4-2-2. Details of Data List Screen



(1) Displaying Item Selection

- Item Group Select

  Select a group of the data to be displayed, and press button.

- Item Select

  By default, none of the items are selected.

  Select an item that you wish to display, and apply the selection using or buttons.

  --Inserts all the items from “Available item list” into the selection areas of “Selected item list.”

  --Inserts the item selected in “Available item list” into the selection area of “Selected item list”.

  --Inserts the item selected in “Selected item list” into the lowermost area of “Available item list”.

  --Inserts all the items from “Selected item list” into the lowermost areas of “Available item list.”

  --Changes the order in which the items are displayed in the “Selected item list” and the “Available item list,” in the sequence of default setting.

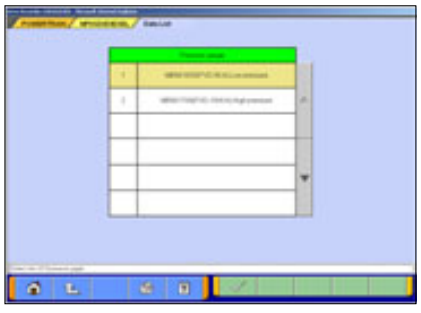
When complete the selection, press button.

Note:

-When there is no selected item, all items are displayed.

-The column of item No appears in green when the service data is OBD basic items.

-“Fuel pressure” and “Voltmeter” cannot be selected simultaneously.



When you select the item “Fuel pressure”

1. Pressure gauge list will be displayed after item selection. Select a type of pressure gauge used for fuel pressure measurement, and press button.

2. Set up the calibration voltage of the pressure gauge, and press button.

   Note:

   For details on how to measure calibration voltage, refer to 10-2-1(1).

(2) Record Data

1. Graph data is paused by pressing button, and the data can be saved on the PC automatically.
   -- OK -- to 2
   --Cancel (Not save the data and return to the pause screen. Pressing button starts data list again.)

2. The data has been saved.
   The file name of the recorded data is set as ”SD + YearMonthDay + Time (military time including seconds)”, using the PC time as standard.
   -- OK

Note:
For details on how to view the saved data, refer to 6-2-2(3).

(3) Changing Item Display Order

-On the data list display screen, you can change the display order of the items. The change is possible for both text display and graph display.
-The display order change can be performed with the data list displayed continuously. (The graph display is reset.)
-Selecting the name display area of an item fixes the item. Then over-scrolling only the items not selected using the vertical scroll keys changes the order.
-The selection can be released by selecting the item again.
-The function is not activated while a data range display area is selected. (Selection, release, and scroll functions of item are not available.)

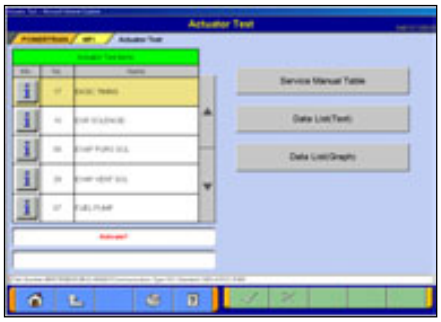
(4) Data Range Change

-Select a data range display area on the graph.
-When the color of the selected area turns into yellow, you can enter values.
-Entering method: Use PC keyboard or scroll keys.
-When use PC keyboard, enter a value, and then press the [Enter] key or release the selection of the data range display area to determine the data range change.
-When the scroll keys, and , on the screen are used for the data range change, pressing the key each time changes the data range setting by +5 % of full scale and the key changes it by –5 %. The change is determined at each key pressing.

4-3. Actuator Test

Press **Actuator Test** button on the screen 4-1-1.(2), then go to 4-3-1 or 4-3-2 to proceed, according to the type of the screen, A or B.

4-3-1. Actuator Test (Type A)



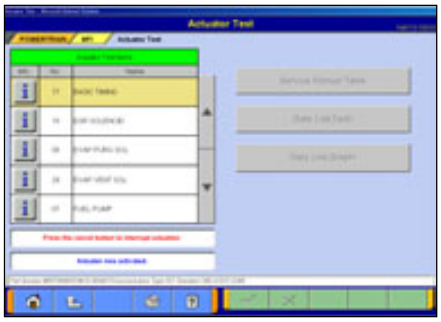
If the screen illustrated on the left appears….

(1) Select a test item and press ✓ button to activate actuator.

Service Manual Table --Displays "Actuator test Reference Table" of Service Manual. (Not Available in US, Australia)

Data List(Text) --Data List simultaneous display (Text)

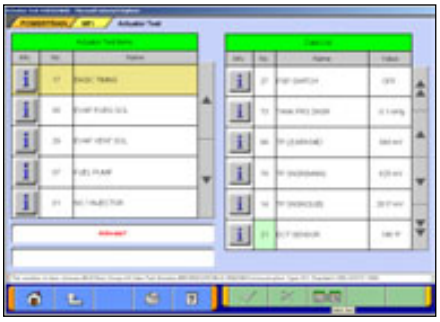
Data List(Graph) --Data List simultaneous display (Graphs)



(2) Actuator Test Executing

If you want to interrupt Actuator Test, press ✕ button.

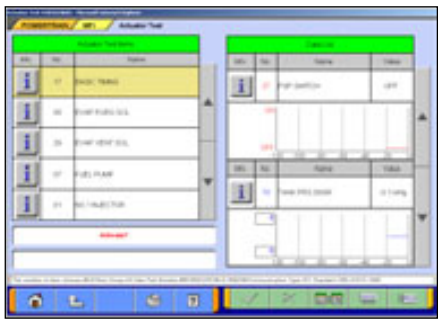
When completes the test, a dialog box appears.
Press ✓ button. → returns to screen (1).



■ Data List simultaneous display (Text)

Refer to (1)(2).

--Select items for Data list display
(For details how to select items, refer to 4-2-2 (1).)



■ Data List simultaneous display (Graphs)

Refer to (1)(2).

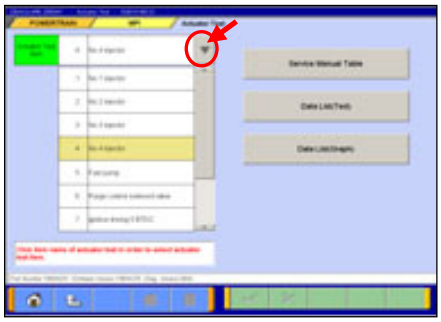
--Select items for Data list display
(For details how to select items, refer to 4-2-2 (1).)

--Change Time Scale

--Change Data Scale

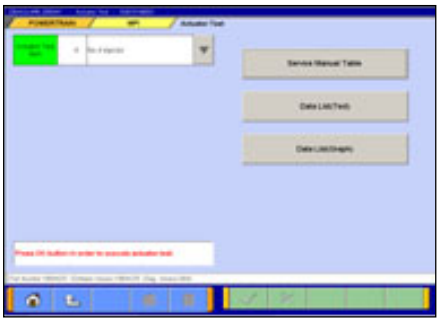
4-3-2. Actuator Test (Type B)

If the screen illustrated on (2) or (3) appears….



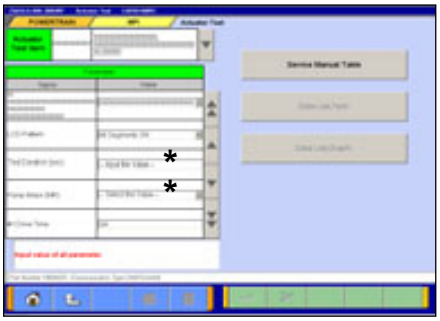
(1) Press ▼ button located next to item name, and select a test item from the pull-down menu.
-When the selected item has no parameters -- to (2)
-When the selected item has parameters -- to (3)

Service Manual Table --Displays "Actuator Test Reference Table" of Service manual.
Data List(Text) --Data List simultaneous display (Text)
Data List(Graph) --Data List simultaneous display (Graphs)



In case selected item has no parameter

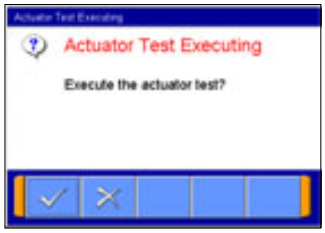
(2) Press ✓ button to execute Actuator Test. -- to (4)



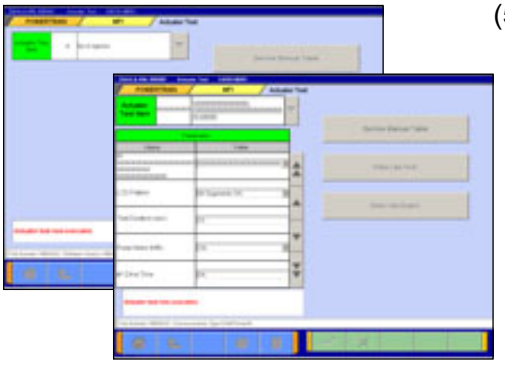
In case selected item has parameters

(3) The test item that you have selected need to be set some parameters. After completes the parameter setting, press ✓ button to execute the Actuator Test. -- to (4)

* "--Select the Value--" : Select the value from the pull-down.
* "--Input the Value--" : Input the value using hexadecimal keys appeared by clicking the input box.



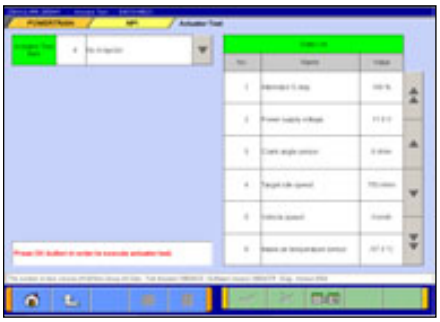
(4) Confirmation dialog box appears.
Press ✓ button



(5) Actuator Test Executing

If you want to interrupt the Actuator Test, press button.

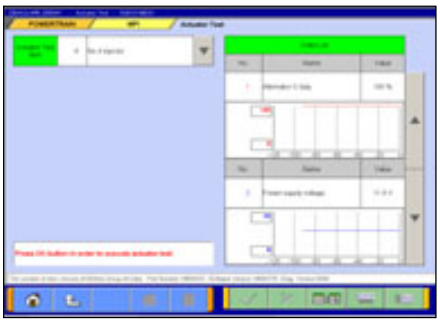
When completes the test, a dialog box appears.
Press button. → returns to screen (2) or (3).



■ Data List simultaneous display (Text)

Refer to (1)-(5).

--Select items for Data list display



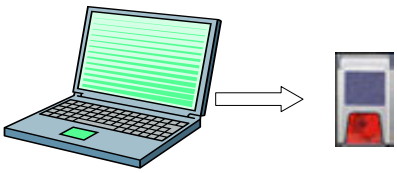
■ Data List simultaneous display (Graphs)

Refer to (1)-(5).

--Select items for Data list display
--Change Time Scale
--Change Data Scale

4-4. V.C.I. Stand-alone Diagnosis

This function allows you to read out DTCs by V.C.I. alone, without carrying PC or USB cable into the vehicle, using a memory card that is storing a diagnostic data transferred from PC.
Once 4-4-1 has been performed, you should precede just 4-4-2 operations until a new database will be distributed.



4-4-1. Data transfer to memory card

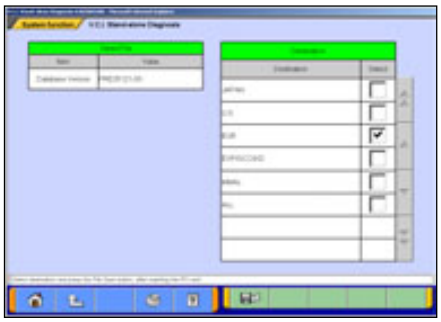
Transfers the data in hard drive to a memory card.
Please perform this operation after every update of the database for V.C.I. stand-alone diagnosis.

(1) Insert the memory card (MB991853) into the card adaptor (MB991939), and then insert them into m-card slot on PC.

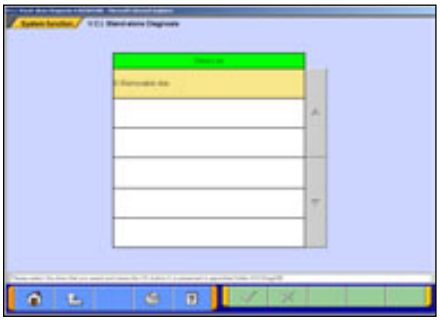
Note:
If you use the same memory-card as using for ECU reprogramming, it may take time to display the next step after selecting [1.Read DTCs] on V.C.I. LCD menu. (refer to 4-4-2(2)).

(2) Press **Special Function** button on the STV Top Menu.

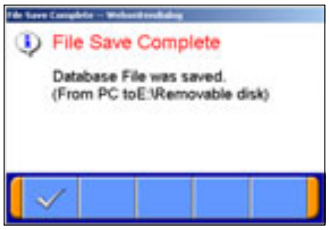
(3) Select **System Function** tab,
then press **V.C.I. Stand-alone Diagnosis** button.



(4) The version of current data for V.C.I. Stand-alone Diagnosis is indicated on the left table.
Please select a destination having a box checked (☑) on the right table, then press button to transfer the data.



(5) Drive Selection
Select the appropriate drive (removable disk drive) to save the data, then press ✓ button.

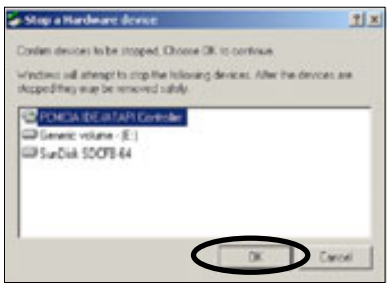


(6) The data has been saved.
Press ✓ button.

Double click here

(7) Before you remove the memory card, double-click the icon for removal of adaptor displayed on the bottom-right corner.

(8) Select [*PCMCIA IDE/ATAPI Controller]* or the other appropriate device, then press **Stop** button.

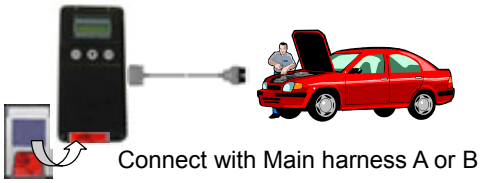


(9) Verify the contents of the selection, then press **OK** button.

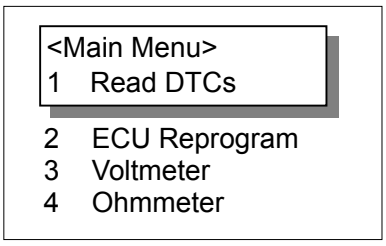
(10) After displayed the message “The device can now be safely removed from the system”, push the lever on the side of PC m-card slot and remove the memory card.

Caution:
Do not remove the memory card away unless complete above method or turn off the PC.

4-4-2. Reading DTCs by V.C.I. stand-alone

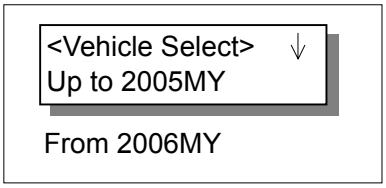


(1) Insert the memory card, which is storing V.C.I. stand-alone diagnosis data, into the card adaptor, then insert them into V.C.I. main unit.
-Connect the V.C.I. main unit and the diagnosing vehicle with an appropriate main harness securely.



(2) Turn the V.C.I. power ON, and the V.C.I. LCD screen displays the Main Menu as illustrated on the left.
Confirm that "**1. Read DTCs**" is displayed, then press (Enter) button.

Note:
-If the memory card stores no data, the above Main Menu will not be displayed.
-If the V.C.I. is set on Drive Recorder mode, the LCD displays Drive Recorder menu screen (refer to 6-1-1(18)). Please cancel the Drive recorder mode.



For EU countries, the options are classified in "**Up to 2004 MY**" and "**From 2005 MY**".

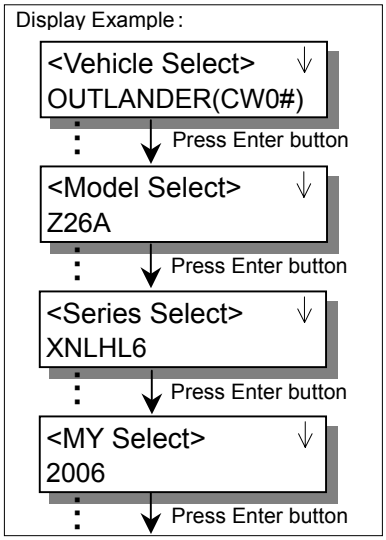
(3) Press button to browse the list until the LCD displays the appropriate category for the vehicle you are diagnosing, then press (Enter) button.

-When selecting "**Up to 2005 MY**" -- go to (5)
-When selecting "**From 2006 MY**" -- go to (4)

Note: **<Common operations for (3)-(7)>**

- The display scrolls in the direction of the arrow displayed on the first line. To switch the direction, press (Esc) button once.
- If you press (Esc) button twice in quick succession, the screen goes back to the Main Menu.

Display Example:



(4) As next 'Vehicle Select' menu is displayed, press button to browse the list until the LCD displays the vehicle name, then press (Enter) button.

After vehicle selection, the LCD menu is followed by 'Model Select', 'Series Select', and 'Model Year Select'. Perform each selection in the same operation. → go to (6)

Note:
-The options are displayed in alphabetical order.

Display Example:

<System Select> ↑
MPI/GDI/DIESEL
IMMOBILIZER
ELC-AT/CVT
ABS/ASC/ASTC
TCL
⋮

(5) System Selection

Press ▼ button to browse the list until the LCD displays the system you want to diagnose, then press Enter (Enter) button.

Display Example:

<Option Select> ↓
ABS
ASC

(6) Option Selection

If the system has a loading option, the 'Option Select' menu will be displayed. (If not, go to (7) directly)

Select an option, then press Enter (Enter) button.

Display Example:

<DTCs> ↓ 01/10
C1234 RL Weel Sp
C xxxx * Pump Motor
C xxxx Brake Peda
U xxxx * Bus off
⋮

(7) Display of the DTCs

The DTCs that have been read from ECU are displayed.

-The number shown on the right edge of first line is indicating [Serial # / Total number of detected DTCs].

-Press ▼ button to display the next DTC.
(When having only one DTC, the arrow is not displayed on the first line.)

-V.C.I. is constantly reading DTCs and updating the display.

-If the system supports status recognition, current status of each DTC is expressed by the following symbols, which appears between code and name.

Active	: [ ] (blank)
Stored	: [*]
Pending	: [#]

RL Weel Speed Sen
sor Short Circuit

-Pressing Enter (Enter) button shows full name of the DTC.
(To return to the previous screen, press Enter or Esc once.)

NOTE:

The following systems, which need special process to read DTCs, are out of target for the V.C.I. Stand-alone diagnosis.

-Some of ABS for MIRAGE / LANCER(CMO/CLO#)

-SWS for GRANDIS(NA4W) / COLT(Z20#)

4-4-3. Troubleshooting of V.C.I. Stand-alone Diagnosis

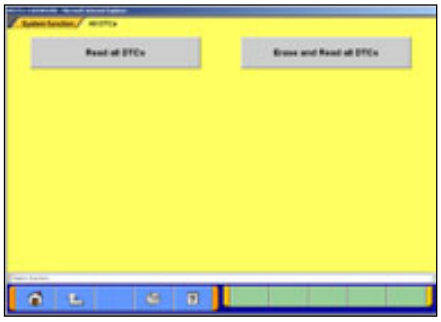
No.	Message	Cause/Remedy
1	<No DB Error> Check PC Card	<Cause> Failed to access the memory card. <Remedy> 1. Verify that the memory card is inserted into PC correctly. 2. Press the V.C.I. “Enter” key to go back to the Main menu, then start the operations over again.
2	<Version Error> Update Diag.data Current Ver Program: **.** Database: **.**	<Cause> The V.C.I. stand-alone diag. database stored in memory card does not work with the V.C.I. built-in program for V.C.I. stand-alone diag. <Remedy> 1. Press the V.C.I. “Enter” key to go back to the Main menu. 2. Remove the memory card, then insert it into PC to update the database.(refer to 4-4-1) 3. If the database is the latest one, connect PC and V.C.I. to update the V.C.I. built-in program. 4. Start the operations over again.
3	<Init. Error-*> Check the system	<Cause> Failed to initialize ECU by any cause. <Remedy> 1. Confirm that the system option that you selected is installed in the vehicle. 2. Check if the communication wire between V.C.I and ECU is breaking or not. 3. Verify that proper main harness is connected. 4. Press the V.C.I. “Enter” key, then restart the procedures from system selection operation. (4-4-2(5)) * Check the battery voltage of the diagnosing vehicle.
4	<NRC Error-*> Check the system	<Cause> Failed to read out DTCs. <Remedy> 1. Confirm that the system option that you selected is correct. 2. Press the V.C.I. “Enter” key, then restart the procedures from system selection. (4-4-2(5))
5	<Reg. Error-*> Update Diag. data	<Cause> The information read from ECU is not registered in the database. <Remedy> 1. Remove the memory card, then insert it in PC to update the database. (refer to 4-4-1) 2. Start the operations over again.
6	<Comm. Error> Retry?	<Cause> Communication between V.C.I. and ECU got disconnected from any cause. <Remedy> 1. Verify that the IG switch is turned ON. 2. Check if the communication wire between V.C.I. and ECU is disconnected or not. 3. Pressing the V.C.I. “Enter” key proceeds on the diagnosis. * Check the battery voltage of the diagnosing vehicle.

4-5. All DTCs

4-5-1. Reading and Erasing All DTCs

(1) Press **Special Function** button on the STV Top Menu.

(2) Select **System Function** tab, then press **All DTCs** button.



(3) Select a button corresponding to your purpose.

Read all DTCs

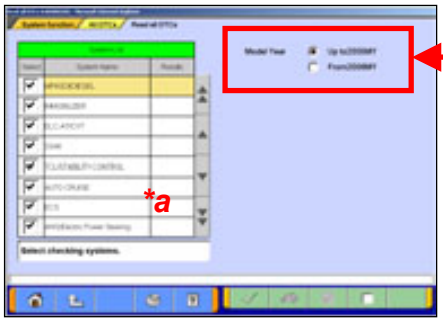
--Displays a list of all DTCs read from vehicle ECU.

Erase and Read DTCs

--Erases DTCs from system to system, and displays a list of all DTCs read from vehicle ECU.

