

OPERATION MANUAL

SMARTASSIST-Direct

YANMAR



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YANMAR CO., LTD.

<https://www.yanmar.com>

04YSA-E00018
303VTSKJ

YANMAR CO., LTD.

Head office
YANMAR FLYING-Y BUILDING 1-32, Chayamachi, Kita-ku, Osaka, 530-6311, Japan
Phone: 81-6-6376-6237

Agricultural Operations Business
Quality Assurance Division
Umeha Gate Tower 1-9 Tsurunocho, Kita-ku, Osaka, 530-0014, Japan
Phone: 81-6-6376-6347

Industrial Power Products Management Division
Quality Assurance Division
1009-2, Kawamichi-cho, Nagahama-city, Shiga, 526-0111, Japan
Phone: 81-749-72-5195

Large Power Products Management Division
Quality Assurance Division
1-1, 1-Chome, Nagasu Higashi-dori, Amagasaki, Hyogo, 660-8585, Japan
Phone: 81-6-6489-8017

Yanmar Construction Equipment Co., Ltd.
Service Information Section
1717-1, Kumano, Chikugo-shi, Fukuoka, 833-0055, Japan
Phone: 81-942-53-8427

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- The pictures in this manual refer to Windows 7.
- The contents of this manual may change without prior notice.

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OPERATION MANUAL

SMARTASSIST-Direct

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1. Overview

The SMARTASSIST-Direct software supports the error diagnosis, and mounting and maintenance services of electrical control devices. It runs on Windows personal computers.

2. Operation Environment of SMARTASSIST-Direct

The service tool operates in the below environment.

● PC

- CPU: Intel Pentium 4 2 GHz or more recommended
- HDD: 200 MB or more recommended ^{*1}
- OS/Memory: Windows Vista
Windows 7 32bit/64bit (recommended)
Windows 8 (recommended)
Windows 8.1 (recommended)
Windows 10
- Display resolution: 1024 x 768 or higher
- USB 1.1: 1 port
- Microsoft Excel 2000 or higher (for the display of operation data)
- Internet Explorer 8.0 or higher (for the manual link)

^{*1} Does not included memory for data storage.

● Interface Box (YANMAR Diagnosis Interface Box)

1R1999-25000 (HITACHI interface box)

1RF002-25000 (YANMAR interface box)

● Display Language of SMARTASSIST-Direct

- Japanese
- English
- Chinese

Note If SMARTASSIST-Direct software is not installed normally, consult with the YANMAR Service Department.

If you install to an OS without appropriate operating environment, the message below will be show and you cannot use smartASSIST-Direct.



* Anti-virus software may affect the installation of SMARTASSIST-Direct software.

3. Contents of SMARTASSIST-Direct

3.1 Contents of the Program

● Software

The engine ECU (hereafter ECU), the 3G controller (hereafter ECU) and the drivers connect to the PC via the interface box (a signal converter) ([Figure 3-1 Connection to the product]). The software performs error diagnosis, writing of software, and initial settings.

● Training Mode

In this mode, you can practice how to use SMARTASSIST-Direct on your PC without connecting to the ECU. The operation of the software and the ECU are simulated using data that is stored on the PC in advance.

● Displaying measurement data and product operation data

- All data collected during maintenance can be displayed with the provided software.
- The data can be compared to other data of the same kind.
- All collected data can be displayed on other SMARTASSIST-Direct workstations.

● Communication with the Center

The software uses the Internet to download required data and updates, and to upload collected data.

● Detail Settings

The settings allow to change the data rate to the ECU and other conditions. It is also possible to select the training mode and confirm software updates.

As a basic rule, do not change the communication settings unless instructed to do so by YANMAR.

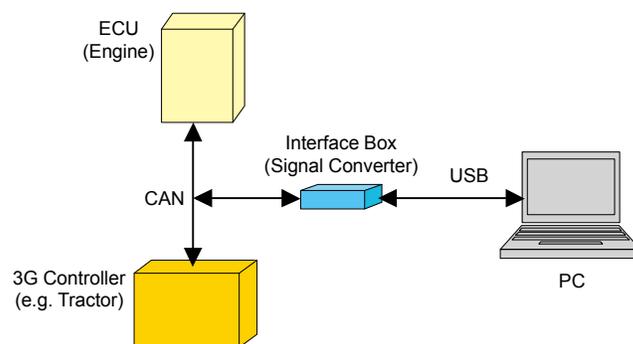


Figure 3-1 Connection to the product

3.2 Function Mode

Three settings for the usable functions are available, depending on the service level.

● Standard Mode

Basic error diagnosis function is available.

● Advanced Mode

Basic error diagnosis, ECU writing and electrical part replacement functions are available.

● Expert Mode

All functions are available.

O: Usable X: Not usable

Type		Standard	Advanced	Expert
Utilization limitation	All models per product category are available	O	O	O
License Management	License Update	O	O	O
Error Diagnosis		O	O	O
ECU Writing/Replacement		X	O	O
Parts Replacement/Adjustment		X	O	O
Customization		X	X	O
Product Operation Data (Display)		X	X	O
Data Management IP/EP		X	O	O
Training		O	O	O
Campaign		X	O	O
ECU Maintenance Data Upload		X	O	O
Product Operation Data		O	O	O
Service data	Manual link	X	O	O
Software update		O	O	O

* The detailed function may be different depending on the content of the license in the same function mode.

3.3 Updating SMARTASSIST-Direct

The SMARTASSIST-Direct service tool updates automatically.

Connect the PC to the Internet, launch the service tool and login. It communicates automatically with the center, receives the setup files, and performs the update.

Note If you activate the Internet connection AFTER starting the service tool, it will not update.

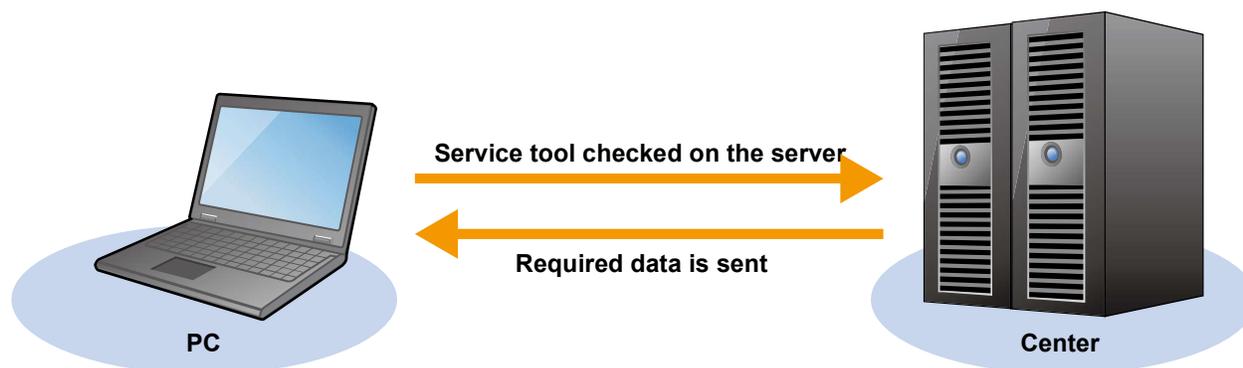
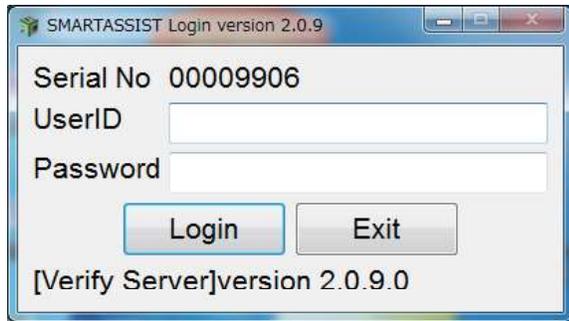


Figure 3-2 Refresh schema

After an automatic update, the login screen is displayed again after the process screen is shown. This is not a malfunction. Simply enter your user ID and password again to login.

3. Contents of SMARTASSIST-Direct

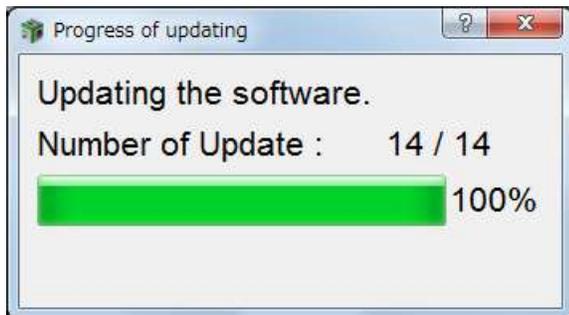
1 Enter your user ID and password to login.



2 Update message is displayed. Click "OK".



3 After an auto update, the below screen is displayed for a couple of seconds.



3.4 License Security Check

To ensure that you always use the latest version of the software, a security check of the license is conducted at the center. Software management is necessary because some functions may influence engine performance.

● Security Check Period

The security check period is three months after the last communication with the center.

● Security Check Period Warning

One month before the security check period expires, a warning is displayed each time the service tool is started to remind of the end of the security check period.

● Exceeding the Security Check Period

If the security check period has exceeded and the service tool has not been used for an extended period of time, the usage period is extended for a grace period of 7 days.

After the grace period, the system switches to default mode and its functions become unavailable. Connecting to the center will make it serviceable again. (The security check period is extended by 3 months when connecting to the center.)

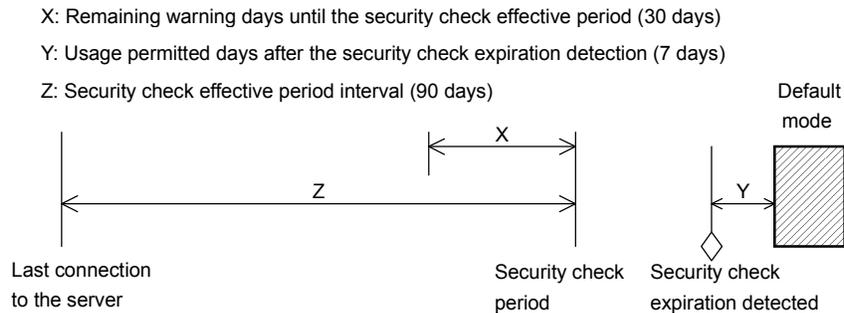


Figure 3-3 Security check period schema

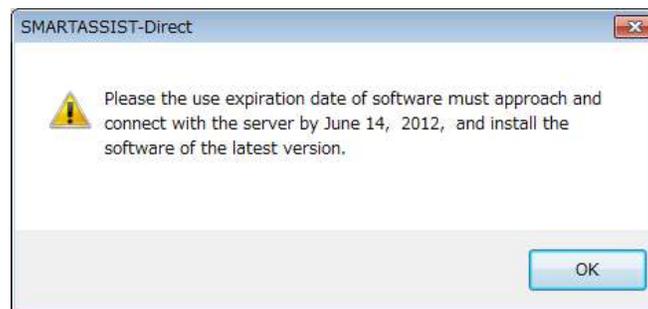


Figure 3-4 Before Incident Warning Screen

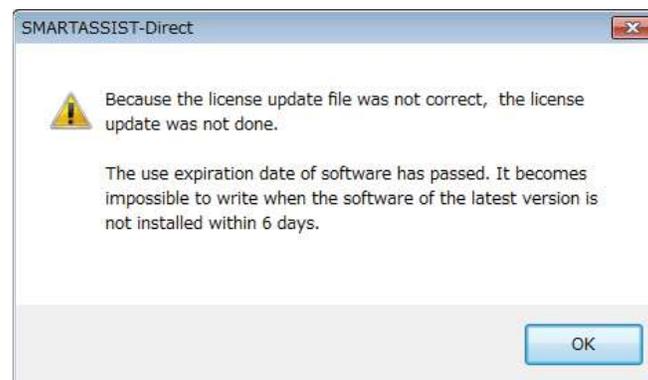


Figure 3-5 Screen After Exceeding Limit

- Remark**
- The security check is performed for each PC.
 - If one PC is used by multiple users and one user connects the PC to the center, the last connection date is updated.

Not all users need to connect to the center

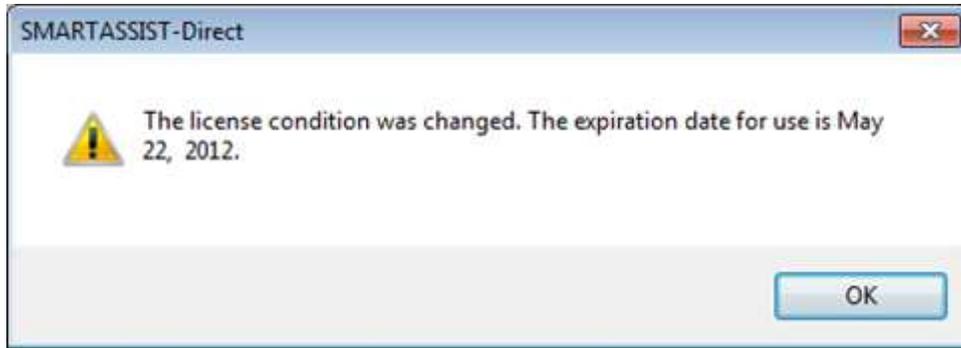
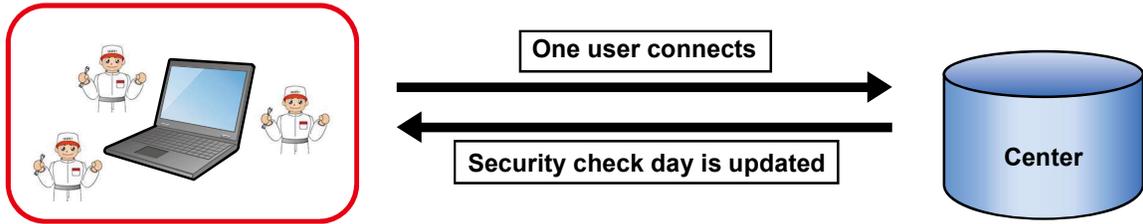


Figure 3-6 Example screen for security check refresh

3.5 License Expiration Date

The license is generally valid for one year, from January 1 to December 31.

If a security check was conducted, but the license period is exceeded, it is not possible to connect to the center.

Please confirm with YANMAR whether to extend the license period before it expires.

- X: Security Check Period (90 days)
- Y: License Extension Confirmation Period (60 days)
- Z: License Period (1 year)

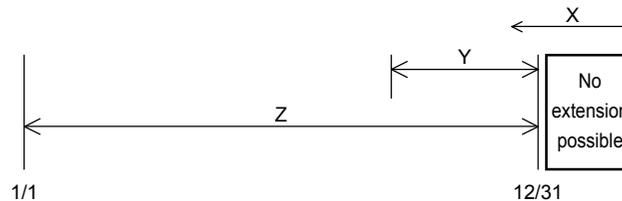


Figure 3-7 License expiration date schema

3.6 Maintenance Information for the ECU, Driver, Pump and Other Parts

In the earlier YDT system, it was necessary to formally register information that was written to the ECU or similar parts to YGSM.

SMARTASSIST-Direct automatically uploads to the center all data that was written or deleted, making it unnecessary to register the data separately.

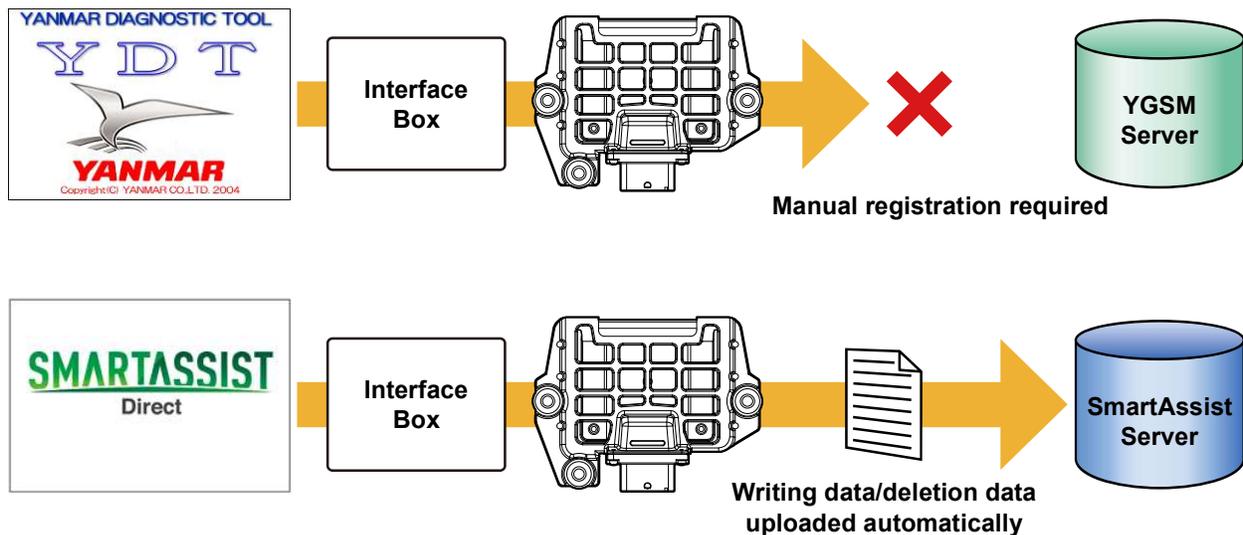


Figure 3-8 Upload of write data

- Important**
- To make sure that the data is sent and registered, start SMARTASSIST-Direct with an active Internet connection soon after maintenance is finished.
 - The writing process can be canceled from the software's menu. (It is necessary to send cancellation/deletion data to the center.)

3.7 Software Serial Number and the License

YANMAR produces a wide range of products. To be able to conduct proper maintenance after appropriate training for the product, licenses are issued separately for each product category. (Same as YDT)

The product category-specific license information is affiliated with the software serial number. (License serial number)

Multiple product category-specific licenses can be affiliated to the same serial number

The standard mode license (with basic error diagnosis functions) and the expert mode license (with rewrite functions of the ECU and similar parts) are operated by separate software serial numbers.

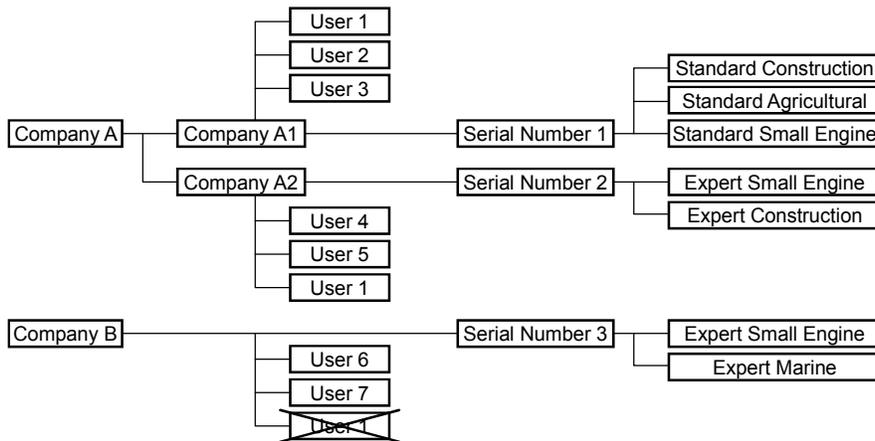


Figure 3-9 Serial number and user schema

The SMARTASSIST-Direct installed on the PC has an individual software serial number and can only be used by users registered for that serial number.

Example 1: User #4 cannot loginto the PC with serial number 3 using his ID and password.

Example 2: User #1 is registered as user for the PCs with serial number 1 and 2 that have the same company code, and can loginto both PCs with his ID and password.

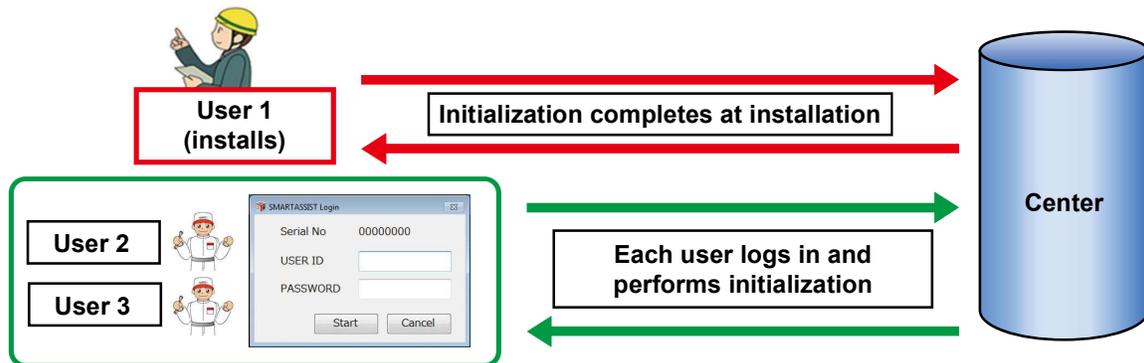
Example 3: User #1 cannot be registered for the PC with serial number 3 that has a different company code.

3.8 Software Serial Number and the User ID

Under SMARTASSIST-Direct, the users per PC are limited for reasons of safety and security.

- After the software installation is complete, the software connects to the center and activates. SMARTASSIST-Direct then confirms the serial number based on the information registered at the center in advance during the application.
- This serial number and user ID is affiliated with the registration information. Other SMARTASSIST-Direct users who are not affiliated cannot use the system.

Point The initialization (user verification) is performed for each user ID.
After the installation is completed, each user should log into SMARTASSIST-Direct with an active Internet connection. (The initialization is performed automatically.)



3.9 User ID and Password

The SMARTASSIST-Direct user ID and password are the same as for YANMAR D SITE (YDS).

● If You Forget Your User ID or Password

It is necessary to reassign a user ID and password within the YDS system through the YDS operation tool.

For details, consult with a representative of the business unit or your sales agent.

Important It is a rule within YDS to change the password on a regular basis. Depending on the usage condition, it is possible that the SMARTASSIST-Direct password and the YDS password are different the first time that you use SMARTASSIST-Direct after a password change.

● When using the system with an active Internet connection

Enter the new password

● When using the system without an active Internet connection

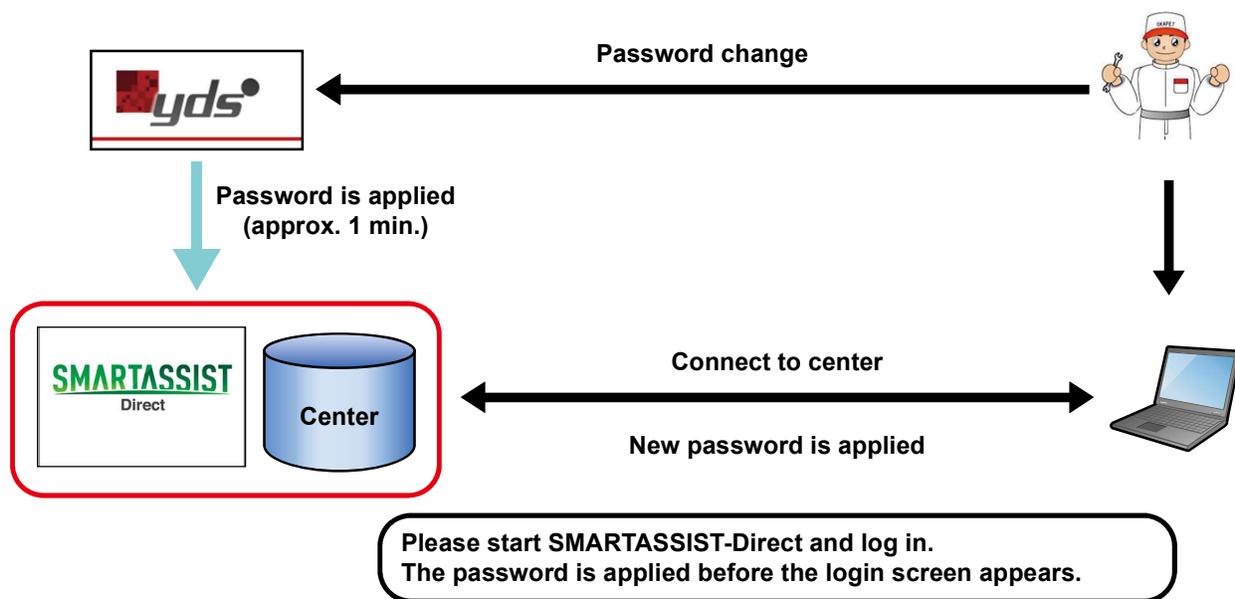
Enter the old password

(This is because the new password has not yet been sent to the PC from the center.)

Point The YDS password change is reflected on the SMARTASSIST-Direct server in approx. 1 minute.

Start SMARTASSIST-Direct right after the change and login to the system and the PC password is also changed.

(This method requires some extra effort, but it is the most reliable method.)



Note Because YANMAR employees use the same ID and password as for the "My Portal" system, they need to exercise the same care after a password change as when using YDS.

4. Start, Stop and Finish Procedures

4.1 Operation Procedures

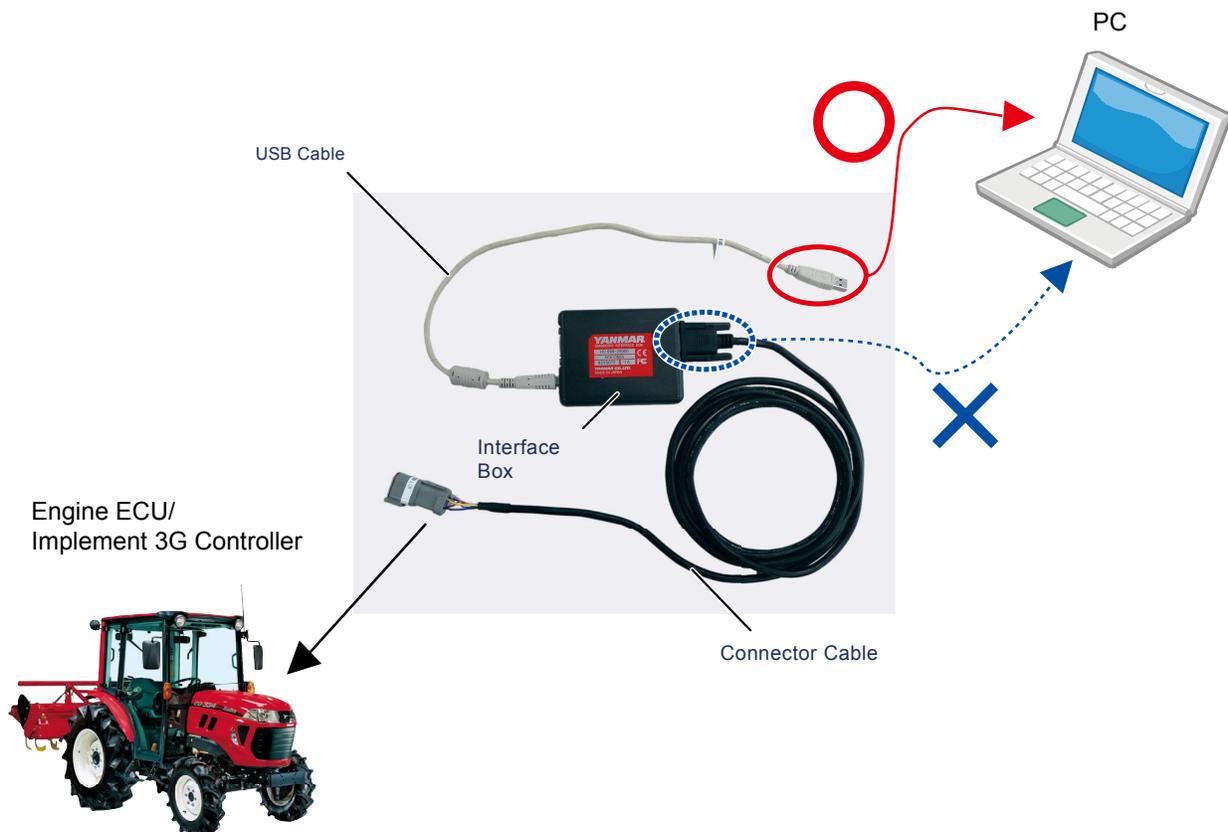
4.1.1 SMARTASSIST-Direct Connection

- 1 Plug the USB cable into the USB port of the PC and the USB port of the interface box.
- 2 Plug the diagnostic cable into CN1 (D-SUB 9P male end) of the interface box.
- 3 Plug the diagnostic cable into the service connector.

The interface box is powered by the device. Be careful: using a defective cable or short-circuiting the cable connector terminal is very dangerous.

The correct way to connect the cables is is: Plug the connector cable into the interface box. Connect the interface box with the USB cable to the PC.

It is not possible to do the connection without the interface box (e.g. by plugging the connector cable directly into the PC or using a serial USB conversion cable). Always use the supplied interface box when using SMARTASSIST-Direct.



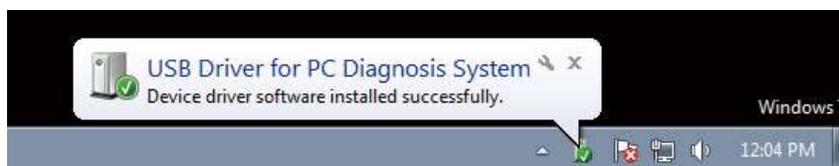
4.1.2 Power Supply

Except when using in training mode, it is necessary to turn on the power of the connection destination or the ECU (ignition key or power switch) before starting SMARTASSIST-Direct.

4.1.3 USB-Driver Installation

■USB Driver 1 of the Interface Box

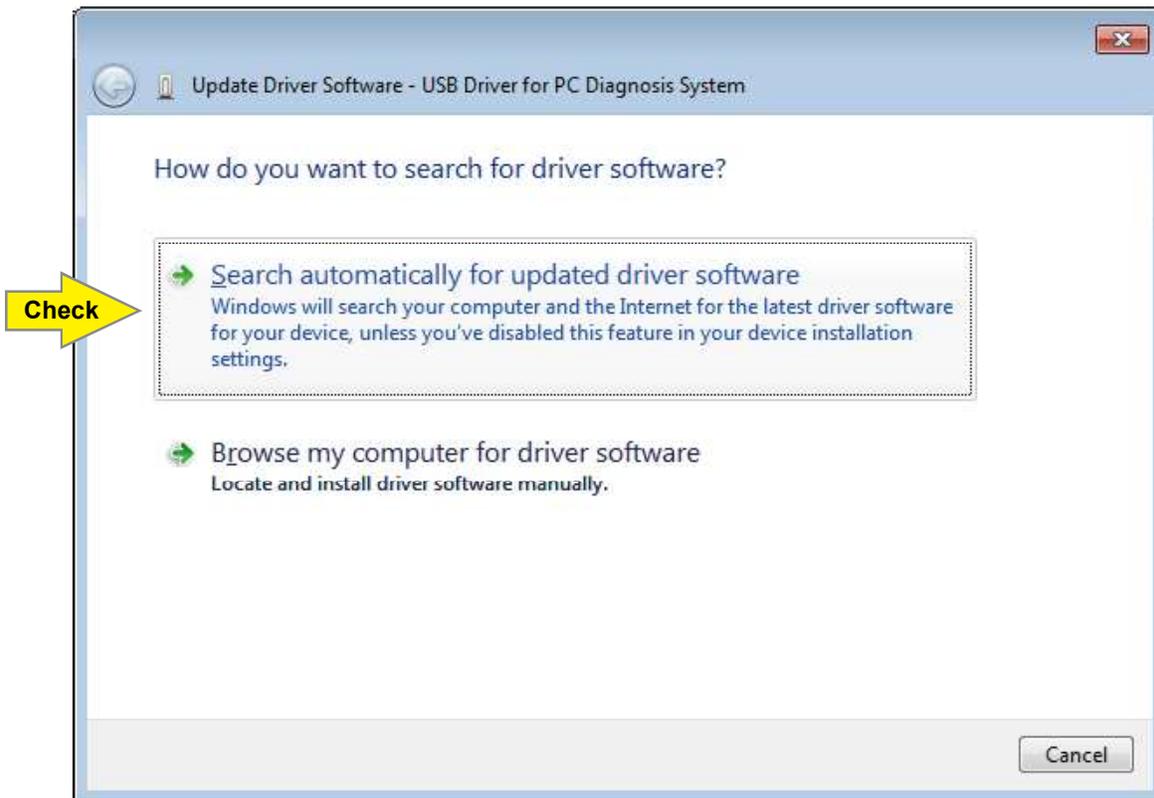
Insert the interface box with the power on ^{Note)} to the USB port of your computer. The driver will be installed automatically. (The example screen is for Windows 7.)



Note The interface box is supplied with power (for example, connected to the product with the key switch turned on).

■USB Driver 2 of the Interface Box

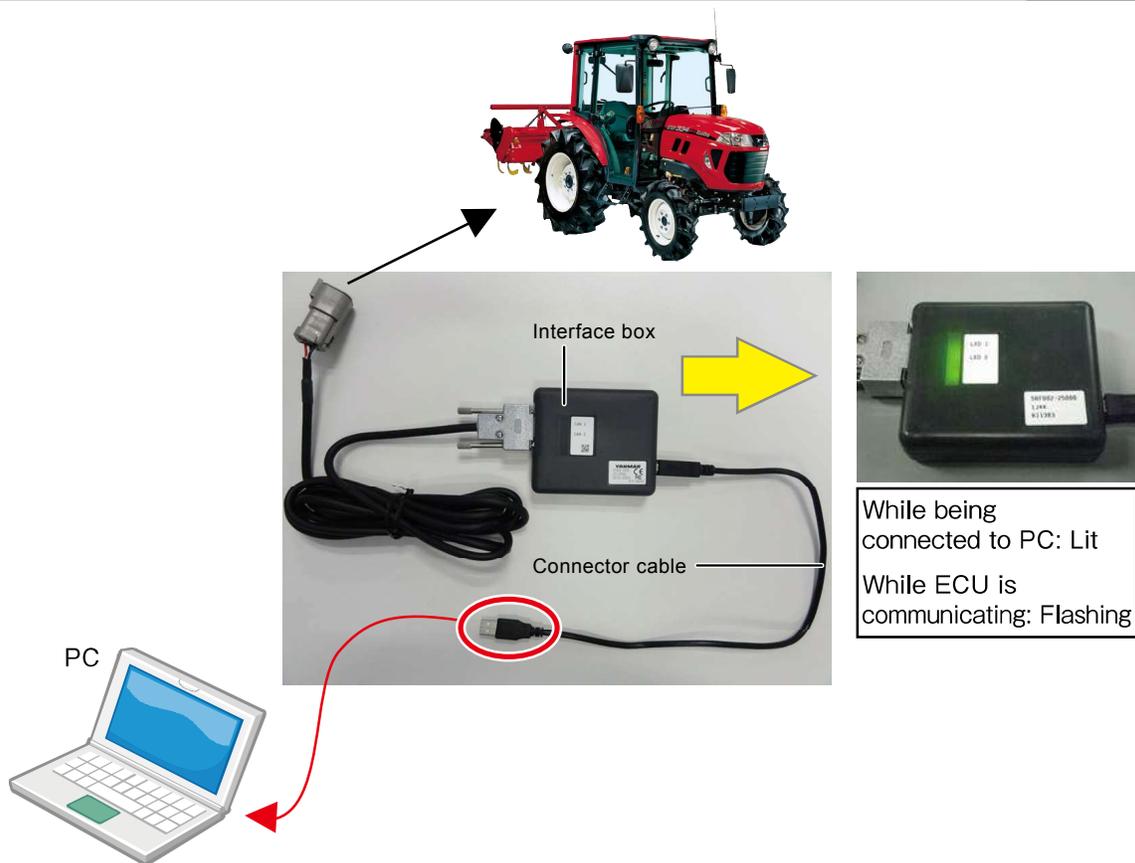
Depending on the version of Windows, the setup wizard may launch. Follow the instructions on the screen to install the driver. (The example screen is for Windows 7.)