Note:

-DTCs that failed to be erased are displayed on the list.
-DTCs that take time to detect after being erased will not be displayed.



(4) System Selection

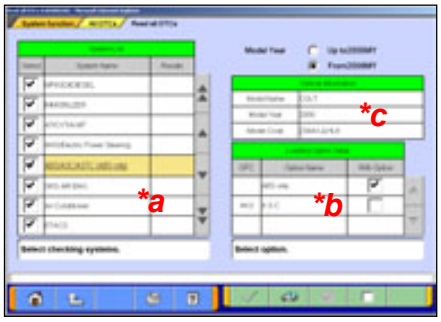
Select either one of "**Up to 2005MY**" or "**From 2006MY**" for the Model Year of the vehicle you are diagnosing.
Then follow the each operation below.

✧ When selecting "**Up to 2005 MY**"

The *System List* *(*a)* appears on the screen.

-All the systems are selected by default.
-Select systems to read DTCs having the box checked (✔), then press ✔ button.
(Clicking the box deletes the ✔ mark)

Note:
M.U.T.-III for EU countries, the options for Model Year is classified in "**Up to 2004 MY**" and "**From 2005 MY**".



✧ When selecting "**From 2006 MY**"

The *System List* *(*a)* and the *Vehicle Information* list *(*c)* appear on the screen.

1. Confirm the contents of the *Vehicle Information* list *(*c)*.
   -When the contents are not describing the vehicle, press button to correct the information. (refer to 3-3-2)

2. Select systems to read DTCs having the box checked (✔), and its option if necessary, then press button.

System List *(*a)*

-All the systems are selected by default.
-Clicking a box deletes the ✔ mark.
-System, which has loading options to be chosen, is indicated by underlining the name.
"system name (**Select Option!**)": Not chosen
"system name (option name)" : Has been chosen
-Systems to read DTCs must have completed the loading-option selection.

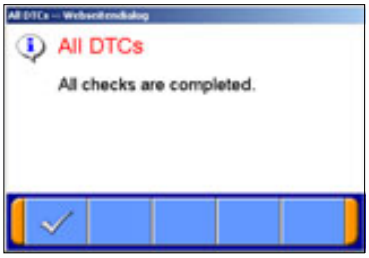
Loading Option Setup list *(*b)*

-Only displayed when the column of the system, which has loading-options to be chosen, is being selected (appearing in yellow color) on the *System List* *(*a)*.
-When this list appears, select an appropriate option having the box checked (✔).

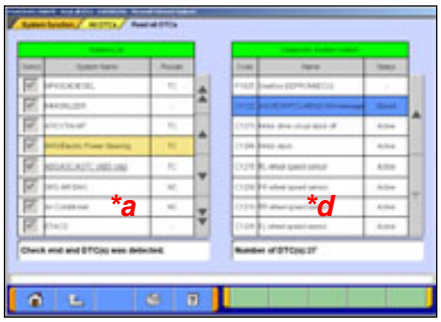
Note:
- button -- Sets all systems selected on *System list*.
- button -- Sets all systems unselected on *System list*.
-Deleting ✔ marks on systems, which are not installed in the vehicle, will shorten the processing time.
-It is no problem if a system, which is not installed in the vehicle, is selected.

(5) Confirmation dialog box appears.
Press button

(6) DTCs checking



(7) DTCs checking are complete.
Press button.



(8) Results

System List *(*a)*

-Indicates presence or absence of DTCs on the results field as below.

- "**OK**": DTCs are not detected
- "**TC**": DTCs are detected
- " **-** " : Unchecked (out of the check system)
- "**NC**": Not equipped or communication error

Diagnostic trouble code(s) *(*d)*

-All detected DTCs are listed.

-Indicates status of the DTCs as below.

- "**Active**" : The trouble occurs currently
- "**Stored**" : The trouble had occurred in past
- " **-** " : Not supporting status recognition

-When selecting a system with "TC" result on the *System List* *(*a)*, columns of corresponding DTC on the *Diagnostic trouble code(s)* *(*d)* will appear in blue color.

Pressing button returns the screen to (3).

NOTE:

The following systems, which need special process to read DTCs, are out of target for the All DTCs diagnosis.

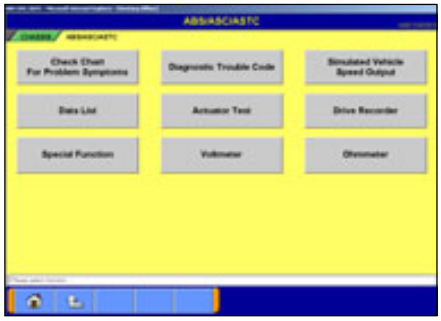
-Air Conditioner for GRANDIS(NA4W)

-SWS for DIAMANTE(F30/40#)

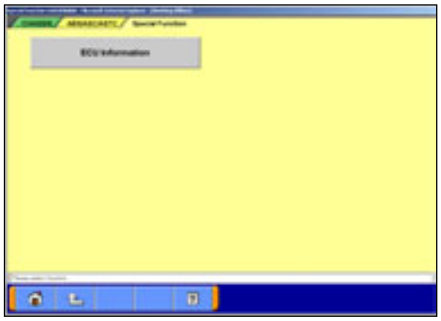
Chapter 5 Special Function (Calibration & Setting)

5-1. ECU Information

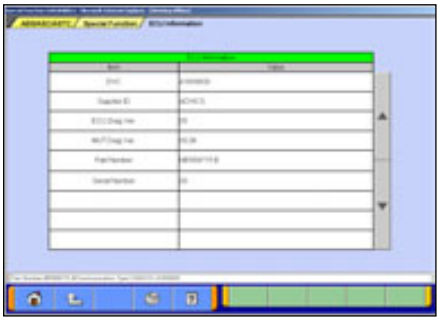
5-1-1. Displays ECU Information (*KWP2000 on CAN* only)



(1) Function Select
Select a system on the System Selection screen.
(For instruction on how to select a system, refer to 3-3-1)
Then press **Special Function** button on Function selection menu of the selected system.



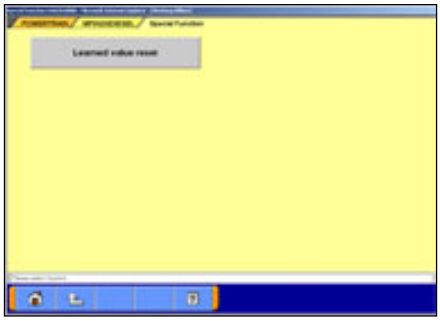
(2) Special Function menu Select
Press **ECU Information** button.



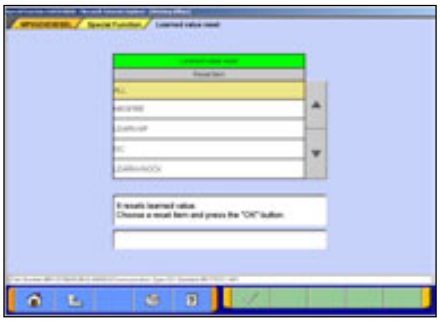
(3) The table of ECU Information appears.

5-2. Learned Value Reset

5-2-1. Learned value reset



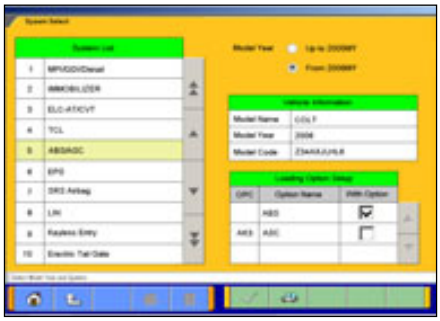
(1) Special Function menu Select
Press **Learned value reset** button.



(2) Select a reset item, and press button.

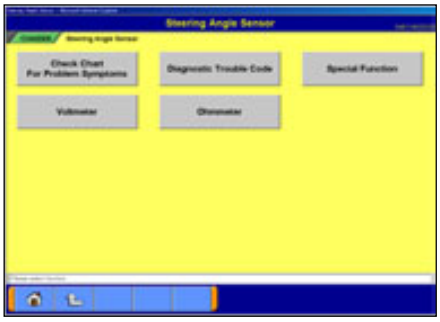
5-3. Steering Angle Sensor Calibration

5-3-1. Steering Angle Sensor Calibration



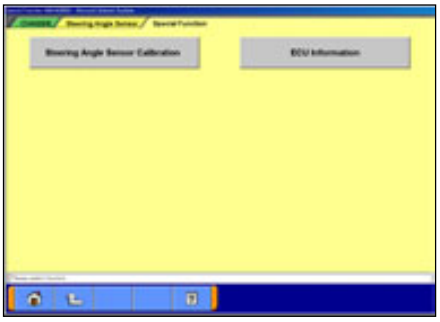
(1) System Select

Select "**Steering Angle Sensor**" on the System Selection screen. (For instruction on how to select a system, refer to 3-3-1)



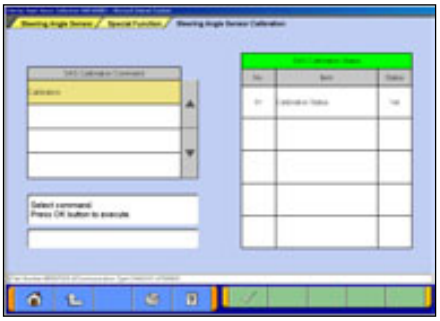
(2) Function Select

Press **Special Function** button.



(3) Special Function menu Select

Press **Steering Angle Sensor Calibration** button.



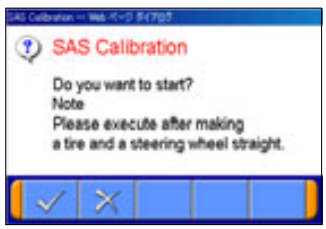
(4) Steering Angle Sensor Calibration

Select a command item and press the ✓ button to execute.

Note:

When the display is "Yet" as the result of status, it is to (5).

When the display is "Done" as the result of status, it is to (7).



(5) Study Confirmation

✓ --Start -- to (6).

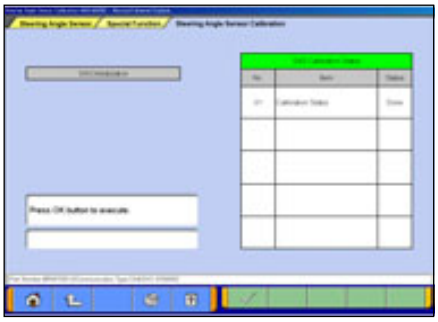
✗ --Cancel -- to (4).

Note:

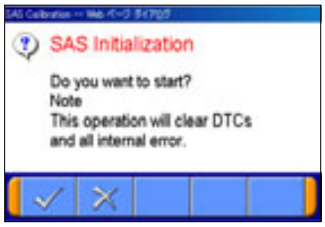
Please execute after making a tire and a steering wheel straight.

(6) Study Completed
--OK -- to (4).

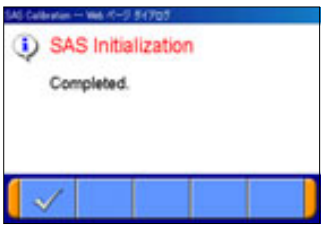
(7) Re-calibration
If the SAS needs re-calibration, press the button to execute SAS initialization.
--Cancel -- to (4).



(8) Initialization
Press the button to execute.



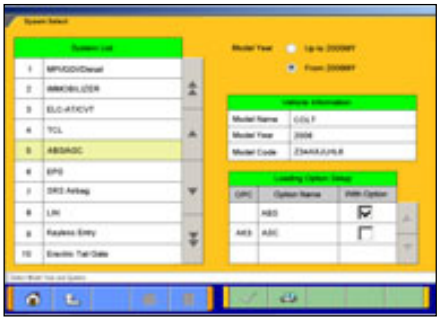
(9) Clear DTCs Confirmation
--Start -- to (10).
--Cancel -- to (8).
Note:
This operation will clear DTCs and all internal error.



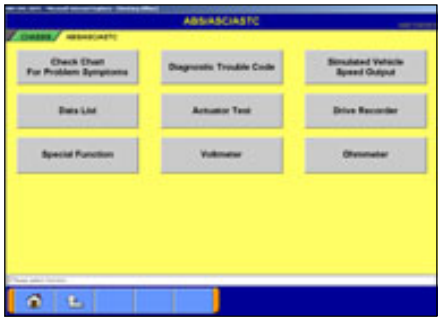
(10) Clear Completed
--OK -- to (4).

5-4. Lateral G Sensor Calibration

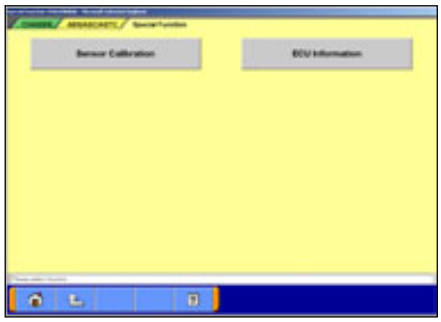
5-4-1. Lateral G sensor Calibration



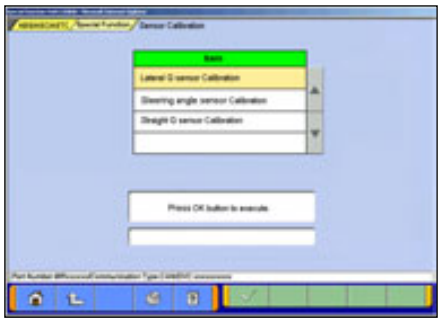
(1) System Select
Select “**ABS/ASC/ASTC**” on the System Selection screen.
(For instruction on how to select a system, refer to 3-3-1)



(2) Function Select
Press **Special Function** button.



(3) Special Function menu Select
Press **Sensor Calibration** button.



(4) Execute Screen
Press the ✓ button to execute.

(5) Execute Confirmation
✓ --Start
✗ --Cancel -- to (4).

(6) Lateral G sensor Calibration Completed
✓ -- returns to (4).

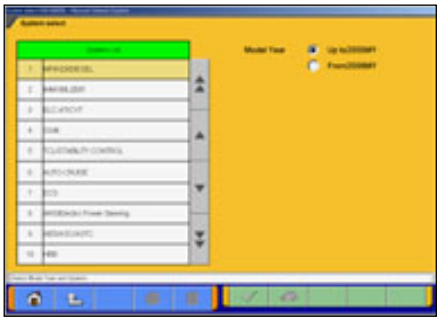
Chapter 6 Drive Recorder

6-1. How to Record the Data

There are two ways for recording the data, “Recording by V.C.I. alone (6-1-1)”, and “Recording on PC with displaying data (6-1-2)”. Please select one of them and follow the procedure.

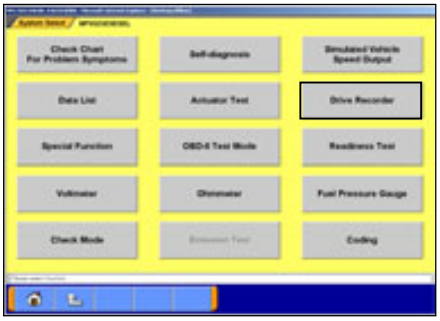
6-1-1. Recording by V.C.I. alone

This section describes the operation for recording data using only V.C.I. without connecting to PC. However, drive recorder settings such as items to be recorded or trigger method are configured using PC.
Please connect V.C.I. into PC and the vehicle, and start performing the following steps using PC first.

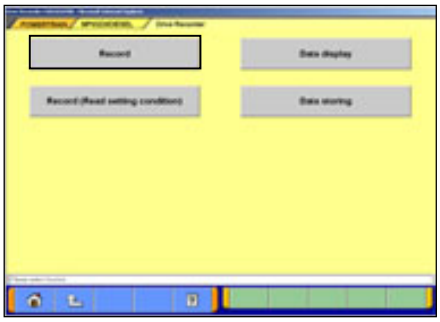


(1) System Select
Select a system for which the drive recorder is to be used on the System Selection screen.
(For instruction on how to select a system, refer to 3-3-1)

- The following explanation describes how to set the drive recorder settings of the MPI/GDI/DIESEL system as a representative example.



(2) Function Select
Press **Drive Recorder** button.

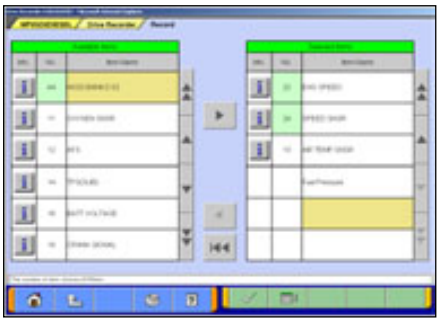


(3) Drive Recorder Function select
Press **Record** button on the Drive Recorder function menu.

Note:
Data display -- To transfer the recorded data on the V.C.I. into the PC (refer to 6-2), or display the data (refer to 6-3).

Record (Read Setting Conditions) -- Restore past recording conditions so that you can execute recording under the same conditions as those used with previously recorded data files. (refer to 6-1-3)

Data Storing -- The data saved in a removable disk can be stored into the PC. (refer to 6-2-2(7))



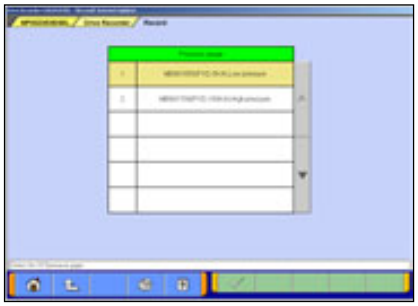
(4) Item Select

- Select an item you wish to record and apply the selection-using ▶ button.

▶ --Inserts the item selected in "*Available items* list" into the selected area of "*Selected items* list".
◀ --Inserts the item selected in "*Selected items* list" into the lowermost area of "*Available items* list".
⏮ --Inserts all the items from "*Selected items* list" into the lowermost areas of "*Available item* list".
--Changes the order in which the items are displayed in "*Selected items* list" and "*Available items* list", in the sequence of default setting.

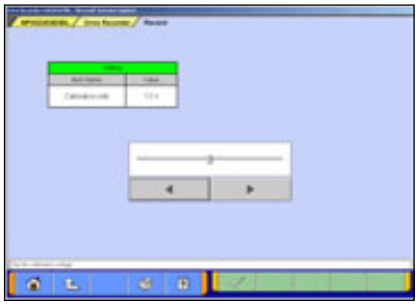
- When complete the selection, press ✓ button.

Note:
-A maximum of 16 items can be recorded.
-"Fuel pressure" and "Voltmeter" cannot be selected simultaneously.



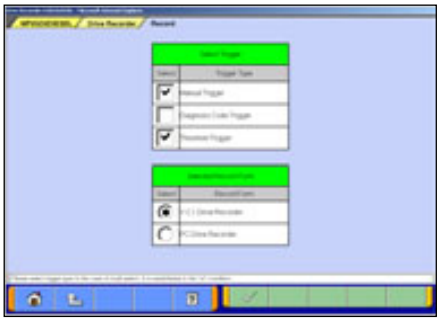
When you select the item "Fuel pressure"

1. Pressure gauge list is displayed after the item selection. Select a type of pressure gauge used for fuel pressure measurement, and press ✓ button.



2. Set up the calibration voltage of the pressure gauge, and press ✓ button.

   Note:
   For details on how to measure calibration voltage, refer to 10-2-1(1).



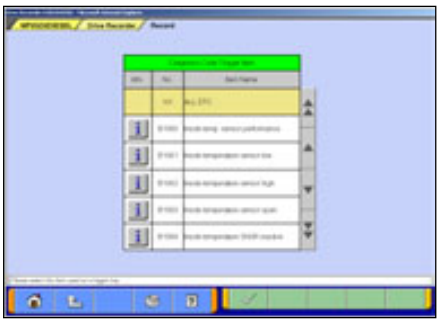
(5) Trigger method / Recording style Select

- Select trigger method and put ✔ mark(s). (Multiple selection)
- Put the ◉ mark on "**V.C.I. Drive recorder**".
- When complete the selection, press ✓ button.

"**Manual Trigger**" --Allows you to set the trigger manually. -- to (8)

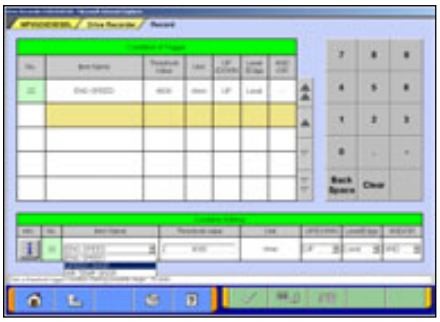
"**Diagnosis Code Trigger**" --Applies the trigger when the specified diagnostic code is generated. -- to (6)

"**Threshold Trigger**"--Applies the trigger when the condition meets the set threshold. -- to (7)



(6) When "**Diagnosis Code Trigger**" is selected in (5), the left screen appears.

- Select an item to be the trigger, and press button.
  -- to (8). (If Threshold Trigger is selected as well, go to (7))

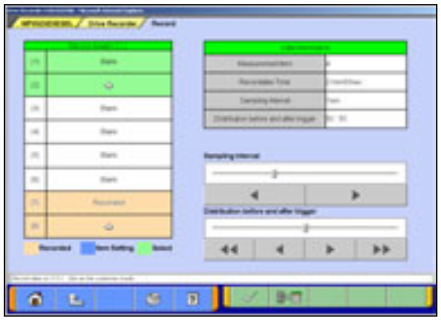


(7) When "**Threshold Trigger**" is selected in (5), the left screen appears.

- Select an item and edit conditions in *Condition Editing* table appearing at the bottom of the screen, first.

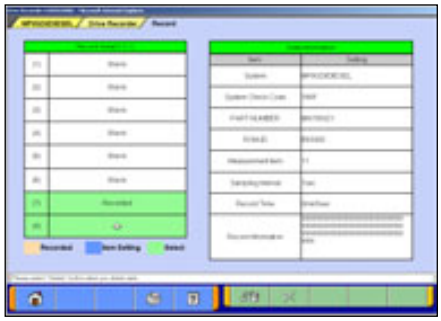
Condition Editing table
"UP/DOWN": Threshold or higher / Threshold or lower
"Level/Edge": Matching data / Data as of the time when it turns to be matching from not matching
"AND/OR": -Data matching with both of this condition and the other one upper row on *Condition of Trigger* table /
-Data matching with either of this condition or the other one upper row on *Condition of Trigger* table

- Then, press button to set the condition into selected area of *Condition of Trigger* table.
  (*Condition of Trigger* table can include up to 8 conditions.)
- When completed the setting, press button.