4.1.4 I/F BOX LineUP

Note I/F boxes (Old type) are no longer newly manufactured.

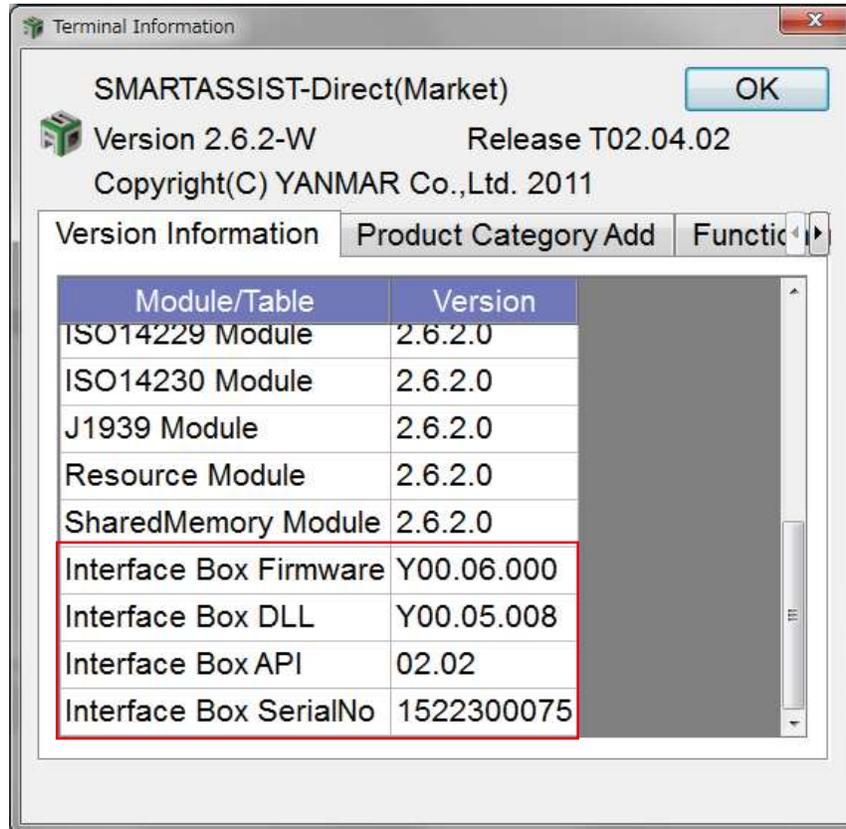
	I/F BOX (Old type)	I/F BOX
External Dimensions	 <p>W:98mm L:77mm D:25mm</p>	 <p>W:90mm L:77mm D:25mm</p>
Communication Functions	<ul style="list-style-type: none"> ● CAN communication (ISO 11989 compliant):1ch ● USB communication (USB 1.1 compliant):1ch ● Driver Installation is required 	<ul style="list-style-type: none"> ● CAN communication (ISO 11989 compliant):2ch ● USB communication (USB 1.1 compliant):1ch ● Applicable to Windows standard HID driver
Power Supply	DC12V (From in-vehicle battery)	DC5V (From USB port of PC)
Connector Harness	The connector harness of the new-type I/F box is compatible with that of the conventional-type I/F box.	
LED Lamp	N/A	While being connected to PC: Lit While ECU is communicating: Flashing



4.1.5 How to Confirm the Terminal Information of the New-type I/F Box

You can confirm the terminal information of the I/F box from the terminal information in SMARTASSIST-Direct (Refer to page 18 and 395 to check the terminal information.)

Note Communicating with the ECU is required to display the terminal information.

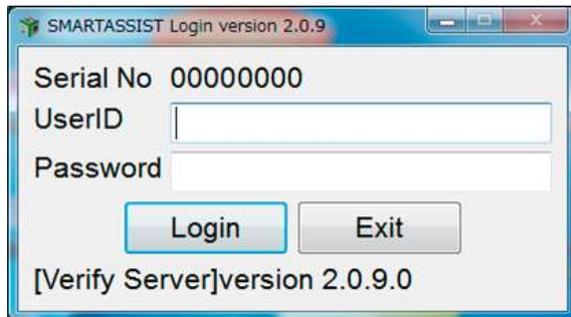


4.1.6 Login Screen

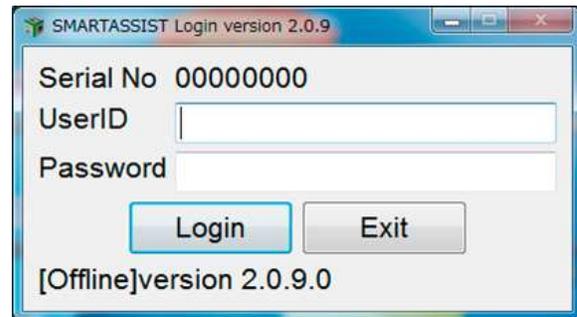
■ How to Login

Double-click the icon () that was created during installation.

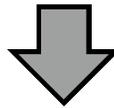
The SMARTASSIST-Direct logo appears, then the login screen is displayed.



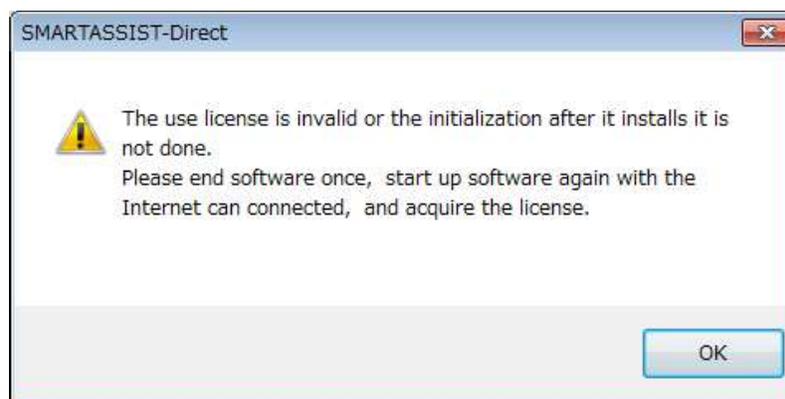
Internet connection active



Internet connection inactive



Note ● If the usage license is invalid or the initialization is not complete (because the software could not connect to the center directly after installation), the below warning is displayed.

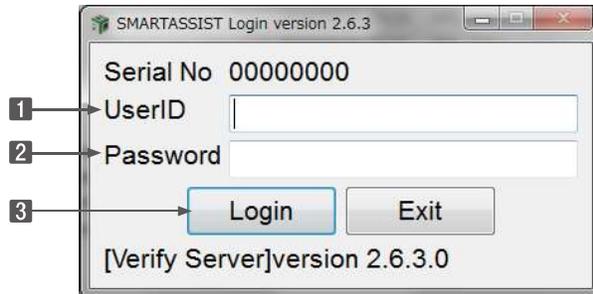


● The user ID and password are the same as those for the YANMAR D SITE (YDS). If the YDS password has changed, refer to [3.9 User ID and Password] on page 10 for details.

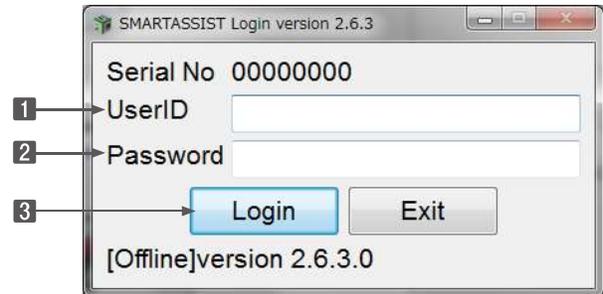
■ Entering the User ID and Password

The Login Screen is displayed.

- 1 **User ID** : Enter the user ID.
- 2 **Password** : Enter the password for this user ID.
- 3 Check the above, and click the **Login** button.

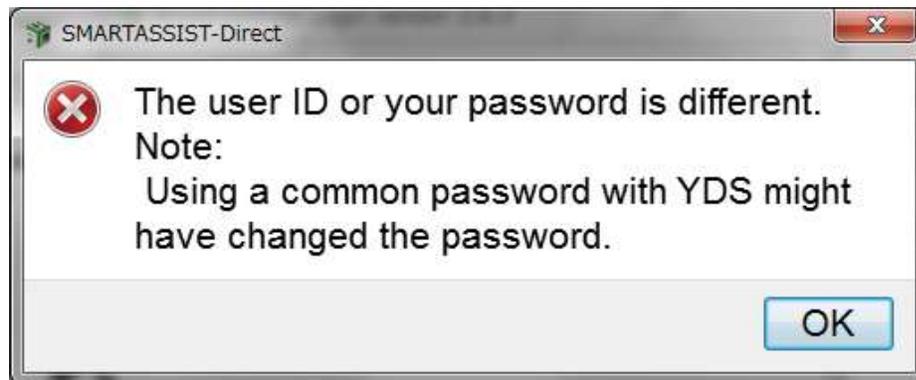


Internet connection active



Internet connection inactive

Note If you enter your user ID or password incorrectly, the following warning appears.



4.1.7 Start Menu

After login, the Start Menu is displayed.

- 1 : It is possible to change the display language. (Japanese/English/Chinese as of December 2015)
- 2 : Select the product category that you wish to use.
- 3 : Exit the software.



Note You can only select the category for which the license is registered.

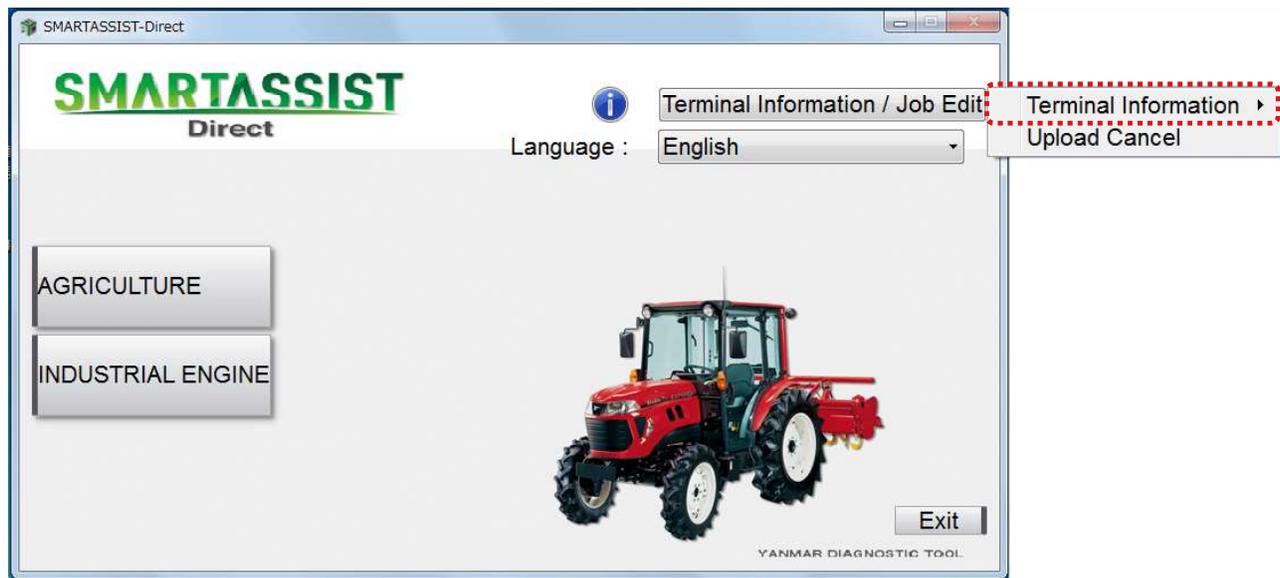
- 4 : You can confirm the Terminal Information and edit the job.



4. Start, Stop and Finish Procedures

Terminal Information confirmation

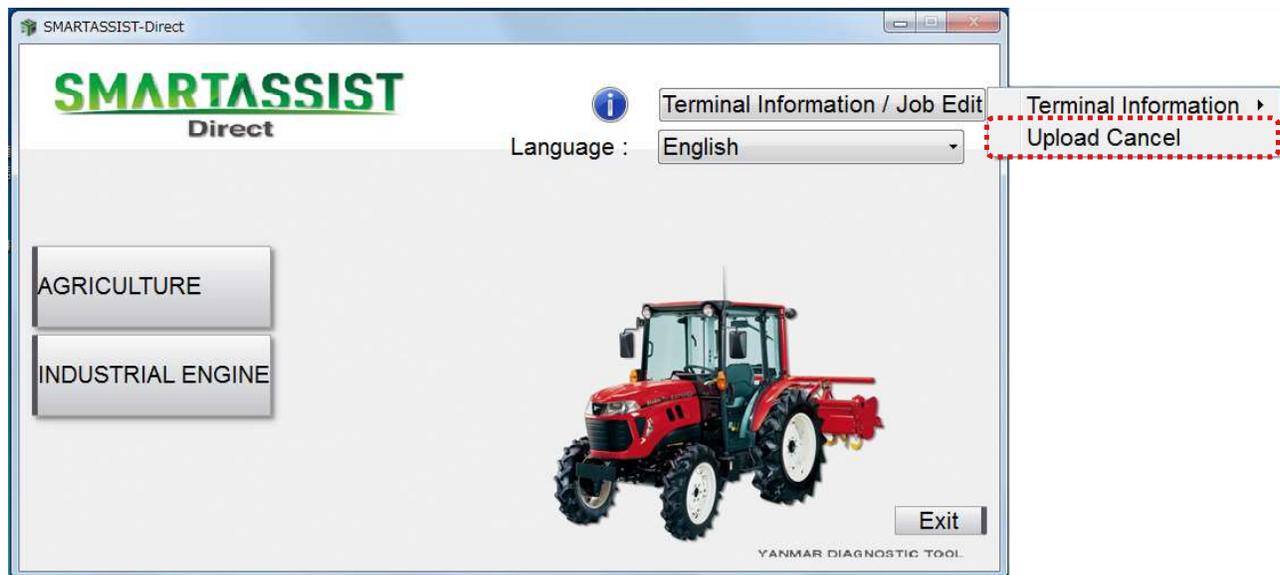
Click the "Terminal Information" and you can confirm the Terminal Information. (Refer to page 395)



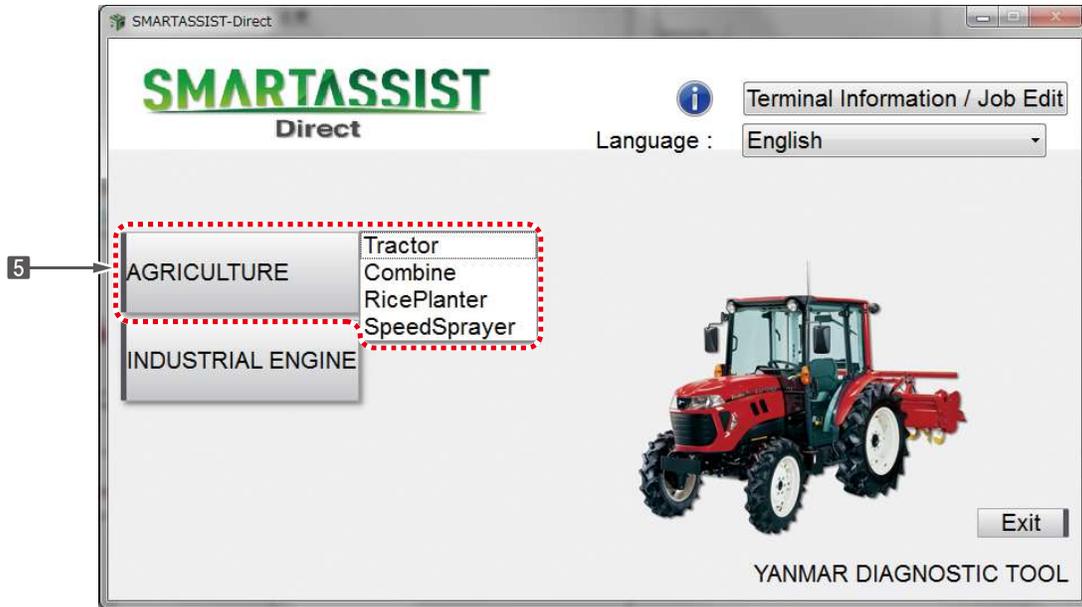
Upload cancellation

Cancel the data when the uploaded ECU exchange information is repeatedly displayed due to the software fault.

* This function is normally not used.



5 : The selected category turns red. Select the model.



The available models are listed below. (September 2012)

Agriculture	Tractor
	Combine
	Rice-Transplanter
	Speed Sprayer
	Multi Purpose Truck
Marine/Ocean	Marine Gear
	Marine Engine
	Large Engine
Energy System	Generator
Construction	Construction
INDUSTRIAL ENGINE	Engine

Note The categories and models increase with time.

4.1.8 Main Menu

All functions of SMARTASSIST-Direct are displayed sorted in categories depending on the work situation.

1 ECU Access

Operations that are performed with the ECU (controller) connected

2 Data Management

Operations that can be performed without the ECU (controller) connected

3 Database Access

Related data is collected voluntarily (via a connection to the center)

4 Advanced Settings/Additional Settings

Settings and additional functions related to system operations (including training mode)

5 Job Assistant

Guide function to perform a series of operations

6 Selection button for all functions. Functions that are not shown in red are unavailable.

7 An explanation for all functions is displayed.

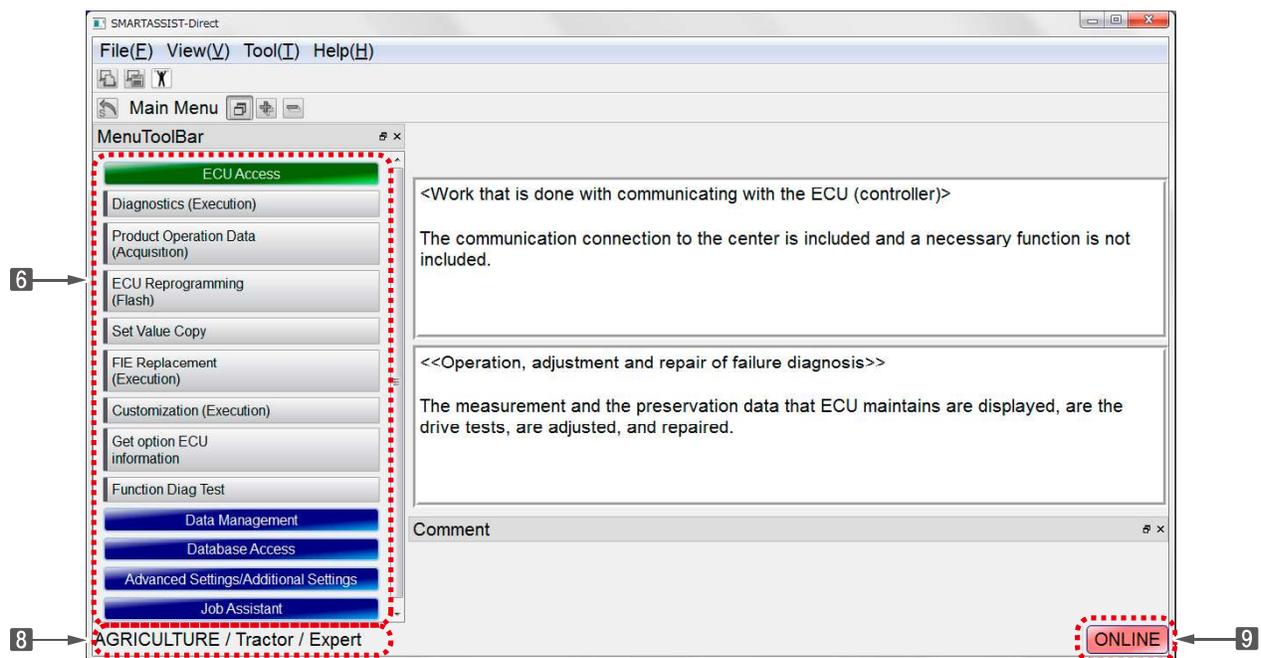
8 The product category or model selected in the start menu and the available function mode is displayed.

9 It is displayed whether a connection to the center or Internet is active.

Online: Connected

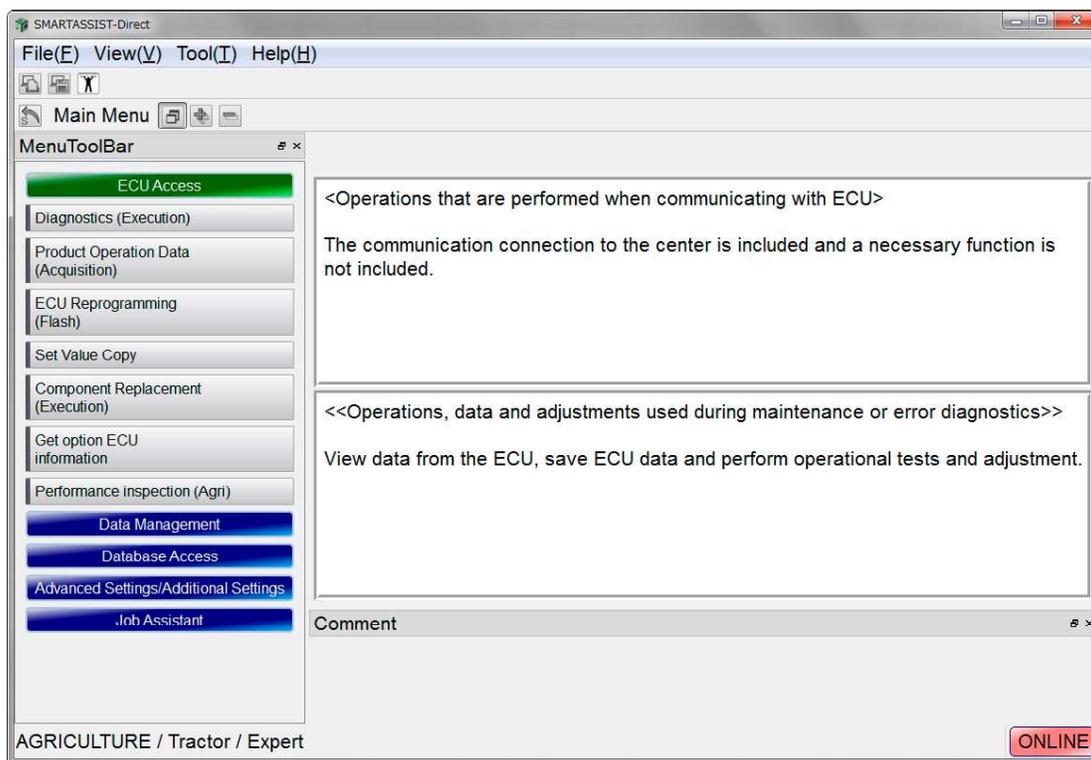
Offline: Not connected

Note To change from offline to online status, it is necessary to exit the software, re-start it, and login. Being connected with a LAN cable alone is not sufficient to change to the online status.



1 ECU Access

Operations that are performed with the ECU (controller) connected

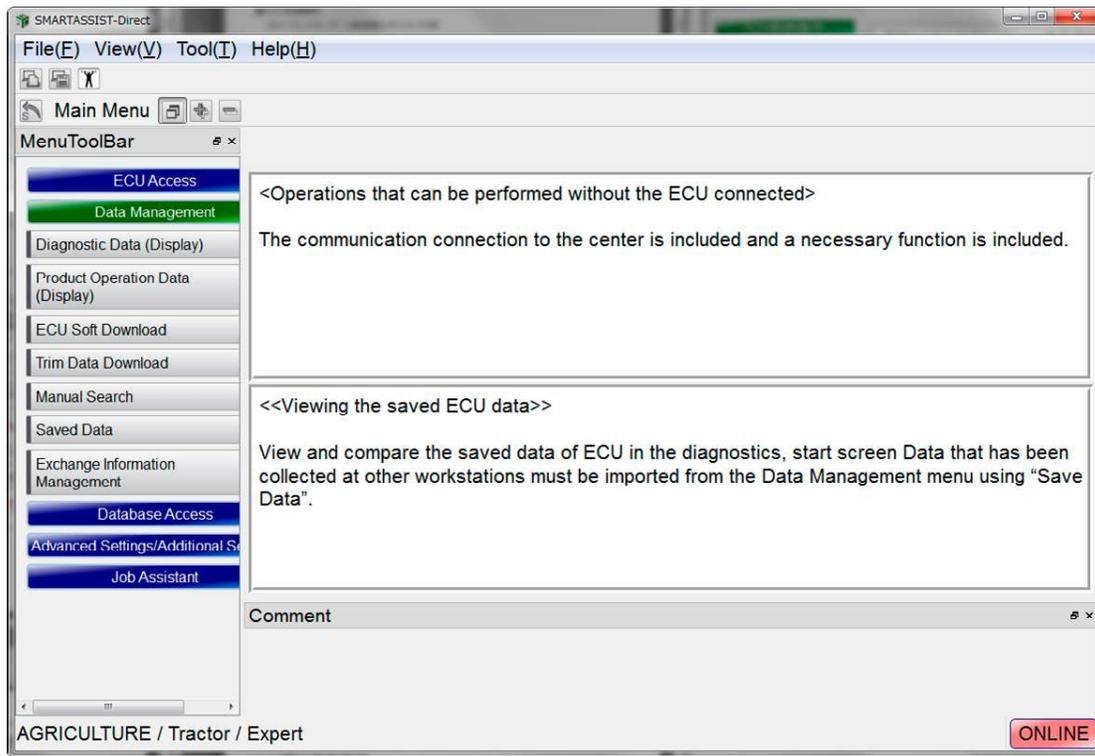


Diagnostic (Execution)	Operations, adjustments and repairs during error Diagnostic	View the measurement data and save data of the ECU, and perform an operational test, adjustments and repairs.	Refer to page 40
Product Operation Data (Acquisition)	Collecting and saving product operation data	View all saved product operation data of the ECU, and do a comparative analysis with past data.	Refer to page 207
ECU Reprogramming (Flash)	ECU software writing	Performed in case of ECU exchange or software updates. First, it is necessary to download the software with the ECU disconnected.	Refer to page 225
Set Value Copy	Copying the settings during ECU exchange	Reading and writing setting values and correction values for ECU exchange. It is necessary to write the software to the new ECU in advance.	Refer to page 239
FIE Replacement (Execution)	Rewriting correction values	Rewrite correction values for the pump, injector and other parts.	Refer to page 265
Get option ECU information	The work when option ECU is installed	SA-D gets the information of option ECU and machine information.	-
Function Diag Test	Check function of maintenance	For quality maintenance of machine with ECU.	-

4. Start, Stop and Finish Procedures

2 Data Management

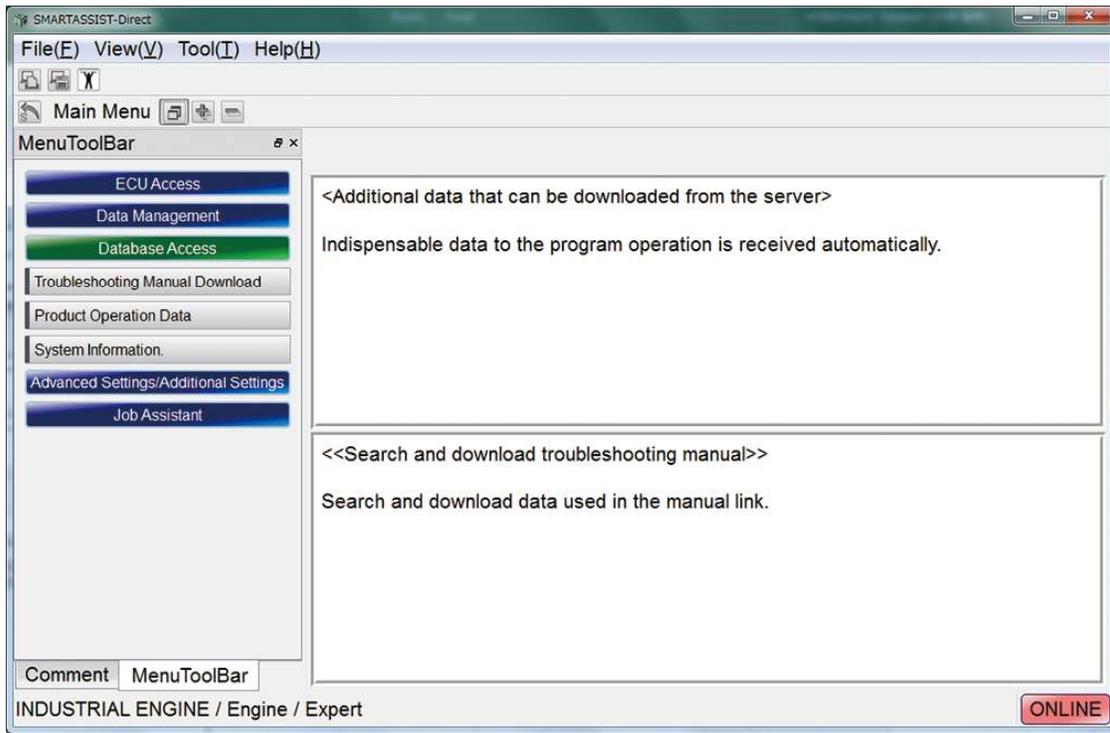
Operations that can be performed without the ECU (controller) connected



Diagnostic Data (Display)	Viewing the saved error diagnostic data	View and compare the saved data of the ECU in the error diagnostic start screen. Data that has been collected at other workstations must be imported from the Data Management menu.	Refer to page 154
Product Operation Data (Display)	View saved product operation data	View and compare the saved data of the ECU in the product operation data screen.	Refer to page 215
ECU Soft Download	ECU Software Download	Performed in case of ECU exchange or software updates. When writing to the ECU, it is necessary to do so with the ECU connected.	Refer to page 227
Trim Data Download	Downloading the correction values for electrical parts	Download the pump correction values. The correction value of the injector for repair is not available for download.	Refer to page 266
Manual Find	Searching and Viewing Technical Manuals	Search for downloaded manuals or manuals on external media.	Refer to page 185
Saved Data	Managing data on the workstation	Import, export and delete data, and edit memos about data saved on the workstation (e.g. ECU write data, error diagnostic data, and product operation data)	Refer to page 384
Exchange Information Management	Manually upload data on replaced electrical parts	Manually upload to the management server data regarding completion and cancellation of electrical parts replacement and software updates	Refer to page 338

3 Database Access

Related data is collected voluntarily (via a connection to the center)

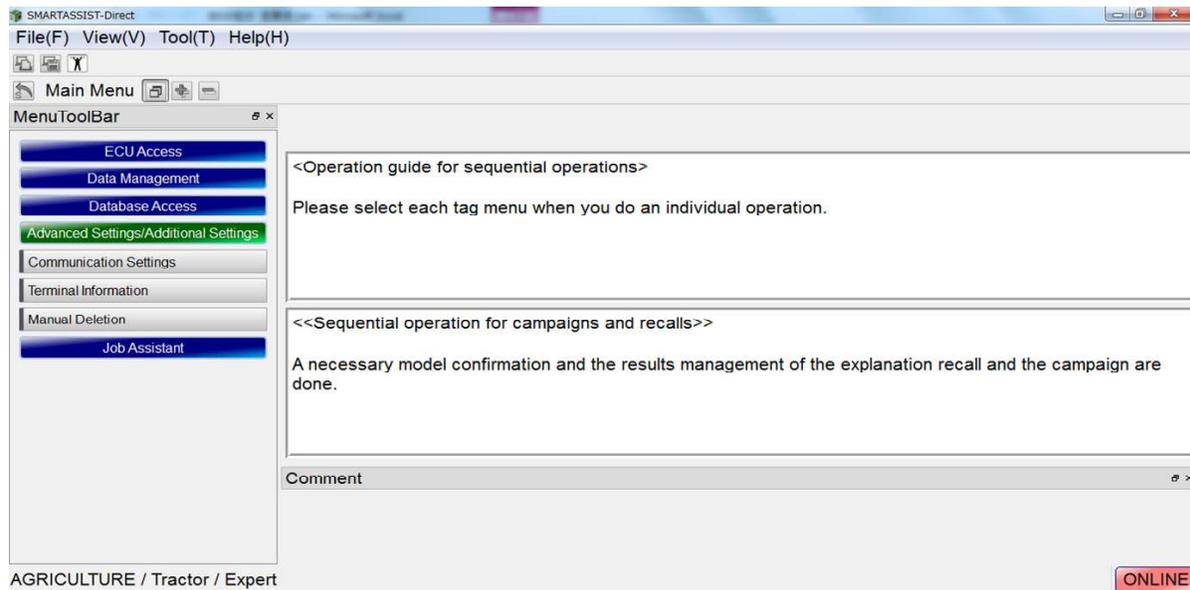


Troubleshooting Manual Download	Search and download troubleshooting manual	Search and download data used in the manual link.	Refer to page 190
Product Operation Data	Search and download product operation data by model and machine number	Search and download product operation data saved in th database.	
System Information	Download information on SMARTASSIST-Direct	To download the latest inforamtion about the system.	

4. Start, Stop and Finish Procedures

4 Advanced Settings/Additional Settings

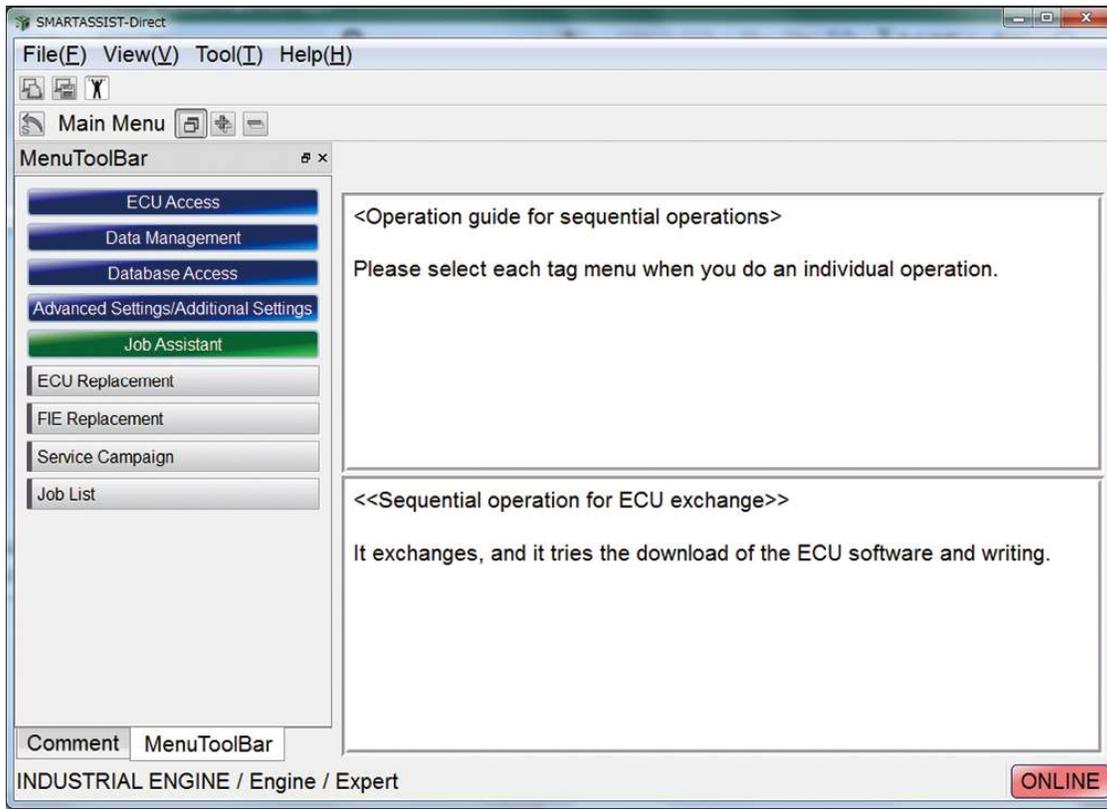
Settings and additional functions related to system operations (including training mode)



Communication settings	Edit the settings for communicating with the ECU	Normally, it is not necessary to change the settings.	Refer to page 390
Terminal information	View all settings of the workstation	It is possible to confirm the usage license, software version, and updated information on supported models.	Refer to page 395
Manual Deletion	Deleting data for the manual link	Delete obsolete data for the manual link.	Refer to page 197

5 Job Assistant

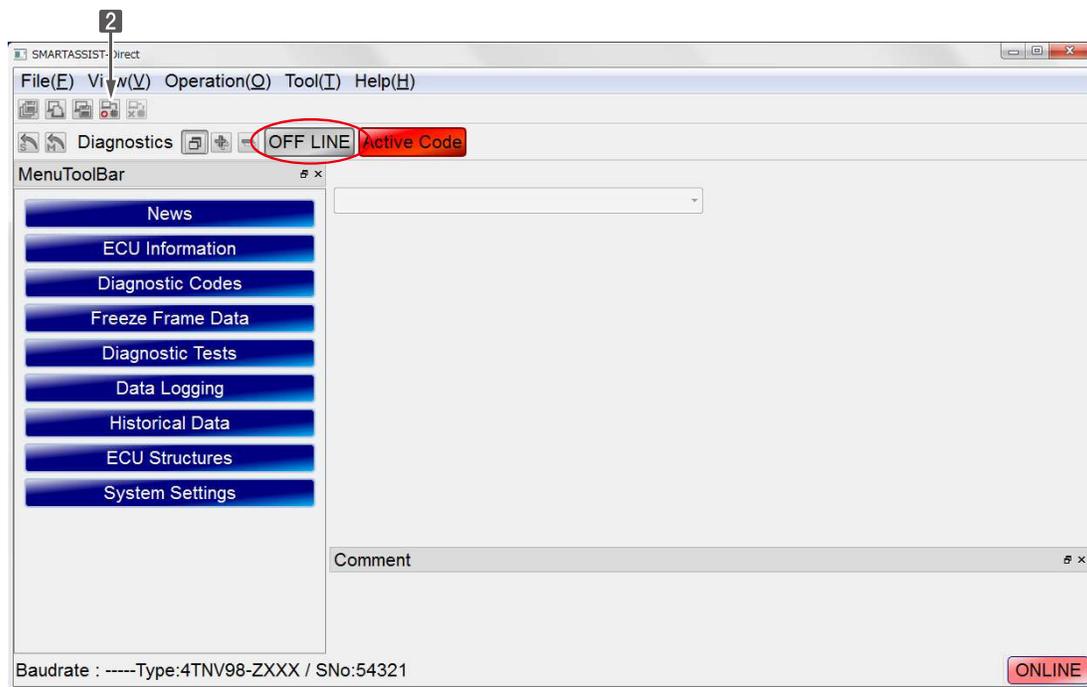
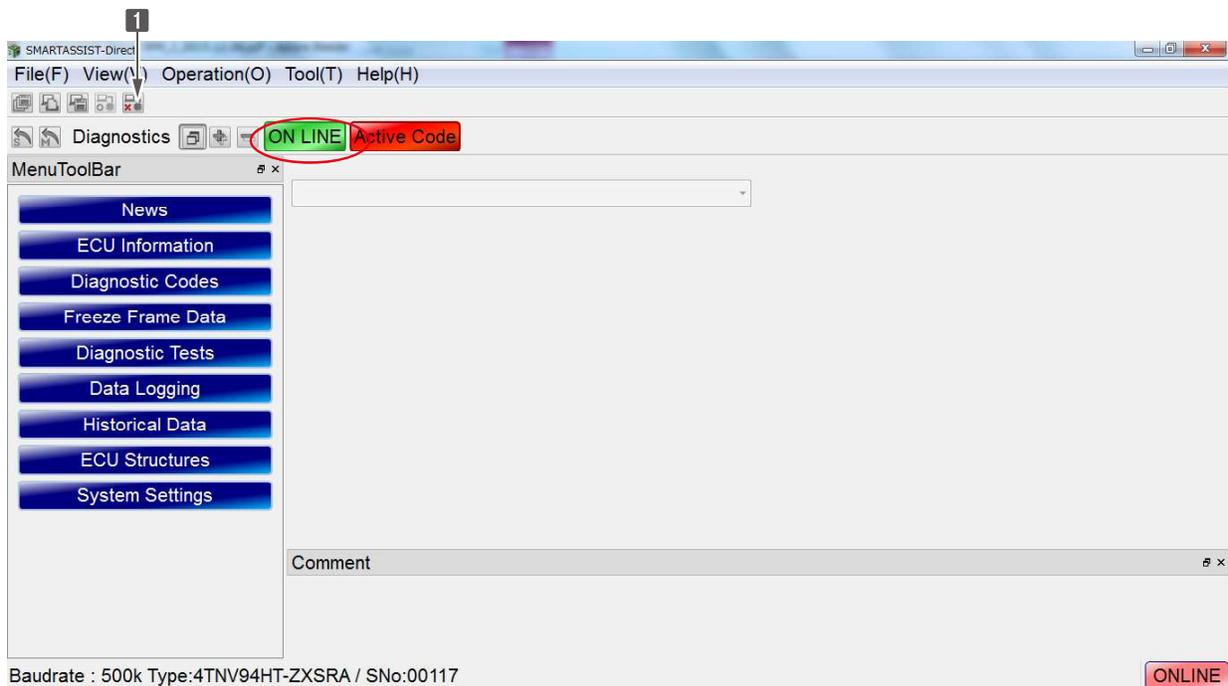
Guide function to perform a series of operations



ECU Replacement	Sequential operation for ECU exchange	It exchanges, and it tries the download of the ECU software and writing.	
FIE Replacement	Sequential operation for electric part exchange	The download of the correction values such as pumps and injectors, rewriting, and the confirmation driving are done.	
Service Campaign	Sequential operation for campaigns and recalls	A necessary model cofirmation and the results management of the explanation recall and the campaign are done.	
Job List	Order and edit job list	Delete or save old items when the execution speed slows down.	

4.2 Stop Procedure

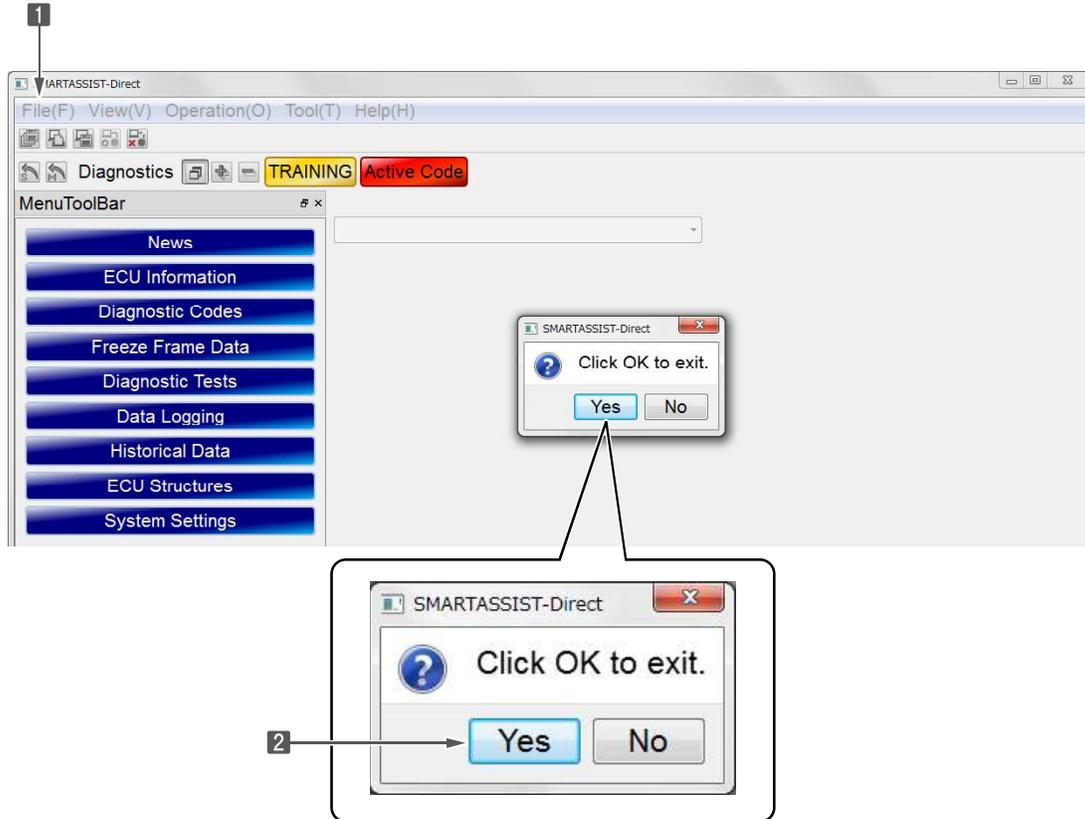
Click icon **1**  to disconnect from the ECU without exiting the program. After the adjustments of the product are complete, click icon **2**  to continue monitoring.



4.3 Finish Procedure

SMARTASSIST-Direct can be exited in the same way as other Windows applications. When disconnecting the interface box, do so after exiting the SMARTASSIST-Direct software.

- 1  or "File (F)" - "Exit (X)": A confirmation message is displayed to exit the program.
- 2  : Click to exit the program.



- 3  : Click this to exit from the Start Menu.



4.4 Troubleshooting

If communication with the ECU is faulty and normal monitoring is not possible, check the below points and restart SMARTASSIST-Direct.

If the communication cable disconnects or the power supply to the ECU/product is interrupted during data transmission, the system may not operate normally even after a restart. In that case, turn off the power (with the key switch) or, if that is not possible, disconnect the interface box from the product's service connector and reconnect it. The interface box will reset and operations will return to normal.

- Are all cables connected? Are all cables in good condition?
- Does the product have power?
- Is the system not in training mode?
- Is the system connected?

For details on the warning messages, refer to [19. Error Screen and Warning Screen] on page 398.

5. Screen Functions

5.1 Basic Screen

● Tool Bar

- 1** Standard Tool bar : On the standard tool bar that allow basic operations 2 to 4, you can press ALT and the bracketed letter as a shortcut.
- 2** Operation Tool Bar : On all screens, the available operations are shown on a tool bar, and only the necessary function icons are displayed.
- 3** Function Selection Tool Bar : The view is equivalent to the standard tool bar where standard functions are selected.
- 4** Screen Display Tool Bar : Expand and minimize the function selection tool bar and display messages and warnings.
- 5** Subfunction Selection Tool Bar : A subfunction button is displayed within each function. Also, if the product has a multi-ECU, the communication destination controller can be switched.

● Display Box

- 6** Main Box : Displayed depending on the selected function.
- 7** Additional Information Box : Used as a special display on graph screens and time series data screens.
- 8** Comment Box : Usually, the current error status is displayed. The error criteria and error diagnosis results are displayed in the screen that shows the error code.
- 9** Status Box : Displays the current communication status.

● Function Buttons

- 10** The function buttons that are not on the standard tool bar (e.g. the clear button) are in the main box or the additional information box.

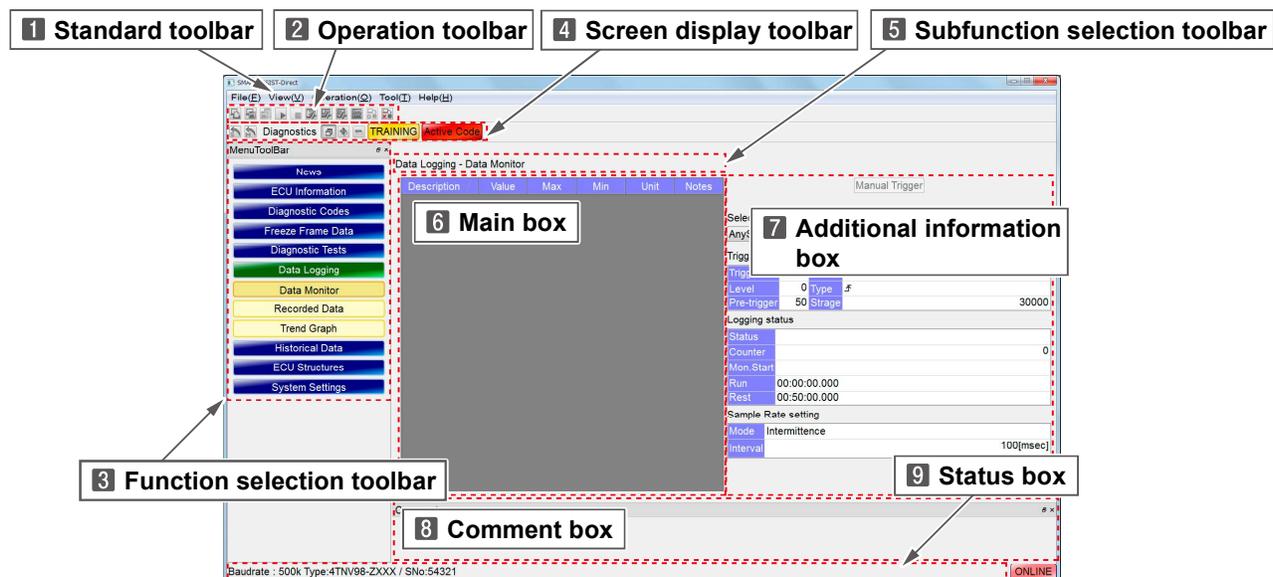


Figure 5-1 Basic Screen

5.1.1 Standard Tool Bar

Tool bar to select the functions, screens, operations and tools. Select by clicking. When a menu is displayed, you can press ALT and the bracketed letter behind a menu entry as a shortcut.



File (F)	
	ECU Data Save (E)
	Screen Print (P)
	Screen Image Save (B)
	Start Manu (S)
	Main Menu (M)
	Exit (X)

View (V)	
	News (N)
	News Link (N)
	ECU Information (I)
	Summary Information (I)
	Diagnostic Codes (F)
	Active DTC (A)
	Logged DTC (L)
	DTC Information List (I)
	Freeze Frame Data (R)
	Recorded Data (S)
	Trend Graph (T)
	Diagnostic Tests (D)
	Pulse/Analog etc (A)
	Digital IN etc (I)
	Digital OUT (O)
	Active Control (D)
	Active Control (Graph) (G)
	Hysteresis Measure (H)
	Data Logging (L)
	Data Monitor (M)
	Recorded Data (S)
	Trend Graph (T)
	Historical Data (H)
	Lifetime Data (L)
	Map Table (M)
	Log Data (G)

View (V)	
	ECU Structures (E)
	Analog Channels (A)
	Digital Channels (E)
	ECU ID Information (D)
	ECU Data Save (S)
	System Settings (S)
	Configuration (C)
	Calibration (A)
	Tuning (T)
	Initial Settings (I)
	Manual Search (M)

Operation (O)	
	Connect (Z)
	Disconnect (X)

Tool (T)	
	Tool Bar (T)
	Menu Tool Bar (M)
	Comment Tool Bar (C)
	Status Bar (S)
	Communication Setting (C)
	Option (O)
	Font Size Setting (F)
	Large (L)
	Middle (M)
	Small (S)

Help (H)	
	Version Information (V)
	Control Manual (M)
	USB Driver Instal method (I)

5.1.2 Operation Tool Bar

On all screens, the available operations are shown on a tool bar, and you can operate them by clicking them. Unavailable operations are displayed in a darker color.



	ECU Data Save		Screen Print (Ctrl+P)		Save image
	File Save (Ctrl+S)		Save measured data		Refresh
	Auto Refresh		Start		Stop
	Option Set		Trigger Set		Sample Rate Set
	Data Set		Graph Top Set		Graph Bottom Set
	Parameter Set		Connect		Disconnect
	Return Start Menu		Return Main Menu		

5.1.3 Function Selection Tool Bar

- Tool bar to select the functions of the service tool. Select a menu by clicking it. The view is equivalent to the standard tool bar.

Name	Description
News	Displayed when relevant news data for the connected product is available.
ECU Information	Displays main system information of the ECU or controller.
Diagnostic Codes	Displays current or past defects detected by the ECU or controller.
Freeze Frame Data	Displays relevant data before/after a recent error was detected (expert function).
Diagnostic Tests	Separately checks the input/output tools. The input/output test has a active control function.
Data Logging	Diagnoses faults and analyses the operating conditions while the engine operates.
Historical Data	Displays the operating condition stored in the ECU.
ECU Structures	Displays ECU and controller data and input/output layout information (expert function).
System Settings	Necessary when performing initial settings and repair, and adjustments such as ECU or controller replacement.

- Operation tool available in all menus

Menu	Submenu	Operation tool available in all menus															
		ECU Data Save *1	Screen Print	Screen BMP Save	File Save	Refresh	Auto Refresh	Start	Stop	Option Set	Trigger Set	Sampling Rate Set	Data Set	Graph Top Set	Graph Bottom Set	Connect	Disconnect
News	News Link																
ECU Information	Summary Information		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
Diagnostic Codes	Active DTC		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	Logged DTC		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
	DTC Information List		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
Display Freeze Frame Data	Recorded Data		○	○	○	○	-	-	-	-	-	-	○	-	-	○	○
	Trend Graph		○	○	-	-	-	-	-	-	-	-	○	○	○	○	○
Diagnostic Tests	Pulse/Analog Input/Output		○	○	○	○	○	-	○	-	-	-	○	-	-	○	○
	Digital Input/Bit Status		○	○	○	○	○	-	○	-	-	-	-	-	-	○	○
	Digital Out		○	○	○	○	○	-	○	-	-	-	-	-	-	○	○
	Active Control		○	○	○	-	-	-	-	-	-	-	-	-	-	○	* 2
	Active Control (Graph)		○	○	○	-	-	-	-	-	-	-	-	○	-	○	○
Data Logging	Hysteresis Measure		○	○	○	-	-	-	-	-	-	-	○	-	-	○	○
	Data Monitor		○	○	-	-	-	○	○	○	○	○	○	-	-	○	○
	Recorded Data		○	○	○	-	-	-	-	-	-	-	○	-	-	○	○
Historical Data	Trend Graph		○	○	-	-	-	○	○	-	-	-	○	○	○	* 2	○
	Lifetime Data		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
	Map Table		○	○	○	○	-	-	-	-	-	-	-	○	-	○	○
ECU Specification/Structure	Log Data		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
	Analog Channels		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	Digital Channels		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	ECU ID Information		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
System Settings	ECU Data Save		○	○	○	○	-	-	-	-	-	-	-	-	-	○	○
	Configuration		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	Calibration		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	Tuning		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
Manual Find	Initial Settings		○	○	○	-	-	-	-	-	-	-	-	-	-	○	○
	-		○	○	-	-	-	-	-	-	-	-	-	-	-	-	-

*1: ECU Access: ECU Data Save

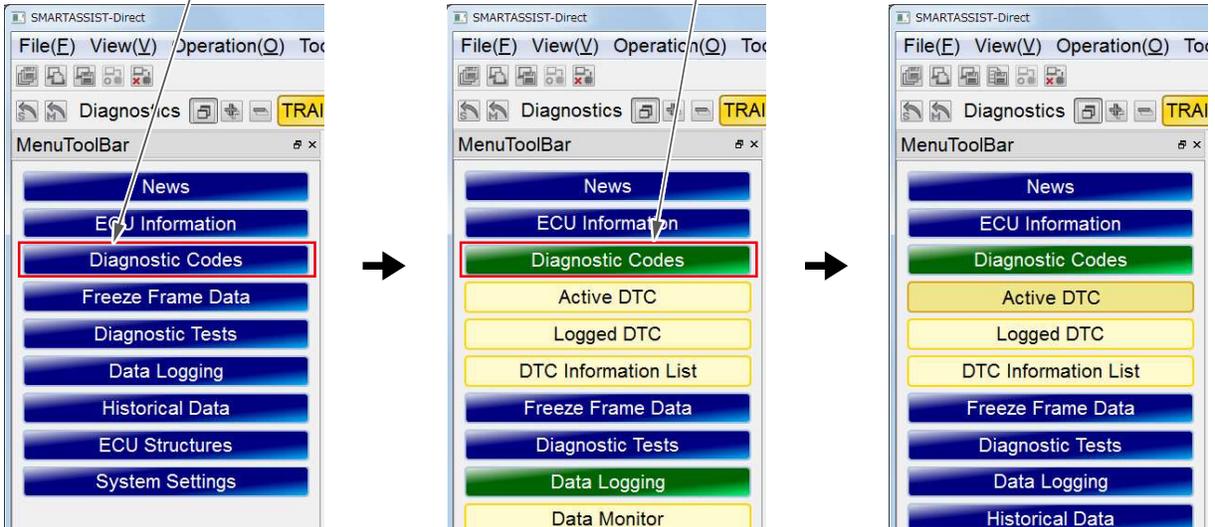
Data Management: ECU Data Read

*2: Cannot disconnect during active control and when receiving logged data

● Display of the Function Selection Tool bar

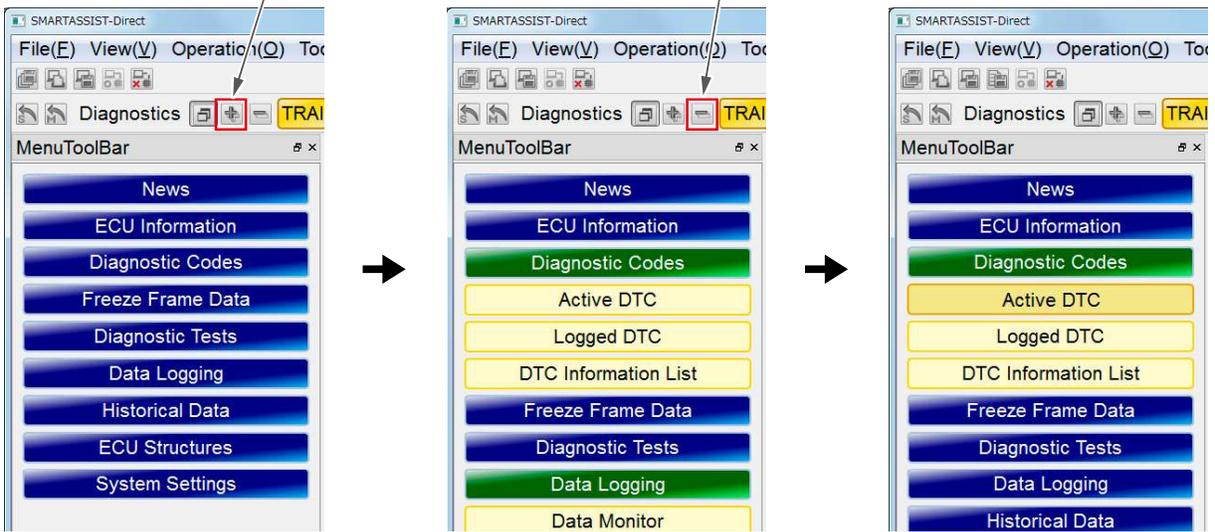
Clicking the menu button opens the sub menu.
By clicking again, it closes.

The selected item in the sub menu will make the button appear dark.



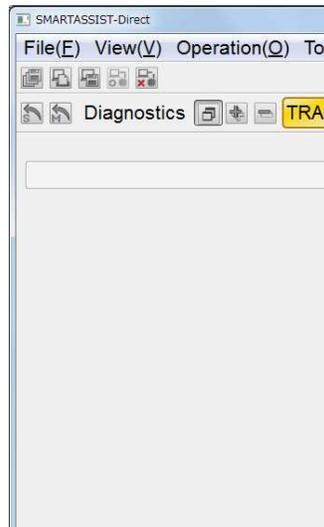
Click to  open all submenus.

Click  to close all submenus.

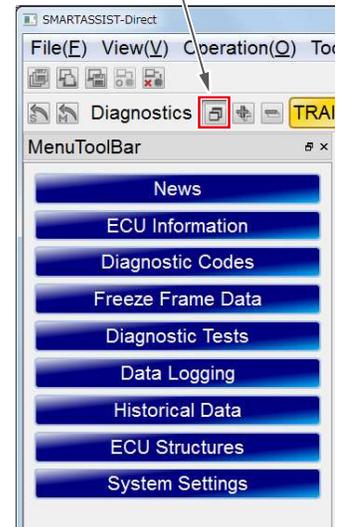


5. Screen Functions

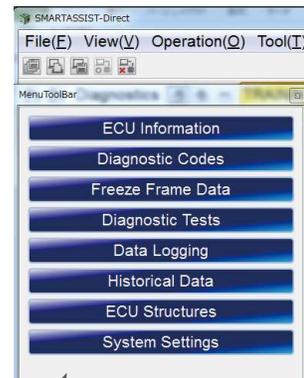
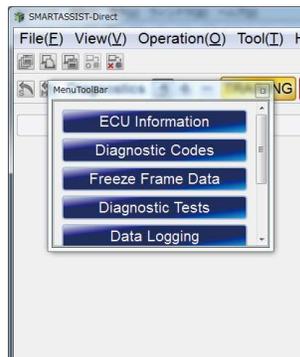
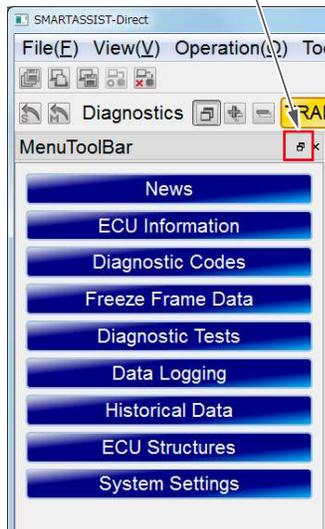
Click  to close the function toolbar and make the main view wider.



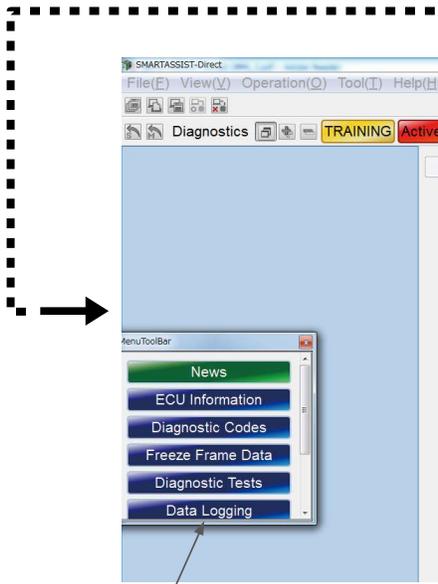
Click  to show the function toolbar.



Clicking  will separate the function tool bar, and it can be moved to an arbitrary place.



You can change the display size.

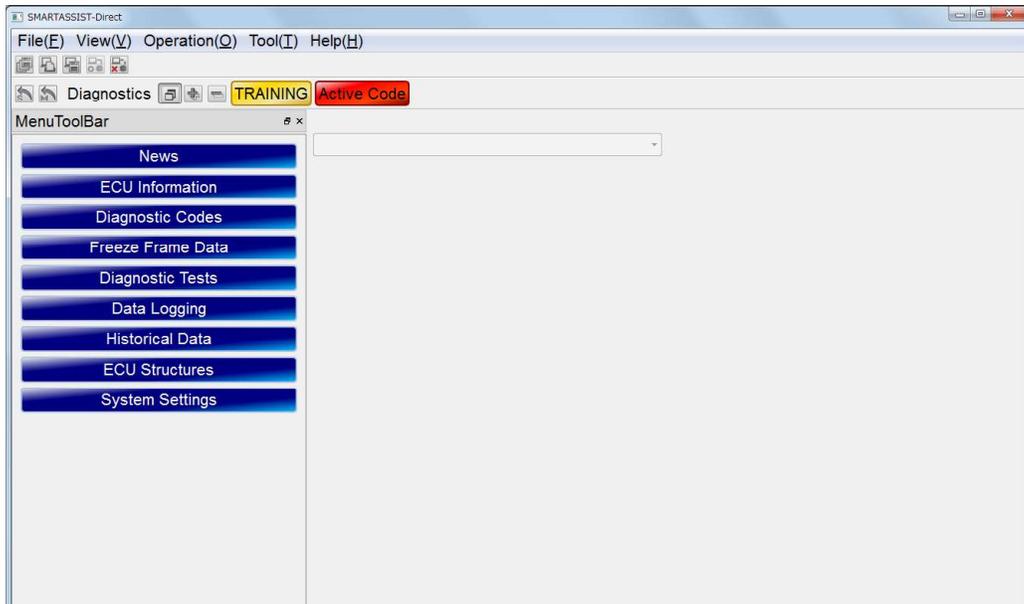
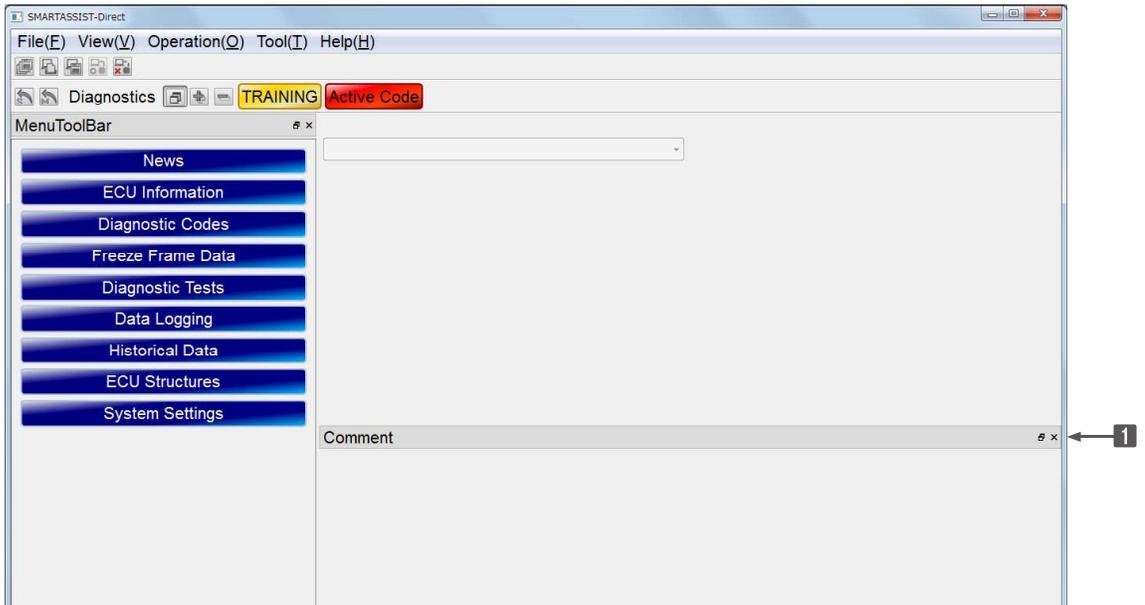


Double-click the menu tool bar to return.

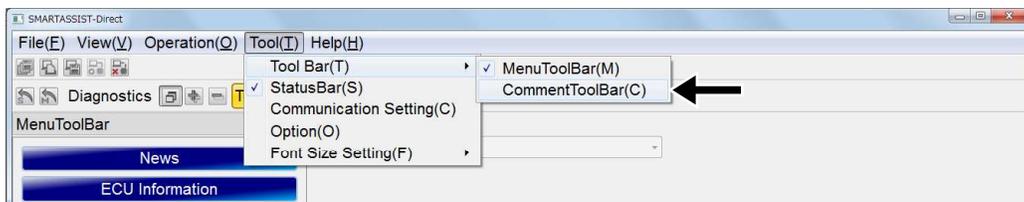
5.1.4 Comment Box

The display of the Comment can be changed in the same way as the function selection tool bar.

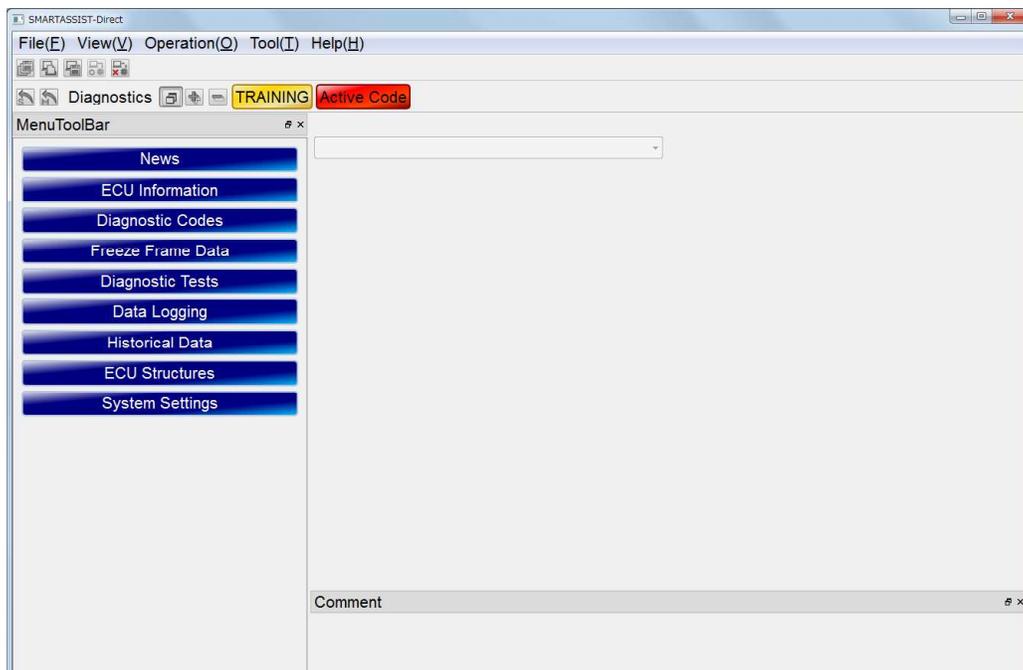
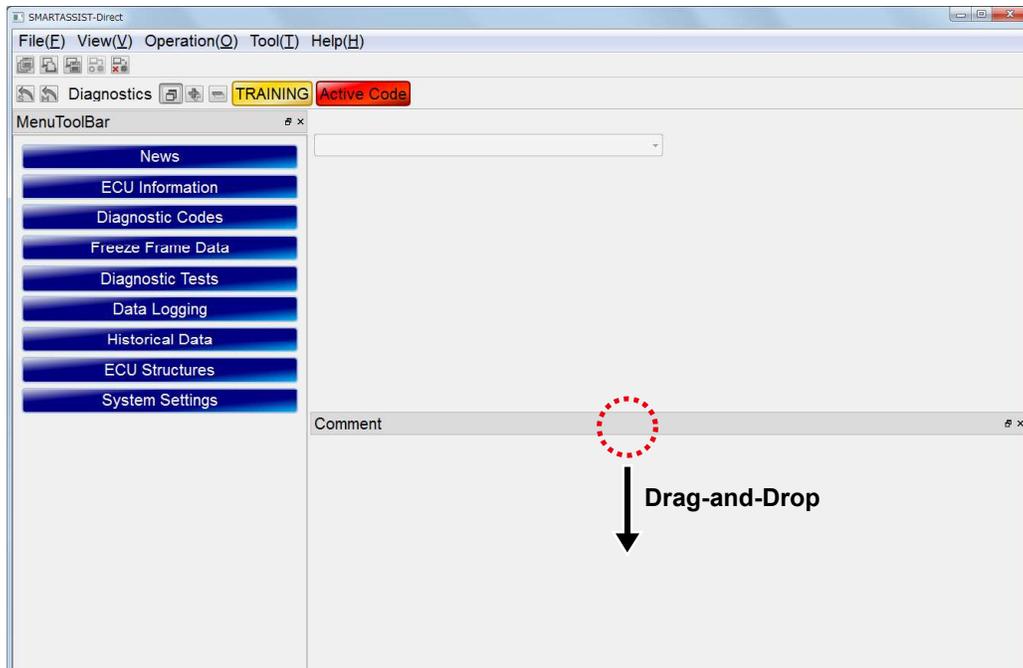
1 : Push to Hide button to hide the Comment box.