(8) Select the V.C.I. recording area on the left list.
Set the sampling interval and rate distributions (before and after trigger) by moving the cursor or by pressing button.
--OK -- to (10)
--Display of V.C.I. data -- to (9)

Note:
-You can select from eight recording areas.
-It is possible to set consecutive areas as well.
-The sampling interval time indicates the data-recording interval for one item. A setting of 0 seconds results in the fastest sampling interval.
-When a sampling interval other than the fastest interval is selected, the amount of time in which recording is possible appears. This time is a calculated estimated time and may differ from the actual amount.

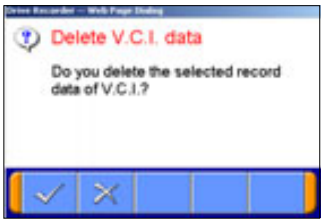


(9) View V.C.I. Regeneration Data

1. For the data recorded in the selected V.C.I. recording area, the settings of the items are displayed.

   -- Deletes data recorded in the V.C.I.
   Select a data you wish to delete, and press this button -- to 2

   -- Cancel -- to (8)



2. Delete Confirmation

   --OK

   --Cancel

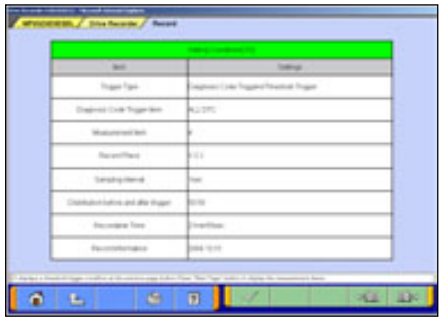
(10) Enter the record information (memo)

Enter the reference information, such as the vehicle model and diagnosed system name.

--OK -- to (11)

Note:

-As the unit is linked with the PC keyboard, you can enter the information either using the PC keyboard or by using the screen keyboard.



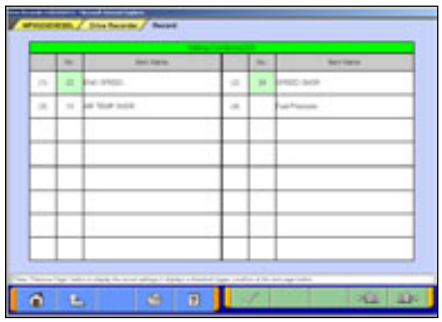
(11) The contents check of setting (1/3)

The list of recording settings appears.

-- to check set items

-- to check threshold trigger conditions (if selected)

Press button transmits the settings to the V.C.I.-- to (14)



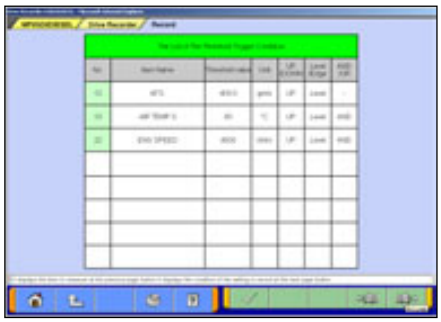
(12) The contents check of setting (2/3)

The list of recording items appears.

-- to check threshold trigger conditions (if selected)

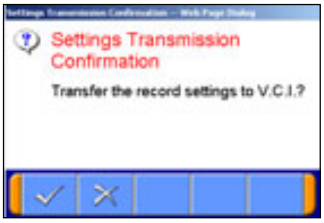
-- to check recording setting

Press button transmits the settings to the V.C.I.-- to (14)

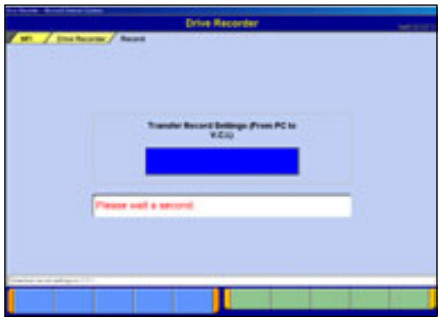


(13) The contents check of setting (3/3) (Only if selected in (7))
The list of Threshold conditions appears.
-- to check recording setting
-- to check set items

Press button transmits the settings to the V.C.I.-- to (14)



(14) Transmit Confirmation
By pressing button on screen (11)/(12)/(13), the record settings are transmitted to V.C.I..
Press button.



(15) Once the settings have been transmitted from the PC to the V.C.I., a message appears indicating that the settings have been transmitted. Please wait a second.

(16) Press button.
Note:
-If you wish to start recording immediately, disconnect the USB cable while leaving the V.C.I. switch ON.
(Disconnecting the USB cable starts to record the data on V.C.I.) -- to (17)
-If you wish to just set the settings and later start recording, turn the V.C.I. switch OFF and then disconnect the USB cable.

(17) Recording
When you record with a manual trigger, connect the trigger harness to the V.C.I. trigger terminal as necessary.
Note:
-When the USB cable is connected, the V.C.I. communicates with the PC, thereby prohibiting drive recorder startup. Do not connect the USB cable.

(18) Starting Recording

To start recording, turn off the engine first, and then turn the ignition switch ON or start the engine and turn the V.C.I. power switch ON. Recording begins after communication initialization.

Note:

-The number in parenthesis on the V.C.I. LCD screen indicates the recording area of the V.C.I. drive recorder.

(19) Trigger

-With a manual trigger, pressing the V.C.I. Enter key activates the trigger, displaying “T” on the screen. Once the trigger has been activated, the data after the time of the trigger are recorded.

Note:

-With a diagnostic trigger, the trigger is automatically activated when the specified diagnostic code is generated.

-With a threshold trigger, the trigger is automatically activated when the specified conditions are met.

(20) Ending Recording

If you wish to end recording, regardless of whether or not the trigger has already been generated, press the V.C.I. ESC key.

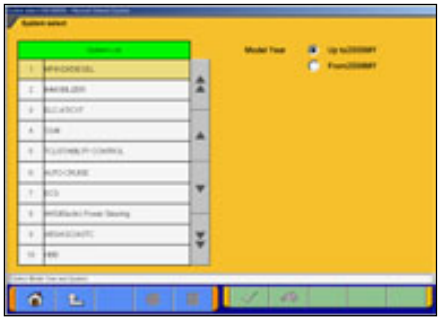
Once the button has been pressed you can disconnect the vehicle harness and trigger harness.

(21) When you check the data recorded in V.C.I.,

continue to 6-2-1.

6-1-2. Recording on PC with displaying data

This section describes the operation for saving the data at a file with displaying it as the set up record conditions on PC.

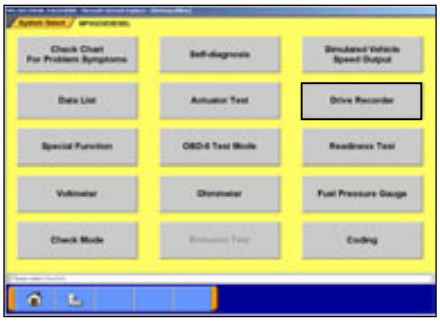


(1) System Select

Select a system for which the drive recorder is to be used on the System Selection screen.

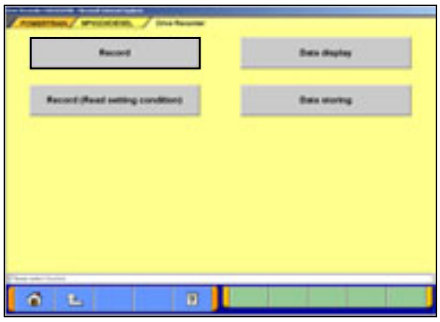
(For instruction on how to select a system, refer to 3-3-1)

- The following explanation describes how to set the drive recorder settings of the MPI/GDI/DIESEL system as a representative example.



(2) Selection of function.

Press **Drive Recorder** button.



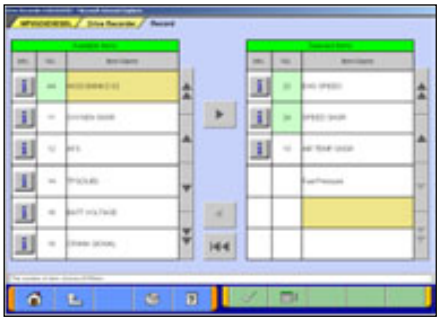
(3) Press **Record** button on the Drive Recorder function menu.

Note:

Data display -- Displays the recorded data. (refer to 6-3) or edit the data (refer to 6-2-2)

Record (Read Setting Conditions) -- Allows you to restore past recording conditions so that you can execute recording under the same conditions as those used with previously recorded data files. (refer to 6-1-3)

Data Storing -- The data saved in a removable disk can be stored into the PC. (refer to 6-2-2 (7))



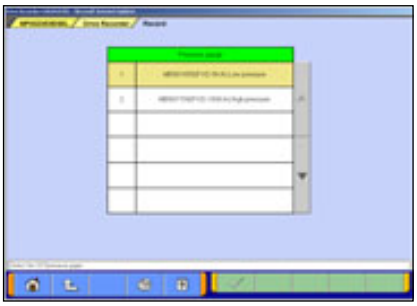
(4) Item Select

- Select an item you wish to record and apply the selection-using ▶ button.

▶ --Inserts the item selected in "*Available items* list" into the selected area of "*Selected items* list".
◀ --Inserts the item selected in "*Selected items* list" into the lowermost area of "*Available items* list".
◀◀ --Inserts all the items from "*Selected items* list" into the lowermost areas of "*Available item*s list".
--Changes the order in which the items are displayed in "*Selected items* list" and "*Available items* list", in the sequence of default setting.

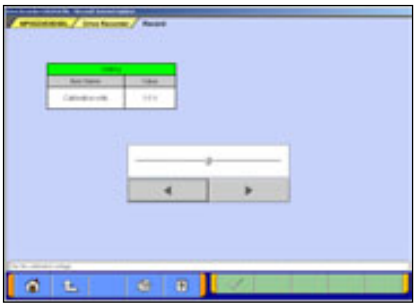
- When complete the selection, press ✓ button.

Note:
-A maximum of 16 items can be recorded.
-"Fuel pressure" and "Voltmeter" cannot be selected simultaneously.



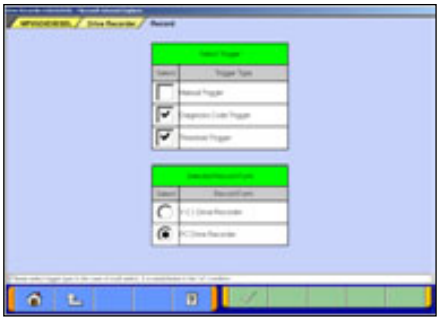
<u>When you select the item "Fuel pressure"</u>

1. Pressure gauge list is displayed after the item selection. Select a type of pressure gauge used for fuel pressure measurement, and press ✓ button.



2. Set up calibration voltage of the pressure gauge, and press ✓ button.

   Note:
   For details on how to measure calibration voltage, refer to 10-2-1(1).



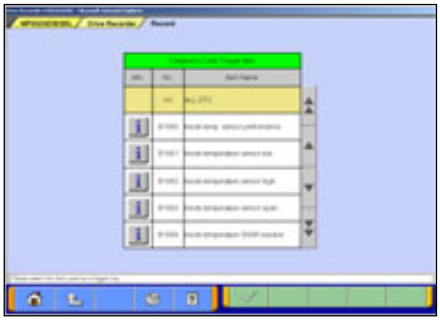
(5) Trigger method / Recording style Select

- Select trigger method, and put ✔mark(s). (Multiple selection)
- Put ◉ mark on "**PC Drive recorder**".
- When completed the selection, press ✓ button.

"**Manual Trigger**" -- Allows you to set the trigger manually. -- to (8)

"**Diagnosis Code Trigger**" -- Applies the trigger when the specified diagnostic code is generated. -- to (6)

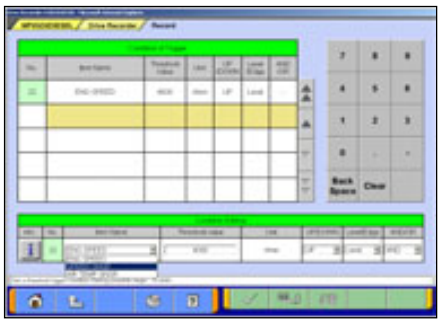
"**Threshold Trigger**" -- Applies the trigger when condition meets the set threshold. -- to (7)



(6) When "**Diagnosis Code Trigger**" is selected in (5), the left screen appears.

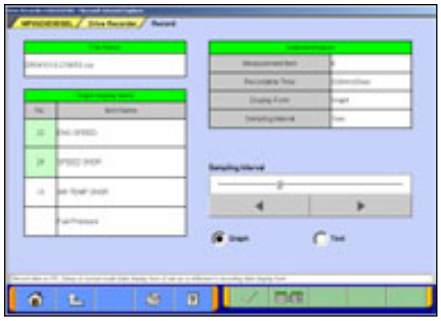
- Select an item to be the trigger, and press button.

-- to (8). (If Threshold Trigger is selected as well, go to (7))



(7) When "**Threshold Trigger**" is selected in (5), the left screen appears.

- Select an item and edit conditions in *Condition Editing* table appearing at the bottom of the screen. (refer to 6-1-1(7))
- Then, press button to set the condition into selected are of *Condition of Trigger* table.
  (*Condition of Trigger* table can include up to 8 conditions)
- When completed the setting, press button.



(8) PC Drive recorder setup

- Please confirm the contents of record setting, and set up the sampling interval with the cursor or button.
- Select a display format for recording (either **Graph** or **Text**) having a circle marked " ".

--Displaying item Select ('Graph' only)-- to (9)

--OK -- to (10)

Note:

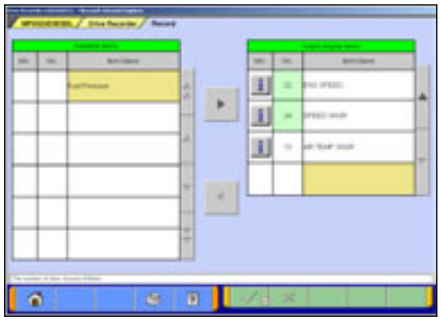
-The sampling interval time indicates the data-recording interval for one item. A setting of "0 sec" (fastest) results in the fastest sampling interval.

-Recordable time computes the number of the maximum record points as 20000 points, and is displayed. This is the prediction time on calculation and differs from actually recordable time.

-The configuration of the displayed file names is DR+ Year Month Day + Time (military time including seconds), using the PC time.

<DR: The file saved by the drive recorder is meant>

-The setting value of a sampling interval can be chosen from 0sec(fastest)/1sec/10sec/1min.



(9) Graph display item selection

Select the items you wish to display on the graph.

-Selected 4items are displayed during the recording.

-The items not selected are not displayed on graph but the data are recorded.

-- OK -- to (8)

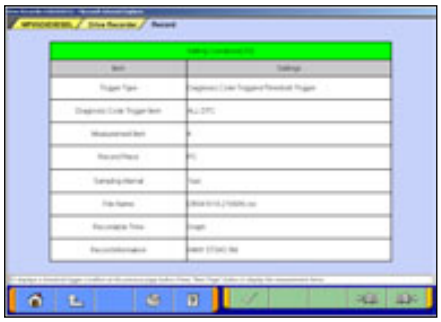
(10) Enter the record information (memorandum).

Enter the reference information, such as the vehicle model and diagnosed system name.

--OK -- to (11)

Note:

Because the unit is linked with the PC keyboard, you can enter the information either directly using the PC keyboard or by using the screen keyboard.



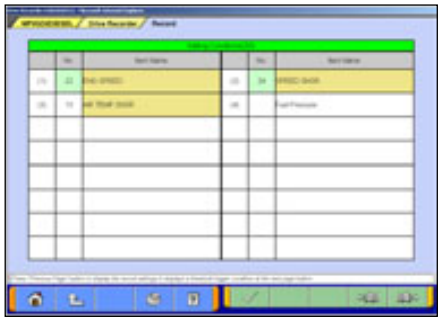
(11) The contents check of setting (1/3)

The list of recording settings appears.

-- to check set items

-- to check threshold trigger conditions (if selected)

Pressing starts recording – go to (14)



(12) The contents check of setting (2/3)

The list of set recording items appears.

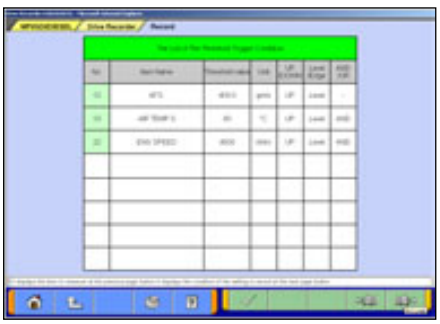
-- to check threshold trigger conditions (if selected)

-- to check recording setting

Pressing starts recording – go to (14)

Note:

When “Graph” is selected in (8), the background color of the name column of the item, which is to be displayed in graph during the recording, changes into yellow.



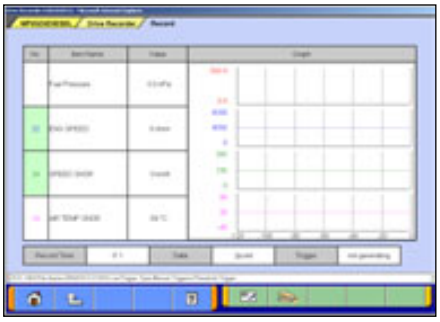
(13) The contents check of setting (3/3) (Only if selected in (7))

The list of threshold trigger conditions appears.

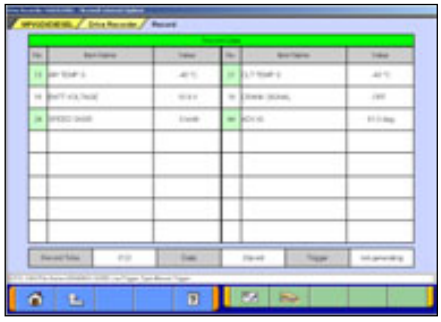
-- to check recording setting

-- to check set items

Pressing starts recording -- go to (14)



(a). Recording screen [Graph]



(b). Recording screen [Text]

(14) Recording Data

[Graph]

It saves at the file, expressing data as the set-up record conditions. The four items chosen on (9) are indicated by graph as the left screen (a).

[Text]

When “Text” was chosen on (8), and a drive recorder is set up, it saves at a file, acquiring and expressing data as the set-up record conditions. (see the left screen (b))

--Data record end -- to (15)

When Trigger is not generated during data record, let the point at the time of a record start is time 0:00.0.

--Manual Trigger occurs

However, when Diagnosis Code Trigger or Threshold Trigger are chosen as trigger conditions, suppose that it is invalid.

Note:

-Record is continued until record end button is pushed, even if trigger occurs.

-The availability of the hard disk of the PC is checked after record screen display and before record start. When the availability is 100MB or less, a message is displayed and record is stopped.

-When the number of record data reaches to 20000 points, a message is displayed and record is completed.

(15) Save record data

On the screens of (14), pressing button ends the data acquisition and saves it, and then displays a dialog indicating completion of the record data saving.

-- OK -- to Drive Recorder function select menu screen (refer to (3)).

Note:

*In the case that there is no record data, a dialog is displayed confirming whether to stop the recording.

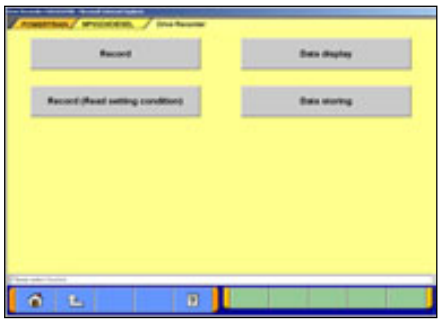
-- OK -- to the drive recorder function select menu

-- Cancel -- to (14) to start recording again.

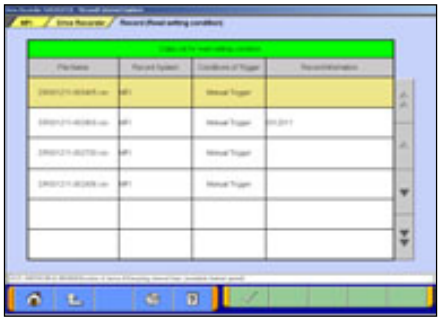
(16) When you check the recorded data, **continue to 6-2-2.**

6-1-3. Reuse past setting condition

Record (Read Setting Conditions) button allows you to restore past recording conditions so that you can execute recording under the same conditions as those used with previously recorded data files.



(1) Press **Record (Read Setting Conditions)** button on the Drive Recorder function menu. (refer to 6-1-1(3))



(2) Select the data you wish to restore, and press button.
The data was recorded using V.C.I.: to 6-1-1(8)
The data was recorded using PC : to 6-1-2(8)

6-2. Recorded Data Handling

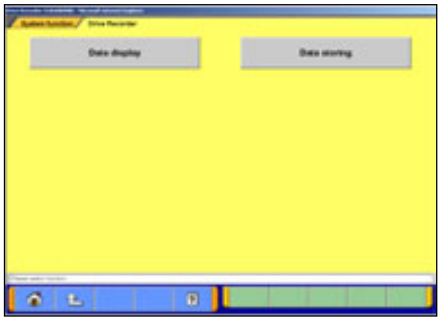
6-2-1. Transmit data on V.C.I. to PC

To view the data recorded on V.C.I., you need to transfer it from V.C.I. to PC first. Connect V.C.I. and PC using a USB cable and operate following procedures.

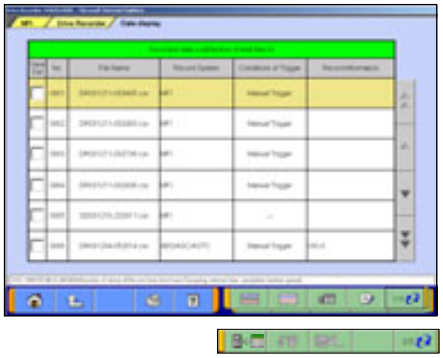
(1) You can transfer the data using only V.C.I. and PC, without connecting to the vehicle. Press **Special Function** button on the STV Top Menu.-- to (2)

Or, if the V.C.I. is already connected to the vehicle, you can press **Data display** from the function menu of the recorded system to regenerate the data. (refer to 6-1-1(3)) -- to (4)

(2) Select the **System Functions** tab on the upper part of the screen, and then press **Drive Recorder (Display only)** button.