To display the Comment box again, go to the standard tool bar and click Tool (T), Tool bar (T), and CommentTool bar (C).

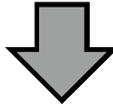


The size of the Comment box is adjustable. (Operate by drag-and-drop.)

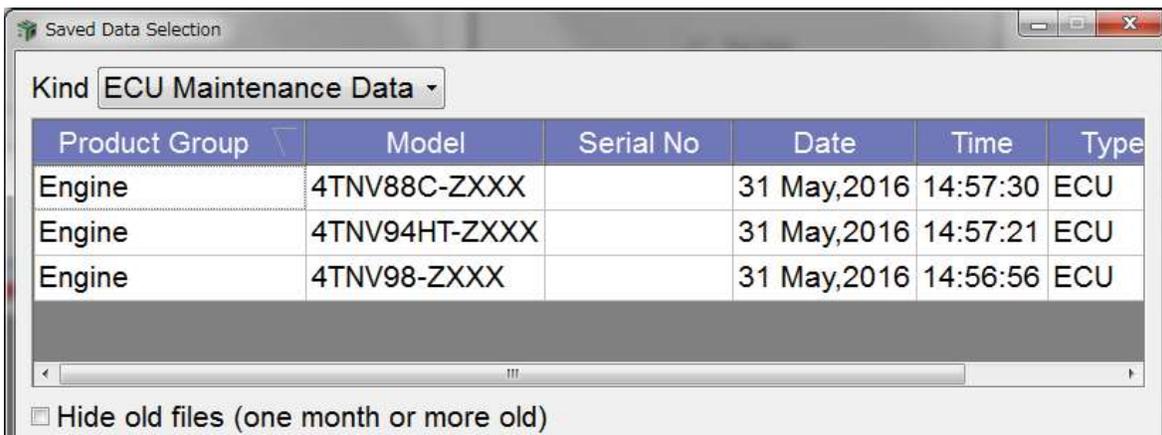
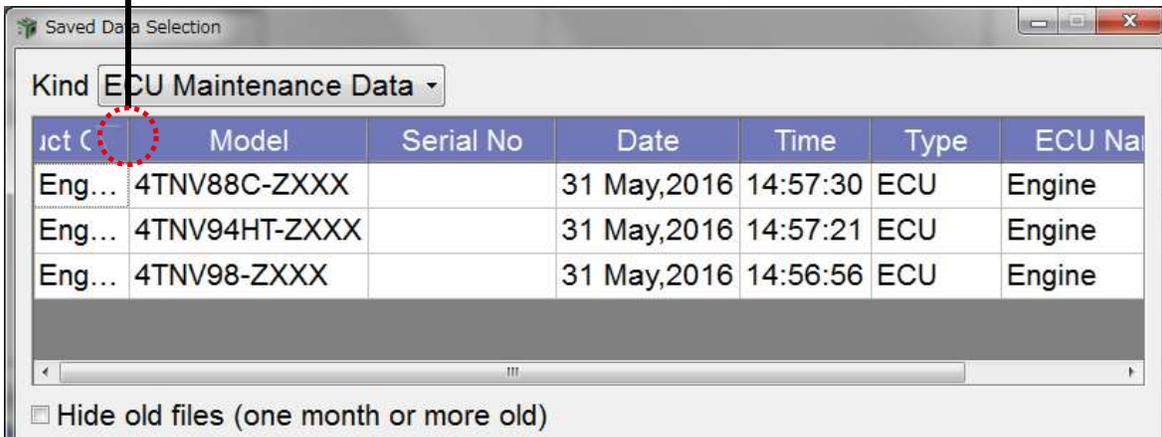


5.1.5 Changing the Display Border Width

The display border width of the display box and all selection screens is adjustable.

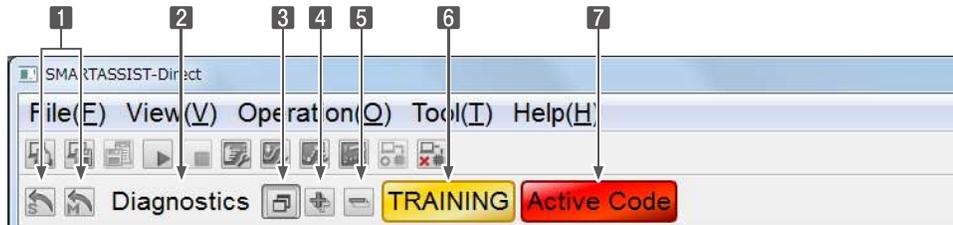


Drag & drop the mark



5.1.6 Screen Display Tool Bar

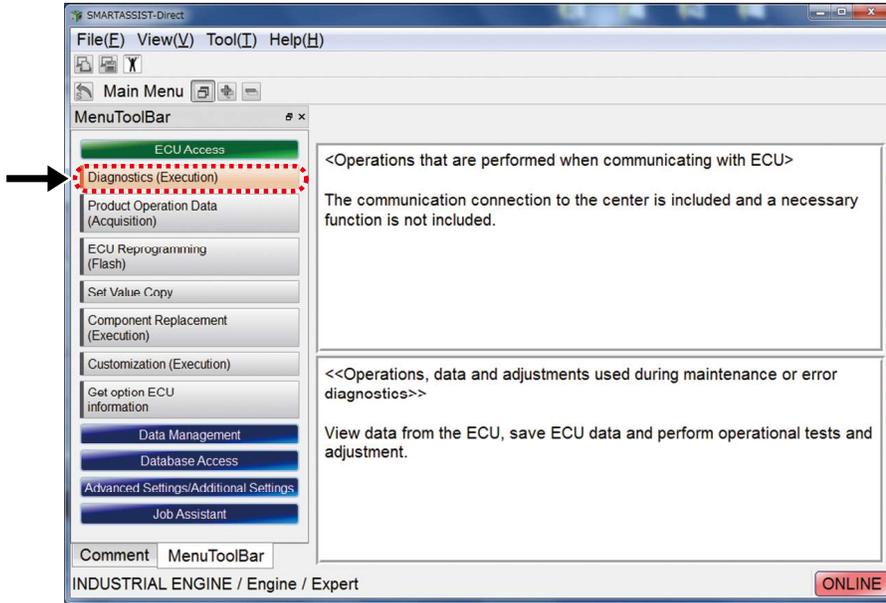
- 1  : Return to the Main Menu
- 2  : Display box for the selected function
- 3  : Show the Function Selection Tool Bar again
- 4  : Expand submenus of the Function Selection Tool Bar
- 5  : Minimize submenus of the Function Selection Tool Bar
- 6 Display of ECU/controller communication status ON LINE:   etc.
- 7 Display of current errors: 



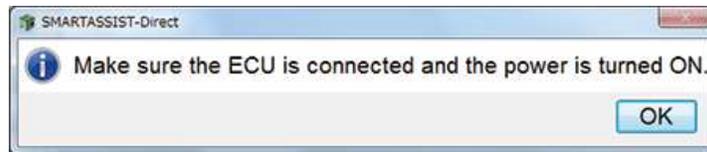
6. Error Diagnostic Function (ECU Access)

6.1 Starting the Error Diagnostic

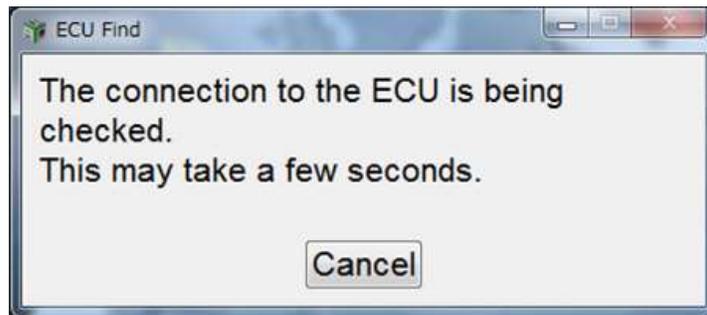
- 1 Connect the product and the PC with the interface box.
- 2 Turn on the product. (Turn the key switch to "On".)
- 3 Select the tab "ECU Access".
- 4 Select the button "Diagnostic (Execution)".



- 5 The following screen is displayed.

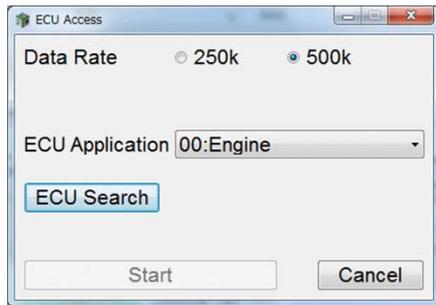


- 6 Connect to ECU. Then turn on the power and click OK. "ECU Find" screen is displayed.



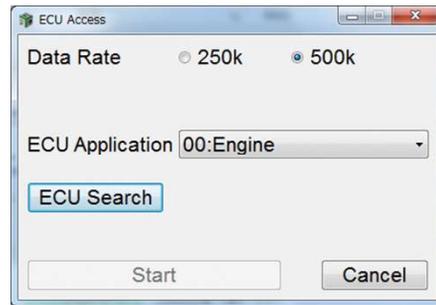
7 When ECU Search is complete, either one of the following screens is displayed.

When the communication speed is appropriate

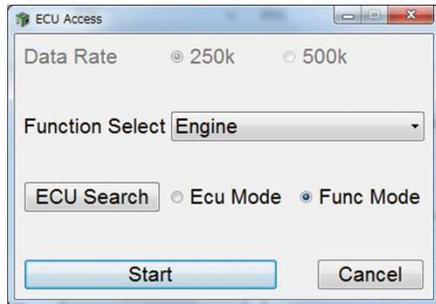


Go to 8.

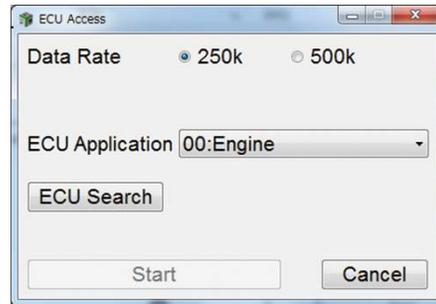
When the communication speed is inappropriate ("Start" button is not available)



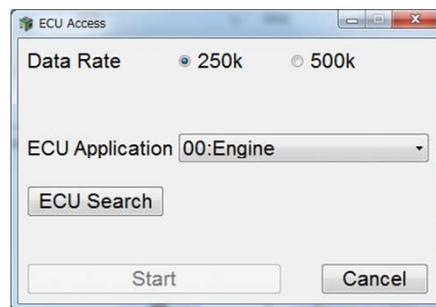
Change the communication speed between 500k and 250k, then select "ECU Search" button.



"Start" button is now available.
Go to 8.



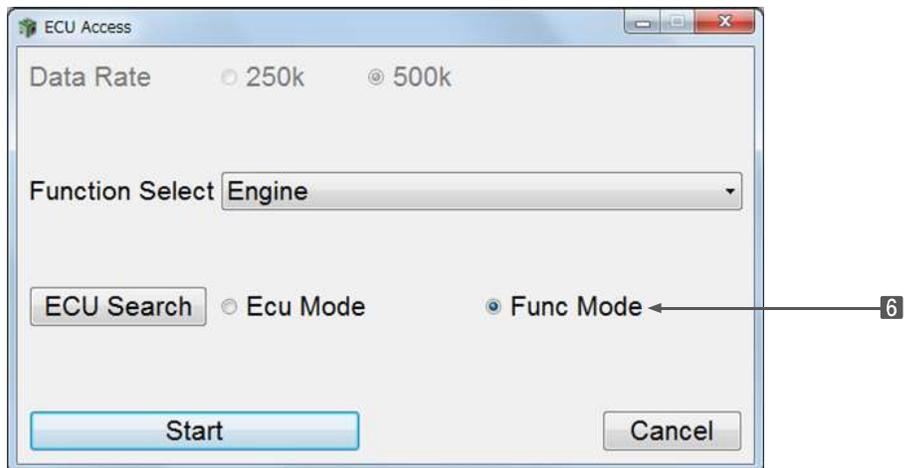
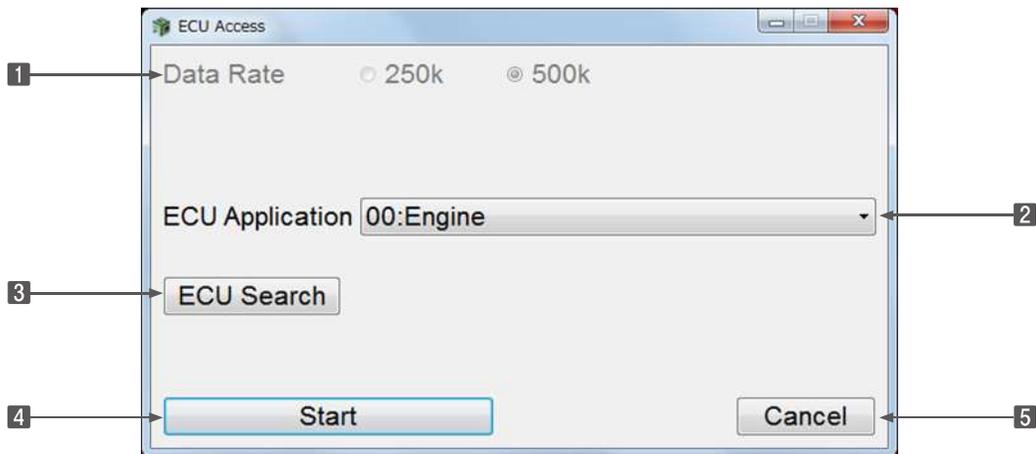
When the communication speed is inappropriate



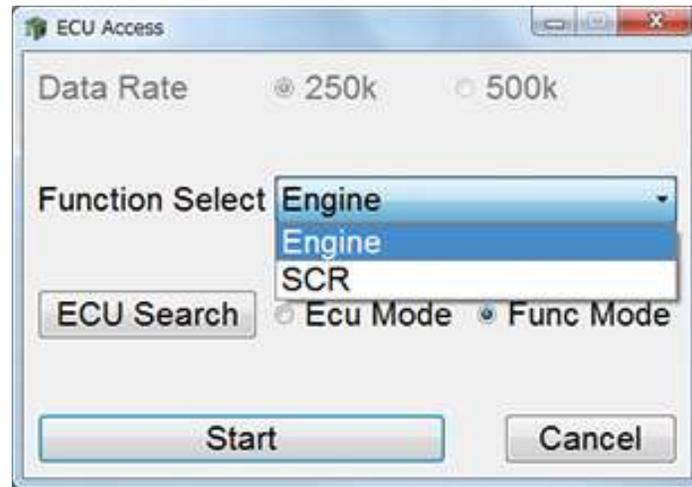
If the screen goes back to 1 and let you do the same operation repeatedly, ECU may be faulty.

6. Error Diagnostic Function (ECU Access)

- 8 When the search of the product's internal ECU is finished, the selection screen for the connection destination is displayed. Select connection destination 2, and click "Start".
 - 1 Normally this is automatically set by a part that adjusts the data rate and cannot be changed.
 - 2 Select the connection destination. Normally, the parts in the product's internal ECU that can be connected to are displayed.
 - 3 Search the ECU again.
 - 4 Activate the connection.
 - 5 Cancel the connection.
 - 6 The display method can be changed to "Ecu Mode" and "Func Mode". (Refer to [9 Display Func Mode] on page 43.)



For industrial engines (land-use), the Function Select window displays "Engine" only for Tier4 CR and older engines. However, for Final Tier4 engine (with ATD unit), it indicates "Engine" and "SCR" as shown below.

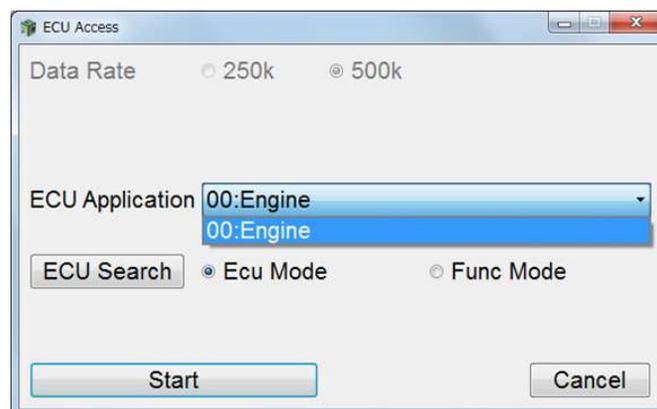


9 Display Func Mode

To improve the product's functionality, a multi-ECU type has been developed that allows the control of one function on multiple ECU. In that case, select the display method "Func Mode" to view the necessary data filtered from multiple ECU.

Example: Transmission control, UFO control

- Note**
- If the search cannot be conducted because the power is turned off, the power supply is unstable, a cable is not connected or other reasons, an ECU list is displayed on the selection screen of 2 that suggests connection destinations from the product category selected on the start menu. If the search is not successful, changing the data rate becomes available. For marine use, the standard is 250 kB; for land use, agricultural and construction equipment, the standard is 500 kB. The Baud rate can vary depending on the machine model. Select the data rate and the ECU application, and click "Start".
 - The ECU application of the model selected at the Start Menu is displayed as selection destination.



- If connected to a service ECU (new ECU), refer to [12 Connecting to the service ECU] on page 46.

10 The communication with the ECU or controller starts.



Note If communication fails and an error screen is displayed, refer to [19. Error Screen and Warning Screen] on page 398.

11 Data Selection Screen for the Manual Link Function

- ① When the connection to the product is established, the product model is confirmed and the manual link data for error diagnosis is automatically set. If multiple data sets are available, the data selection screen is displayed. Select the desired data, and click "OK".



Example screen

Note If only one manual link data set is available, the screens described in ① are not displayed and the data is set automatically.

- ② If the manual link data is of a different language than the language set for the operating system, the below notice screen is displayed, asking for confirmation.

1 Selection window for different languages

2 If confirmed

3 If not confirmed



Note When the manual display language setting and the language set for the PC's operating system are different, the manual display language setting is prioritized.

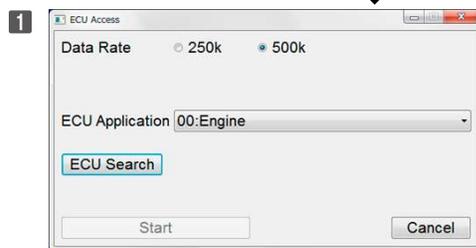
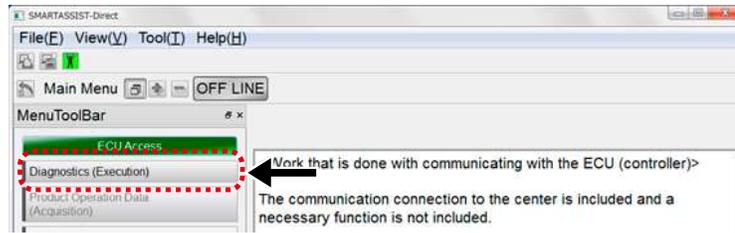
6. Error Diagnostic Function (ECU Access)

12 Connecting to the service ECU

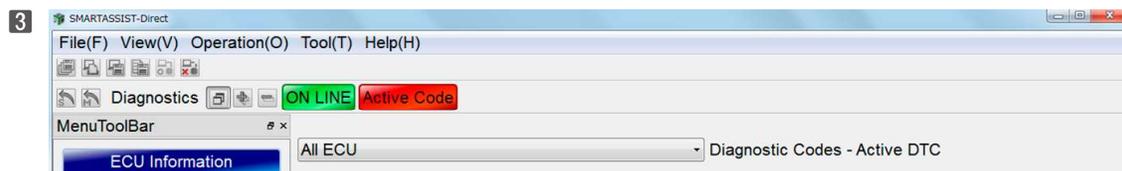
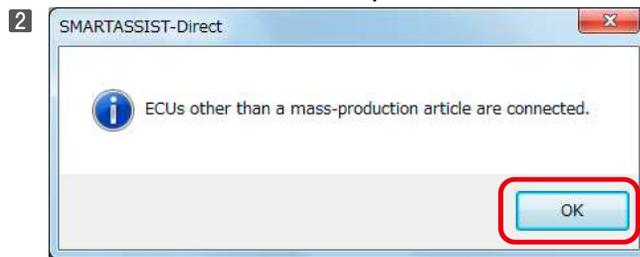
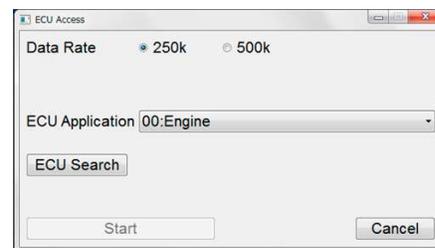
When an Diagnostic (Execution) is performed at the service ECU (new ECU), displays and functions are different between the engine ECU and the implement 3G controller.

● Engine ECU

- 1 The search results for "Data Rate" and "ECU Application" of the connected service ECU are displayed.
- 2 When starting the connection, a warning is displayed stating that the connected ECU is not a marketed product.
- 3 The error diagnostic screen for the service ECU is displayed.

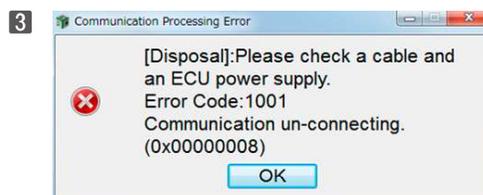
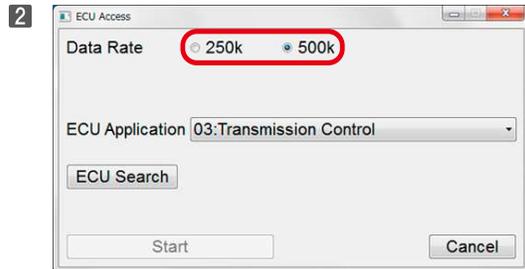


OR



● Implement 3G Controller (ECU)

- 1 The implement 3G controller (ECU) cannot be connected with the diagnostic (execution) function.
- 2 If you click "Diagnostic (Execution)", the data rate will not automatically be set. (selectable)
- 3 If you set the "Data Rate" or the "ECU Application" manually, a warning screen is displayed, and the "Diagnostic (Execution)" function ends automatically.



6.2 ECU Information

6.2.1 Display

Displays summary information of the ECU.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen.
- 3  : Save a screenshot in BMP format.
- 4  : Save the screen data in CSV format.
- 5  : Refresh data.

● Main Box

- 6 : If multiple ECU are installed, you can switch between screens.
- 7 **System Group** : Show the display categories.
- 8 **Detail** : Show the names of the categories.
- 9 **Value** : Show data.
- 10 **Unit** : Display the unit.
- 11 **ECU** : Show the name of the ECU or controller whose data is saved.

● Comment Box

- 12 Comment box: Show annotations.

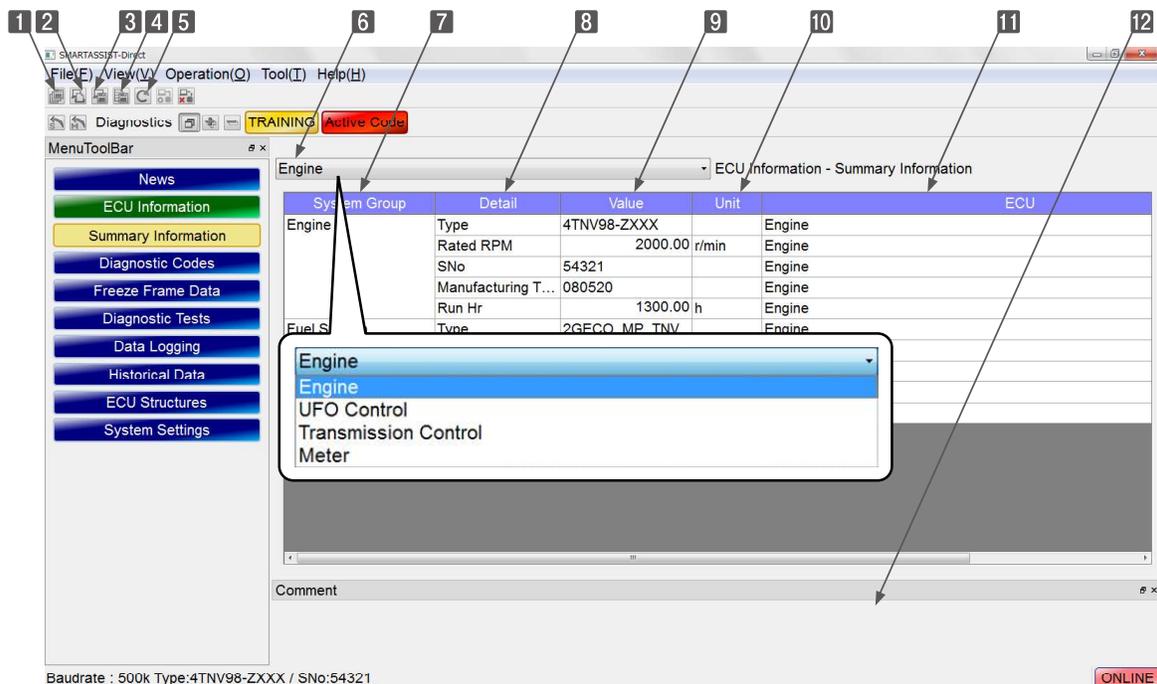
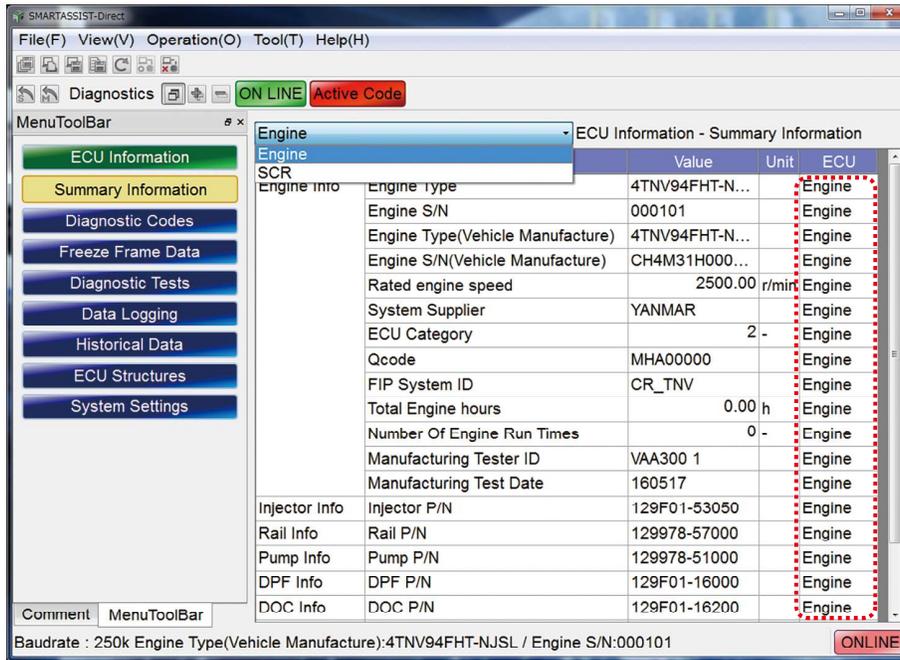


Figure 6-1 ECU Information

6. Error Diagnostic Function (ECU Access)

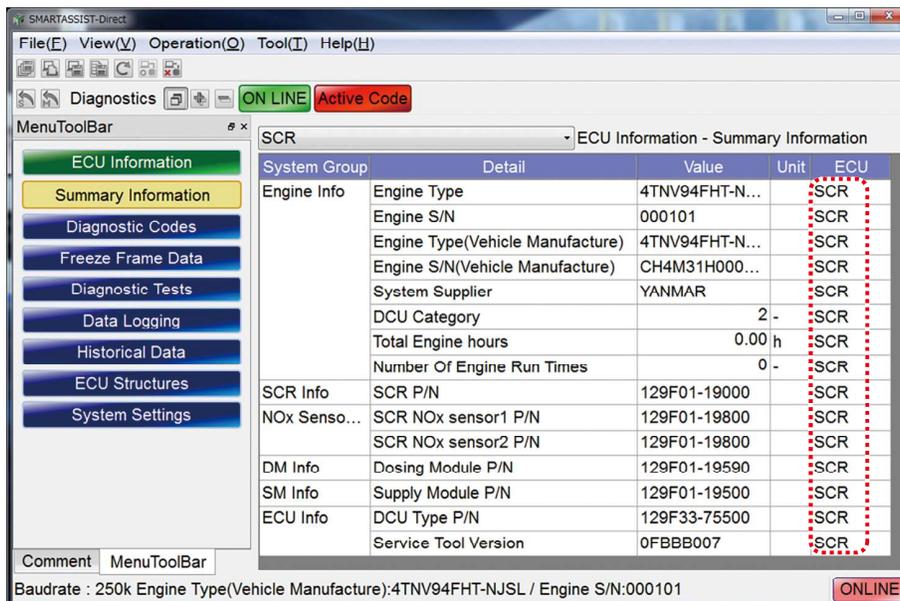
When you select the final Tier4 compliant engine "4TNV94FHT" from "INDUSTRIAL ENGINE" in the start menu, two types of ECU are available for engine and SCR. The screen display can be switched between those two types as indicated below. When you select "Engine", the "ECU" of the summary information is indicated as "Engine".



When switching to SCR ECU (=DCU), select SCR, and then click "Yes".



The SCR ECU (=DCU) of summary information is displayed. The "ECU" of the summary information is indicated as "SCR".



6.2.2 Screen Print

Click the  button of **2** to open the printer settings screen.

Select an available printer and print.

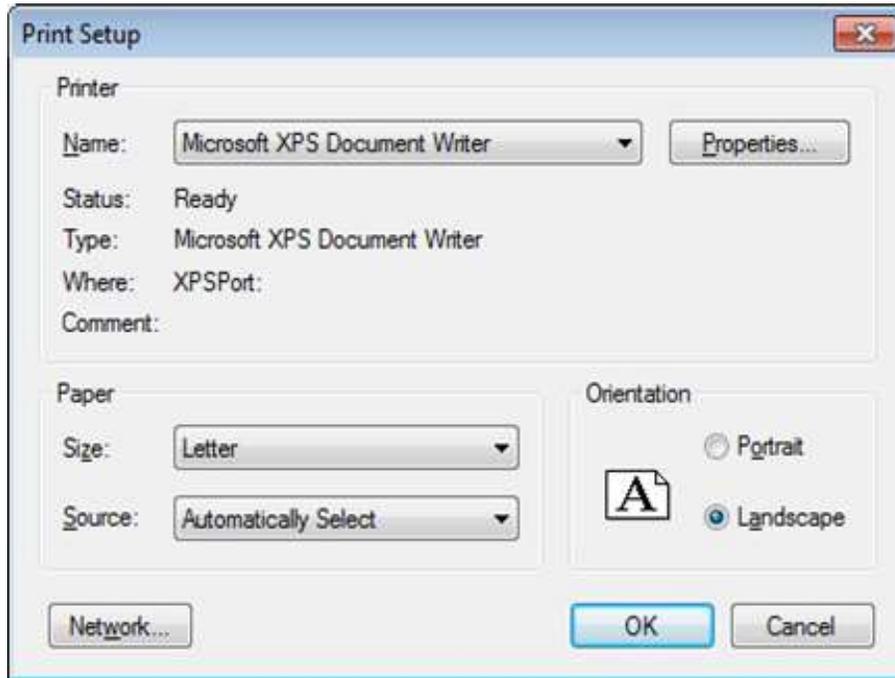


Figure 6-2 Example screen for Windows 7

6.2.3 Saving images

Click the  button of **3** to open the selection screen.

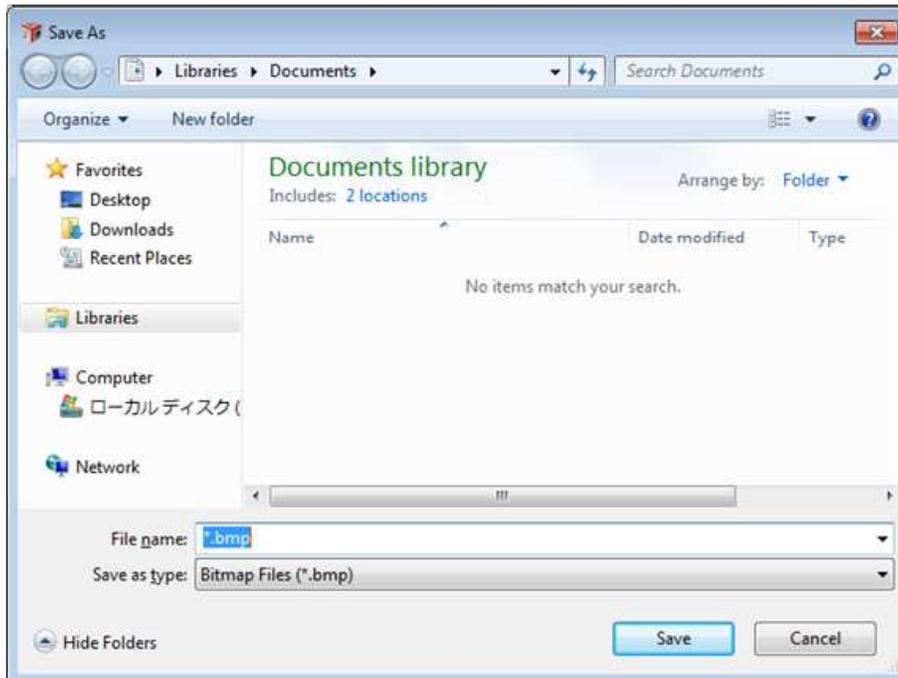
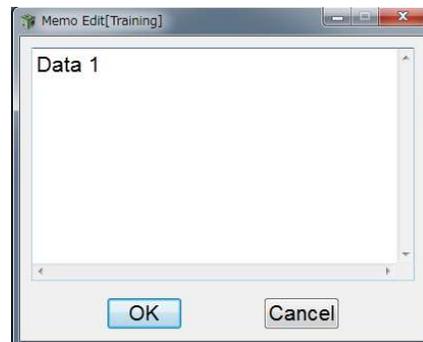
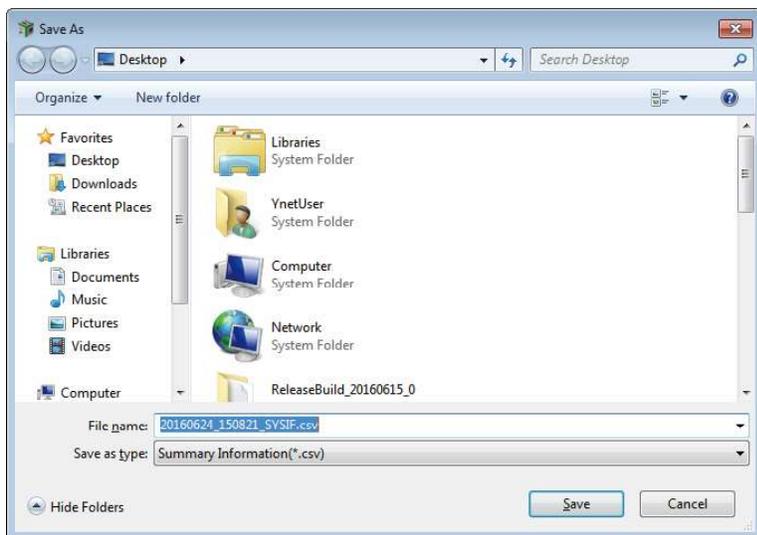


Figure 6-3 Example screen for Windows 7

6.2.4 File Save

Click the  button of **4** to open the selection screen for the save location.

You can write a memo and attach it to the save data.



Remark The data is saved as **Comma Separated Values (CSV)**.

When saving data such as the data below with  button of **4**,

System Group	Detail	Value	Unit	ECU
Engine	Type	4TNV94HT-ZXSRA		Engine
	Rated RPM	2200.00	r/min	Engine
	SNo	00117		Engine
	Manufacturing Test Date	110121		Engine
	Run Hr	0.00	h	Engine
Pump	Pump Learning Completion Time	0.00	h	Engine
ECU	Part No.	129978-75520		Engine
	SNo.	9960900888		Engine



it is saved in the below format.

4TNV98-ZXXX	54321	Data 1	
Information Type	Detail	Data	Unit
Engine data	Type	4TNV98-ZXXX	
Engine data	Rated Speed	2000	r/min
Engine data	SNo.	54321	
Engine data	Shipment Adjustment Day	80520	
Engine data	Operating Hours	1300	h
Pump Data	Type	2GECO_MP_TNV	
Pump Data	Part No.	729938-51XXX--	
Pump Data	SNo.	080528Z321	
ECU Data	Part No.	1R1992-00XXX**	
ECU Data	SNo.	852754321	

Memo displayed here.

6.3 Diagnostic Codes

Displays current or past defects detected by the ECU. Click the Screen Selection tool bar to display Current Defect or the defect history. Has a manual link function that links to more detailed technical information.

6.3.1 Active DTC

This function lists the current or past defects detected by the ECU in real-time (auto update every 2 seconds). It displays the error code and its contents, and provides a simple explanation and solution in the box on the bottom. If the cause of the defect is removed and the machine works normally again, the Defect Display on the top disappears.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the screen data in CSV format. (Refer to [6.2.4])

● Main Box

- 5 : In entries that have this button , pressing it displays more detailed technical information.
- 6 : Display error codes (DTC) that conform to SAE J2012 or that have been specified for the product.
- 7 : Display the error code. (Refer to [20. Attached Documents] on page 420.)
- 8 : Display the contents of the error code.
- 9 : Display the reason for the error determination.
- 10 : Display the ECU of the faulty device. (Only if multiple ECU are connected.)

● Comment Box

- 11 Comment box: Display the contents of the error diagnostic for the selected error (line colored in green).

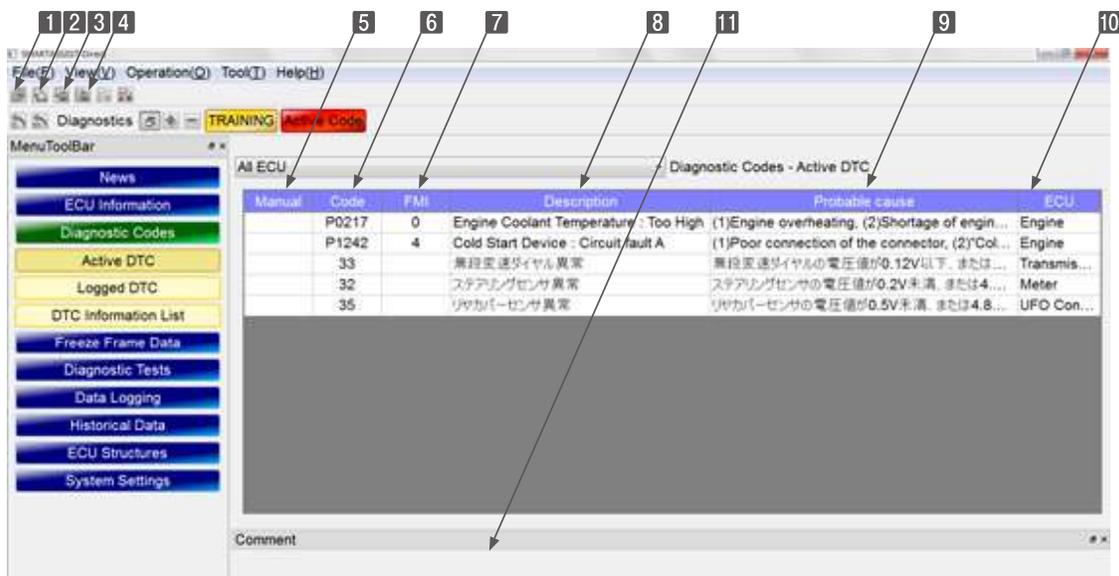


Figure 6-4 Active DTC Screen

6.3.2 Logged DTC

Displays the stored past defect history, error code, error content, number of occurrences, and time of first and latest occurrence. Also, delete the complete defect history or single entries.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5  : Refresh the complete historical data.

● Function Buttons

- 6 **Clear Logged DTC** : Select data in the **Clear** box and delete it.
- 7 **All Clear** : Delete the complete defect history. Past data are deleted, but Current Defect will still be displayed.

● Main Box

- 8 **Clear** : Display the data selected for deletion. (Click to tick the checkbox.)
- 9 **Active** : Current defect are marked with a lamp symbol.
- 10 **Code** : Display error codes (DTC) that conform to SAE J2012 or that have been specified for the product.
- 11 **FMI** : Display the error mode. (Refer to [20. Attached Documents] on page 420.)
- 12 **Description** : Display the contents of the error code.
- 13 **OC** : Display the total number of occurrences for the same defect.
- 14 **First** : Display the time (machine operation) of the first occurrence.
- 15 **Latest** : Display the time (machine operation) of the last occurrence.
- 16 **ECU** : Display the ECU of the faulty device. (Only if multiple ECU are connected.)

● Comment Box

- 17 Comment box: Display the reason for the error determination for the selected error (line colored in green).



Figure 6-5 Logged DTC Screen

6.3.3 DTC Information List

Displays the list of Error Codes that can be detected by the ECU.

Also, do a keyword search.

● **Operation Tool Bar**

- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the complete historical data in CSV format. (Refer to [6.2.4])

● **Function Buttons**

- 5 **Description Search** : Enter the keyword for the search.
- 6 **Search** : Perform the search.

● **Main Box**

- 7 **Code** : Display error codes (DTC) that conform to SAE J2012 or that have been specified for the product.
- 8 **FMI** : Display the error mode.
- 9 **Description** : Display the contents of the error code.
- 10 **SPN** : Display parameter ID numbers that comply to SAE J1939, and numbers for the sensors and actuators
- 11 **ECU** : Display the ECU that controls the devices. (Only if multiple ECU are connected.)

Note The displayed contents can vary by product.

● **Comment Box**

- 12 **Comment box**: Display details of the error code for the selected line (colored in green).

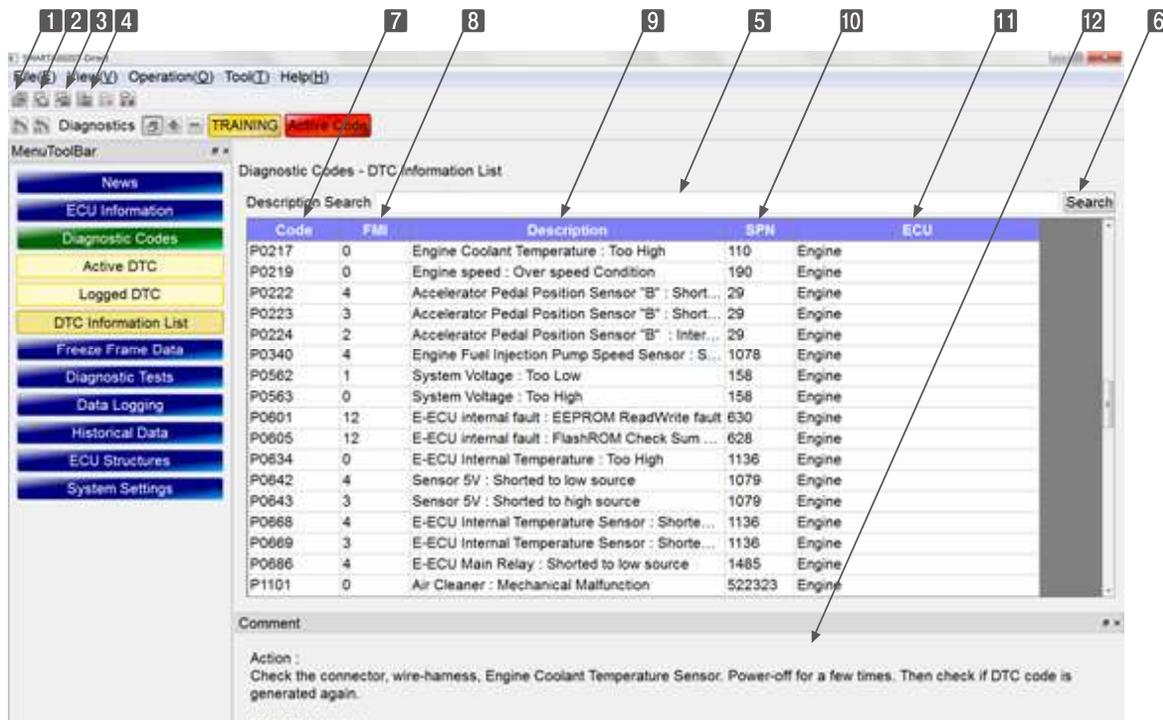


Figure 6-6 DTC Information List Screen

6.4 Freeze Frame Data

Displays relevant data before/after a recent error was detected, and click the screen selection tool bar to view a list of the data and a transition graph.

- Note**
- The kind of data that is stored during an error is set in the factory. It cannot be set later.
 - Depending on the product specification, data before/after error or only before error is saved.

6.4.1 Recoded Data

● Additional Information Box

The saved data is displayed in a list. Click a box to display the data in the main box.

- 1 : Display the line number of the data.
- 2 : Error code (The content can be confirmed at "Diagnostic Codes" - "Logged DTC".)
- 3 : Display the time of error occurrence (total operating time).

● Operation Tool Bar

- 4 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 5 : Print the screen. (Refer to [6.2.2])
- 6 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 7 : Save the data displayed in the main box in CSV format. (Refer to [6.2.4])
- 8 : Refresh the data.
- 9 : Display the data selection subwindow to add, delete and sort the displayed data.

● Function Buttons

- 10 : Delete the selected data. (The Password Entry Screen is displayed.)

* FFD: Freeze Frame Data

● Main Box

- 11 : If multiple ECU are installed, you can switch between screens.
- 12 : Display the time line number of the data.
- 13 : The first letter of the selected data name is displayed, and the name is displayed at 12 .
(Content such as the unit can be confirmed on the ECU Specification/Structure [Analog Channels] Menu screen.) Right-click the Item box to switch the data format from binary to decimal to hexadecimal.

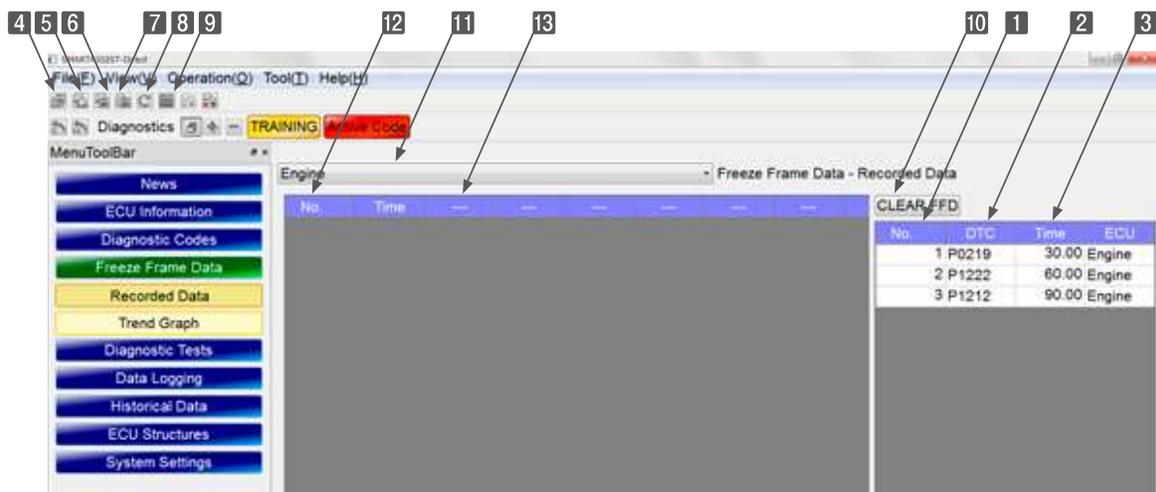


Figure 6-7 Freeze Frame Data Screen

6. Error Diagnostic Function (ECU Access)

● Data Select Window

Select the data displayed in the main box.

- 1 Data : List all available data.
- 2 ◀ / ▶ : Select/deselect data for display.
- 3 Set data : The data displayed in the main box.
- 4 ▲ / ▼ : Change the order in which the selected data is displayed.
- 5 Default : Previously selected main Items are set automatically.
- 6 Set : Confirm an entry.
- 7 Cancel : Discard an entry.

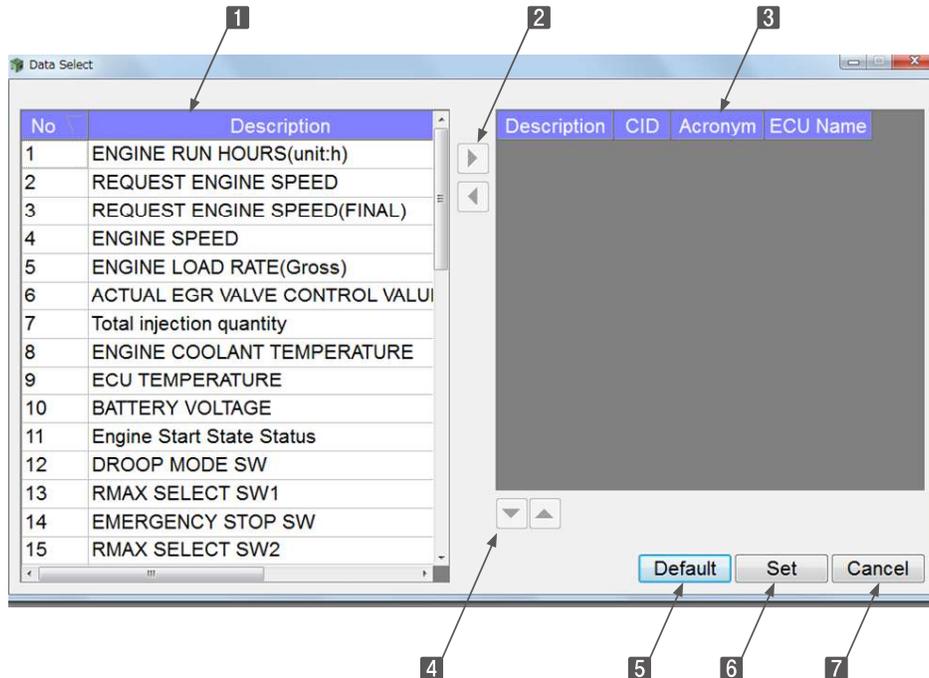


Figure 6-8 Data Select Window Screen

Point If an ECU connection error occurs during data saving due to disconnection, data before the error occurrence is saved.

6.4.2 Trend Graph

● Additional Information Box

With the graph setting operation, display the name of the selected data Item and the position of the cursor.

Graph 1 shows top values, graph 2 shows bottom values.

1 Position : Numeric value for the cursor position

2 Display Item and data: Display the Item name and data. The background color and the line color are of the same color.

● Operation Tool Bar

3  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)

4  : Print the screen. (Refer to [6.2.2])

5  : Save a screenshot in BMP format. (Refer to [6.2.3])

6  : Do the settings for the display Item and the scaling of the top graph.

7  : Do the settings for the display Item and the scaling of the bottom graph.

● Main Box

8 Cursor position : Click the screen to change the position.

9  : Contract the graph.

10 : Set the expansion value.

11  : Expand the graph.

12 Counter value : Display the counter value of the y-axis.

Graph 1 and graph 2 are displayed. For details regarding operation of the graph, refer to [7.1 Error Diagnostic Data Save and Display Functions] on page 154.

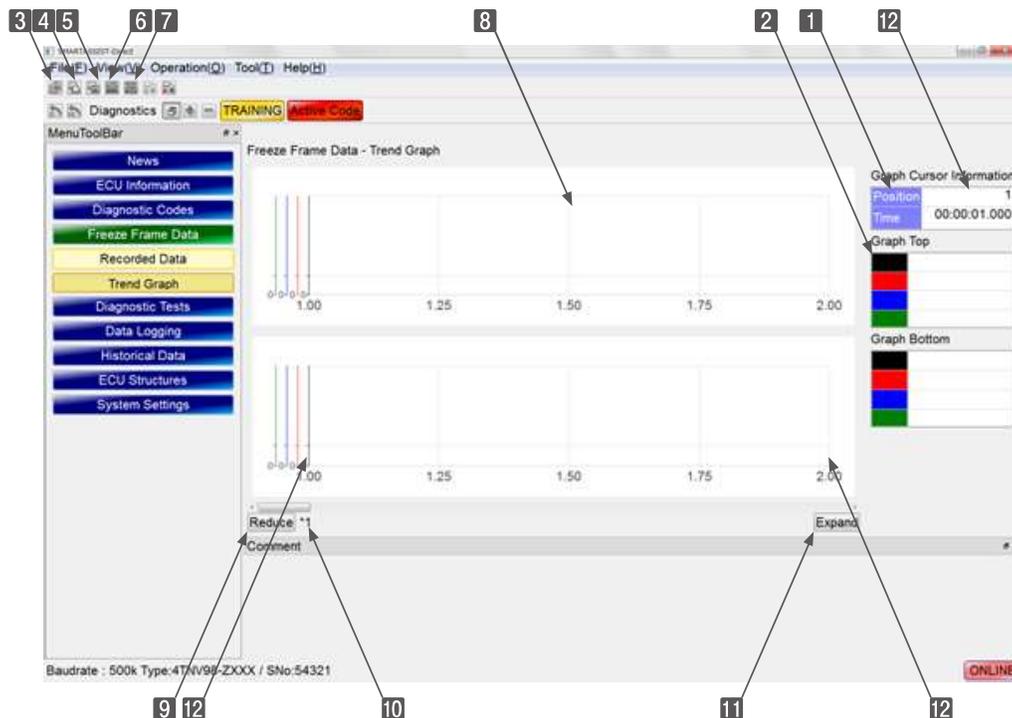


Figure 6-9 Transition Graph Screen

6.5 Diagnostic Tests

Allows to separately test the input/output device. Select the input/output test and the active control function by clicking them on the screen selection tool bar. Operation within this function that involve output may be usable only with the clutch in neutral and the engine in low idle or stopped.

Important ● **The test involves many operations where the product actually operates. Only personnel who have taken the SMARTASSIST-Direct training may perform the test, and must pay due attention to their surroundings. If not, the product may move unexpectedly and cause serious accidents.**

Important ● **In an emergency, turn off the power of the ECU/controller (turn the key switch to "Off") to stop the product.**

● **"Maintain the previous status" or "Automatically controlled test - Return to previous status" are operations in case that the diagnostic tests is canceled under the below conditions, but which one is set varies by product.**

- **The buttons "Abort, "Stop" or "Cancel" were clicked.**
- **The connection harness between the product and the PC is disconnected.**
- **The SMARTASSIST-Direct software was exited.**

Important **Reset**

- **Turn off the power of the ECU/controller after the diagnostic tests is finished. (Turn the key switch to "Off".)**
- Put the product in active control with the SMARTASSIST-Direct, and the ECU/controller will change to force operation mode. If you continue using the device in this state, the automatic control will become unoperational.**

6.5.1 Pulse/Analog etc

The analog measuring values and pulse input values can be confirmed with this function when checking operations of the input device after error diagnosis or repair. When switching screens, the screen display automatically refresh every 2 seconds.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format.
- 5  : Refresh the current data.
- 6  : Continuously refresh the current data. (2 second interval)
- 7  : Stop continuous refresh.
- 8  : After stopping, change the order of the data. With this operation, important data can be sorted in way that is easier to see. For operation details, refer to [Data Select Window] on page 56.

● Main Box

- 9 : If multiple ECU are installed, you can switch between screens.
- 10 : Display the input device name.
- 11 : Display the measurement values.
- 12 : Unit
- 13 : Voltage of analog input (mV)
- 14 : Annotation box
- 15 : Display the ECU/controller that controls the devices. (Only if multiple ECU are connected.)

● Comment Box

- 16 Comment: Display information for the selected line (colored in green).

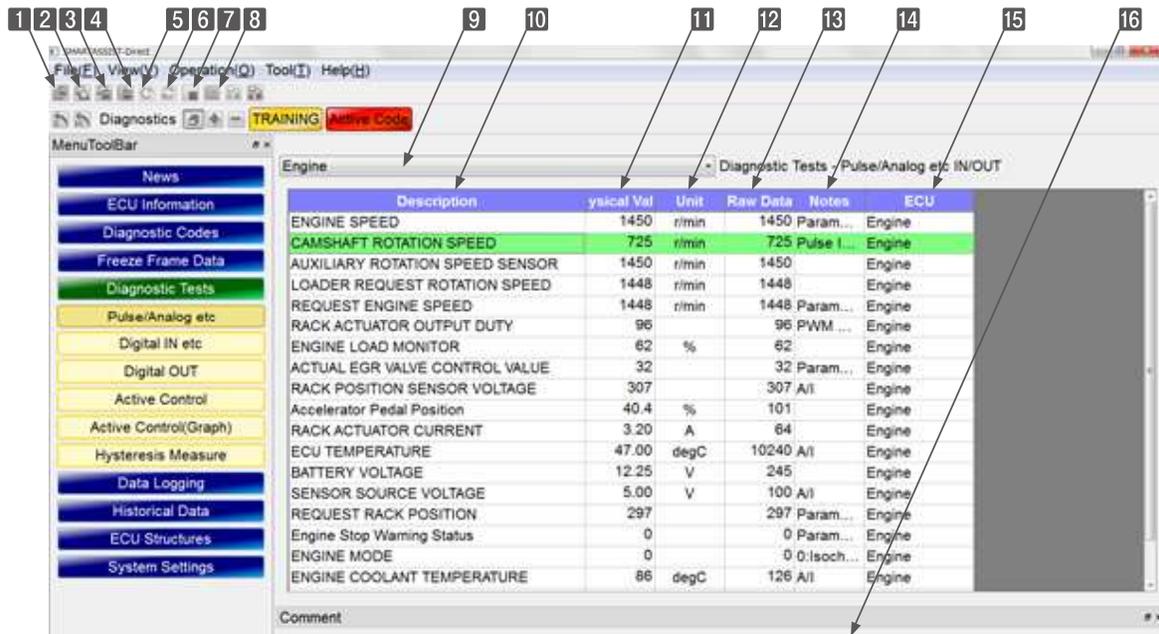


Figure 6-10 Pulse/Analog etc Screen

6.5.2 Digital IN etc

The On/Off status can be confirmed with this function when checking operations of the input device after error diagnosis or repair. When switching screens, the screen display automatically refresh every 2 seconds.

● Operation Tool Bar

- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the complete historical data in CSV format.
- 5 : Refresh the current data.
- 6 : Continuously refresh the current data. (2 second interval)
- 7 : Stop continuous refresh.

● Main Box

- 8 : If multiple ECU are installed, you can switch between screens.
- 9 **Description** : Display the input device name.
- 10 **On/Off** : Display the on/off status.
- 11 **Notes** : Annotation box
- 12 **ECU** : Display the ECU/controller that controls the devices. (Only if multiple ECU are connected.)

● Comment Box

- 13 **Comment**: Display information for the selected line (colored in green).

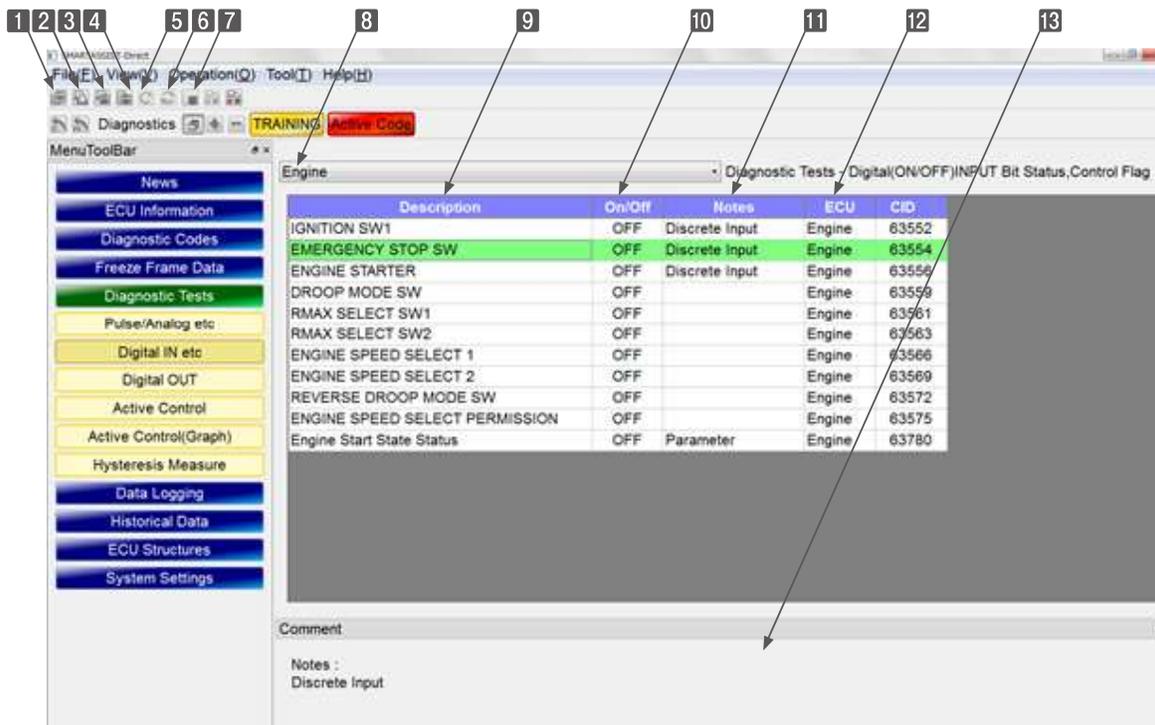


Figure 6-11 Digital IN etc Screen

6.5.3 Digital Out

This function checks operations of the output device after error diagnosis or repair. The forced On/Off status of the contact cannot be executed if the engine is not stopped. When switching screens, the screen display automatically refresh every 2 seconds.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format.
- 5  : Refresh the current data.
- 6  : Continuously refresh the current data. (2 second interval)
- 7  : Stop continuous refresh.

● Main Box

- 8  : If multiple ECU are installed, you can switch between screens.
- 9  **Active Control Mode** : Display manual operations and update operations.
 - When an update operation is performed, manual control is indicated by a check mark.
 - Remove the check mark by clicking it and return to automatic control.

Important When returning to automatic control, whether the status "Maintain the previous status" or "Automatically controlled test - Return to previous status" is set in the ECU/controller varies by product. Use it with due care.

- 10  **Description** : Displays the output device name.
- 11  **On/Off** : Displays the status of the current value.
 - For changeable Items, "On/Off" is displayed in blue.
 - Toggle between On and Off by double-clicking.
 - When changing the status, it is necessary to enter the password.
 - The password confirmation will be valid as long as you use this screen.
 - If toggling between On and Off is not permitted by other devices, the words are displayed in red.
 - Output that cannot be turned on and off (e.g. the main relay) is set by the ECU/controller.
- 12  **Notes** : Annotation box
- 13  **ECU** : Display the ECU/controller that controls the devices. (Only if multiple ECU are connected.)

6. Error Diagnostic Function (ECU Access)

● Comment Box

14 Comment: Display information for the selected line (colored in green).

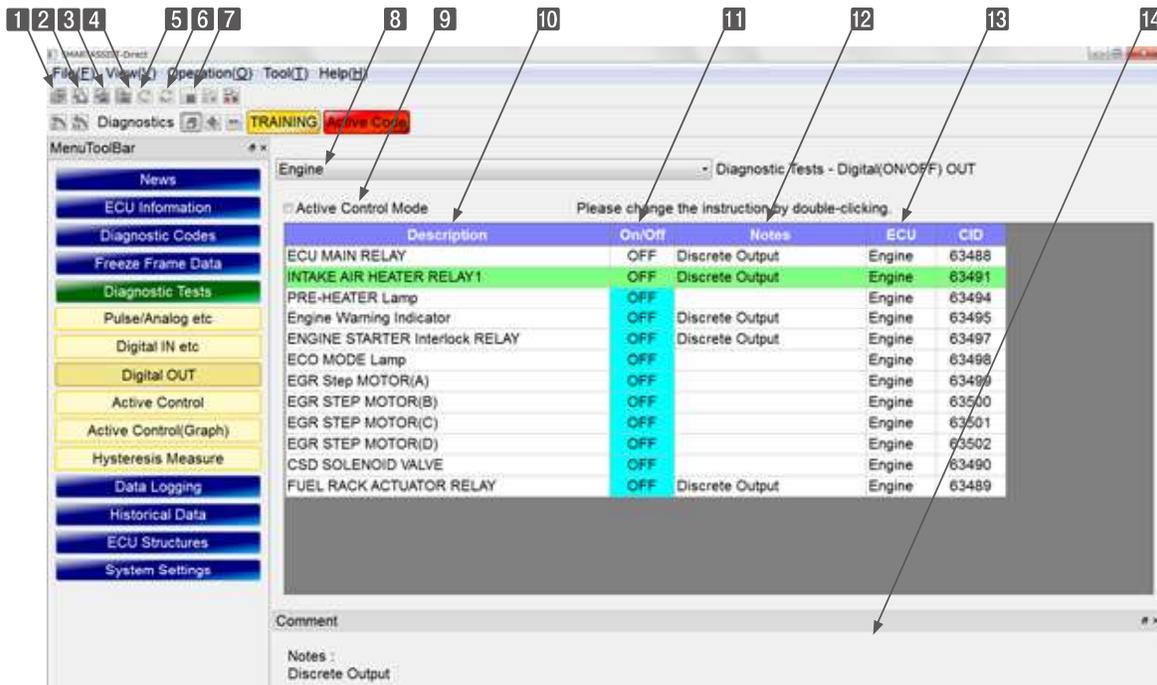


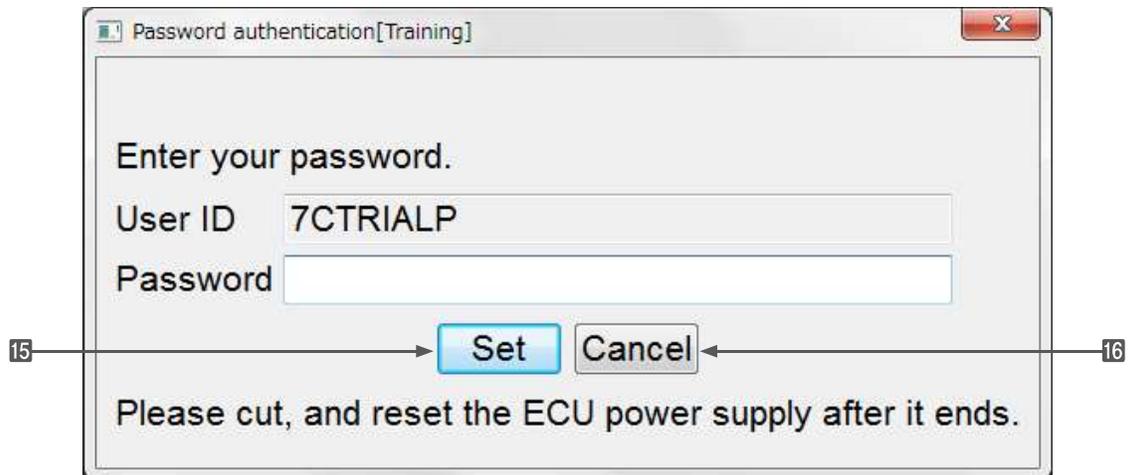
Figure 6-12 Digital OUT Screen

● Subwindow (Screen Shift)

11 If you click "On/Off", the password entry screen is displayed.

15 **Set** : Toggle (On/Off).

16 **Cancel** : Cancel the toggling and return to the previous screen.



6.5.4 Active Control

Sets the status for all devices (e.g. engine, clutch, switch, sensor) when operating each product separately by confirming the feedback control (e.g. control the rack position or speed governing of the engine) and product operation.

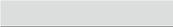
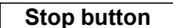
Important When you start it, the product may start as well.

- Be careful when you work with other personnel.
- Operate with due care to the surroundings.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])

● Main Box

- 5  : If multiple ECU are installed, you can switch between screens.
- 6  : Display the status of the active control; a red circle indicates that the active control is in progress, a gray circle indicates that it is stopped.
- 7  : Click to stop the active control.
- 8  : Click to start the active control.
- 9  : Control Item names
- 10  : Indicates that the active control is available.
Req: Active control only during engine operation.
Not: Active control only during engine stop.
- 11  : Display the measurement value (feedback value).
- 12  : Display the target value (current set value). Click the target value to open the subwindow and change the value.
- 13  : Display the unit.
- 14  : A red circle indicates that the graph can be displayed; a gray circle indicates that a measurement is necessary to display the graph. Clicking the red circle after active control switches to the graph display screen.
- 15  : Display the ECU/controller that controls the devices. (Only if multiple ECU are connected.)

● Comment Box

- 16 Comment: Display information for the selected line (colored in green).