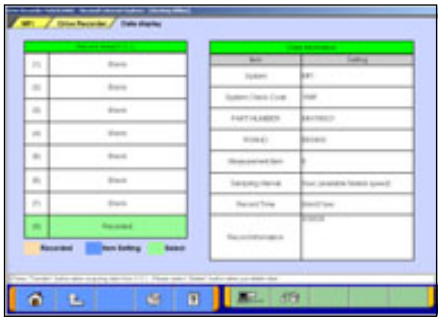


(3) Press **Data display** button.



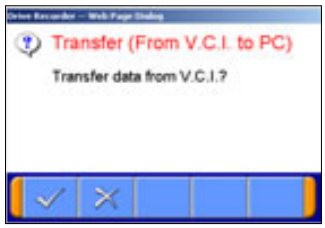
(4) File List

Press button to view 2/2, and press button.

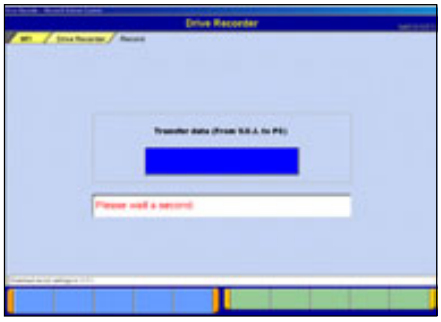


(5) Display of V.C.I. Data
The status of V.C.I. recording area is displayed.
Select a data to be transferred into PC, and press button. -- to (6)

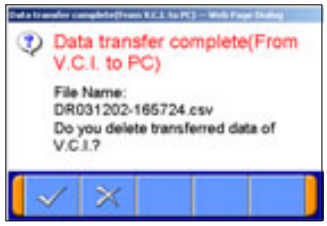
When you wish to delete a data, select it and press button.



(6) Transfer Confirmation
Press button.



(7) The data is being transferred from V.C.I. to PC.
Please wait for a while.



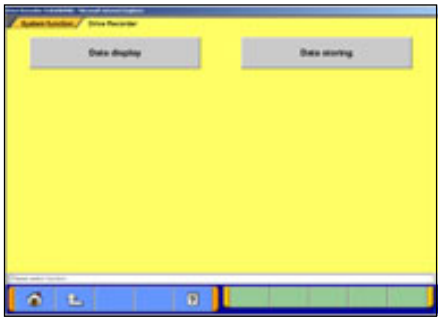
(8) After completion of data transfer, a dialog box appears asking whether to delete the data on V.C.I..

: Deletes the data, then returns to screen (5).
: Returns to screen (5) without deleting the data.

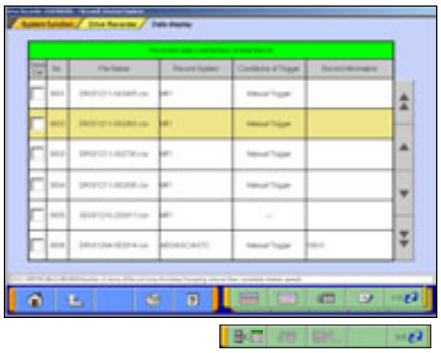
6-2-2. Data Edit Functions

(1) Press **Special Function** on the STV Top Menu.
Then select **System Functions** tab on the upper part of the screen, then press **Drive Recorder (Display only)**.

Or, if V.C.I. is already connected to the vehicle, you can press **Data display** on the function menu of the recorded system. (refer to 6-1-1(3)) -- to (3)



(2) Press **Data display** button.



(3) Recorded data file list

-The file list of the drive recorder (and data list records) saved into the PC is displayed.

-You can view the data details by selecting the data you wish to view from the list and pressing button.
In addition, you can view graph data by pressing button. (to 6-3-1(3))

-The background color of the line containing the selected file changes into yellow.

-- Edit record information -- refer to (4)

-- Delete the data file -- refer to (5)

-- Save the data file -- refer to (6)

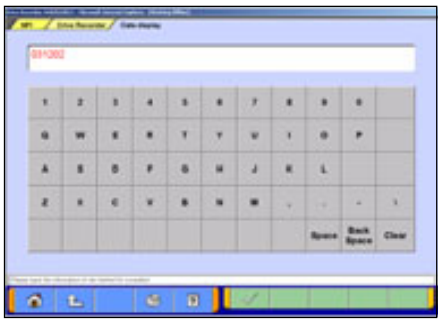
Note:

-The configuration of the displayed file names is DR+Year Month Day+Time(military time including seconds), using the PC time.

-The most recent recorded data appears on top of the list. -Those file names, which begin with “SD”, contain the data of Data List records. (refer to 4-2-2.(2))

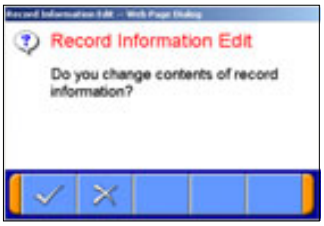
Caution: About “CSV file”

If you open the CSV file on M.U.T.-III using EXCEL, never overwrite and save it. (However, they are allowed after the file is transferred from M.U.T.-III to another PC or copied in another folder.)

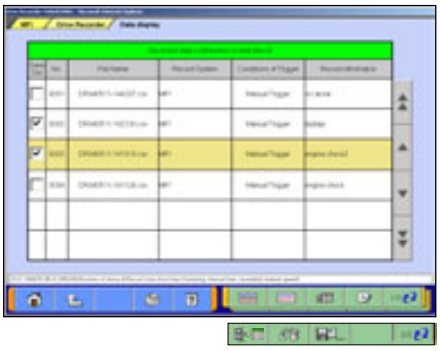


(4) Edit Data Information

1. Select a file to edit and press button to display the screen illustrated on the left, where you can edit the record information that was entered in 6-1-1(10) or 6-1-2(10).
   Press button.



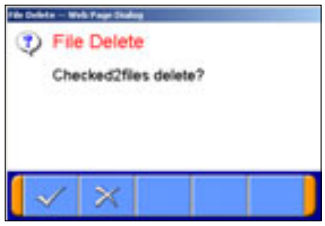
2. Edit Confirmation
   Press button. → returns to (3)



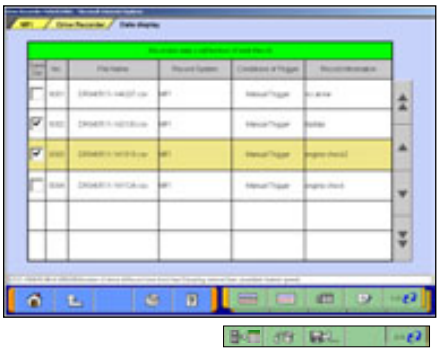
(5) Delete Data

1. To delete a data file loaded on the PC, click the check box next to file No. in the file list (refer to (3)) to place a check mark, and press button.
   (Two or more check marks can be placed.)

Note:
mark will be displayed, if cursor is moved on a check box and it clicks. (Selection)
mark is eliminated by clicking again. (Selection release)



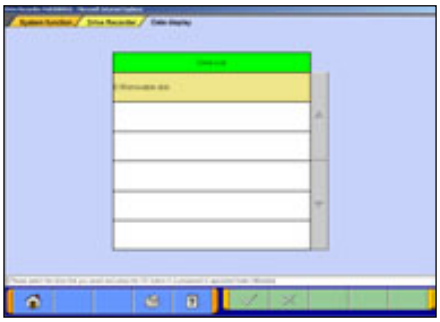
2. File Delete Confirmation
   A message appears asking if you wish to delete the data file. Press button to delete the file.



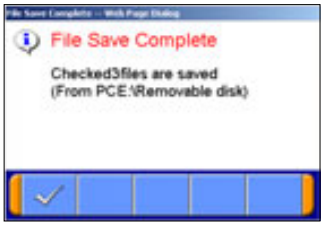
(6) Save Data

1. The data file can be saved to a removable disk (floppy disk or memory card).
   -Insert a disk into the PC, first.
   -Click the check box next to the file No. in the file list to place a check mark, and press button.
   (Two or more file selections are possible.)

Note:
mark will be displayed, if cursor is moved on a check box and it clicks. (Selection)
mark is eliminated by clicking again. (Selection release)



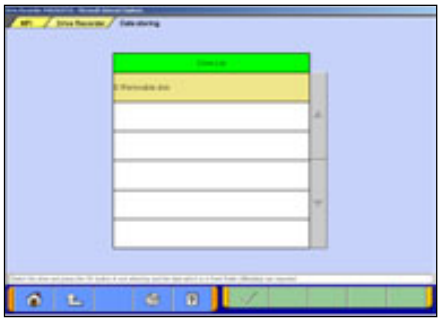
2. Drive Select
   Select a drive for saving the data files, and press button.



3. Data Saved
   The files are saved. Press button.

(7) Data Storing

1. The data saved in a removable disk before can be stored into the PC.
   -Insert the disk into the PC, first.
   -Press **Data Storing** button on the Drive Recorder function menu. (refer to (2))

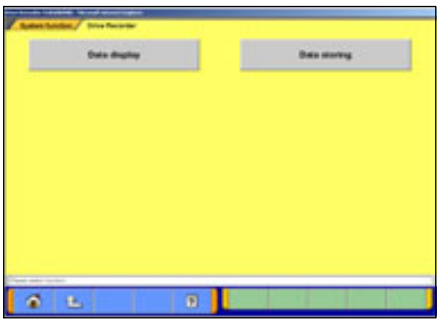


2. Drive Select
   Select the drive storing the data.

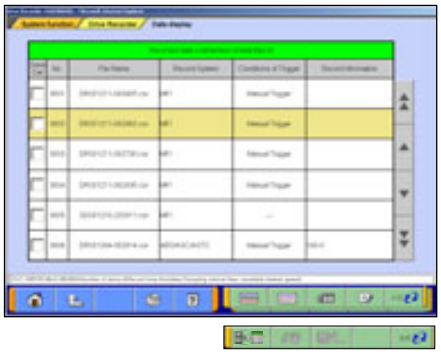
3. Data Storage Complete
   The data has been loaded to PC.
   Press button.

6-3. Display and Analysis of the Recorded Data

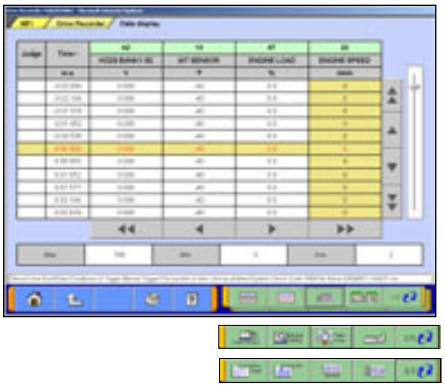
6-3-1. Display the recorded data



(1) Press **Special Function** on the STV Top Menu.
Then select the **System Functions** tab on the upper part of the screen, and press **Drive Recorder (Display only)**,. then press **Data display** button.
-Or, if the PC is connected to the vehicle through V.C.I., you can press **Data display** on the function menu of the recorded system.



(2) Recorded data file list
Data file list that contains record of Drive recorder and Data list saved in PC will be displayed.
You can view the data details by selecting the data you want to display from the list and pressing button.
In addition, you can view graph data by pressing or button.
-The background color of the line containing the selected file changes into yellow.



(3) Displaying Text Data
--Graph data 1
--Graph data 2
--Select item (to (4))
--Edits extraction conditions (to 6-3-2.(1))
--Sets search conditions (to 6-3-2.(2))
--Jumps to a trigger point.
--Saves data (to (6-3-2.(3))
--Displays a correlation diagram (to 6-3-3.(1))
--Displays a distribution chart (to 6-3-3.(2))
--View 1/3
--View 2/3
--View 3/3

Displaying Graph 1

--Text data

--Graph data 2

--Select item (to (4))

--Edits extraction conditions (to 6-3-2.(1))

--Jumps to a trigger point

--Saves data (to 6-3-2.(3))

--Displays a correlation diagram (to 6-3-3.(1))

--Displays a distribution chart (to 6-3-3.(2))

--Change Time Scale

--Change Data Scale

--View 1/3

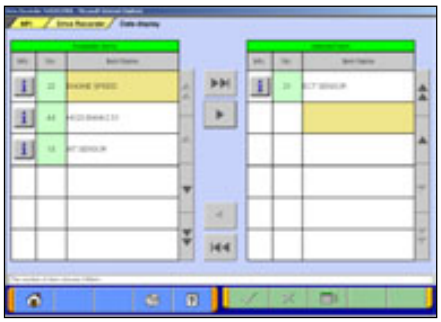
--View 2/3

--View 3/3

Displaying Graph 2

Displayed items are overlaid on a graph.

-The function buttons are the same as Graph1.



(4) Select item

button allows you to select items to be displayed from recorded data.

When complete the selection, press button.

The item number of service data OBD basic items appears green.

--Inserts all the items from "*Available items* list" into the selected areas of "*Selected items* list."

--Inserts the item selected in "*Available items list*" into the selected area of "*Selected items* list".

--Inserts the item selected in "*Selected items* list" into the lowermost area of "*Available items* list".

--Inserts all the items from "*Selected items* list" into the lowermost areas of "*Available items* list."

--Changes the order in which the items are displayed in "*Selected items* list" and "*Available items* list," in the sequence of default setting.

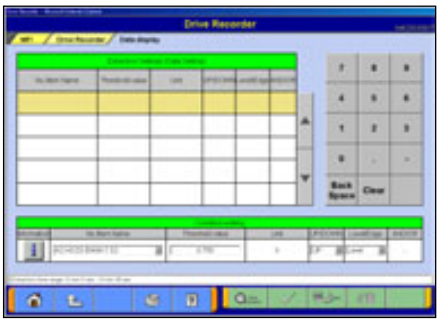
6-3-2. Extraction and Search of the recorded data

Recorded data can be extracted or retrieved for display on predetermined conditions.

<Extraction: Only matching data will be displayed>

<Retrieval: Matching data will be displayed with *(asterisk)>

Time range, threshold of item etc. can be set as condition of extraction or retrieval.



(1) Condition setting for data extraction

Extraction condition setting screen shown on the left will be displayed after pressing button on text/graph display screen.

- Select an item and edit its condition in *Condition editing* table appearing at the bottom of the screen.

Condition editing table

"UP/DOWN": Threshold or higher / Threshold or lower

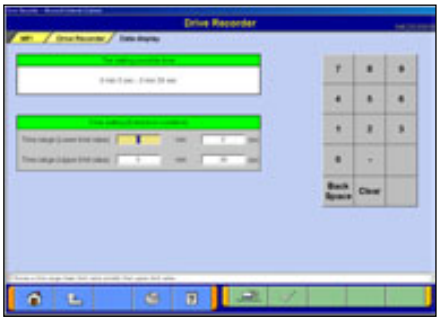
"Level/Edge": Matching data / Data as of the time when it turns to be matching from not matching

"AND/OR": -Data matching with both of this condition and the other one upper row on *Extraction Setting* table/
-Data matching with either of this condition or the other one upper row on *Extraction Setting* table

- Then, press button to add the condition onto *Extraction Setting* table.
  (*Extraction Setting* table can include up to 8 conditions.)
- Press button to display extracted data only in text/graph.

--Set Time extraction condition.

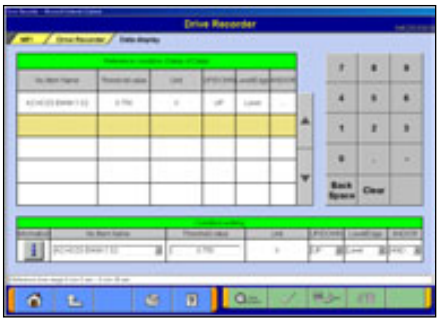
--Delete selected extraction condition data.



Time extraction condition setting

After pressing button, time extraction condition setting screen shown on the left will be displayed. Set time range on this screen and press button to display extracted data only.

--Return to data extraction condition setting screen.



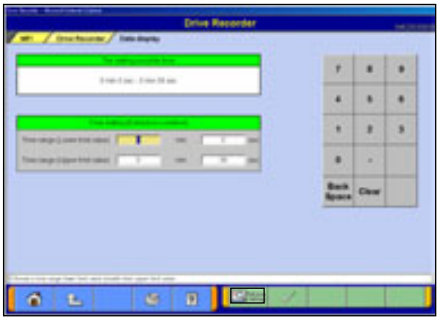
(2) Conditions setting for data search

Condition setting screen shown on the left will be displayed after pressing button on text data display screen.

- Select an item and edit its condition in *Condition editing* table appearing at the bottom of the screen. (See (1) for more details.)
- Then, press button to set the condition onto *Retrieval condition* table.
  (*Retrieval condition* table can include up to 8 conditions.)
- Press button to display text data screen showing * (asterisk) in the Judge column of the data matching with the retrieval condition.

--Set Time retrieval condition.

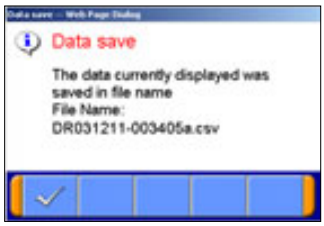
--Delete selected condition.



Time retrieval condition setting

After pressing button, Time retrieval condition setting screen shown on the left will be displayed. Set time range on this screen and press button to display text data screen showing * (asterisk) in the Judge column of the record data matching with the retrieval condition.

--Return to Search conditions setting screen.

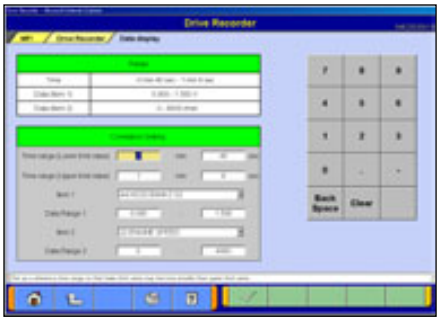


(3) Data save

When pressing button on the screen of displaying data, you can save the extracted or retrieved data into the PC.
As the left dialog box appears, press button.

Note: The configuration of the file name is original data file name + alphabet (a,b..z).

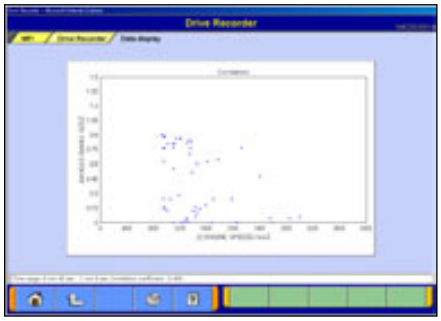
6-3-3. Diagram and Chart



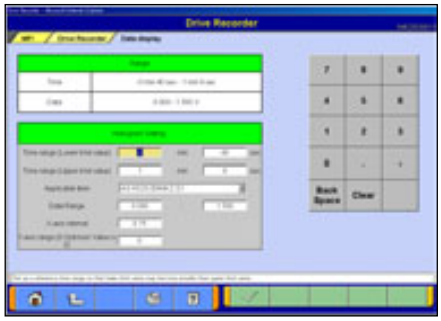
(1) Setting the Correlation Diagram

Pressing button on the screen illustrated in 6-3-1(3) displays the correlation diagram settings screen as illustrated on the left.

Setting the target data time range, item names and data display range and pressing button displays the correlation diagram.



<Correlation Diagram>



(2) Setting the Distribution Chart

Pressing button on the screen illustrated in 6-3-1(3) displays the distribution chart settings screen as illustrated on the left.

Setting the target data time range, item names, data range, division width, and frequency range and pressing button displays the distribution chart.

<Distribution Chart>

6-3-4. Other Functions

(1) Changing Item Display Order

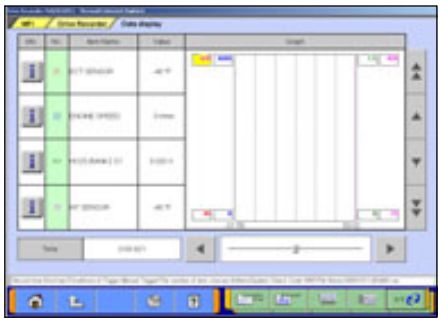
On the data list display screen, you can change the display order of the items. The change is possible for both text display and graph display.

-Selecting the name display area of an item fixes the item.

-Then over-scrolling only the items not selected using scroll keys changes the order.

-The selection can be released by selecting the item again.

-The function is not activated while a data range display area is selected in the data range change function. (Selection, release, and scroll functions of item are not available.)



(2) Data Range Change

Select a data range display area on the graph.

When the color of the selected area turns into yellow, you can enter values.

Entering method: Use PC keyboard or scroll keys.

-When the PC keyboard is used, enter a value from the keyboard and then press the [Enter] key or release the selection of the data range display area to determine the data range change.

-When the scroll keys, ▲ and ▼, on the screen are used for the data range change, pressing the ▲ key each time changes the data range setting by +5 % of full scale and the ▼ key changes it by -5 %. The change is determined at each key pressing.

Chapter 7 SWS Monitor

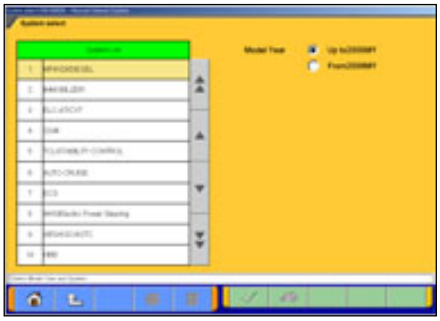
7-1. SWS Monitor Operation

Precautionary Notes

Prior to connecting or disconnecting the SWS monitor and vehicle, be sure to turn the ignition switch OFF.