6. Error Diagnostic Function (ECU Access)

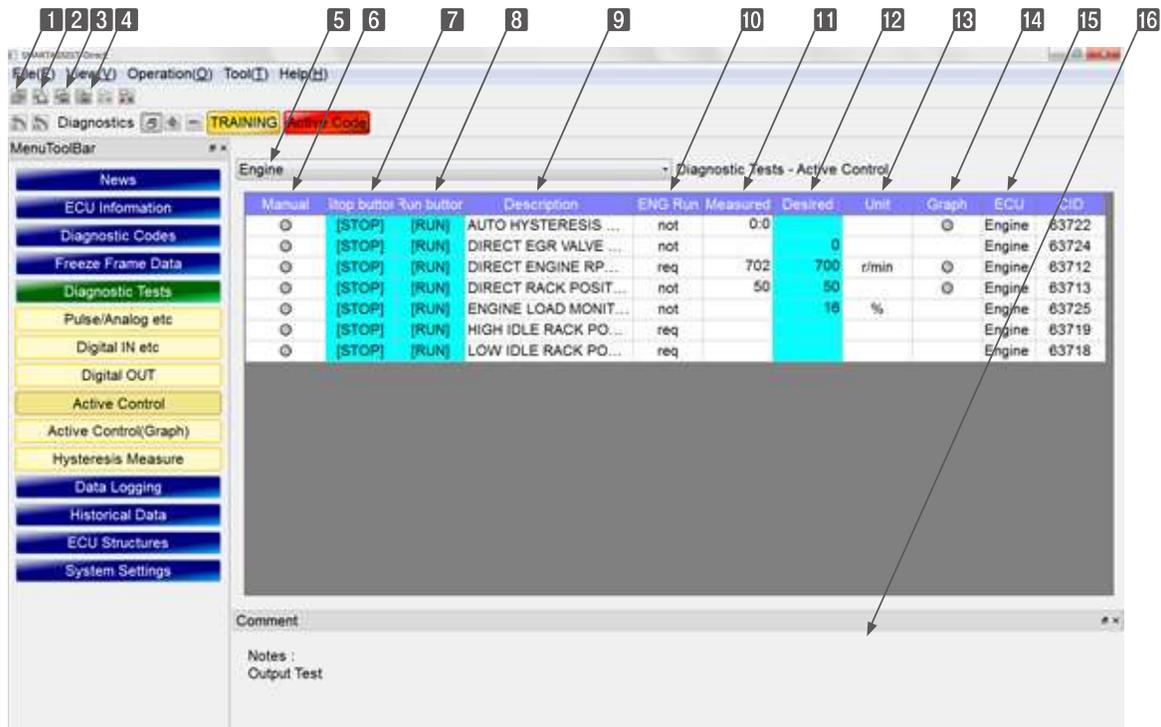
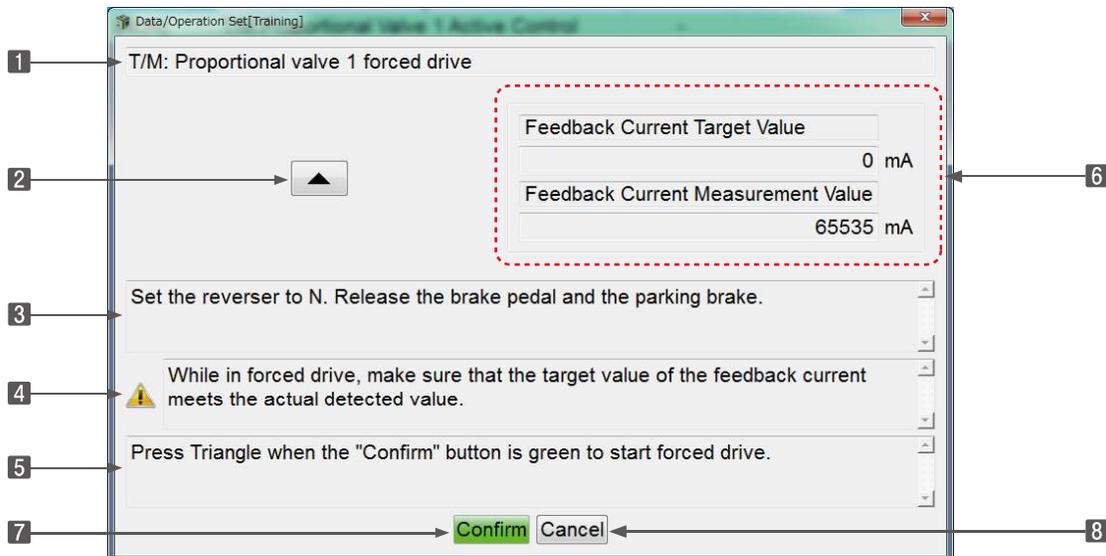


Figure 6-13 Active Control Screen

● Change Subwindow 1

- 1 **Item Name** : Display the name of the active control Items.
- 2 **Operation Button** : Display operation buttons such as Up (▲) and Down (▼).
- 3 **Operation Message** : Display conditions set before active control.
- 4 **Precaution Message** : Display precautions regarding active control.
- 5 **Assistance Message** : Display additional information for active control.
- 6 **Assistance Message** : Display target values/measurement values.
- 7 **Confirm** : The confirmation button has two functions.
 - A green light indicates that the product can be operated in active control.
 - The light goes output if the upper limit or lower limit is exceeded during active control.
- 8 **Cancel** : Close the subwindow.

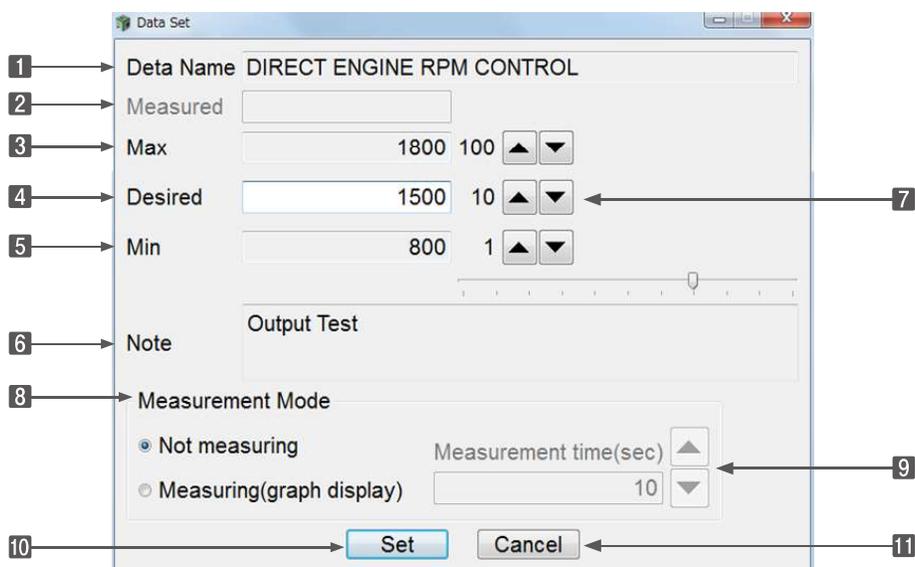


● Change Subwindow 2

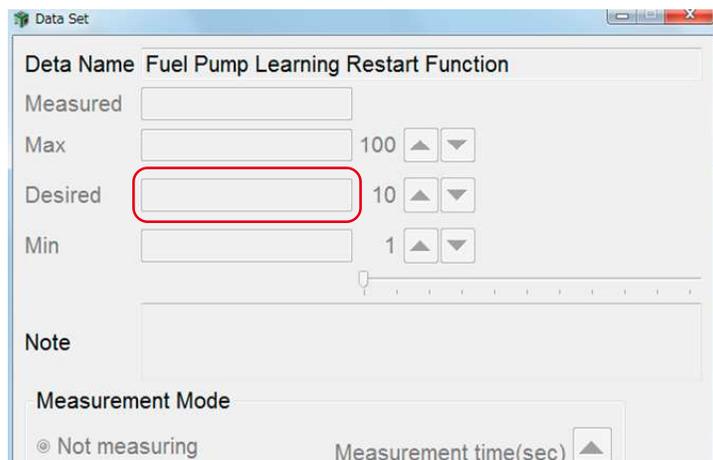
- 1 **Data Name** : Display the name of the active control Items.
- 2 **Measured** : Display the current measurement value of the feedback Item.
- 3 **Max** : Display the maximum setting for the target value.
- 4 **Desired** : Display the current setting (target value).
- 5 **Min** : Display the minimum setting for the target value.
- 6 **Note** : Annotation
- 7 ▲/▼ : Change the setting in increments of 1, 10, and 100.
- 8 **Measurement Mode** : Select to measure the feedback data.
- 9 ▲/▼ : Adjust the measurement time.
- 10 **Set** : Send the set directive value to the ECU and perform active control.
- 11 **Cancel** : Cancel the active control and close the sub-window.

● Adjust the direct value with the ▲ / ▼ buttons. Set the direct value of the selected Item with the **Set** button.

● Select 8 "Measuring (graph display)" with **Measurement Mode**, save the feedback data of the set time, and view the data on the graph screen.



A part of the active control Items are tested according to the previously set program for active controls. In that case, the directive value cannot be entered.



6.5.5 Active Control (Graph)

The graph is only displayed if Measuring (graph display) is selected for active control.

● **Additional Information Box (Cursor Value)**

Displays the name and value for the data selected by the graph setting operation.

Graph 1: Top, data value

- 1 Position: Displays the data number for the cursor position.
- 2 Display Item data: Displays the Item name and data. The background color and the color of the graph are the same.

● **Operation Tool Bar**

- 3 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 4 : Print the screen. (Refer to [6.2.2])
- 5 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 6 : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 7 : Save the measured data. Save the data of the active control after measurement. For the display of the saved data, refer to [7. Error Diagnostic Data Save and Display Functions].
- 8 : Do the settings for the display Item and the scaling of the top graph.

● **Main Box**

Graph 1 is displayed. For details regarding operation of the graph, refer to [7. Error Diagnostic Data Save and Display Functions] on page 154.

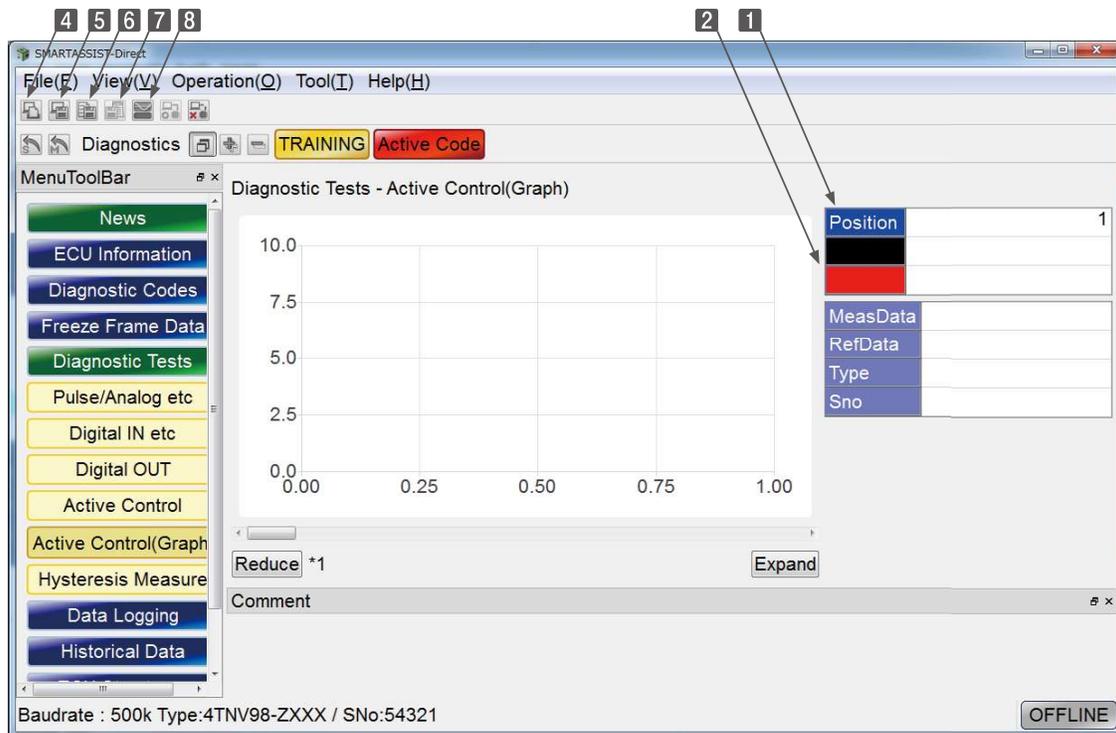
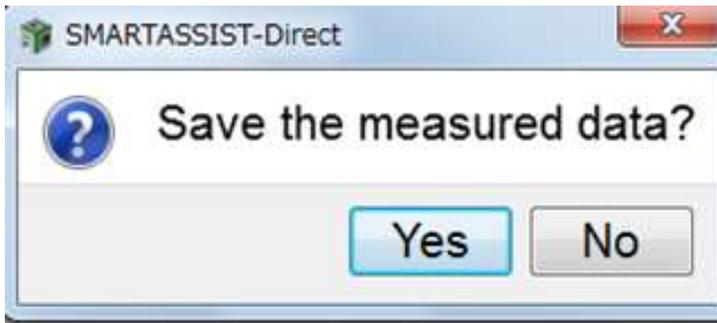


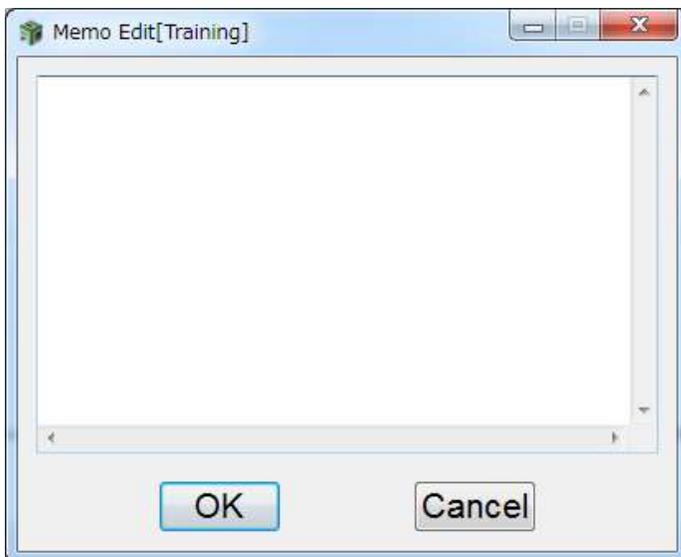
Figure 6-14 Active Control (Graph) Screen

6.5.6 Saving the Measured Data

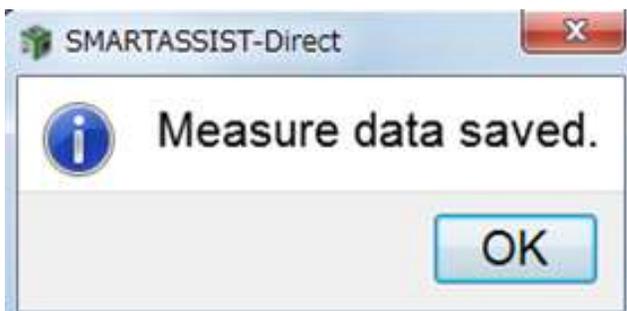
- Click the  button of  to open the confirmation screen.



- Click "OK" to enter a memo regarding the measured data.



- After entering the memo, Click "OK" then saving is complete.



- Note**
- You cannot select the save location.
 - You can change the contents of the memo.

6.5.7 Hysteresis Measure

Execute the active control (active control) of all automatic hysteresis measurements to start the set program, collect data from the ECU, active the below functions and display the graph in this screen.



Figure 6-15 Selection screen for switching the Graph Display

- Note**
- **The response to the results gathered by the automatic hysteresis measurement differs depending on the product.**
 - **For details, refer to the product's technical manual or consult with the YANMAR Service Department.**

● Additional Information Box (Data Display)

- 1 **Cursor Data** : Display data for the cursor position. (Only on the trend graph screen)
- 2 **X-Y**, **Trend** : Click the corresponding button to switch to an X-Y graph (x-axis: current) and trend graph (x-axis: time) .

● Operation Tool Bar

- 3  : Print the screen.
- 4  : Save a screenshot in BMP format.
- 5  : Save the measurement results in CSV format.
 - date_time_DTHY.CSV: raw data of X-Y graph only
 - date_time_DTHYC.CSV: point data and calculated results
- 6  : Save the measured data. Save the data of the active control after measurement. For the display of the saved data, refer to [7. Error Diagnostic Data Save and Display Functions].
- 7  : Do the scaling settings for the X-Y plot graph.

● Main Box

Displays a graph of the raw data on the top.

For details regarding operation of the graph, refer to [7. Error Diagnostic Data Save and Display Functions] on page 154.

< X-Y graph >

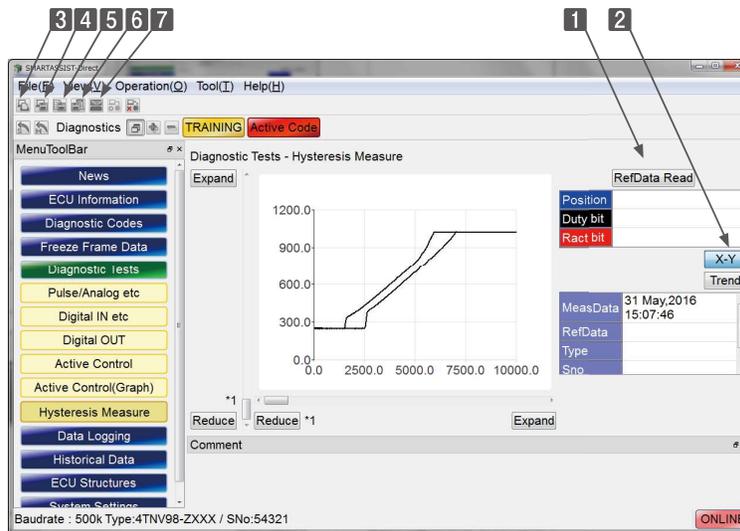


Figure 6-16 Hysteresis Measure Screen

< Trend graph >

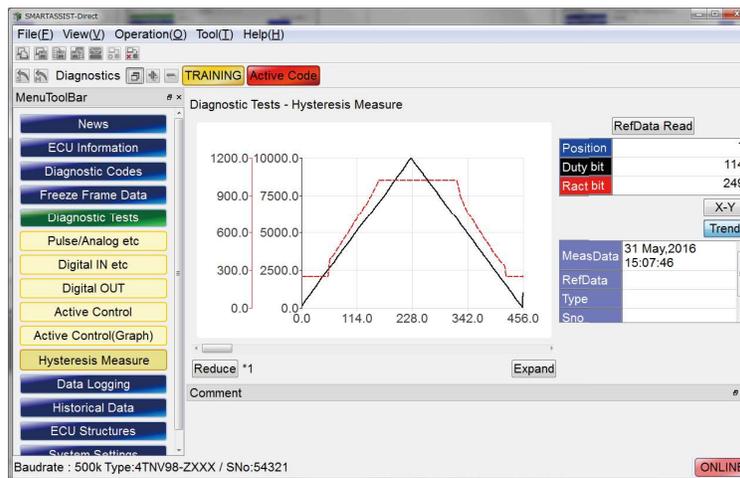


Figure 6-17 Trend Graph Screen

Remark In case of rack hysteresis

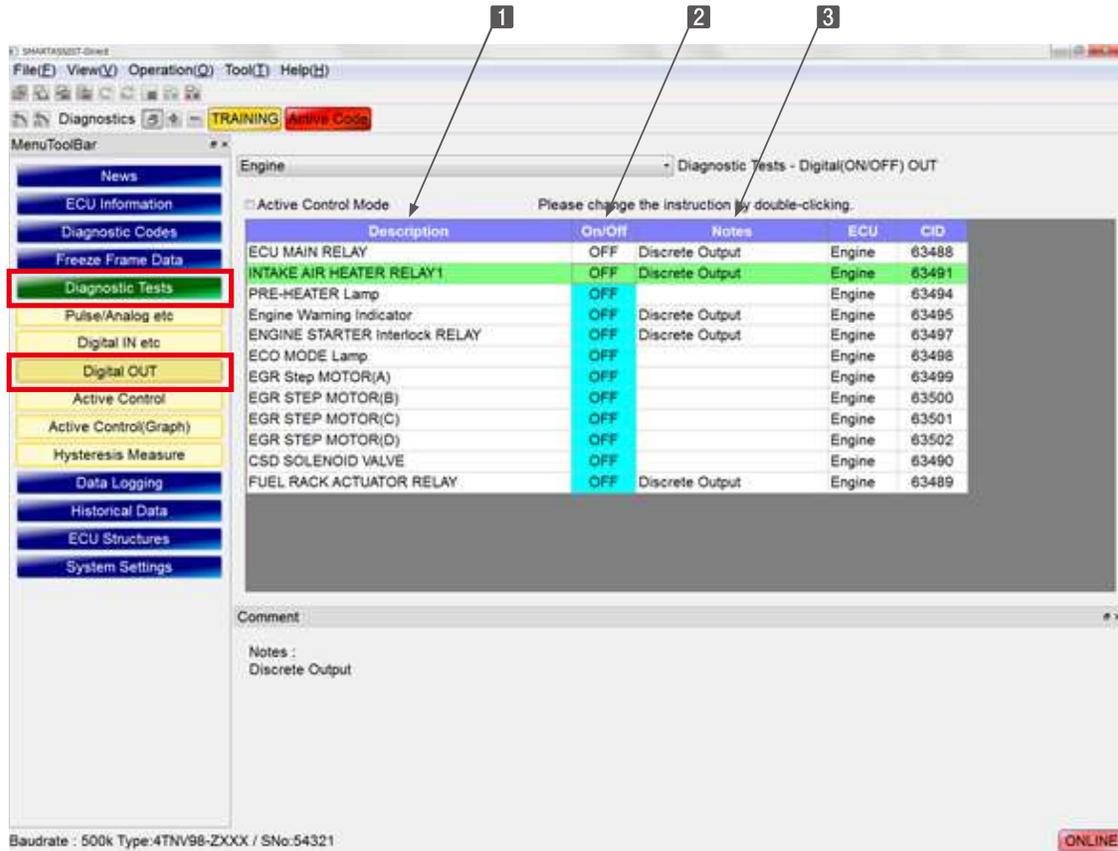
- The substitute value (pulse duty value) of the rack actuator current is on the x-axis. The substitute value (digital encode value of the voltage) of the rack position is on the y-axis. Because the rack position value is displayed together with the increased or decreased x-axis value, the hysteresis is easily identified. Generally, if the x-axis value is increased, the y-axis value changes along the bottom line; if the x-axis value is decreased, the y-axis value changes along the top line.
- The x-axis shows time (0.1 sec/point), the y-axis shows the substitute value for rack position (digital encode value of voltage) and the substitute value for the rack actuator current (pulse duty value). Any divergence between the rack position (rack) and the electric current value (duty) is easily identified.

6.5.8 Reference material: Digital OUT (Engine/2G Eco TNV series)

■ Digital OUT Screen

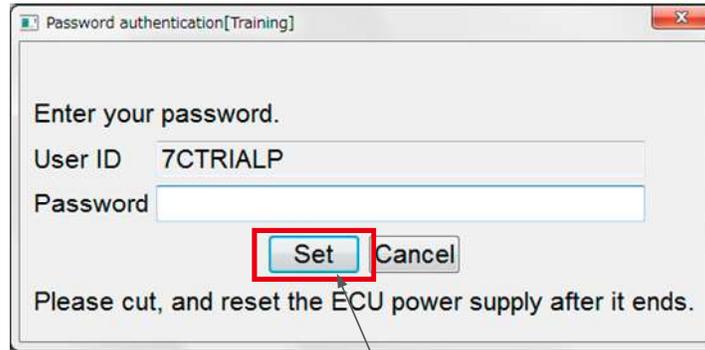
In the red box in the below menu **Diagnostic tests**, select **Digital Out** to switch to the digital out screen.

- 1 **Description** : Display the setting Items.
- 2 **On/Off** : Display the current settings.
- 3 **Notes** : Display reference information.



How to Perform Digital OUT

Click the On/Off box to the right of the desired Item. The password confirmation screen is displayed. First time only: Enter the login password and double-click the set button to toggle the output on/off.



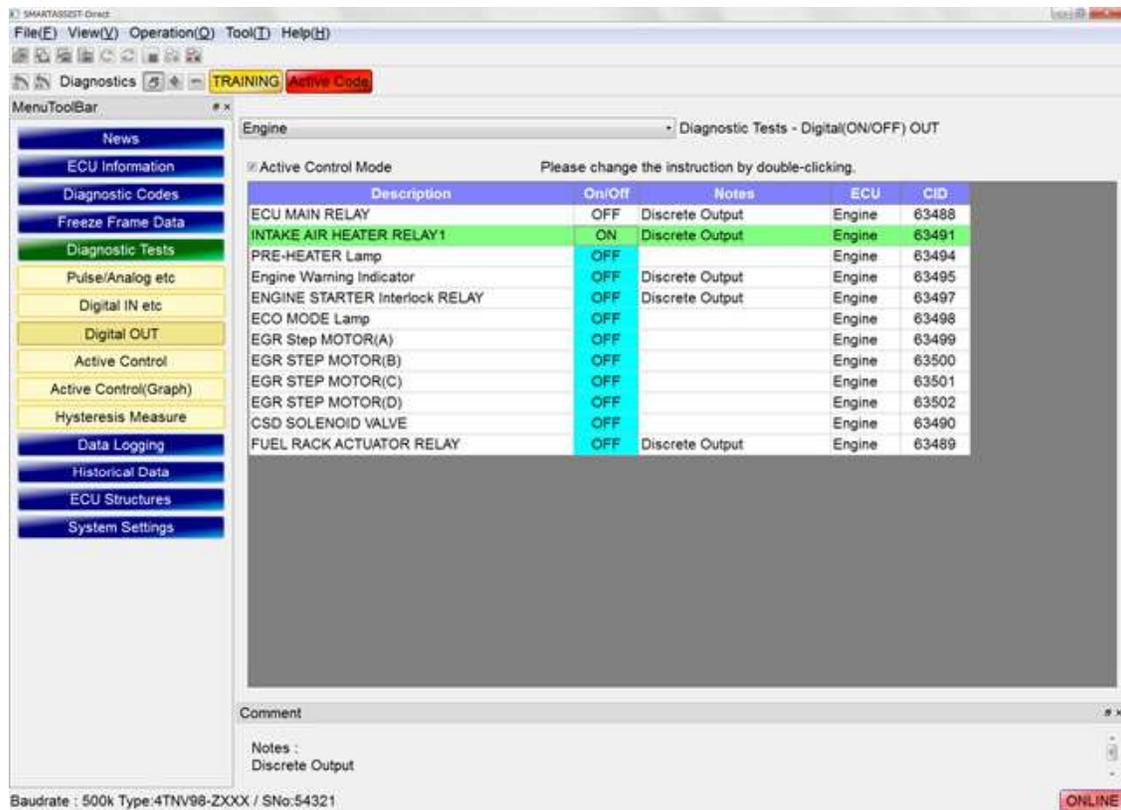
Enter your password.

User ID 7CTRIALP

Password

Please cut, and reset the ECU power supply after it ends.

Change applied

SMARTASST Direct

File(E) View(V) Operation(O) Tool(T) Help(H)

Diagnostics TRAINING Active Code

MenuToolBar

Engine Diagnostic Tests - Digital(ON/OFF) OUT

Active Control Mode Please change the instruction by double-clicking.

Description	On/Off	Notes	ECU	CID
ECU MAIN RELAY	OFF	Discrete Output	Engine	63488
INTAKE AIR HEATER RELAY1	ON	Discrete Output	Engine	63491
PRE-HEATER Lamp	OFF		Engine	63494
Engine Warning Indicator	OFF	Discrete Output	Engine	63495
ENGINE STARTER Interlock RELAY	OFF	Discrete Output	Engine	63497
ECO MODE Lamp	OFF		Engine	63498
EGR Step MOTOR(A)	OFF		Engine	63499
EGR STEP MOTOR(B)	OFF		Engine	63500
EGR STEP MOTOR(C)	OFF		Engine	63501
EGR STEP MOTOR(D)	OFF		Engine	63502
CSD SOLENOID VALVE	OFF		Engine	63490
FUEL RACK ACTUATOR RELAY	OFF	Discrete Output	Engine	63489

Comment

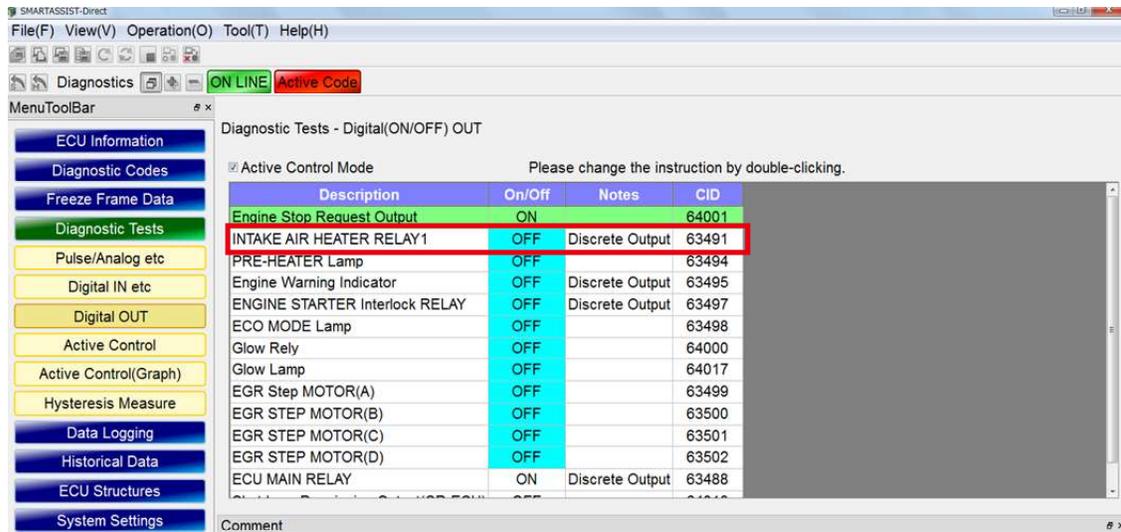
Notes :
Discrete Output

Baudrate : 500k Type:4TNV98-ZXXX / SNo:54321

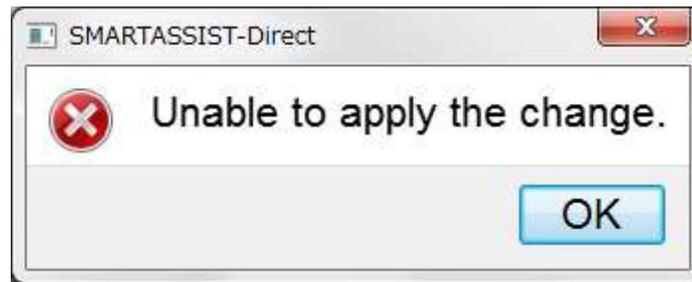
ONLINE

6. Error Diagnostic Function (ECU Access)

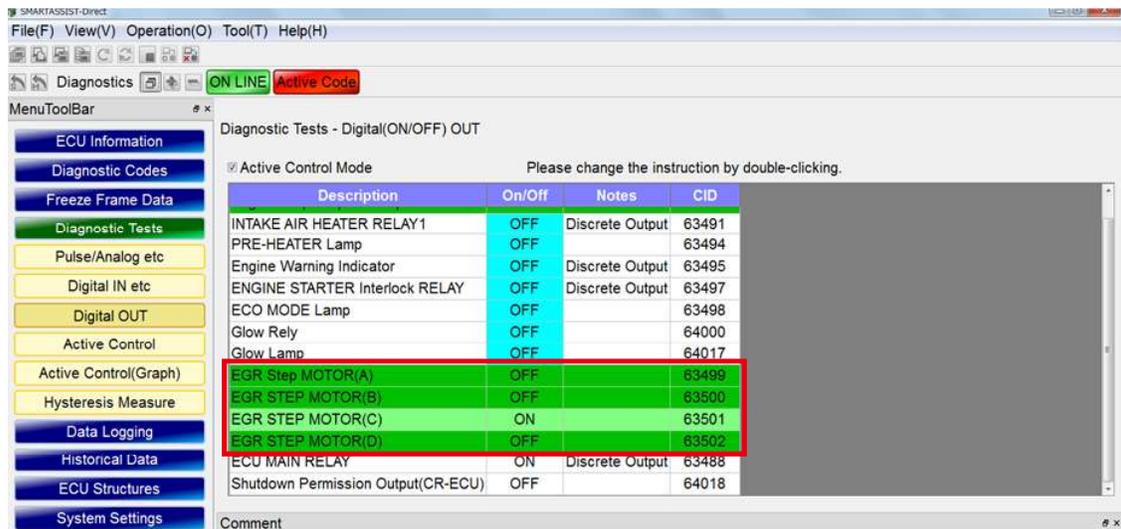
If an Item is light blue, digital out has been performed before.



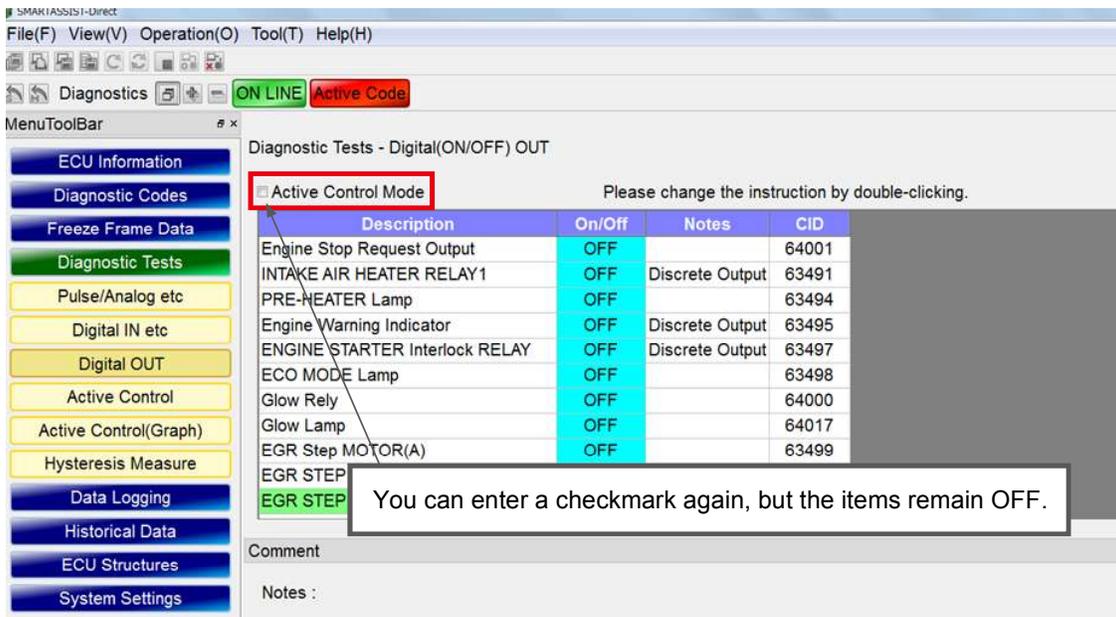
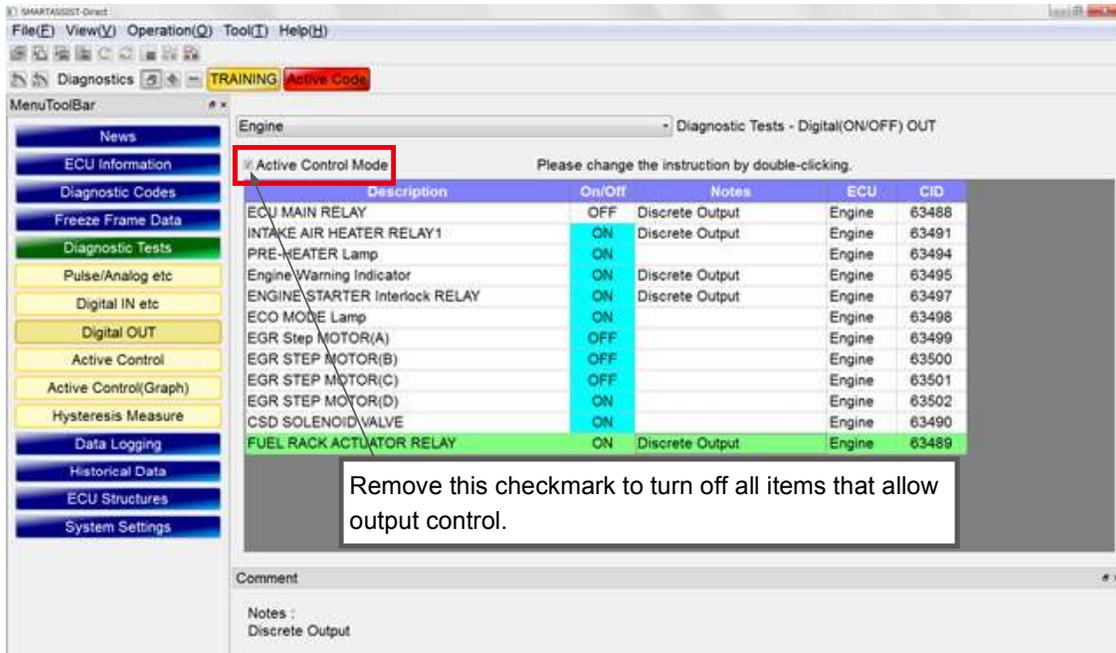
If an On/Off box is black, digital out cannot be performed on that Item.



Step motors (phase A to D) can only have one Item turned ON.



Performing digital out automatically puts a check mark into the checkbox.

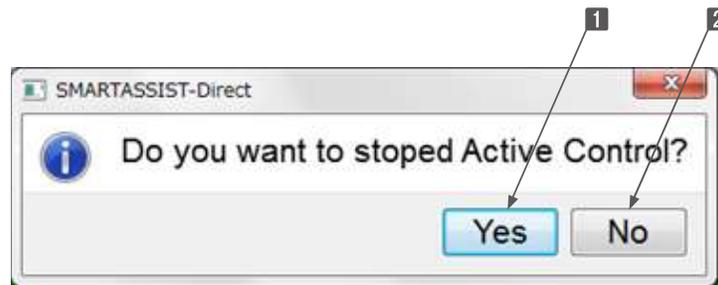


6. Error Diagnostic Function (ECU Access)

When moving to another tab, a confirmation dialog for the end of the active control is displayed.

1 : Turn all applicable output statuses to off and move to another tab.

2 : Keep all current output statuses and move to another tab.



6.5.9 Reference material: Active Control (Engine TNV series for Tier3/Tier4)

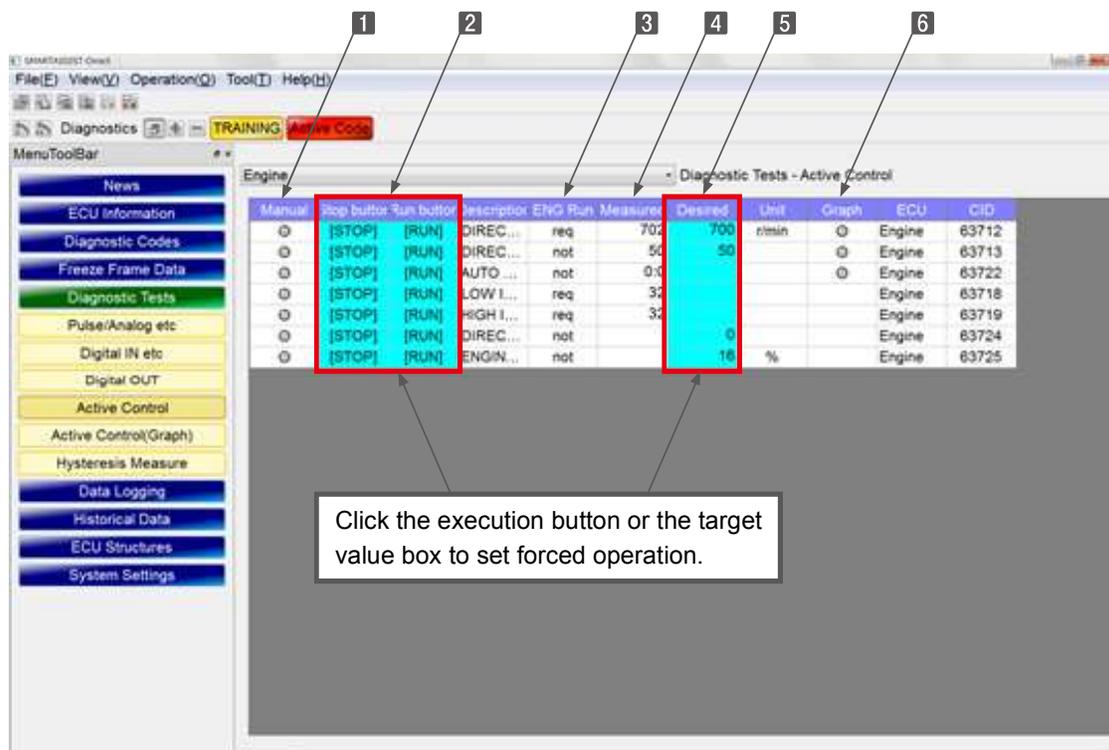
Items for active control vary by engine model.

The items for active control are shown by the engine model in the below table.

Engine model	Fuel injection system	Items for active control										
		Engine speed control	Rack position control	Rack hysteresis	EGR valve opening	Load monitor output	CR injector	Intake/Exhaust valveopening	DPF regeneration	Pump training	Aqueous urea injection	Aqueous urea tank heating valve
3/4TNV**-Z, E, A, C	Yanmar 2G eco pump	○	○	○	○	○	-	-	-	-	-	-
3TNV**F	Yanmar 2G eco pump	○	○	○	○	○	-	-	-	-	-	-
4TNV94HT-Z	Denso CR	○	-	-	○	-	○	-	-	○	-	-
4TNV94CHT	Denso CR	○	-	-	○	-	○	○	○	○	-	-
4TNV94FHT	Denso CR	○	-	-	○	-	○	○	○	○	○	○
3/4TNV**C/CT/CHT	Bosch CR	○	-	-	○	-	○	○	○	-	-	-

■ Active Control Initial Screen

- 1 : Marked with a red light during active control.
- 2 : Select Stop/Run.
- 3 : Indicates that the active control is available.
Req: Only active during engine operation
Not: Only active during engine stop
- 4 : Display the current measurement values.
- 5 : Display the control target values.
- 6 : Graph display button



* A safety is locked on the ECU side.

If the active control cannot be performed, the in-progress lamp does not turn on.

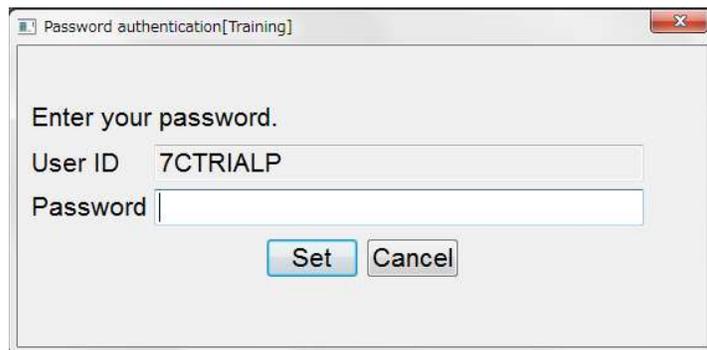
6. Error Diagnostic Function (ECU Access)

- On the "YANMAR 2G ECO Pump" engine and "4TNV94HT-Z: DENSO CR", you can check the running operating state by selecting "Pulse/Analog Input/Output", "Digital Input", "Digital Output" "Forced Operation Graph" from the diagnosis test menu during forced operation, however, on the "DENSO CR" and "Bosch CR" engines, although "Forced Operation Graph" can be selected, "Pulse/Analog Input/Output", "Digital Input", "Digital Output" cannot be selected. The following table summarizes whether or not selection is possible. Therefore, to check the various data during forced operation using "DENSO CR" or "Bosch CR" engines, it is necessary to select "Data Monitor" that corresponds to data logging. Please refer to page 98 for details about "data logging during forced operation".

Engine model	Fuel injection system	Selectable menu during forced operation			
		Pulse/Digital Input/Output	Digital Input etc.	Digital Output	Forced operation graph
3/4TNV**-Z, E, A, C	Yanmar 2G eco pump	○	○	○	○
3TNV**F	Yanmar 2G eco pump	○	○	○	○
4NTV94HT-Z	Denso CR	○	○	○	○
4TNV94CHT	Denso CR	-	-	-	○
4TNV94FHT	Denso CR	-	-	-	○
3/4TNV**C/CT/CHT	Bosch CR	-	-	-	○

■ Directive Engine Speed Control

- 1 Clicking the execution button or the target value box displays the password confirmation screen. Enter the password. (First time only):



Password authentication[Training]

Enter your password.

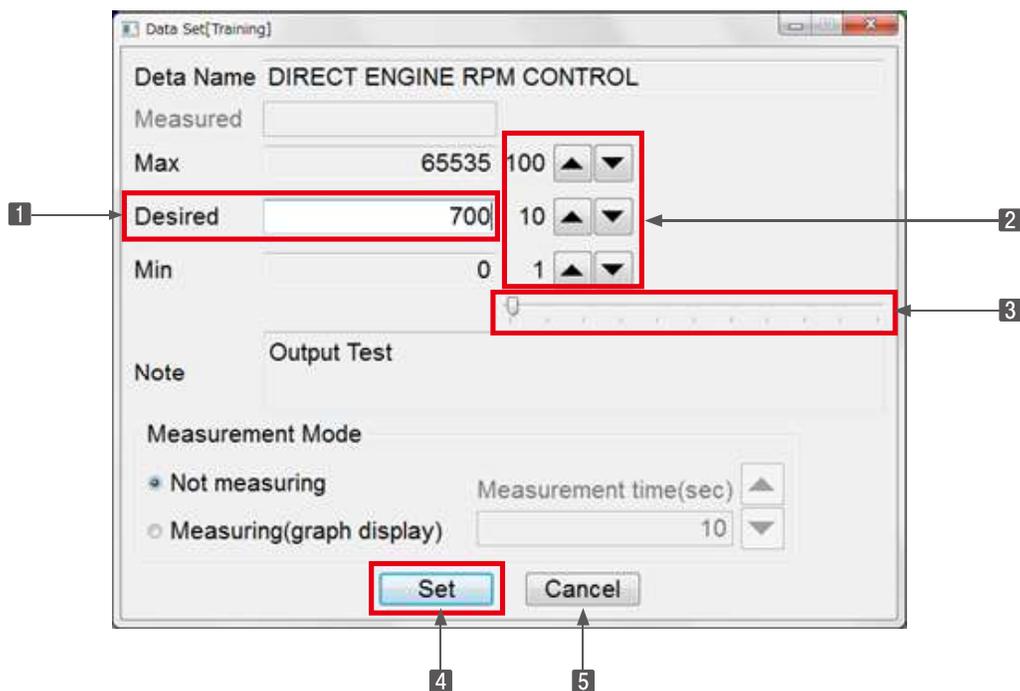
User ID 7CTRIALP

Password

Set Cancel

- 2 Select the directive value on the data setting screen.

- 1 **Desired** : Enter the desired.
- 2 ▲ / ▼ : Adjustable in increments of 1, 10, and 100.
- 3 : Adjustable by a slider.
- 4 **Set** : Confirm an entry.
- 5 **Cancel** : The manual lamp is lit, but it indicates the active control mode.



Data Set[Training]

Data Name DIRECT ENGINE RPM CONTROL

Measured

Max 65535 100 ▲ ▼

Desired 700 10 ▲ ▼ ← 2

Min 0 1 ▲ ▼

← 3

Note Output Test

Measurement Mode

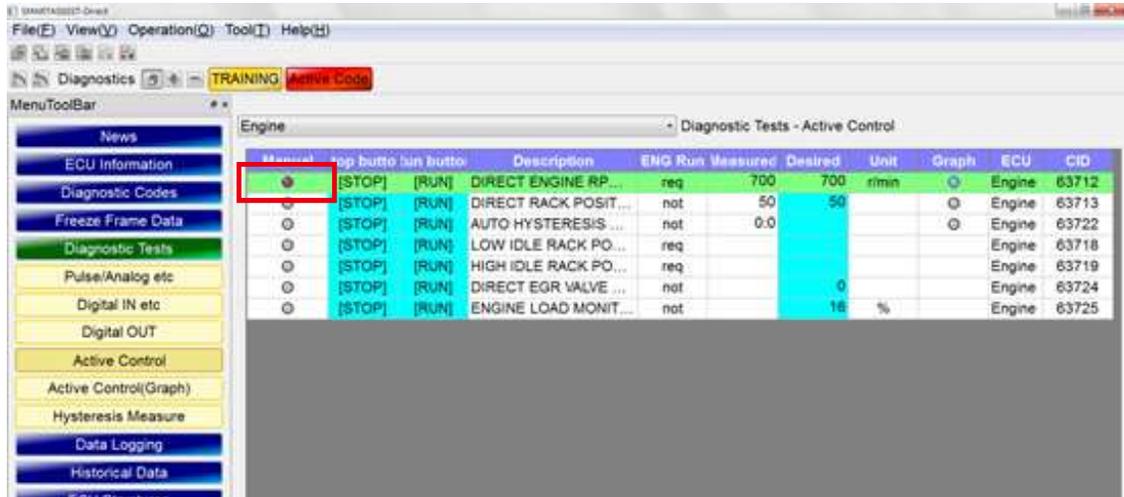
Not measuring Measurement time(sec) ▲

Measuring(graph display) 10 ▼

Set ← 4 Cancel ← 5

6. Error Diagnostic Function (ECU Access)

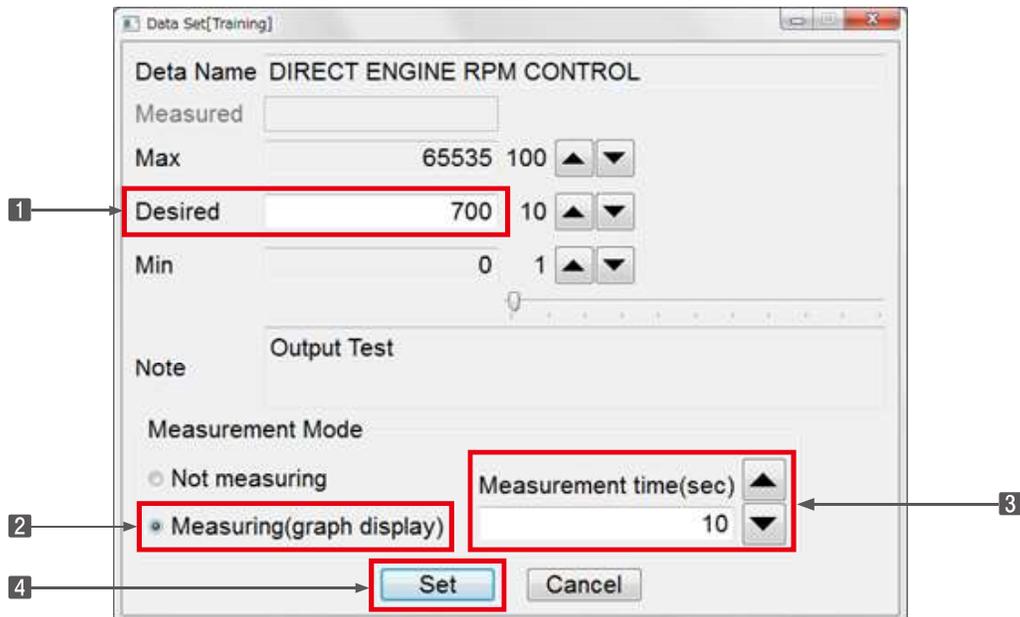
3 During active control, the manual lamp is red.



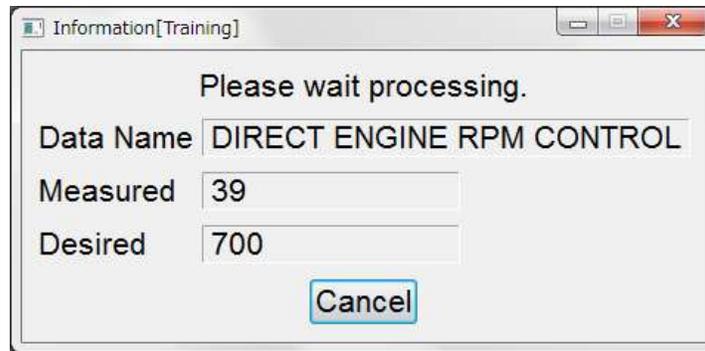
■ Directive Engine Speed Control (Measurement)

1 Select the directive value at the data selection screen. Change the measurement mode to "Change to Measuring (graph display)".

- 1 **Desired** : Enter the desired.
- 2 **Measuring** : Insert a checkmark.
- 3 **Measurement Time** : Enter the measurement time. (seconds)
- 4 **Set** : Start the measurement.

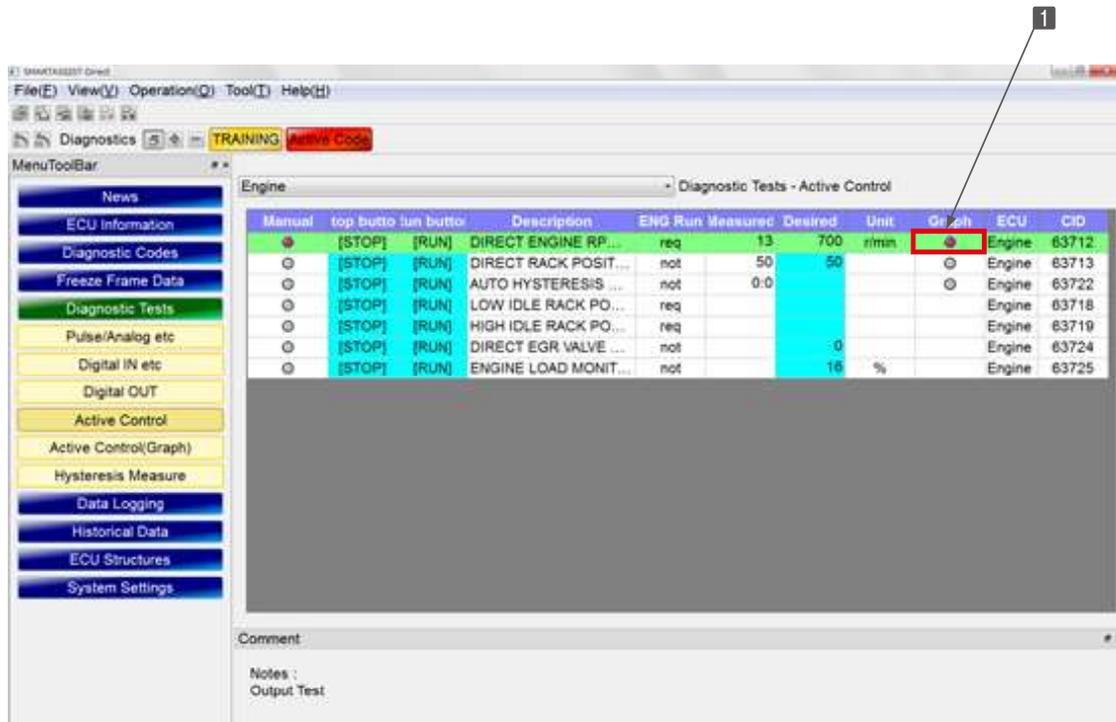


2 Wait until the measurement is finished.



3 When the measurement is finished, a graph is displayed. (Active control continues.)

1 **Graph** : Display the graph.

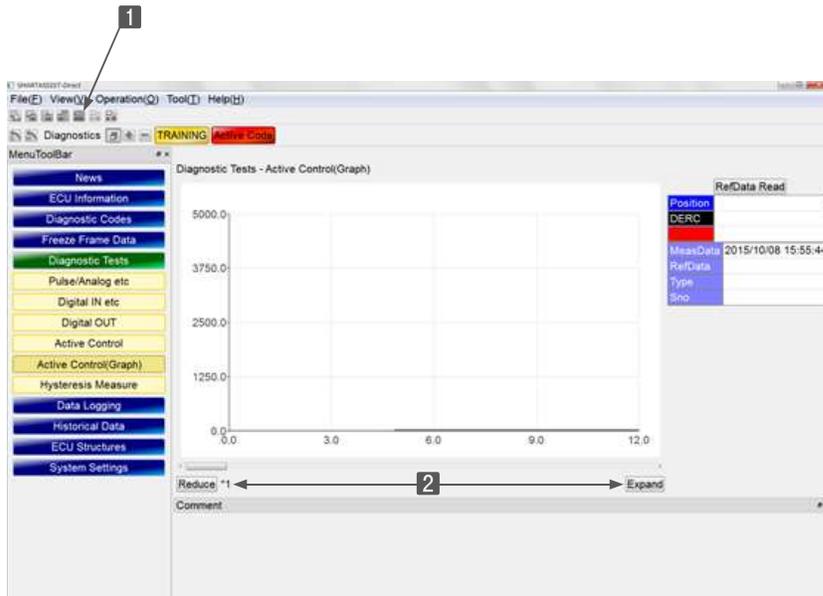


6. Error Diagnostic Function (ECU Access)

4 The measurement results are displayed in a graph.

1  : The y-axis scale is adjustable.

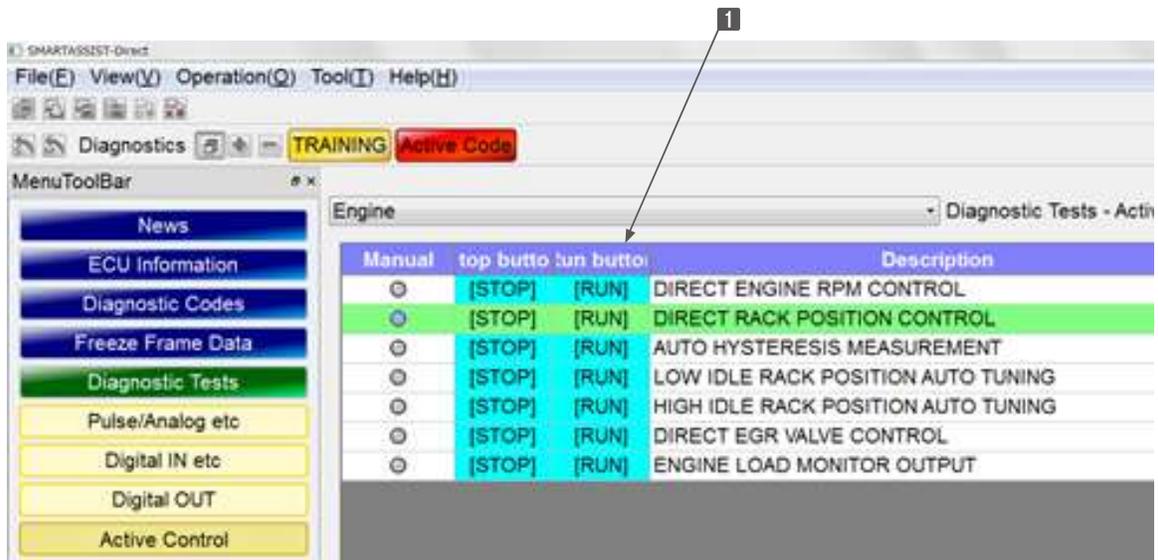
2 **Reduce** / **Expand** : The x-axis scale is adjustable in 6 steps.



■ Specified Rack Position Control

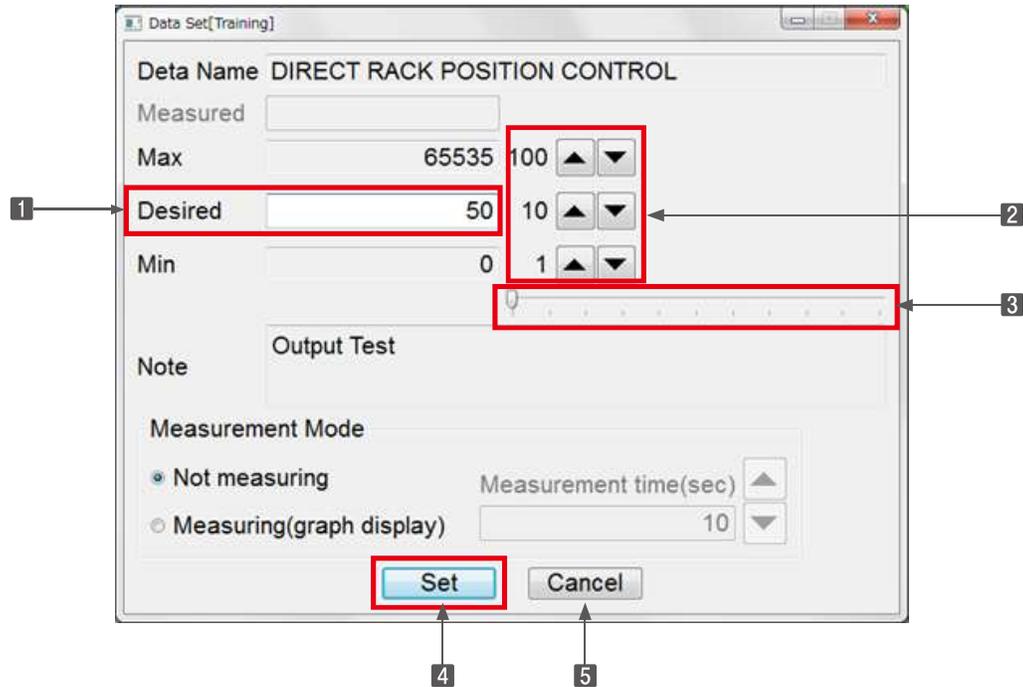
1 Clicking the execution button or the target value box opens the data setting screen.

1 **Run button** : Display the setting screen.

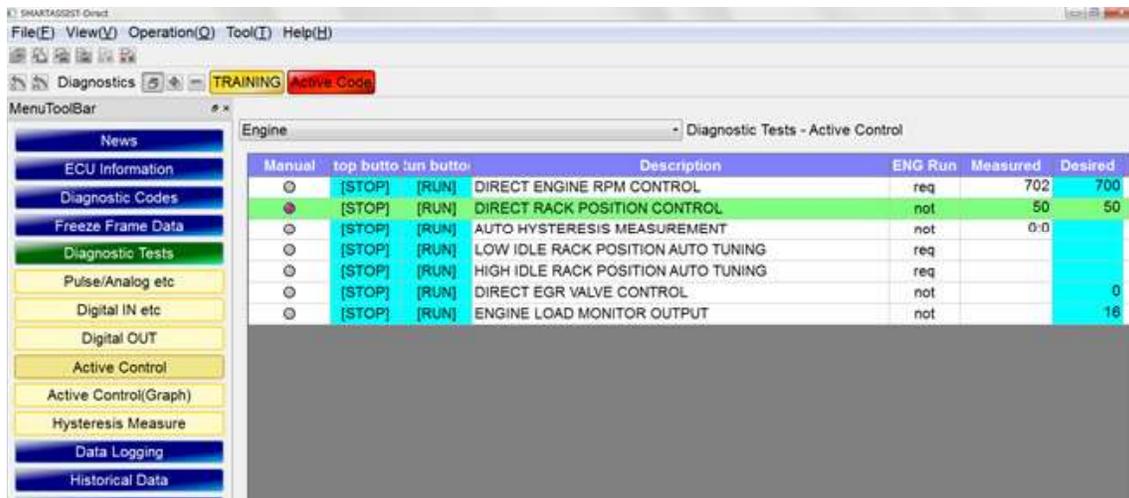


2 Select the directive value on the data setting screen.

- 1 **Desired** : Enter the desired.
- 2 ▲ / ▼ : Adjustable in increments of 1, 10, and 100.
- 3 —|— : Adjustable by a slider.
- 4 **Set** : Confirm an entry.
- 5 **Cancel** : The manual lamp is lit, but it indicates Active control mode.



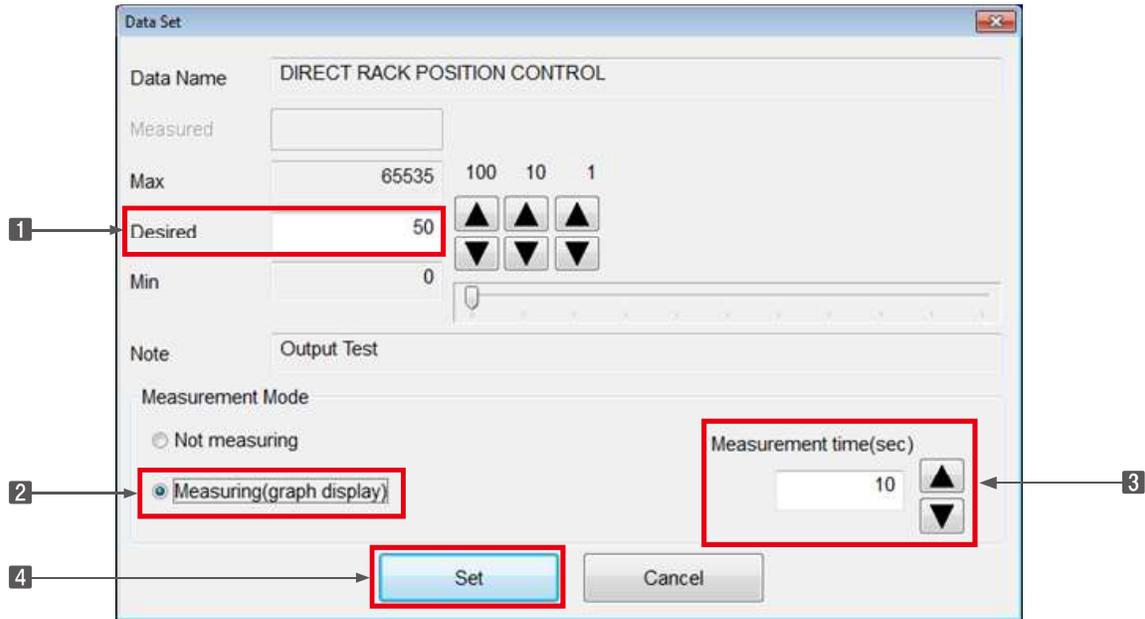
3 During active control, the manual lamp is red.



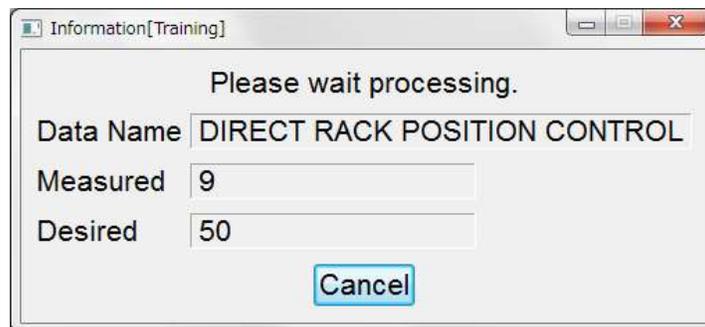
■ Specified Rack Position Control (Measurement)

1 Select the directive value on the data setting screen. Change the measurement mode to "Change to Measuring (graph display)".

- 1 **Desired** : Enter the desired.
- 2 **Measuring** : Insert a checkmark.
- 3 **Measurement Time** : Enter the measurement time. (seconds)
- 4 **Set** : Start the measurement.

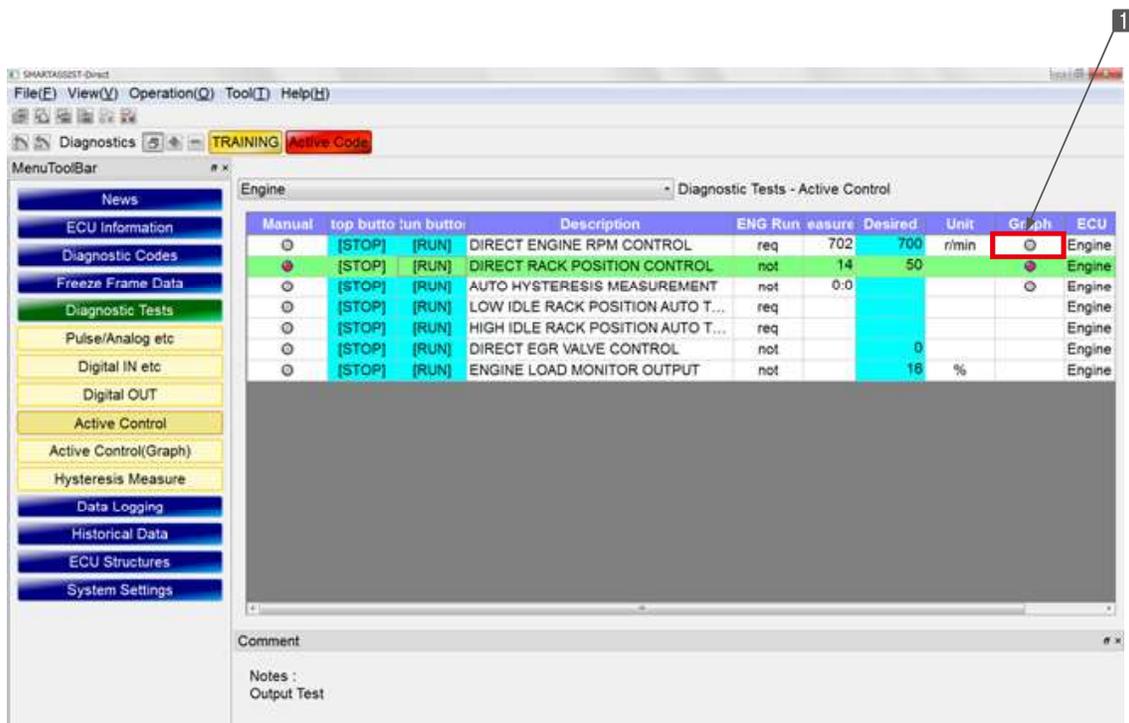


2 Wait until the measurement is finished.



3 When the measurement is finished, a graph is displayed. (Active control continues.)

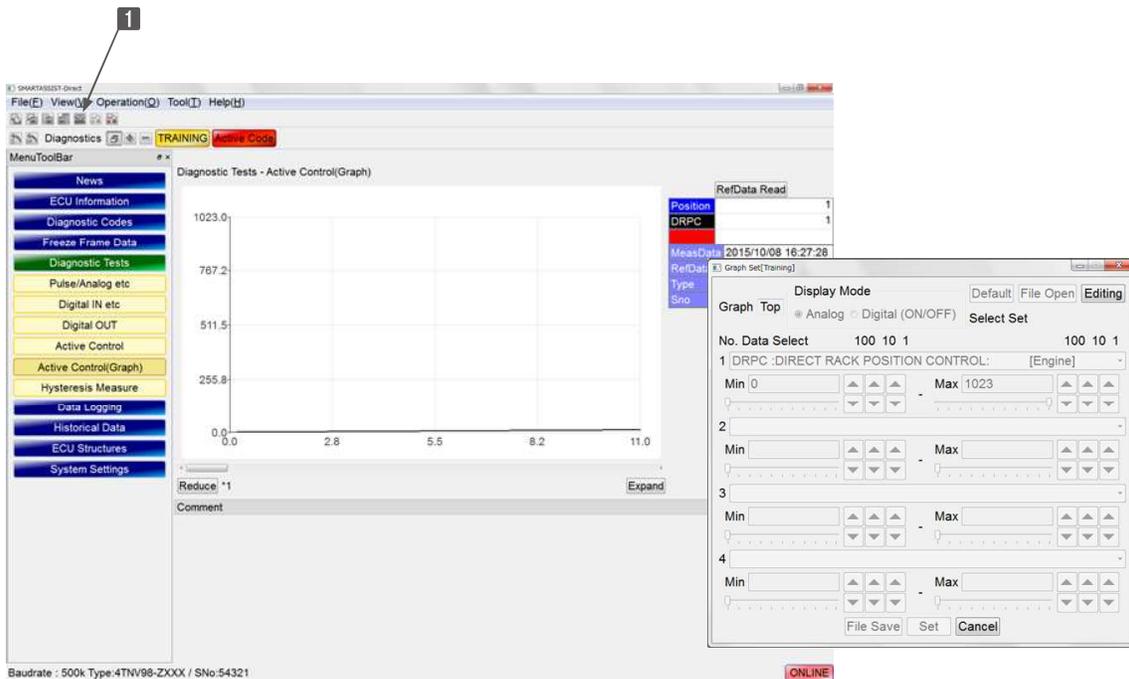
1 **Graph** : Display the graph.