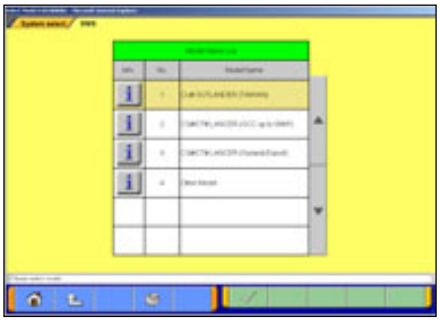
1. If the SWS monitor is connected to the column switch connecter, connecting the SWS monitor cartridge and V.C.I. prior to V.C.I. power activation may cause damage to the V.C.I.
   Refer to connection instructions for more details – connect the monitor cartridge after the V.C.I. is connected to the vehicle and the V.C.I. power switch is ON.
2. If you wish to use the SWS monitor continuously for a long period of time, the V.C.I. and SWS cartridge will consume power. Take extra precautions to ensure that the battery does not die during use.
3. Use of cellular phones and amateur radios near the SWS monitor during use may cause the SWS monitor to not function properly. Avoid using such apparatuses near the monitor during use.
4. During use, the SWS monitor may affect systems employing weak electric currents such as GPS systems.
5. The tip of the door communication probe is sharp. Be careful during handling.

7-1-1. SWS Monitor Function

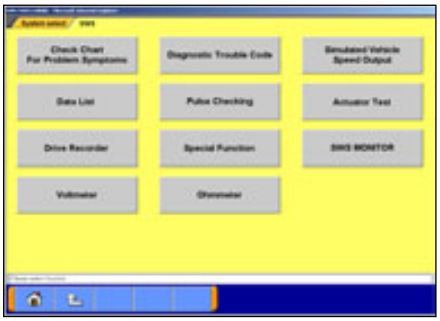


(1) System Select
Select "**SWS**" on the System Selection screen.
(For instructions on how to select a system, refer to 3-3-1)

Note:
SWS monitor cartridge is required in M.U.T.-III as well for SWS monitor. For details regarding how to connect the cartridge and harness, see the M.U.T.-II reference manual (Pub. No. MSSP-310B-2002) or the service manual data of each vehicle.

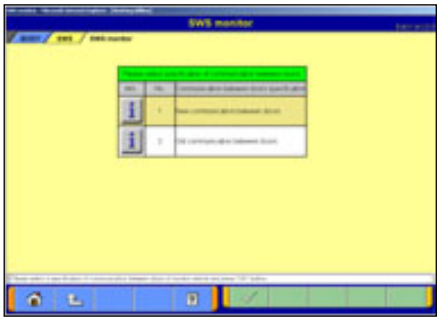


(2) Vehicle Select
Select the type of vehicle diagnoses and press button.



(3) Function Select
Press **SWS MONITOR** button on the SWS function menu.

Note:
If the SWS monitor cartridge is not connected to the vehicle, **SWS MONITOR** button does not appear.



(4) This screen appears depending on vehicle SWS version.
Select a specification of communication between doors of the vehicle that you monitor, and press button.

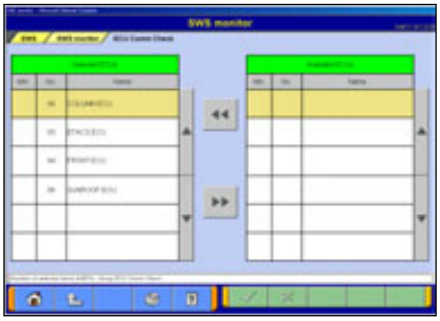
[New communication between doors]
Power windows are controlled by multiplex communication between driver's seat Power window module and other Power window **switches**.

[Old Between-doors communication]
Power windows are controlled by multiplex communication between driver's seat Power window module and other Power window **motors**.

(5) Function Select
The SWS monitor menu screen appears.
ECU Comm Check -- to 7-1-2.
Data List -- to 7-1-3.
Function Diag. -- to 7-1-4.
Drive Recorder -- to 7-1-5.
Keyless Entry -- to 7-1-6.
Custom Function -- to 7-1-7.

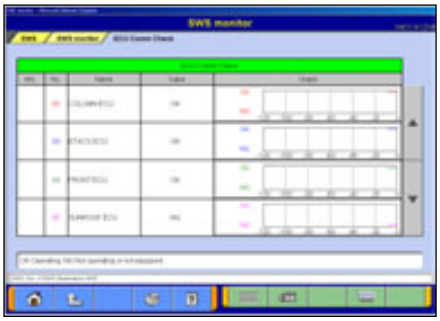
Note:
The Keyless Entry and Custom Function buttons will appear depending on the SWS version of vehicle.

7-1-2. Checking ECU Communication

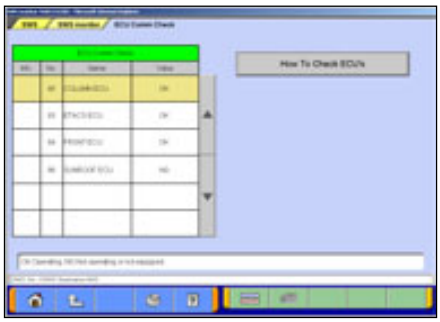


(1) Item Select
The item selection screen appears.
Select items to check and press button.

Note:
All items are selected as default.



(2) Displaying Graph
"OK" appears if the ECU is communicating properly, and "NG" appears if there is a communication error. "NG" also appears if the system has not been installed or is installed but not communicating. Prior to performing the check, therefore, it is necessary to identify the system for the monitored vehicle.
--Change Time Scale
--View text style-- to (3)



(3) Displaying Text style

If you press **How to Check ECU's** button, you can view the Service Manual. (Not Available in US, Australia)

7-1-3. Data List

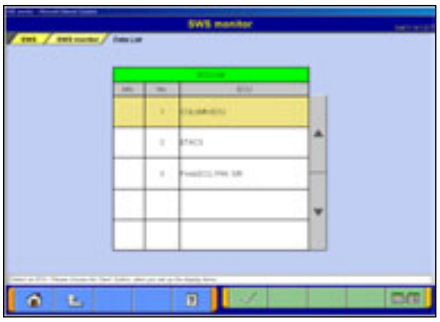
(1) When pressing **Data List** on SWS monitor menu screen, some vehicle SWS version shows "Item Group List" illustrated on the left. (others will go to (2) directly).

Select a group of data and press button.

-When selecting "Communication Data"-- to (2)

-When selecting "ETACS Switch Data" or "ETACS Analog Data" -- to (3)

--Item Select (only when selecting "ETACS Switch Data" or "ETACS Analog Data")



(2) Item Select

Select an ECU to monitor from the Data List, and press button.

--Item Select

(3) Displaying Graph

--View text -- to (4)

--Change Time Scale

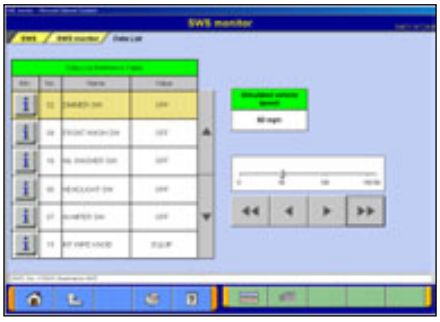
--Change Data Scale

(4) Displaying Texts

Data List Reference Table--Displays the Data List of the Service manual. (Not Available in US, Australia)

Simulated Vehicle Speed Output --Allows you to simultaneously view the Simulated Vehicle speed and Data List. -- to (5)

--View graph



(5) Simulated Vehicle Speed Output

The Simulated Vehicle speed output function displays the simulated vehicle speed and Data List simultaneously.

Speed output can be changed in 1 mph or 10 mph increments using the speed adjusting buttons.

--Unit: 1mph

--Unit: 10mph

--View graph

7-1-4. Function Diagnosis

(1) Press **Function Diag.** button on the screen illustrated in 7-1-1(4). Select the function you wish to diagnose and press button.

(2) Select a detailed function and press button.

--Item Select

(3) Displaying Graph

--View Text -- to (4)

--Change Time Scale

--Change Data Scale

Note:

If required operating conditions are not met, the item number appears in pink color.

(4) Displaying Text

Data List Reference Table: (Not Available in US, Australia)

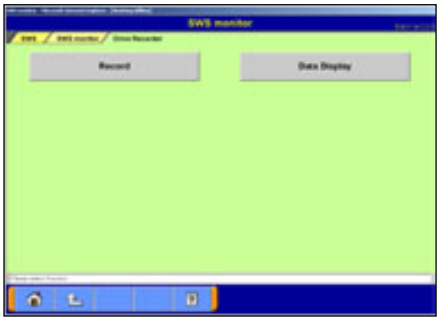
Displays the Data list of the Service manual.

--View Graph

Note:

If required operating conditions are not met, the item number appears in pink color.

7-1-5. Drive Recorder Function



(1) **Record**

--Records data such as Data List in the built-in memory of SWS monitor cartridge. -- to (2).

Data Display

--Displays the data recorded with the drive recorder. -- to (9).

(2) The left figure is displayed when the last record remains. Erase recorded data in SWS monitor cartridge, before record data. Press ✓ button.

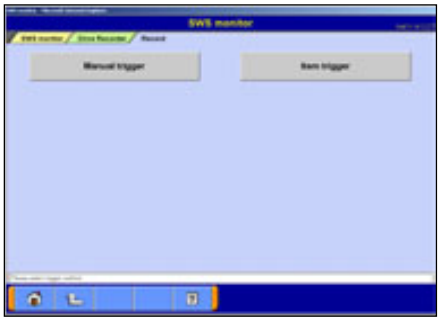
(3) Recording Data

Select an item you wish to record.

ECU Comm Check -- to (4)

Data List -- to (4) after ECU selection

Function Diag. -- to (4) after function selection.



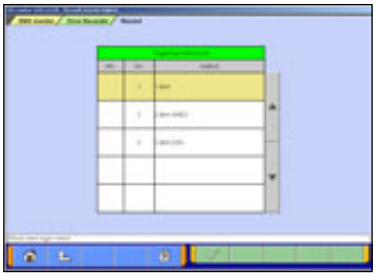
(4) Selecting the Trigger Method

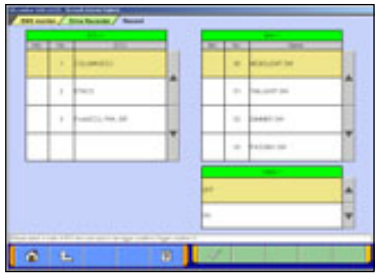
Manual trigger --

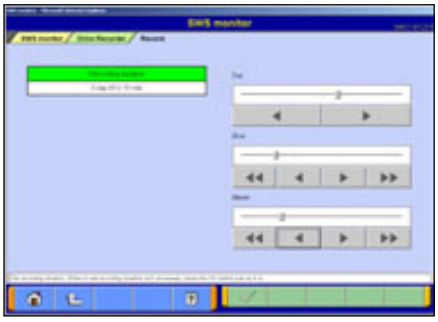
Allows you to apply the trigger manually.

Item trigger --

Allows you to select one or two items and uses the ON or OFF signal of the item(s) as a trigger to start recording.







(5) Setting the Recording Time

The recording time can be set from 0day 0h 0min to 5days 0h 0min. If you do not wish to set a recording time, press button without setting the time.

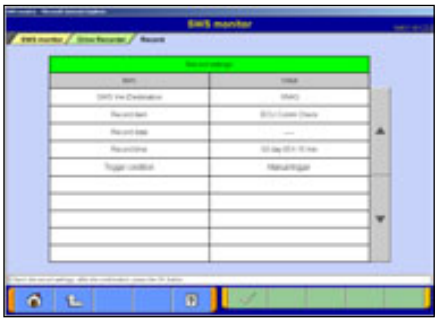
The day and time are set using .

-Day --Unit: 1 day

-Hour-- Unit: 1h, Unit: 5h

-Minute-- Unit: 1min, Unit: 10min

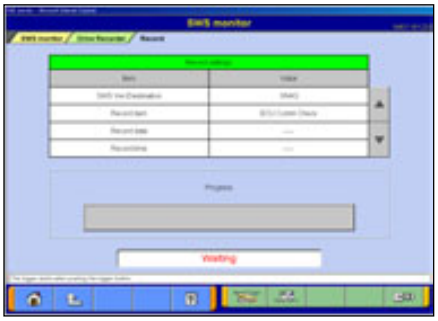
You can also set the time using the slide bars.



(6) Checking the Recording Settings

Check the recording settings and press button to transmit the data to the SWS monitor cartridge.

A message appears indicating that the recording settings will be transmitted to the I/F cartridge. Press button.



(7) Recording Using the Drive Recorder

Once the data have been transmitted to the SWS monitor cartridge, the screen shown at left appears. If the trigger set was a manual trigger, press button to start recording.

If the trigger set was an item trigger, recording begins when the set conditions are met.

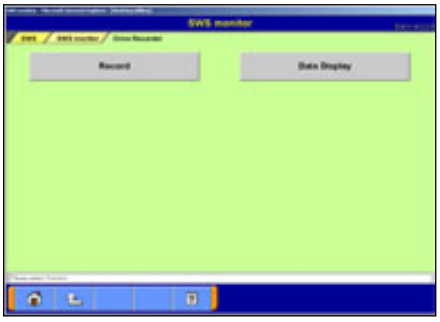
Note:

To disconnect the SWS monitor cartridge, press button.

The following message appears: “Do you wish to disconnect the I/F cartridge? (If so, select YES, then wait for the ready message to appear.)” Once the ready message appears, disconnect the cartridge.

(8) Ending Recording

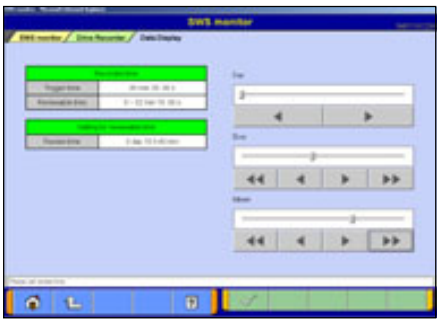
To end recording, press button.



(9) Data Display

Select **Data Display** button on the screen of (1).

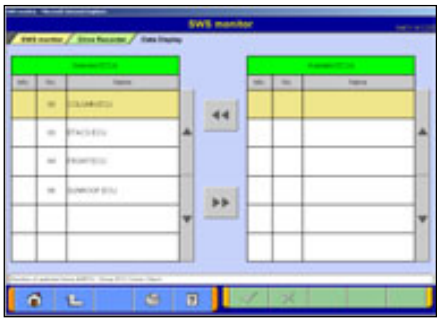
You can also display recorded data by returning to the STV Top Menu, selecting **Special Functions**, then selecting the system function **SWS Drive Recorder**. In this case, you can view the data without connecting V.C.I. to the vehicle by using an AC-DC adapter (MB991878).



(10) You can set a time in which you wish to regenerate and view the data as described below.

The day and hour can be set using ◀◀ ◀ ▶ ▶▶ buttons.

After the setting, press ✓ button.

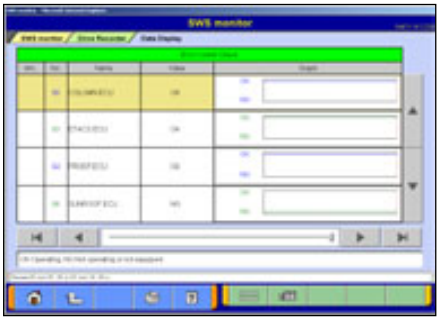


(11) Displaying Recorded Data

Select the items you wish to display and press ✓ button.

Note:

All items are selected as default.



(12) Displaying Data

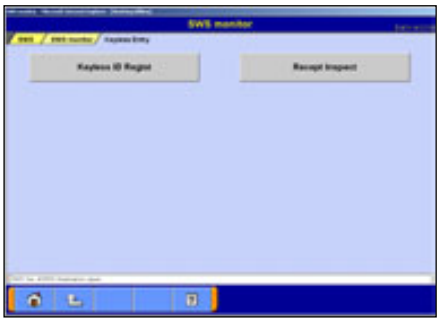
The recorded data are displayed in graph format by default.

-- View Text

--Displays the previous or next data change point.

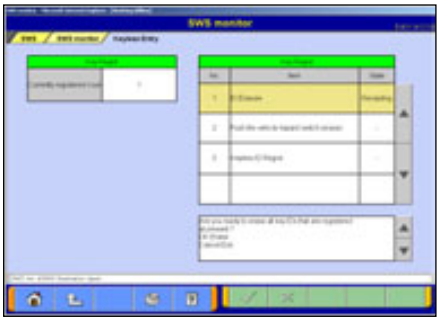
--Displays the previous or next record. You can also set the settings by operating the slide bar.

7-1-6. Keyless Entry Function

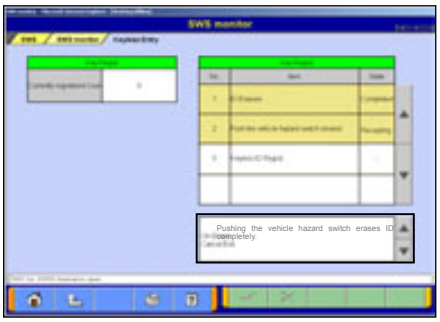


(1) When pressing **Keyless Entry** button on 7-1-1.(4), the screen illustrated on the left appears.

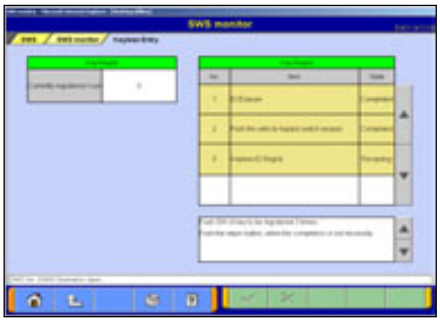
Keyless ID Regist --Delete and register ID -- to (2)
Recept Inspect --Check for signal detection. -- to (5)



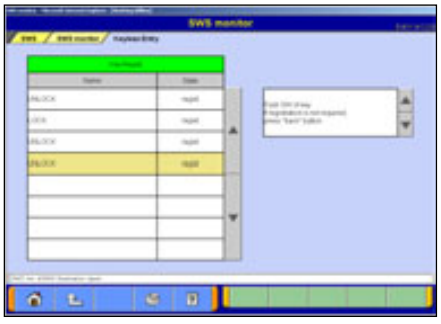
(2) Deleting Keyless ID
When pressing **Keyless ID Regist** button in (1), the screen illustrated on the left appears. In this screen, all of registered Key ID at present can be deleted.
-- Delete all Key ID
-- Cancel



(3) Pressing Hazard warning lamp switch of the vehicle deletes the ID completely.



(4) Keyless ID Registration
Press Lock-switch or Unlock-switch of the key to be registered three times continuously.



(5) Checking for signal detection
Press **Recept Inspect** button on (1), and the screen illustrated on the left appears.
Press Lock-switch or Unlock-switch of the key to be checked. When ECU acknowledges the Lock or Unlock signal, it displays the signal name and state of the key for the vehicle.

7-1-7. Customize Function

(1) Displaying Data

When pressing **Custom Function** button on 7-1-1.(4), a massage indicating that a short time is required to display the data appears.

When the data illustrated on the left displayed, select an item to customize and press button.

-- Initialize all adjustment value -- to (3)

(2) Select adjustment value and press button.

(3) Adjustment Value Initialization

When pressing button in (1), you can initialize adjustment value of all functions.

As a confirmation dialog box appears, press button.

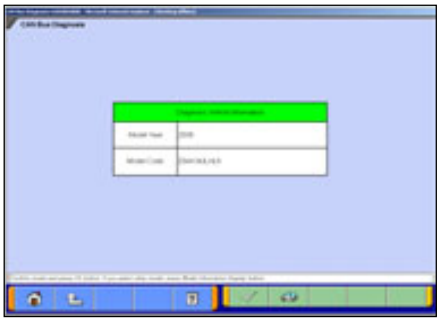
Chapter 8 CAN Bus Diagnosis

8-1. Diagnosing the CAN Bus

< CAUTION >

- When you execute CAN Bus diagnosis, use M.U.T.-III main harness A.
- When you execute CAN Bus diagnosis, halt the vehicle.
- Calibrate ohmmeter to 0 point periodically for proper diagnosis. (refer to 10-2-2.)

8-1-1. CAN Bus Diagnosis



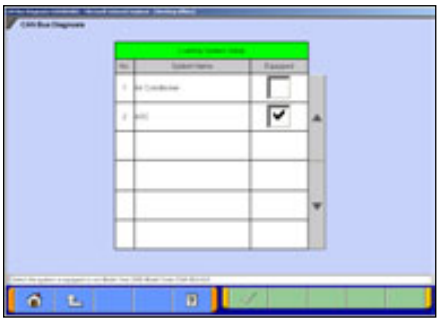
(1) Start Screen

Press **CAN Bus Diagnosis** button on the STV Top Menu (illustrated on 3-2), then the left screen appears.

Confirm the contents of Diagnosis Vehicle information list on the screen.

-If the contents are describing the vehicle, press . → (2)

-If the contents are not describing the vehicle, press to correct the information. (refer to 3-3-2)



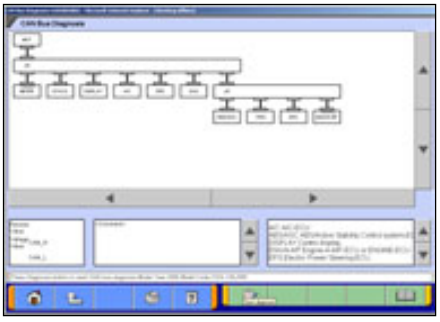
(2) Equipping System Setup

Put a check mark if the equipment is existence, and press button.

Note:

✔ mark will be displayed, if you move cursor onto a check box and click it. (Selection)

✔ mark will be eliminated, if you click again. (Selection release)

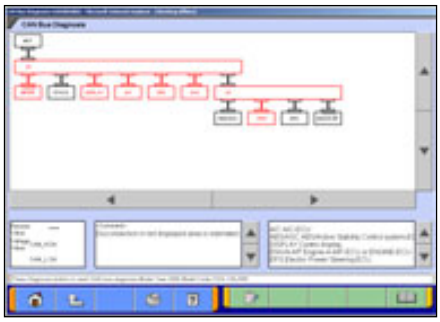


(3) CAN Bus Diagnosis

Pressing button starts the CAN bus diagnosis process.

Note:

The right lower massage box shows the details of ECU names displaying on the configuration screen.



(4) Results

The results of the diagnosis are reflected on the configuration screen (Error locations are indicated in red), and the comment is shown on the center lower massage box.

--Displays the data of the Service manual pertaining to the error locations. (Not Available in US, Australia)

Chapter 9 ECU Reprogramming

Notes:

- This function enables the program installed in ECU to be reprogrammed using M.U.T.-III.
- As VIN or other setting information on ECU is not erased by this reprogramming, you do not need to rewrite VIN.

9-1. Process Flow Chart

■ **Reprogramming by <u>K-Line</u> communication system**

-There are 7 different ways for ECU reprogramming as shown below.
-Procedure (a) is recommendable due to the most simple in operation.
-File extension code is “ .rpg”.

Process flow chart (Chapter No.)

Device		**V.C.I. alone**			PC + VCI (Optional)			
Procedure name		**(a) Auto data retrieval**	(b) Load RPG file	(c) ECU reprogram	(d) Automatic reprogramming (K-line)	(e) Database File Display	(f) Reprogram Data Selection	(g) Search
Data selection method		**Automatic**	Select from Data library	-	Automatic	Select from data library in PC	Select from data library in any drive	Select by key of vehicle info.
1	CD-Rom => PC	**9-3-1**	9-3-1	-	9-3-1	9-3-1	9-3-1	9-3-1
2	PC => CF memory card	**9-4-1**	9-4-1	-	-	-	-	-
3	CF memory card => VCI	**9-4-2 + 9-4-3(a)**	9-4-2 + 9-4-3(b)	-	-	-	-	-
4	PC => VCI (<u>Not via</u> memory card)	**-**	-	-	9-5-1 + 9-5-2(a)	9-5-1 + 9-5-2(b)	9-5-1 + 9-5-2(c)	9-5-1 + 9-5-2(d)
5	VCI => ECU	**9-4-4**	9-4-4	9-4-3(c)+ 9-4-4	9-5-3	9-5-3	9-5-3	9-5-3
Note		Recommended	In case of (a) failure	Special use only (When data stored in VCI)	In case memory card is N/A	In case memory card is N/A and (d) failure	In case memory card is N/A and (d) failure	In case memory card is N/A and (d) failure

■ **Reprogramming by <u>CAN</u> communication system**

-This is the only way for reprogramming by CAN communication system.
-This procedure allows you to select an arbitrary system (ECU) to reprogram as required.
-File extension code is “ .cff”.

Device		**PC+V.C.I.**
Process name		**Automatic Reprogramming (CAN)**
Data selection		**Automatic**
1	CD-Rom => PC	**9-3-1**
2	PC => VCI =>ECU	**9-6**

9-2. Equipments

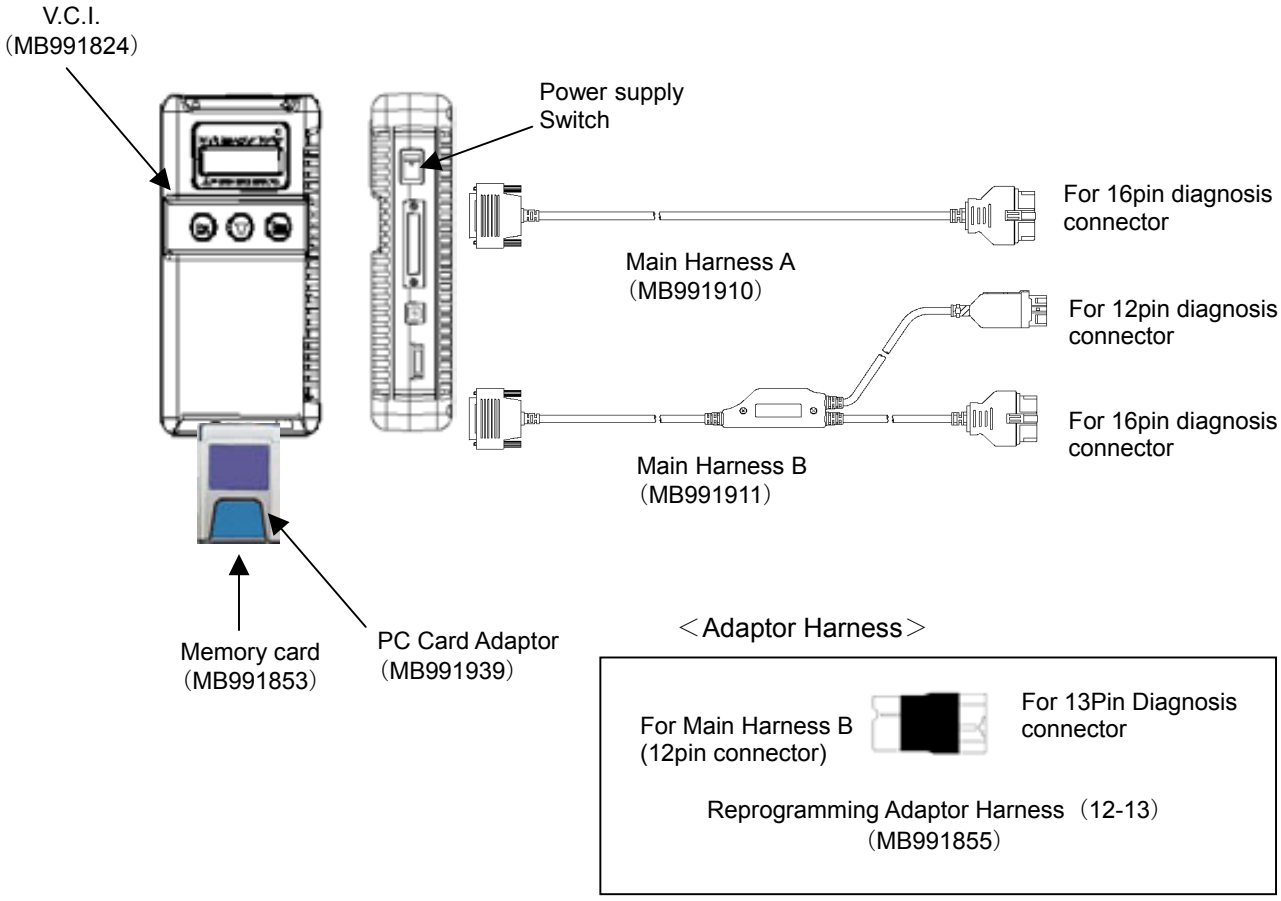
Necessary parts for ECU reprogramming are as follows

Parts Name	Parts Number	
M.U.T.-III Personal Computer	-	
Update CD-ROM of reprogramming data	-	
CF Memory card（128MB）	MB991853	← Only when reprogramming with V.C.I. alone
CF Memory Card Adaptor	MB991939	← Only when reprogramming with V.C.I. alone
V.C.I.	MB991824	
M.U.T.-III Main Harness A（44-16） ＊1	MB991910	
M.U.T.-III Main Harness B（44-16/12）	MB991911	
Reprogramming adapter Harness （12-13）＊2	MB991855	

Remarks

＊ 1：Vehicle which is only equipped with a 16 pin diagnosis connector.

＊ 2：Vehicle which is equipped with 16 pin and 13 pin diagnosis connector.



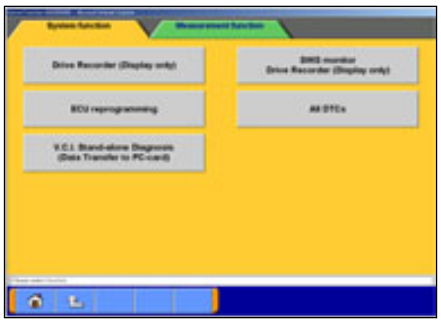
9-3. Data preparation on PC from Update CD-ROM

9-3-1. PC Update Operation (CD-ROM --> PC)

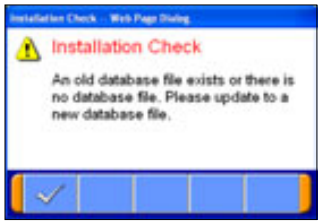
< CASE 1 >

(1) When an Update CD-ROM of ECU reprogramming data is distributed newly, insert the CD-ROM into CD-drive on PC.

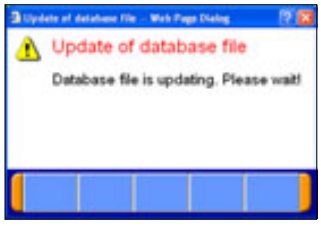
(2) Press **Special function** button on STV Top Menu.



(3) Select **System Function** tab,
and press **ECU reprogramming** button.



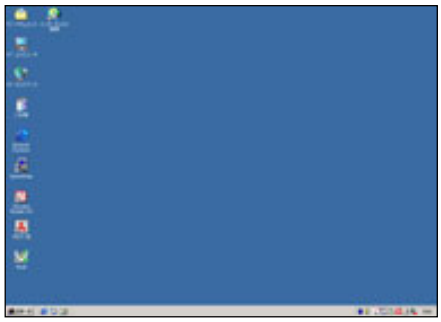
(4) The message “Please update to a new database file.” is displayed when the new Update CD-ROM is recognized.
Press ✓ button.



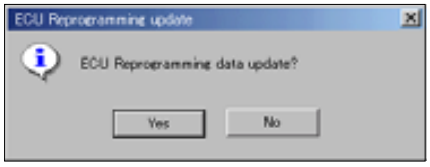
(5) The message “Please wait!” is displayed during progress.
When complete the updating, the message disappears.
You can remove the CD-ROM from PC.

< CASE 2 >

(1) By inserting ECU Reprogramming data CD-ROM in the CD-ROM drive of a PC, update of ECU Reprogramming data starts automatically. And by operating it according to the message displayed, it is possible to update the ECU Reprogramming data in M.U.T.-III in the newest state.



(2) After terminating M.U.T.-III, insert Reprogramming data CD-ROM in the CD-ROM drive of a PC.



(3) Confirmation of update

Click the “Yes” button, update of the ECU Reprogramming data in M.U.T.-III is started.

Remark:

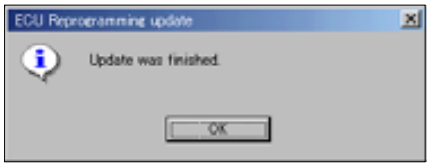
An end message changes by the kind of data updated at this time.

(4) Update finished

(Case A)

Update was finished. Click the “OK” button, update of ECU Reprogramming data is ended.

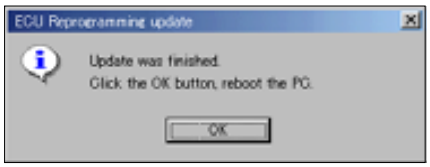
Double-click the M.U.T.-III icon displayed on the desktop to start up the system.



(Case B)

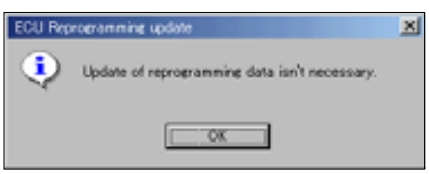
Update was finished. Click the “OK” button, the PC is rebooted automatically.

After rebooting the PC, Double-click the M.U.T.-III icon displayed on the desktop to start up the system.



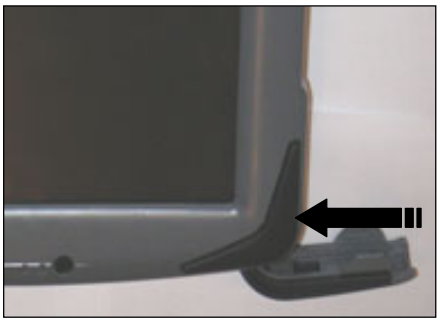
(5) Update is unnecessary

The ECU Reprogramming data in M.U.T.-III is in the newest state. It is not necessary to update ECU Reprogramming data. Click the “OK” button, this update application is ended.



9-4. Reprogramming Operation (V.C.I. alone)

9-4-1. Data transfer (PC --> Memory Card)

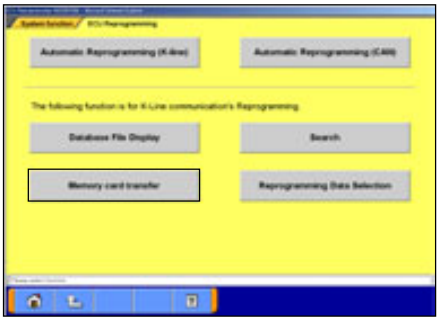


(1) Start up the M.U.T.-III system.
Insert the Memory card (MB991853) into the Card Adaptor (MB991939), and then insert them into m-card slot on PC.

(2) Press **Special function** button on STV Top Menu.

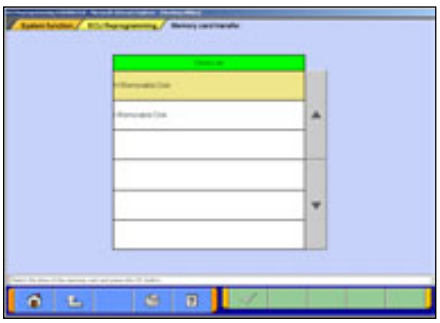
(3) Select **System Function** tab,
and press **ECU reprogramming** button.

Caution:
-In case an update CD-ROM is set in the PC with update undone, data update starts. (refer to 9-3-1(4))

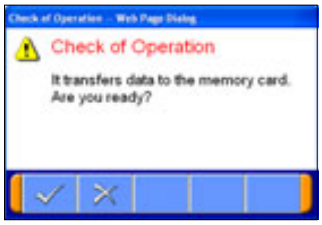


(4) Press **Memory card transfer** button.
ALL reprogramming data in the M.U.T.-III PC are transferred to the memory card.

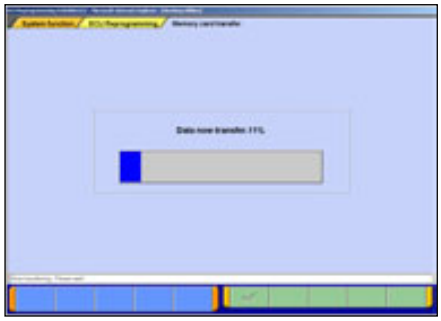
Caution
-Do not remove the memory card from PC.



(5) Select a memory card drive, and press ✓ button to start transferring.

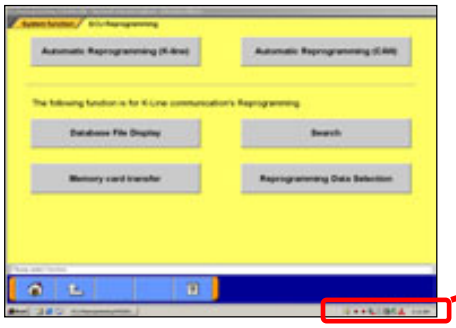


(6) Press ✓ button when the message “It transfers data to the memory card. Are you ready?” appears



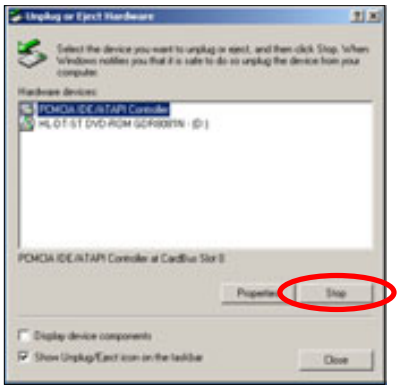
(7) Data transfer
The progress bar is displayed during the transfer.

(8) The data transfer is complete.
Press ✓ button.

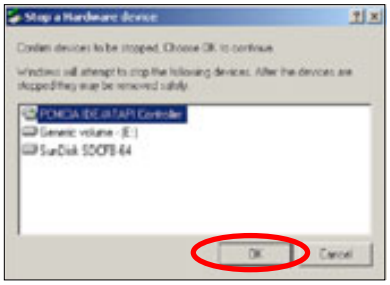


(9) Before you remove the memory card, double-click the below icon for removal of the adaptor.

Double click here



(10) Select [*PCMCIA IDE/ATAPI Controller]* or the other appropriate device, then press **Stop** button.



(11) Verify the contents of the selection, then press **OK** button.

(12) After displayed the message “The device can now be safely removed from the system”, push the lever on the side of PC card slot and remove the memory card.

Caution:
Do not remove the memory card away unless complete above method or turn off the PC.

9-4-2. Equipment Set-Up

(1) Insert the Memory card (MB991853), which is storing the reprogramming data, into the Card adaptor (MB991939) and insert them into V.C.I. main unit (MB991824)

(2) Connect M.U.T.-III Main Harness B (MB991911) or A (MB991910) to V.C.I. main unit securely. (refer to 9-2.)

Note:
Select appropriate harness by instruction below.
- Main harness A: For vehicle only equipping 16 pin diagnosis connector.
- Main harness B: For other vehicles.
- Adaptor harness (MB991855): Outlander, Montero (after ‘02MY)

(To connect Main harness B and 13pin diagnosis connector)

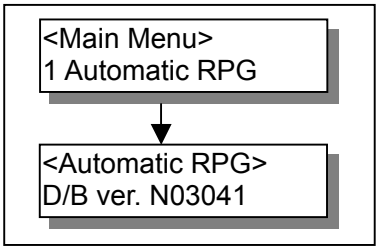
(3) After verifying the ignition switch position at LOCK (OFF), connect the M.U.T.-III Main harness B or A to the diagnosis connector.

(4) Turn Ignition switch on, and turn V.C.I. main switch on.
(Do not start engine)

9-4-3. Data Retrieval (Memory card --> V.C.I.)

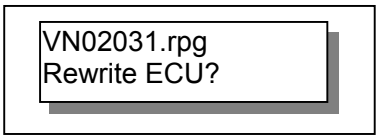
(a). Automatic Data Retrieval
(b). Select and Load Data
(c). (Special case)

(a). Automatic Data Retrieval



(1) Select “Automatic RPG” in main menu and press Enter key. Version No.of data base file appears.

By waiting 10sec or pressing Enter key, V.C.I starts communicating with ECU and retrieves reprogramming data file with the ECU’s parts No. and ROM-ID.

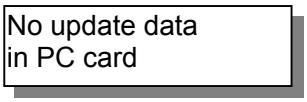


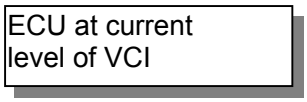
（2）The appropriate reprogramming data file No. is displayed. Pressing Enter key starts transferring the data file into V.C.I built-in-memory.

Remark:

- To search another data, press Esc key. If another appropriate reprogramming data exist, it will be displayed.

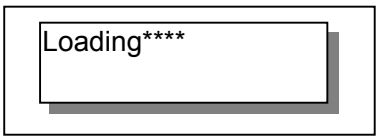
- The message bellows are displayed depends on ECU parts No, ROM-ID and condition of ECU. Press Enter Key to move back to Main menu.



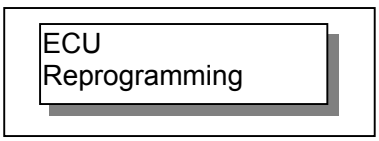


(a) “No update data in PC card”
This message appears if no pertinent reprogramming data exists. No data will be transferred.

(b) “ECU at current level of VCI”
This message appears if the ECU has been already reprogrammed. No data will be transferred.

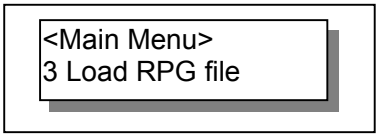


(3) Progress is displayed on the monitor.
* mark is increased by steps.

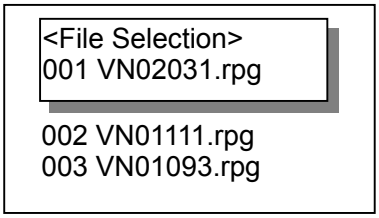


(4) After completing data transfer, ECU reprogramming starts sequentially.
For next steps, refer to 9-4-4.

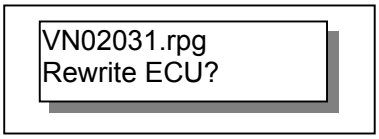
(b). Select and Load Data



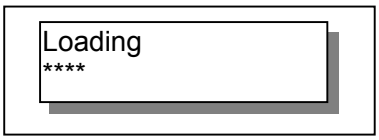
(1) Select “Load RPG file” in main menu by ▼ key, and press Enter key.



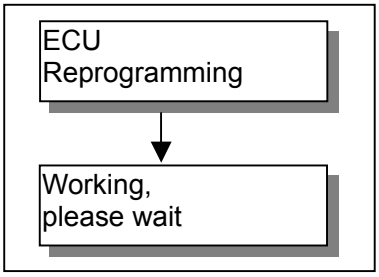
(2) Select a reprogramming data file by ▼ key, and press Enter key.
Esc key: Move back to main menu.
Remark:
-The data files are displayed in numeric order of data No.. (From big to small; new to old)



(3) Reconfirm the data file No., and press Enter key to start transferring the data into V.C.I. built-in-memory.
Esc Key: Cancel

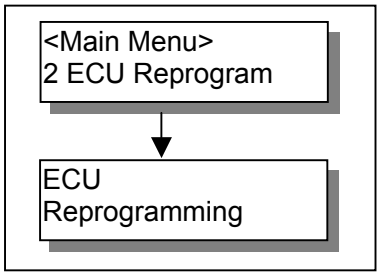


(4) Progress is displayed on monitor
* mark is increased by steps.



(5) After completing data transfer, ECU reprogramming starts sequentially.
For next steps, refer to 9-4-4.

(c). (Special case)

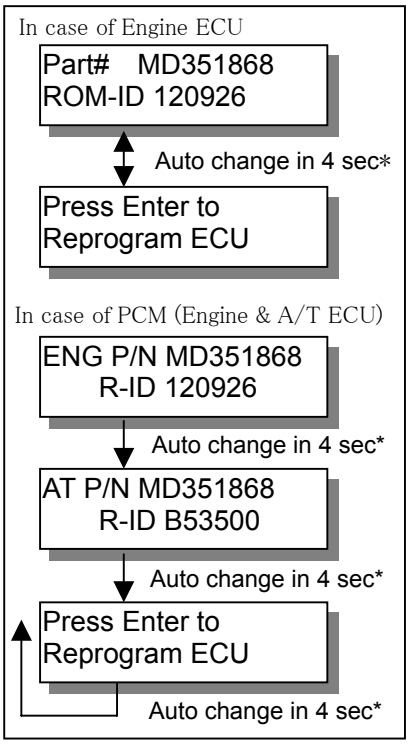


(1) If V.C.I. has already stored the reprogramming data, select “ECU Reprogram” in main menu, and press Enter key.
(Refer to 9-4-2.(2)-(4) for setting up the equipments.)

Reprogramming data file No. and program version No. in the V.C.I. memory are displayed for a few seconds, and then ECU reprogramming starts sequentially.

For next steps, refer to 9-4-4.

9-4-4. Reprogramming ECU (V.C.I. --> Vehicle ECU)

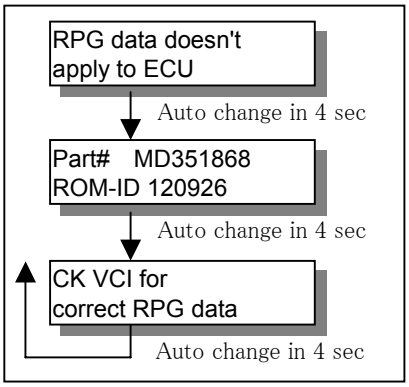


(1) ECU parts No. and ROM-ID No. are displayed.
Press Enter key to start reprogramming.
ESC / ▼ key : restart V.C.I.

* : By pressing ▼ key, immediately move to next.

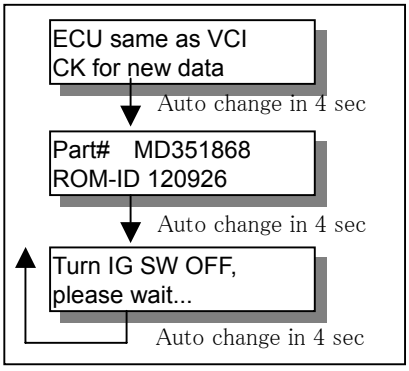
Note:
- Reprogramming must carry out on the condition of engine stop and IG switch on.
- Do not disconnect harness/ turn off the IG switch during ECU reprogramming.

[Messages before/during reprogramming process]

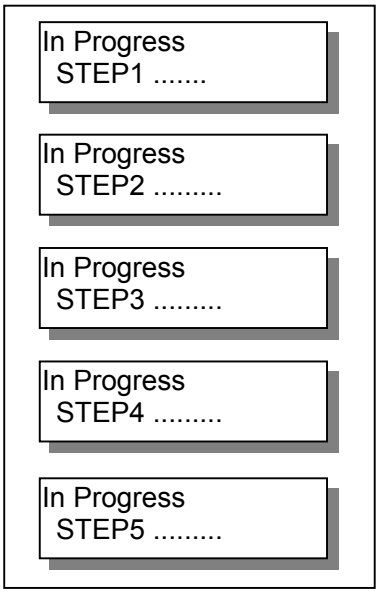


a) "RPG data doesn't apply to ECU"
Reprogramming stopped owing to the data in V.C.I. memory being not appropriate for the ECU.

- Note down the displayed ECU parts No. and ROM-ID.
- Restart V.C.I. by pressing Enter key, and confirm the matching of the data file No, which is displayed by reboot, and the ECU part No./ ROM-ID for reprogramming.



b) "ECU same as VCI, CK for new data" (CK; check)
Reprogramming stopped because reprogramming has been already done.

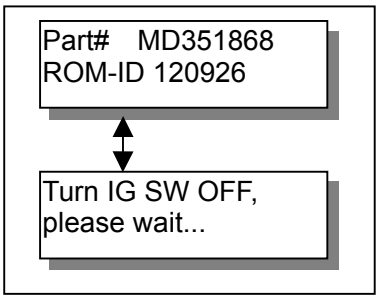


(2) 5 steps progress is displayed while reprogramming.

Caution:

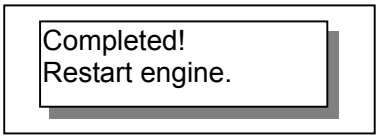
- Do not press any key during reprogramming automatically proceeding.
- Do not turn off V.C.I power or IG switch during reprogramming.

STEP1: Saving the data to the back up memory.
STEP2: Erasing data in ECU.
STEP3: Writing reprogramming data
STEP4: Verifying the data between ECU and V.C.I.
STEP5: Erasing diagnosis code and back up memory



（3）On completion of the 5steps, new reprogrammed ECU parts No. and ROM-ID are displayed.
Turn IG switch LOCK（OFF）.

Note:
Diagnosis code might be memorized in ECU if without turning IG switch Lock (off)



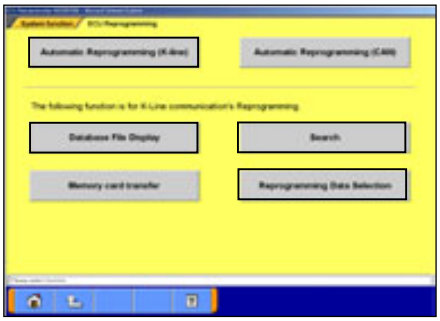
（4）ECU reprogramming completed
Verify the system properly operated by starting engine.
Enter key: V.C.I. restart

9-5. Reprogramming Operation (V.C.I. - PC connected)

9-5-1. Search method Selection

(1) Press **Special function** button on STV Top Menu.

(2) Press **ECU Reprogramming** button.



(3) Select an appropriate button.

Automatic Reprogramming (K-line) -- to 9-5-2(a)
- Automatically searches appropriate Reprogramming data stored in PC.

Database File Display -- to 9-5-2(b)
- Shows the list of Reprogramming data stored in PC.

Reprogramming Data Selection -- to 9-5-2(c)
- Allows selecting Reprogramming data in arbitrary drive and directories.

Search -- to 9-5-2(d)
- Allows searching the target data by ECU No., ROM-ID, etc.

✧ Connect PC and V.C.I., and prepare following steps.

1. Connect M.U.T.-III Main Harness B or A to V.C.I. securely.
2. After verifying the ignition switch position at LOCK (OFF), connect the M.U.T.-III Main harness B or A to the vehicle's diagnosis connector.
3. Turn Ignition switch on, and turn V.C.I. main switch on. (Do not start engine)

9-5-2. Data Search & Transfer (PC --> V.C.I.)

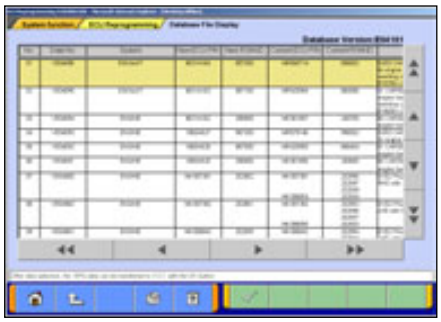
(a). Automatic Data Search
(b). Database File display
(c). Reprogramming Data Selection
(d). Search

(a). Automatic Data Search

(1) Press **Automatic Reprogramming (K-line)** button on the function menu, then the left dialog box appears.
Verify the connection of V.C.I. and harness, and press ✓ button. Applicable reprogramming data is searched from database installed in PC automatically.

(2) Result of the search appears.
Select an appropriate data file with scrolling the list using ▲▲ ▲ ▼ ▼▼ ◀◀ ◀ ▶ ▶▶ buttons, and press ✓ button to start transferring the data into V.C.I. memory.
-After completing the data transfer, ECU reprogramming will start sequentially. (refer to 9-5-3.)
Note:
Press **OK** button when message window of device removal warning comes out at start and end of data transfer.

(b). Database File display

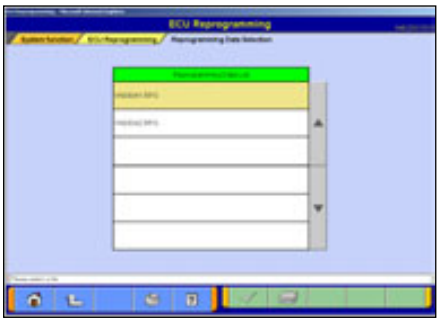


Press **Database File Display** button on the function menu, then the left screen appears.
-Reprogramming data files in the hard disk are listed.
-Select an appropriate data file with scrolling the list using ▲▲ ▲ ▼ ▼▼ ◀◀ ◀ ▶ ▶▶ buttons, and press ✓ button to start transferring the data into V.C.I memory.
▼▼ ▲▲ --10 lines scrolling

-After completing the data transfer, ECU reprogramming will start sequentially. (refer to 9-5-3.)
Note:
Press **OK** button when message window of device removal warning comes out at start and end of data transfer

(c). Reprogramming Data Selection

To select the reprogramming data from arbitrary directories.



(1) Press **Reprogramming Data Selection** button on the function menu, then the left screen appears.

-- to select arbitrary drive and directory → (2)

On this screen, select an appropriate data file and press to start transferring the data into V.C.I memory.

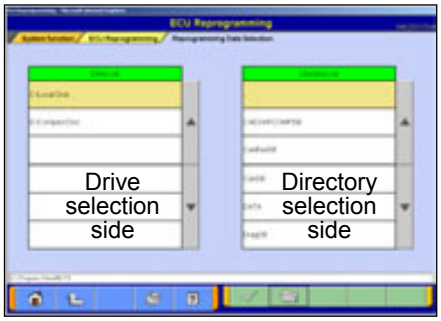
Note:

-The displayed data as default is in the folder shown below.

C:¥Program Files¥MUT3¥RPGDATA

This directory is the default reprogramming data pool of M.U.T.-III, referred from 9-4-1, 9-5-2(a),(b),(d).

-After completing the data transfer, ECU reprogramming will start sequentially. (refer to 9-5-3.)



(2) Data selection

Select a drive on the left chart, and the directories in the drive are displayed on the right chart.

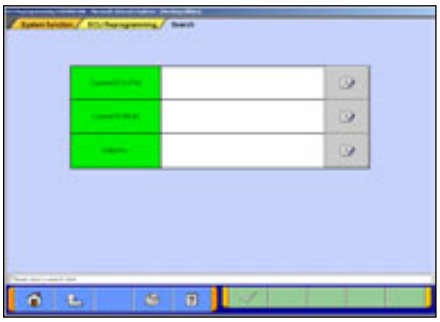
-To move to a lower directory, select appropriate row on the right chart and press button.

-To move to an upper directory, select row on the right chart and press button.

Select appropriate directory name row on the right chart, and press button to return to (1) and list the files contained in the directory.

(d). Search

To search the reprogramming data by inputting ECU Part No., ROM-ID, or Data No.

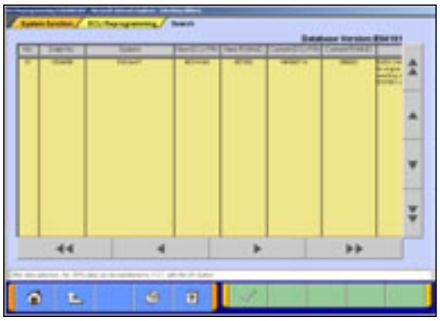


(1) Press **Search** button on the function menu, then the left screen appears.

Input search key info in the input column, then press button.

Note:

- To input, 2 ways can be taken.
  - -By PC keyboard
  - -By virtual keyboard --press
- Some info need to be a combination with the other info for data search
  - - **Current ECU P/N** & **ROM-ID** need to be together.
  - - **Data No.** needs no other info.



(2) Results

Select appropriate data with scrolling the list using buttons and press button to start transferring the data into V.C.I memory.

--10 lines scrolling

-After completing the data transfer, ECU reprogramming will start sequentially. (refer to 9-5-3.)

Note:

Press **OK** button when message window of device removal warning comes out at start and end of data transfer.

9-5-3. Reprogramming ECU (V.C.I. --> Vehicle ECU)

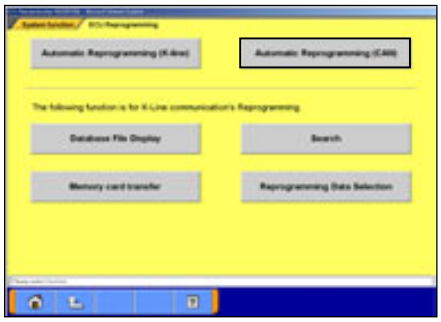
Operate with buttons (in the lower right corner of the screen) according to directions of screen display.

The same operation as 9-4-4. need to be performed on PC screen.

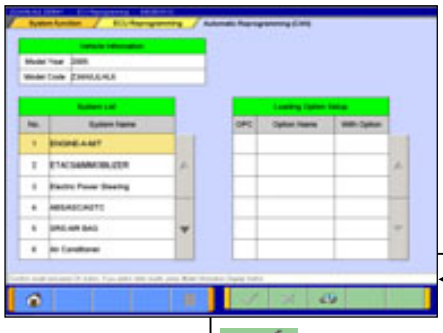
9-6. Reprogramming by CAN communication

(1) Press **Special Function** button on STV Top Menu.

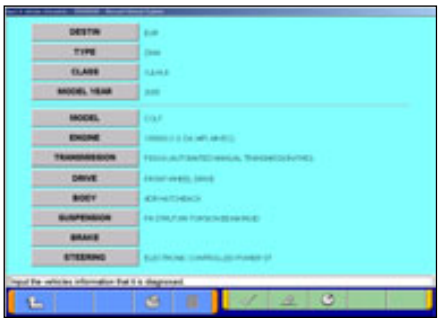
(2) Press **ECU reprogramming** button.

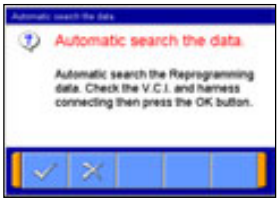


(3) Press **Automatic Reprogramming (CAN)** button.
Note:
Other 5 buttons are for K-line system and not for CAN system.



(4) Vehicle choice
-Selected Model year and Model Code of the vehicle are indicated.
-Select a system (ECU) and loading option, and press button.
-If you select other Model year and Model code, press button and select model.





(5) Check
Check all equipment properly then press button.

(6) Data search

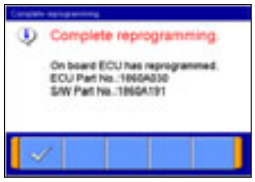
Searching the target reprogramming data.

Unnecessary reprogramming

< Unnecessary reprogramming >

- Appropriate reprogramming data is not released.
- Onboard ECU Part No. and S/W Part No. are indicated.

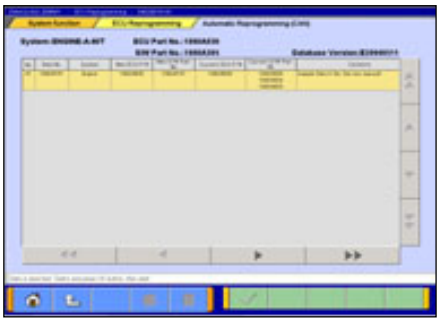
Complete reprogramming



< Complete reprogramming >

- Onboard ECU has reprogrammed.
- Onboard ECU Part No. and S/W Part No. are indicated.

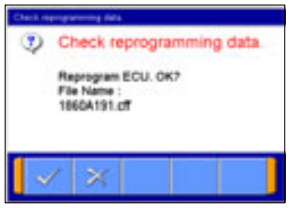
Target data found



(7) Data check

-The appropriate reprogramming data is indicated.

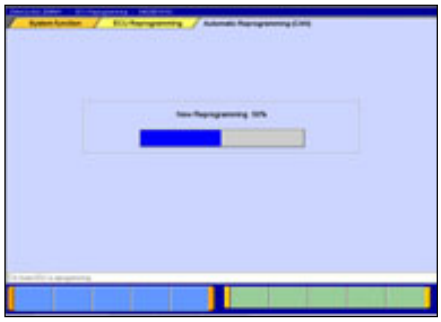
-Press ✓ button to go to next.



(8) Reprogramming data check

-Check and press ✓ button.

-If you select other repro. data, press ✗ button to back.



(9) Reprogramming

Reprogramming on board ECU starts.

(10) Reprogramming completed

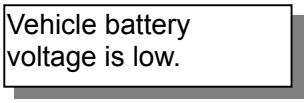
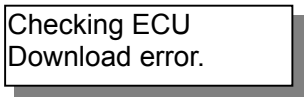
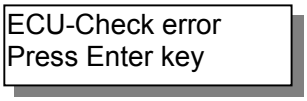
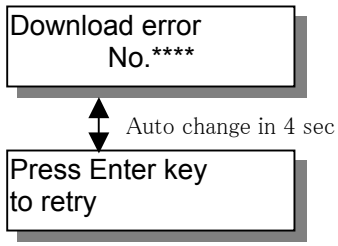
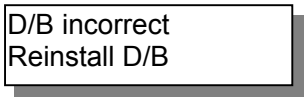
-Reprogramming is completed properly.

-Reprogrammed ECU Part No. and S/W Part No. are indicated.

-Press ✓ button, and turn IG switch OFF.

9-7. Troubleshooting of Reprogramming

9-7-1. Trouble of Reprogramming on K-Line communication

No.	Message	Cause/Remedy
1	During ECU reprogramming 	<Cause> • Due to low battery supplied to V.C.I.. (The voltage of battery falls down 9.7V and below for 5 seconds.) • The V.C.I. has connected to PC without connection to vehicle during retry of reprogramming. <Remedy> 1. Verify the connection between V.C.I. and vehicle, and check the battery carried in the vehicle. Recharge or replace it as needed. 2. Press the V.C.I. “Enter” key to reboot the V.C.I.
2	During ECU reprogramming 	<Cause> Failed to communicate with ECU during ECU- checking. <Remedy> 1. Turn off the IG switch. 2. Press the V.C.I. “Enter” key and reboot the V.C.I. to restart the procedure.
3	During ECU reprogramming. 	<Cause> Disagreement of the data in ECU and it in memory card. <Remedy> 1. Press the V.C.I. “Enter” key The reprogramming will be continued using data in memory card.
4	During ECU reprogramming 	<Cause> • Disconnect during reprogramming • IG OFF during reprogramming • Communication error • Voltage of battery fall down <Remedy> 1. Verify the connection of harness, and condition of battery carried in the vehicle. 2. Press the V.C.I. “Enter” key and reboot the V.C.I. to retry. (Retry the procedure until the reprogramming completed properly on the error occurred vehicle.) [Error code list] 001A/B : Communication error A/B 002A/B : ECU data erasing error A/B 003A/B : Data writing error A/B 004A/B : Data reading error A/B 004C : Data verifying error 005A : Diagnosis erasing error
5	After select [Automatic RPG] from V.C.I. Main menu. 	<Cause> Reprogramming data base file (MUT-3REP.csv) in the memory card is incorrect. <Remedy> 1. Press the V.C.I. “Enter” key and back to Main menu. 2. Turn off the V.C.I. and eject the memory card from V.C.I.. 3. Insert the memory card into M.U.T.III (PC), and transfer the data to the card. Then retry the procedure.

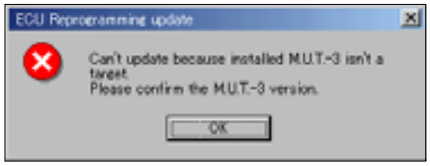
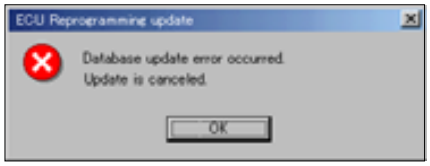
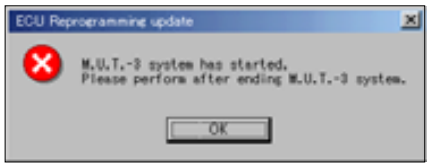
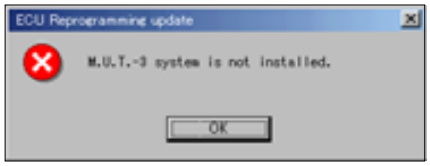
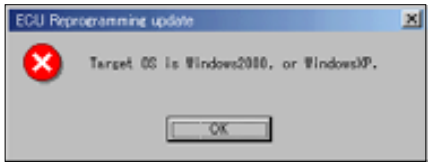
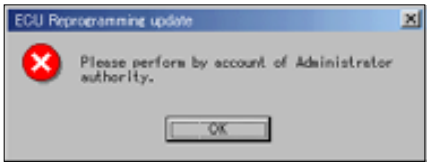
No.	Message	Cause/Remedy
6	During Automatic RPG with V.C.I. alone. No response from vehicle ECU	<Cause> • There is no ECU for requiring reprogramming • IG switch not positioned “ON”. • Main Harness not connected. <Remedy> 1. Turn off the V.C.I. power. 2. Verify the connection of harness, and condition of harness itself. 3. Verify if the ECU for required reprogramming is installed. 4. Verify if the ECU can communicate with V.C.I. 5. Then redo the procedures.
7	During Automatic RPG with V.C.I. alone. CK VNxxxxx.rpg In PC card	<Cause> There is no reprogramming data in memory card although ECU is affected for reprogram. <Remedy> 1. Press the V.C.I. “Enter” key and back to Main menu. 2. Turn off the V.C.I. and eject the memory card from V.C.I.. 3. Insert the memory card into M.U.T.-III (PC), and transfer the data to the card. Then retry the procedure.
8	During automatic RPG or Load RPG with V.C.I. alone. Load error	<Cause> Failure of data transfer from memory card to V.C.I.. <Remedy> 1. Press the V.C.I. “Enter” key and back to Main menu. 2. Retry Automatic RPG or Load RPG again.

9-7-2. Trouble of Reprogramming on CAN communication

No	Message	Cause/Remedy
1		< Cause > ・No reprogramming data exists for selected vehicle. < Remedy > ・Select vehicle type again.
2		< Cause > ・Model specifying information (Model Year, Type, Class) is insufficient. < Remedy > Select vehicle type again.
3		< Cause > ・No CBF file exists in PC. < Remedy > ・Reinstall M.U.T.-III.

No	Message	Cause/Remedy
4		< Cause > ・Connection between V.C.I. and vehicle malfunctioned. ・The power switch of V.C.I. is OFF. < Remedy > ・Confirm connection between V.C.I. and vehicle. ・Confirm the power switch of V.C.I.
5		< Cause > ・No reprogramming data (CFF file) exists in PC. < Remedy > ・Reinstall reprogramming data (CFF file).
6		< Cause > ・While reprogramming, an error occurred. < Remedy > ・Restart reprogramming process from beginning.
7		< Cause > ・Diagnosis code couldn't be erased. < Remedy > ・Erase the DTC by diagnosis function of M.U.T.-III.
8		< Cause > ・An error occurred in accessing database to search reprogramming data. < Remedy > ・Reinstall M.U.T.-III.
9		< Cause > ・The internal process error occurred on database to search the reprogramming data. < Remedy > ・Reinstall M.U.T.-III.

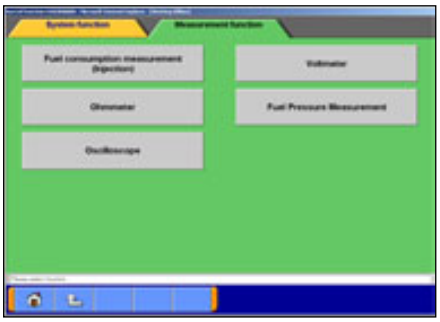
9-7-3. Other Troubles of Reprogramming

No	Message	Cause/Remedy
10		< Cause > ・M.U.T.-III Ver. is not an object version of ECU Reprogramming data CD-ROM inserted in the CD-ROM drive. < Remedy > ・Please check the M.U.T.-III Ver. and upgrade M.U.T.-III if needed.
11		< Cause > ・The error occurred at the time of update of a database. < Remedy > ・Please inform the help desk of M.U.T.-III.
12		< Cause > ・Application was started during M.U.T.-III starting. < Remedy > ・Please insert CD-ROM in a PC again after terminating M.U.T.-III.
13		< Cause > ・M.U.T.-III system is not installed in the PC. < Remedy > ・Please use the PC with which M.U.T.-III were installed.
14		< Cause > ・OS installed in the PC is except Windows2000 or WindowsXP. < Remedy > ・Please use the PC with which Windows2000 or WindowsXP was installed.
15		< Cause > ・It started by users other than "Administrator" or "mut". < Remedy > ・Please log in and start by the user of "Administrator" or "mut".

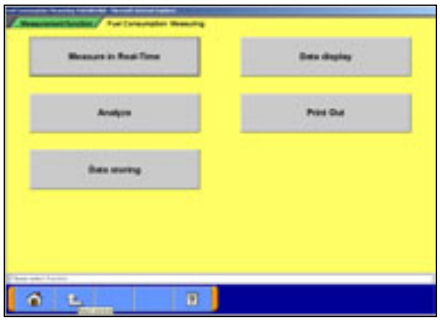
Chapter 10 Measurement Functions

10-1. Injector-Type Fuel Consumption Measurement

10-1-1. Function Select

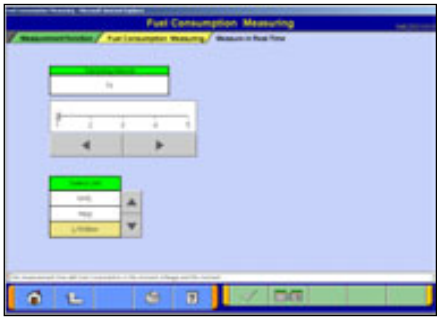


(1) Press **Special function** button on the STV Top Menu (illustrated on 3-2), then select **Measurement Functions** tab on the upper part of the screen.
Press **Fuel consumption measurement (Injection)** button on this menu screen.



(2) Function Selection
Measurements in Real-time -- to 10-1-2.
Data Display -- to 10-1-3.
Analyze -- to 10-1-4.
Print out -- To print out the view graph.
Data storing -- To load the data, which is stored in a removal disk, onto the PC.

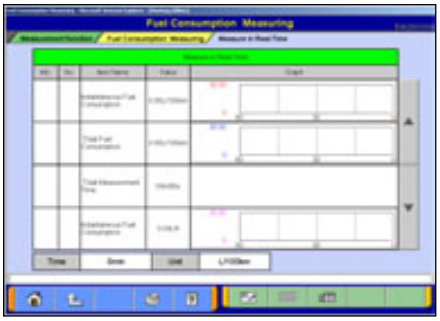
10-1-2. Measurement in Real-time



(1) Preparations Prior to Measurement
Set the sampling interval, and select the displayed unit of measurement by pressing the ▲ ▼ buttons.
If you wish to select display items, press button.
When the setting complete, press button.

Note:
The amount of recording time is proportional determined by the length of the sampling interval.

(2) Entering and Recording Record Information
Enter your user name and the vehicle model type.
button starts the measurement process.



(3) View Graph

The data of 4 items/4 graphs are displayed.

-Pressing button stops recording.

-Once recording has been stopped, the data is automatically saved.

--View Text To (4).

Note:

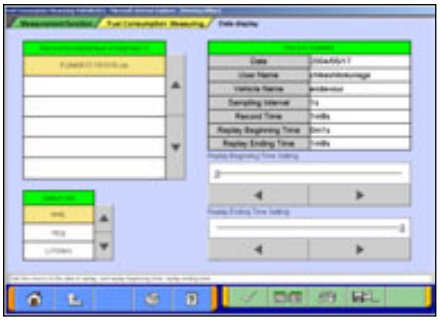
The file name is set as “FU+Year Month Day+Time (military time including seconds)”.

(4) View Text

--View Graph To (3)

--Stop Record

10-1-3. Data Display



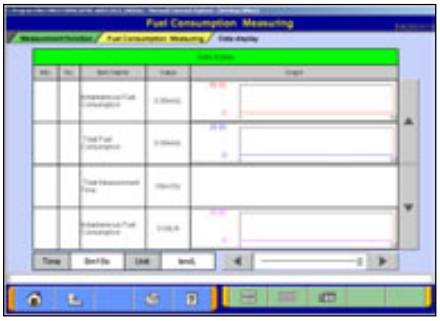
(1) Select a record file containing the data you wish to check. Set the necessary speed range with , and select unit of measurement with .

Then press button.

--Delete Data

--Select item

--Save Data



(2) View Graph

The data of 4 items/4 graphs are displayed.

Pressing buttons or moving the slide bar displays the value of the cursor line.

--View Text To (1)

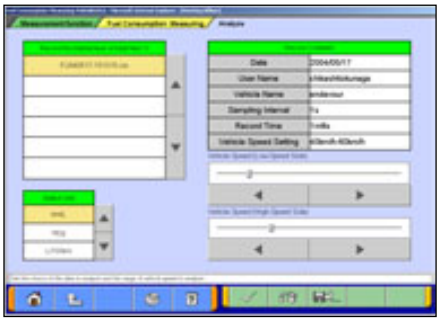
--Change displayed Unit

(3) View Text

--View Graph To (2)

--Change displayed Unit

10-1-4. Performing Simplified Analysis



(1) Select a record file containing the data you wish to analyze. Set the necessary speed range and displayed unit of measurement, and then press button.

--Delete Data

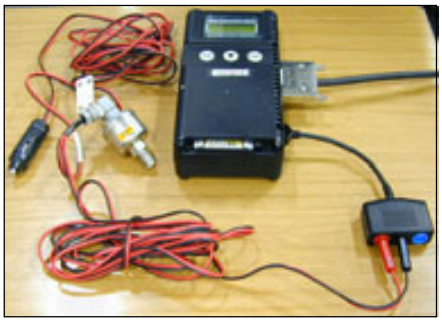
--Save Data

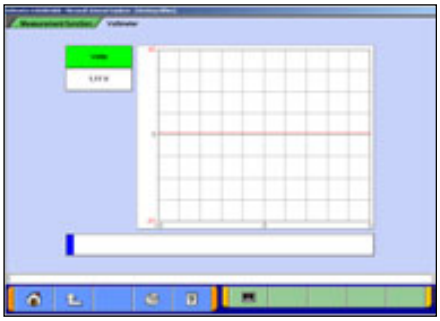
(2) Viewing Analysis Results

--Change displayed Unit

10-2. Fuel pressure, Voltage, Ohmmeter, Oscilloscope

10-2-1. Measuring Fuel Pressure (Not available in US)



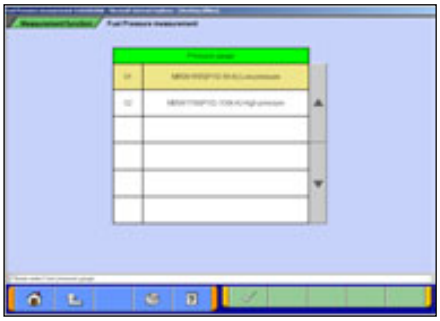


The fuel pressure can be measured using pressure gauge (LP: MB991655 or MB991979 / HP: MB991708 or MB992007), and displayed as text or graph style on PC.

(1) Measuring the Calibration Volt

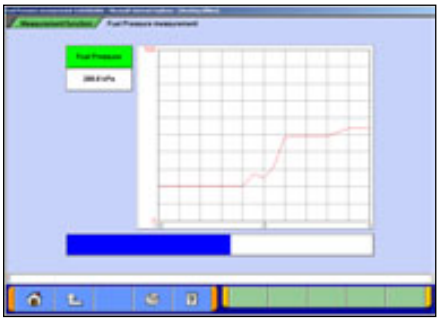
To adjust manufacturing difference of solid state in each pressure gauge, you need to input its calibration value. Please measure the calibration value as follows.

- Connect the pressure gauge to cigarette lighter socket, and to V.C.I. (Don't put the pressure gauge on the fuel pipeline yet.)
- Press **Voltmeter** on the menu screen of 10-1-1(1).
- The displayed voltage is the calibration value of the gauge.



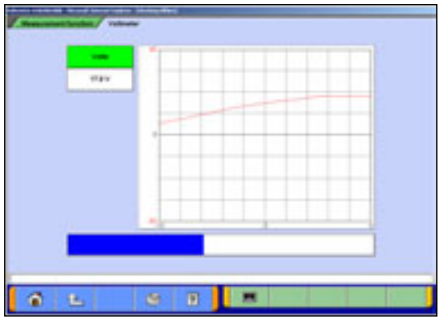
(2) Put the pressure gauge on the fuel pipeline.
Press **Fuel Pressure Measurement** on the menu screen of 10-1-1(1).
The selection screen of pressure gauge appears. Select a pressure gauge and press button.

(3) Entering the Calibration value
Enter the calibration volt which you measured in (1), and press button.



(4) Measuring Fuel Pressure
The measured value is displayed on the graph.

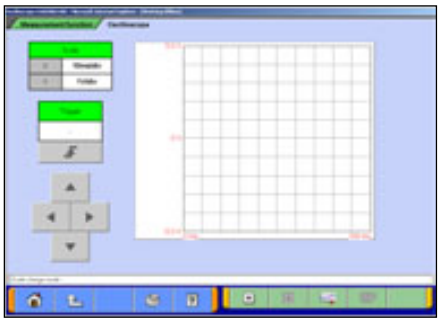
10-2-2. Measuring Voltage and Resistance



(1) Press **Voltmeter** or **Ohmmeter** on the menu screen of 10-1-1(1).
The voltage or resistance value comes from the test leads connected to the trigger terminal and displayed on the PC screen.
-For details on how to connect the measurement probe, and details for measuring using V.C.I. alone, refer to 2-2-3.
-Prior to executing the measurement process, calibrate the instrument to 0 using button.

Note:
-DC voltage can be measured in the range of 0-±40V.
-Resistance can be measured in the range of 0-100KΩ.

10-2-3. Oscilloscope Function

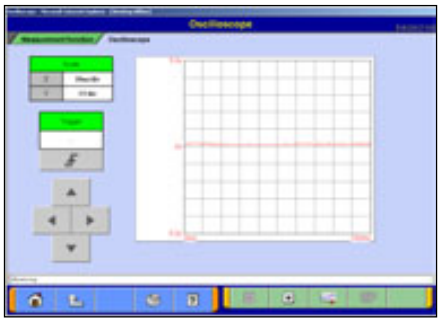


(1) Press **Oscilloscope** on the menu screen of 10-1-1(1).

This function allows you to observe the continuous waveform, which is loaded from the voltage measurement terminal, on PC screen using test leads (MB991499, etc).

--Starts the waveform display
--Stops the waveform display
--Switches to Scale mode
: to set the time axis and voltage axis --(2)
--Switches to Trigger mode
: to set trigger conditions --(3)

Note:
DC voltage can be measured in the range of 0-±40V, and resolution can be measured at 0.1V.
The shortest sampling interval is 500μs.

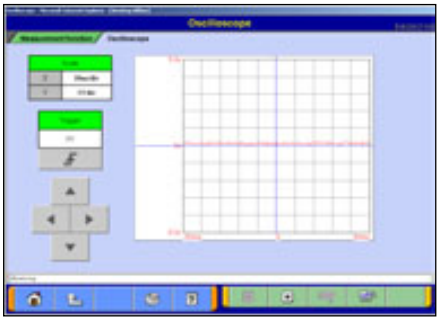


(2) Setting the Time Axis and Voltage Axis

button switches to the scale mode, and the buttons can be used to set time axis and voltage axis.

--Changes time axis scale
--Changes voltage axis scale

Note:
Time scale: (10,20,40,100ms/div)
Voltage scale: (1,2,5,8V/div)



(3) Setting Trigger Conditions

button switches to the trigger setting mode, and a trigger point can be changed by the buttons.

--Up Trigger
--Down Trigger

Chapter 11 Troubleshooting Procedures

11-1. Individual Troubleshooting Procedures

This chapter describes troubleshooting guidelines for the causes of main error messages as well as error symptoms.

Note:

- The messages described herein sometimes appear simultaneously with other screens.
- For details regarding circuit inspection, see the electrical wiring diagrams of the applicable vehicle.
- Communications lines are determined by the system and communication method.
- For details regarding the diagnosis connector terminal configuration, see the electrical wiring diagrams of the applicable vehicle.

No.	Message/Symptom	Cause	Remedy
1	The V.C.I. does not power up when connected correctly to the vehicle. Be sure the IG switch is ON.	Vehicle power supply failure due to: • V.C.I. switch turned OFF • Low battery • Vehicle harness not connected or a short exists • Hardware error	1. Verify that the V.C.I. switch is ON. 2. Verify the vehicle battery is sufficiently charged (12V). 3. Disconnect and reconnect the connector. 4. Check if there is a short in the harness. (Try using a different harness.) 5. If the problem is not resolved by remedies 1-4, there may be a hardware error. Request inspection with the harness.
2	The V.C.I. does not power up from the PC connection with the USB cable. V.C.I. is not connected to vehicle at this time.	PC power supply failure due to: • PC power not activated • USB cable not connected or a short exists • Hardware error (PC or V.C.I.)	1. Verify that PC is ON. 2. Verify that appropriate USB cable is firmly connected between the PC and V.C.I. (Do not use a USB hub.) 3. Disconnect and reconnect the connector. 4. Check if there is a short in the cable. (Try using a different harness.) 5. If the problem is not resolved by remedies 1-4, there may be a hardware error. Request inspection with the PC.
3	The screen “Maintenance Mode” appears as soon as the V.C.I. is powered up.	V.C.I. was powered on with pressing “Esc” key.	1. Turn the V.C.I. OFF. 2. Disconnect USB cable and connector. 3. Turn the V.C.I. power ON. (Do not touch “Esc” key.) 4. If the “Main Menu” or “PC Communication” display does not appear, the V.C.I. may be at fault. Request inspection.

No.	Message/Symptom	Cause	Remedy
4	The screen “ECU Reprogramming” appears as soon as the V.C.I. power is activated.	The V.C.I. basic application has not been installed.	1. Connect the unit to the PC (for power activation) while pressing the V.C.I. “Esc” key. 2. Verify that the V.C.I. screen display indicates “Maintenance Mode”. 3. In order to install the V.C.I. basic application, using the automatic version upgrade feature, start the PC M.U.T.-III diagnostic application and attempt diagnosis. (refer to 3-3-1) 4. As “Setup V.C.I.” dialog box appears on PC screen during the diagnosis, press button. 5. When “Update” dialog box disappears on PC screen, the install is completed. 6. If, once the application has been downloaded and the V.C.I. power has been reactivated, the “Main Menu” or “PC Communication” display does not appear, request inspection.
5	The screen “Drive Recorder [1] Record error ” appears during recording the Drive recorder with V.C.I. alone.	Communication error	1. Press the V.C.I. “Enter” key. 2. Verify that the V.C.I. screen display indicates “Drive Recorder Continue? “, press the “Enter” key or wait 10seconds to start recording again.

Chapter 12 Reference Material

12-1. V.C.I. Electrical Properties

<Power Supply Properties>

Rated voltage	DC12V, 24V
Ground polarity	(-)
Power supply (guaranteed operation range)	DC 8.0 - 32.0 V
Power supply reverse current	DC - 40 V (1 minute period)
Unit current consumption (maximum)	1A

(When voltage is within the guaranteed operation range)

◆ Excludes conditions when the voltage is not within the guaranteed operation range and special conditions such as when a ground short occurs on an updated control terminal, etc.

The amount of current consumption when the unit is used with rated power supply is 420mA or less.

Appendix

<< Terminology >>

In alphabetical order

A

AMT: Abbreviation for Automated Manual Transmission Electronic Controlled Unit.

ASC: Abbreviation for Active Stability Control System.

C

CAN: Abbreviation for Controller Area Network. A system that shares data between ECUs through communication. The processing of each command (signal) is possible using a communication line only.

D

Data transmission: The transmission of data stored from one memory area to another memory area. In the case of M.U.T.-III, this refers to the transmission of data from the V.C.I. memory area to the PC.

Default: Initial setting. A predetermined value that is set when an item that should be defined is not defined.

Diagnosis: Refers to the self-diagnosis function. A system in which the ECU installed in the vehicle monitors input signals from the various sensors and switches and, when an error occurs or erroneous information is identified, records the data in memory.

E

ECU: Abbreviation for Electronic Control Unit. The control unit of the electronic control system.

EPS: Abbreviation for Electric Power Steering

I

I/F cartridge: A cartridge used when the ECU communication method employed is a special method or when M.U.T.-III functions have been expanded and support is not possible by the M.U.T.-III unit alone. The various I/F cartridges, such as the cartridge for the SWS monitor set in M.U.T.-II or the cartridge for DCC communication, can be used as is.

M

Memory card: A medium used to store data. Records data such as those used for ECU updates. With M.U.T.-III, flash memory is employed which allows the user to electrically change the data as well as maintain the information even if the power is turned off. Batteries are not required.

O

Online help: Also referred to as the online manual. An operation manual loaded on M.U.T.-III, which gives easy-to-understand explanations on how to use the various functions. It also provides processing methods related to the operation currently performed when the user is unsure how to perform an operation during application use.

R

RAM: Abbreviation for Random Access Memory. A memory device that is capable of both read and writes operations. The information stored in this device is lost when the power is turned off.

ROM: Abbreviation for Read Only Memory. A memory device that is capable of read operations only. The information stored in this device is maintained even when the power is turned off.

S

Serial communication: A method in which the bits that make up digital data are transmitted in series one bit at a time on the communication line. The reading of diagnostic code via communication from the ECU using the M.U.T. is referred to as “Pattern Diagnosis.”

Slide bar: A method in which a value is entered by moving a bar.

SWS: Abbreviation for Smart Wiring System. A system that centrally controls multiple electrical signals on one harness, thereby minimizing the number of harnesses used. The SWS lead to the development of the multiplex transmission system, making harness weight reduction and the development of multifunctional electrical components possible.

V

V.C.I.: Abbreviation for Vehicle Communication Interface. The communication interface used to connect the ECU mounted in the vehicle with a PC.

<< Screen Button Explanations >>

The name and function of each button icon are described below.

Button Image	Button Name	Button Function
	Main menu	Returns the screen to the M.U.T.-III Start screen.
	Home	Returns the screen to the top menu screen.
	Return one level	Returns the screen to the upper layer screen.
	OK or YES	Determines an outcome.
	Cancel	Cancels the operation or closes the screen.
	Help	Displays online help.
	Print screen	Print the screen image.
	Information	Displays information.
	View vehicle information	Displays vehicle information.
	Erase	Erases diagnosis data
	History	Displays history of vehicle information settings.
	View graph1	Displays four items on four graphs.
	View graph2	Displays (overwrites) four items on one graph.
	View text	Displays text.
	Change time scale	Changes the graph display time scale.
	Change data scale	Changes the graph display data scale.
	Select item	Opens the Item selection screen.
	Sort	Sorts the list into default order.
	Run	Starts the item.
	Stop	Stops the item.
	Pause	Pause

Button Image	Button Name	Button Function
	Add	Adds items.
	View V.C.I. Regeneration data	Displays a list of V.C.I. Regeneration data.
	Delete file	Deletes files.
	Previous page	Displays the previous page.
	Next page	Displays the next page.
	Record end	Ends the recording
	Manual trigger	Generates a manual trigger.
	Transmit data	Transmits the data of the selected block to the PC.
	Save data	Saves the selected data files to a removable disk.
	Alphanumeric input screen	Opens the alphanumeric input screen.
	Trigger point data	Jumps to the trigger point.
	Data extraction settings	Opens the extraction condition setting screen.
	Data search settings	Opens the search condition setting screen.
	Correlation chart	Opens the correlation chart setting screen.
	Distribution map	Opens the distribution chart setting screen.
	Time setting	Opens the Time extraction/search condition setting screen.
	1/2	Change of function button (1/2 display)
	2/2	Change of function button (2/2 display)
	1/3	Change of function button (1/3 display)
	2/3	Change of function button (2/3 display)
	3/3	Change of function button (3/3 display)

Screen Button Explanations

Button Image	Button Name	Button Function
	Save to HDD	Save to Hard drive.
	Disconnect cartridge	Disconnects the SWS monitor cartridge.
	Start diagnosis	Starts diagnosis and displays the result.
	Related information	Displays related information
	Zero point calibration	Corrects the calibration on measurement function.
	Change unit	Changes the displayed unit of measurement.
	Change scale	Changes the scale.
	Trigger setting	Sets the Oscilloscope function trigger.
	Up trigger	Generates a trigger at the time of a rise.
	Down trigger	Generates a trigger at the time of a fall.
	Select drive	Opens the drive selection screen.
	Select folder	Opens the selected folder.

Button Image	Button Name	Button Function
	Esc	ESC Key function of V.C.I.
	Enter	Enter Key function of V.C.I.
	Down arrow	Down arrow Key function of V.C.I.
	Bookmark	Displays bookmarks (pages with bookmarks).
	View MSB	Displays MSB to check revision points of the Service manual.
	Document information	Displays document information.
	Connector index	Displays the connector index.
	Search List	Returns the screen to the search list screen.
	Group top	Returns the screen to the list of the presently displayed groups (or to the list of reference
	Previous display	Returns the screen to the previously displayed screen.
	Zoom in	Enlarges the display.
	Zoom out	Reduces the display.