4 The measurement results are displayed in a graph.

1 : The y-axis scale is adjustable.

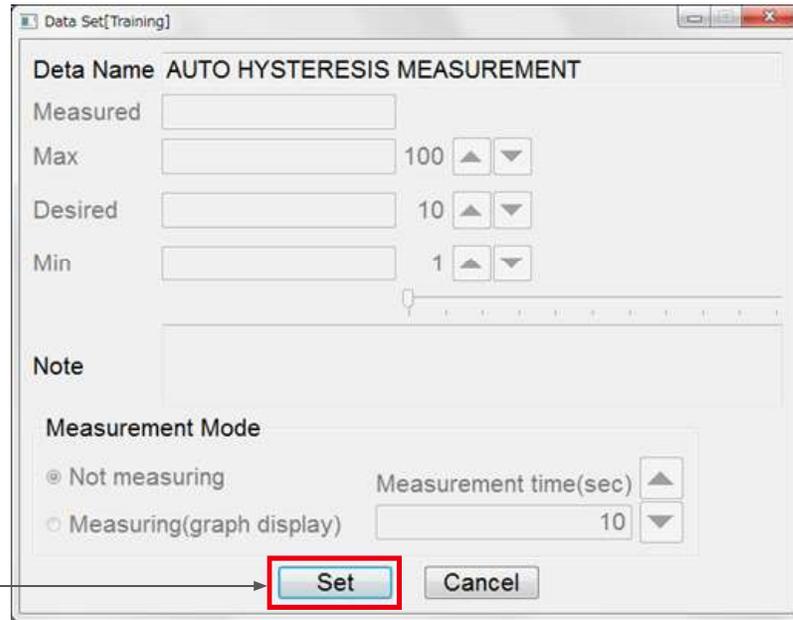
2 **Reduce** / **Expand** : The x-axis scale is adjustable in 6 steps.



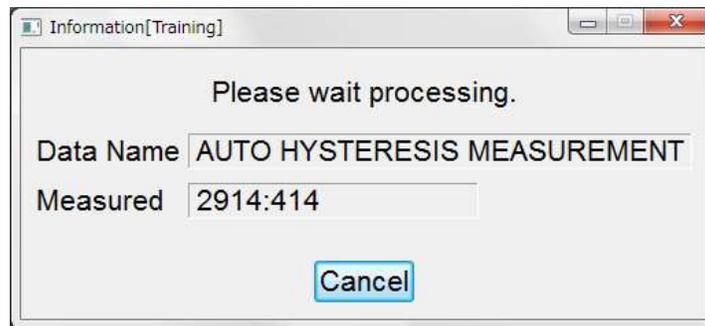
■ Automatic Hysteresis Measurement

1 Measure the hysteresis of the rack actuator.

1 **Set** : Start the measurement.

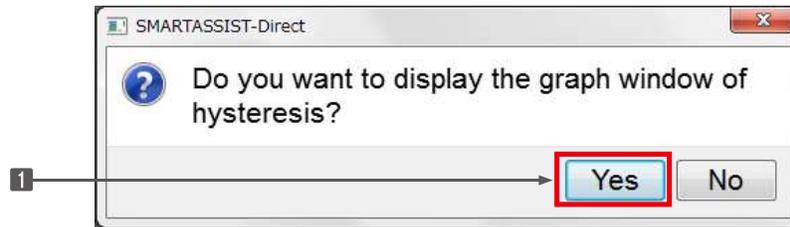


2 Wait until the measurement is finished.



3 Switch to the hysteresis Measure.

1 **Yes** : Display the measurement graph.



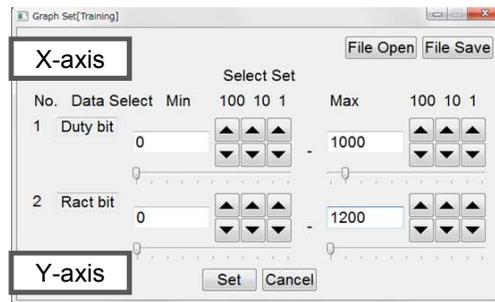
4 The X-Y display mode compares measurement discrepancies between the forward and reverse measurement, and its wrap-around is at the right end of the graph.

1 : The x- and y-axis scale are adjustable.

2 **Reduce** / **Expand** : The y-axis scale is adjustable in 6 steps.

3 **Reduce** / **Expand** : The x-axis scale is adjustable in 6 steps.

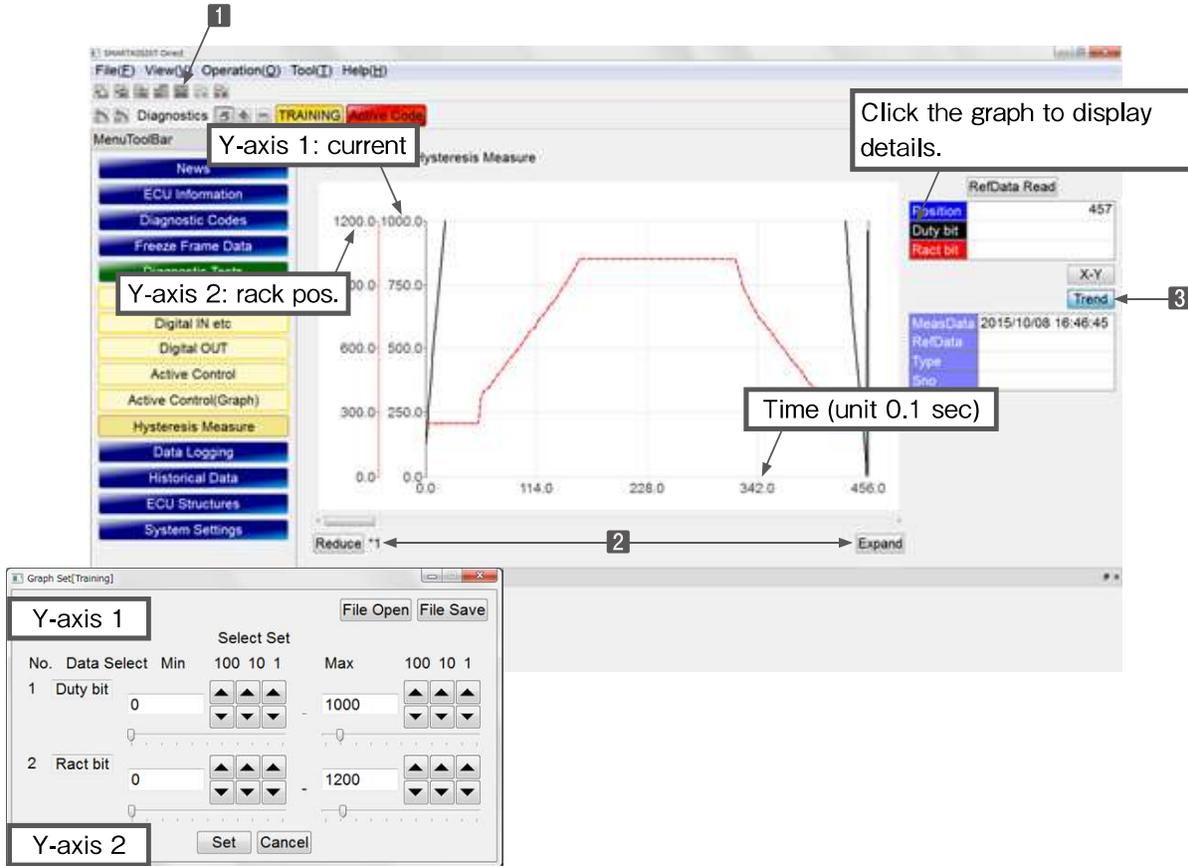
4 **X-Y** : Display the X-Y display mode.



6. Error Diagnostic Function (ECU Access)

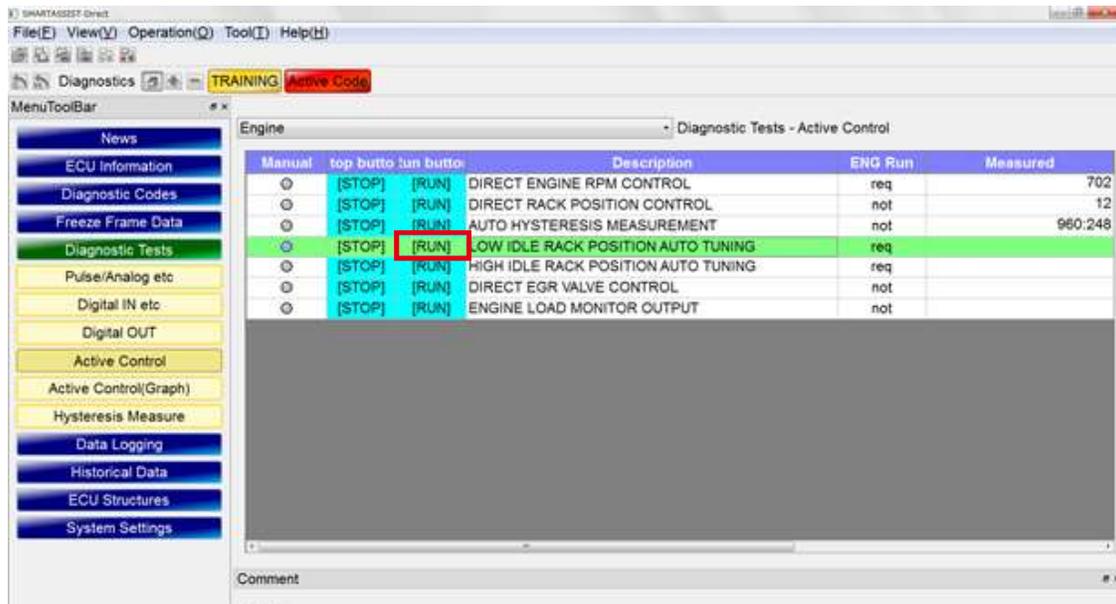
5 The trend display mode compares the directive value (black) and the measurement value (red), and displays a time line.

- 1  : The y-axis scale is adjustable.
- 2 **Reduce** / **Expand** : The x-axis scale is adjustable in 6 steps.
- 3 **Trend** : Display the trend display mode.

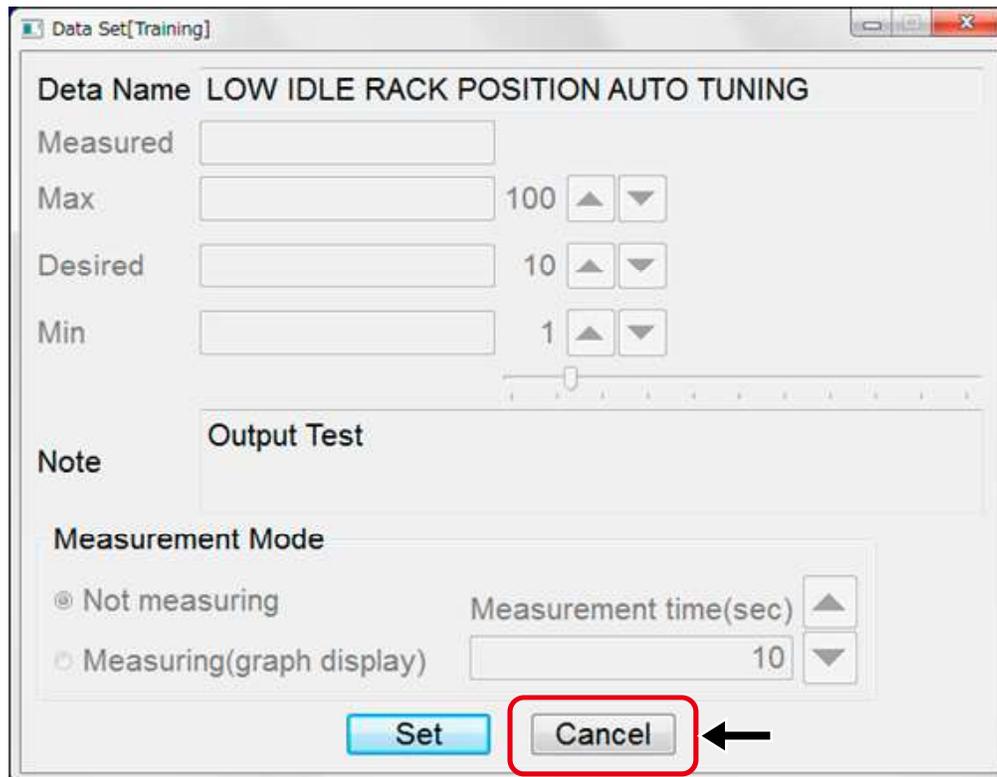


■ Automatic Correction of the Idle Rack Position (L-idle, H-idle)

This function is limited to developers.



When trying to execute it, the below error message is displayed.



■ EGR Valve Opening Control

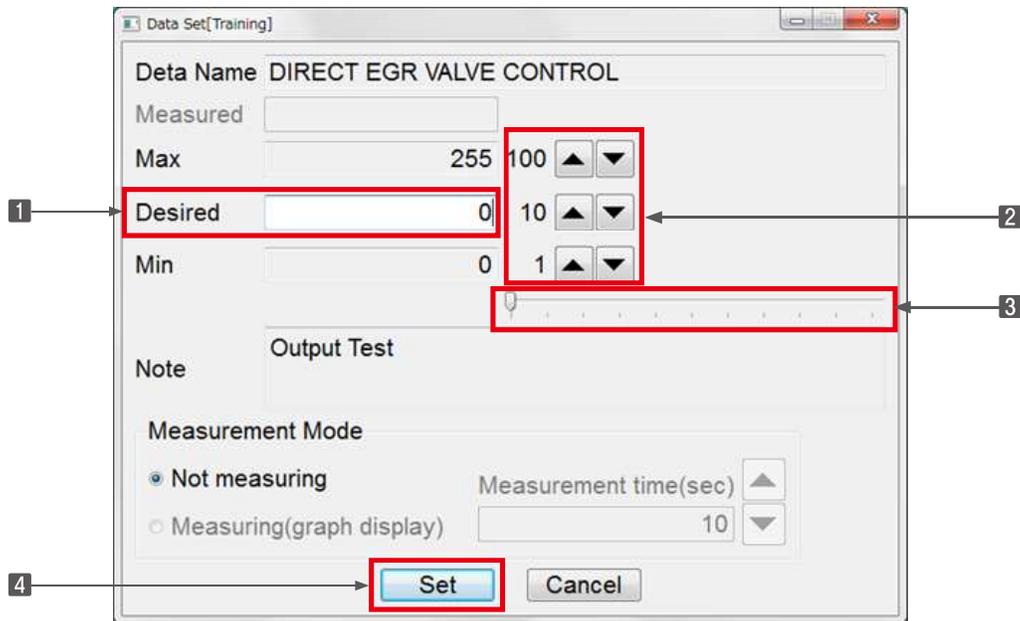
1 Select the directive value on the data setting screen.

- 1 **Desired** : Enter the desired.
- 2 ▲/▼ : Adjustable in increments of 1, 10, and 100.
- 3 —|— : Adjustable by a slider.

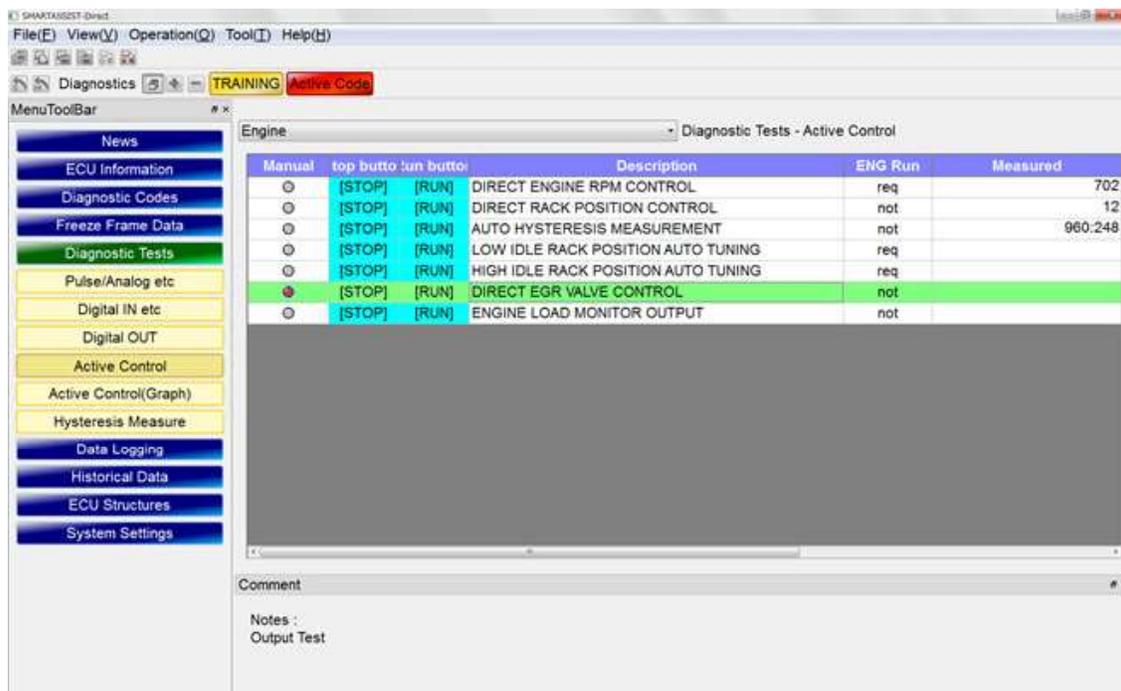
* The directive value must be between 0 and 255. (Entry range is 0 - 54)

* If a value higher than the specified entry value (max. 54) is set, the value on the screen may be greater than 54, but the actual effective value is limited to 54.

4 **Set** : Confirm the entry.



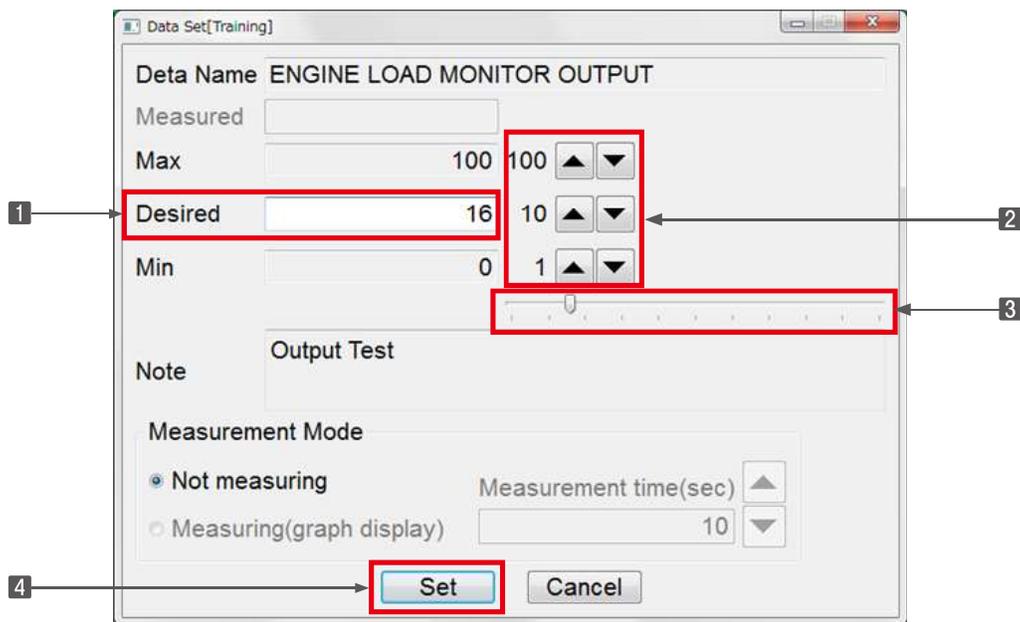
2 Active control starts, and the manual lamp lights in red.



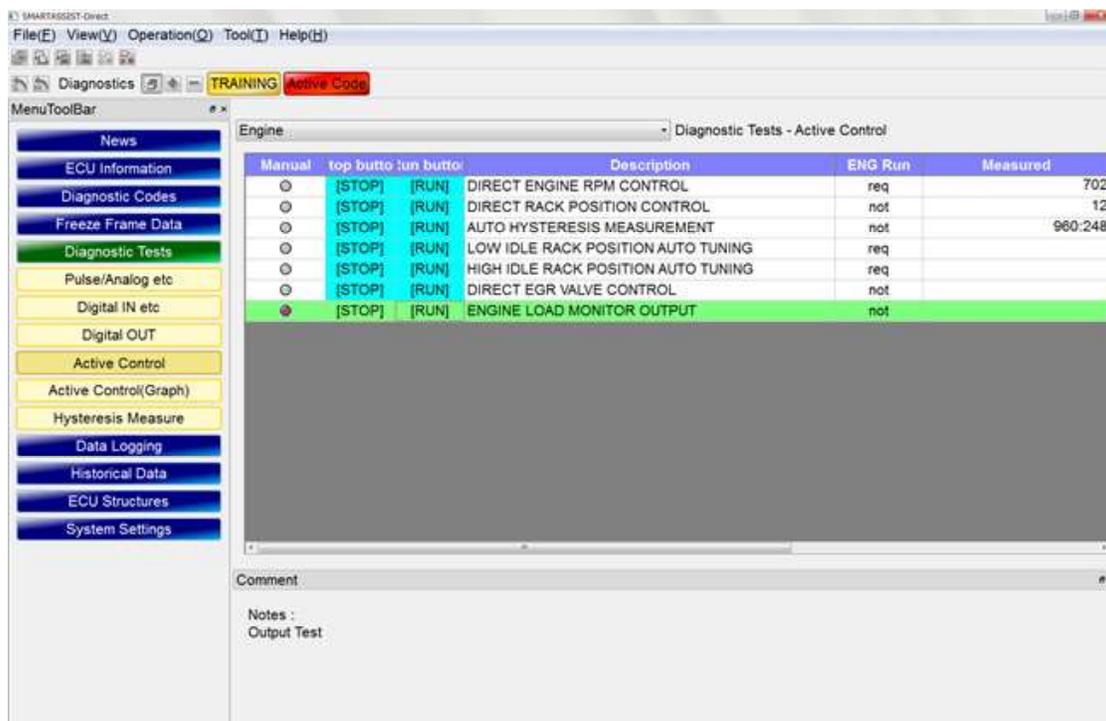
■ Engine Load Monitor Output

1 Select the directive value on the data set screen.

- 1 **Desired** : Enter the desired.
- 2 ▲/▼ : Adjustable in increments of 1, 10, and 100.
- 3 —|— : Adjustable by a slider.
- 4 **Set** : Confirm the entry.



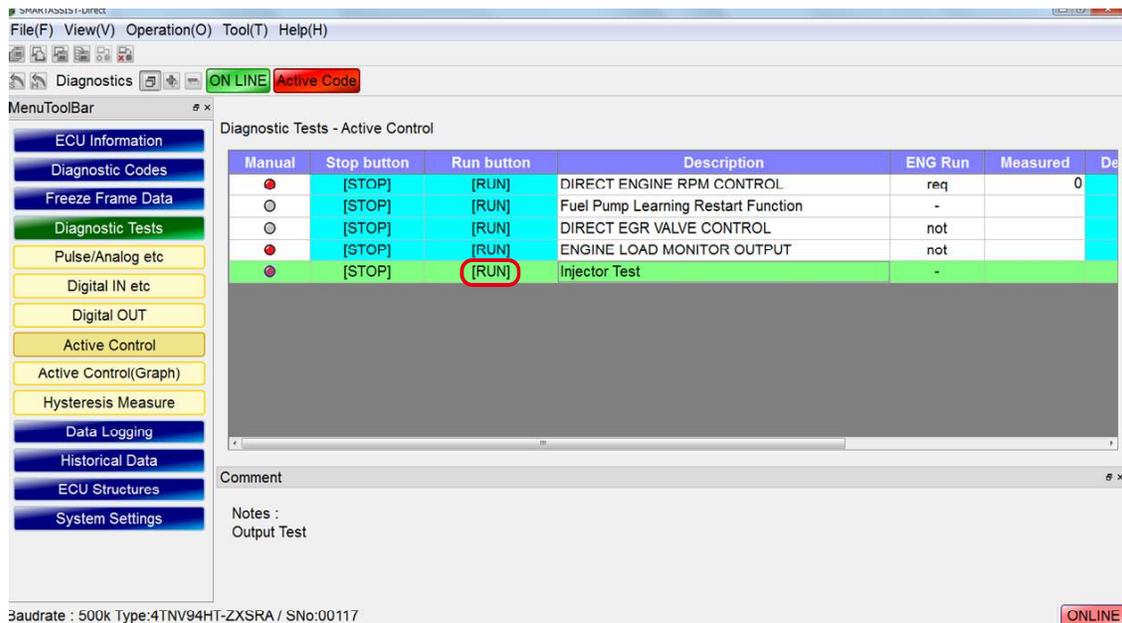
2 Active control starts, and the manual lamp lights in red.



6. Error Diagnostic Function (ECU Access)

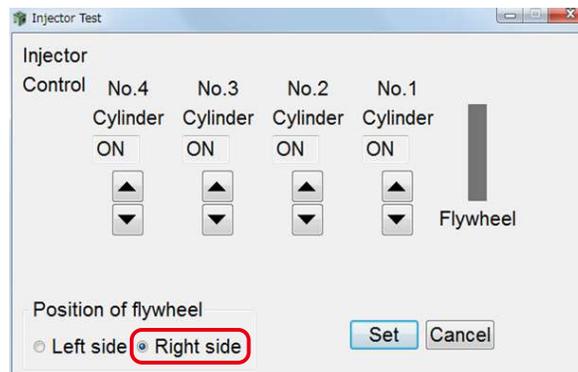
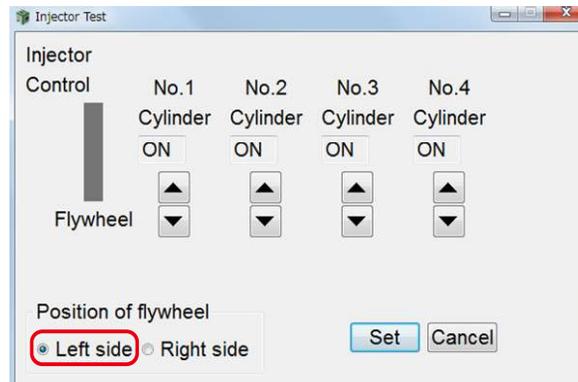
■ Injector Test

Fuel injection is turned on and off by each cylinder.



Screen display is changed by selecting the flywheel position.

Matching the installed settings and the screen display prevents mis-numbering of cylinders.

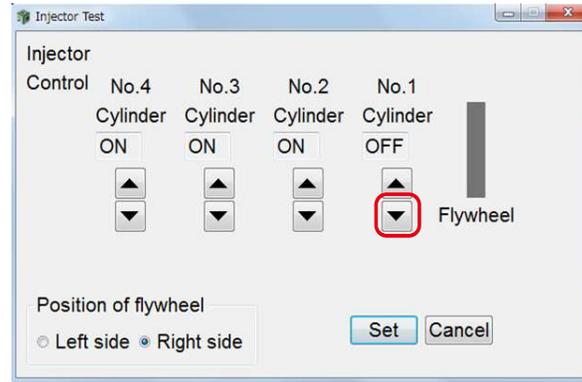


6. Error Diagnostic Function (ECU Access)

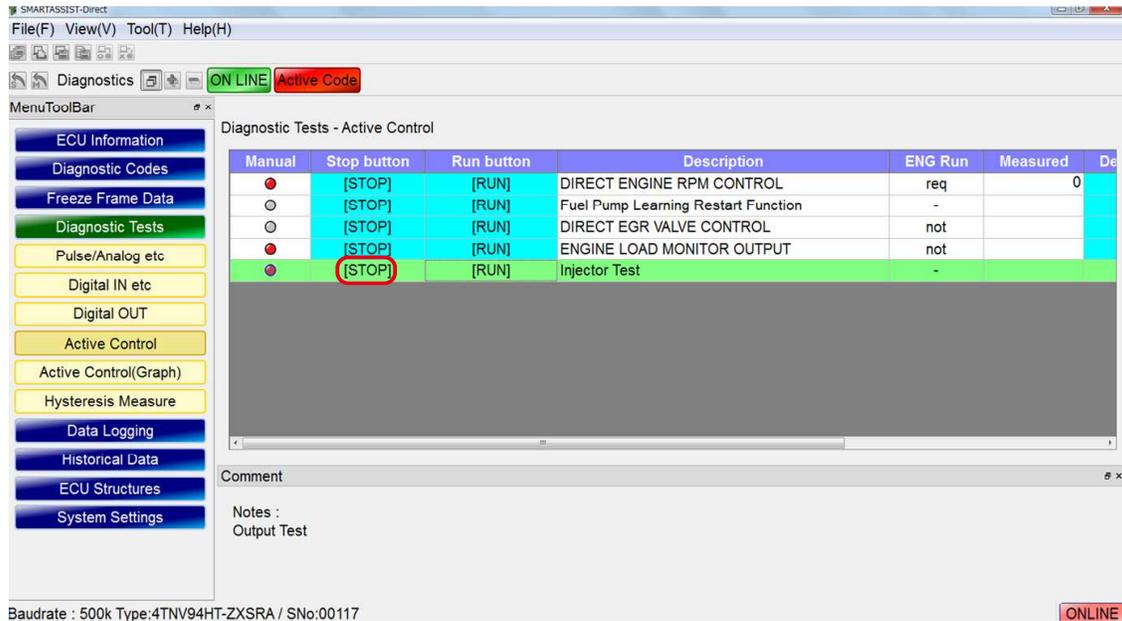
When ▼ is selected, the injection is stopped (OFF). When ▲ is selected, the fuel injects (ON).

Click "Set", then ON/OFF setting is confirmed.

* If more than 2 cylinders are set to "OFF", the engine may stop.



Click "STOP" to move to another screen.

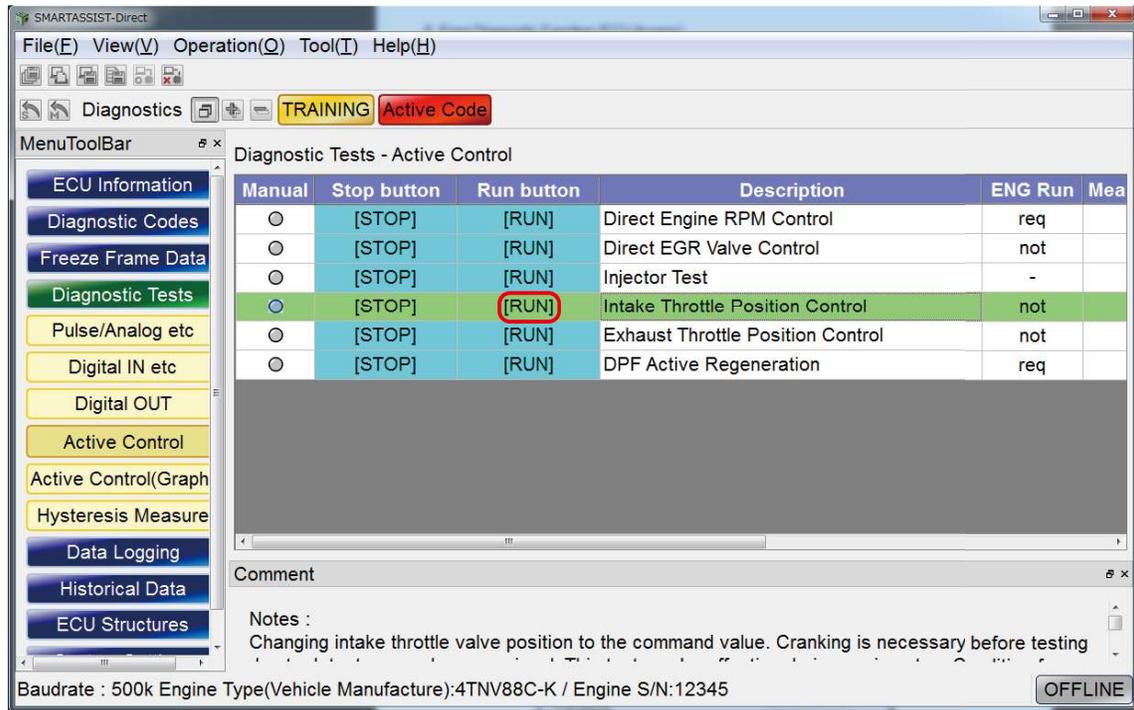


6. Error Diagnostic Function (ECU Access)

■ Intake Throttle Position Control

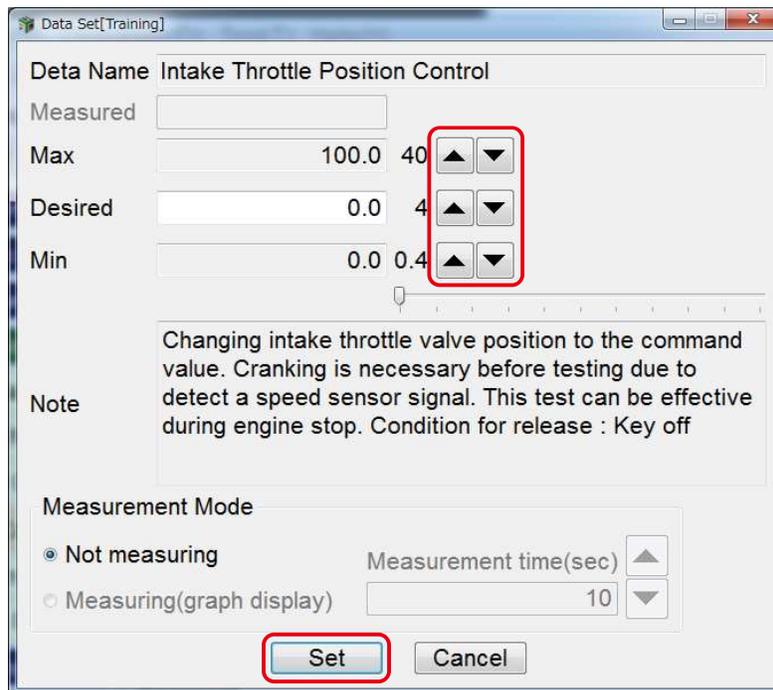
You can set the desired position of the intake throttle valve.

This is valid only when the engine is stopped.



Adjust the directive value with the ▼ / ▲. The minimum value is 0.4.

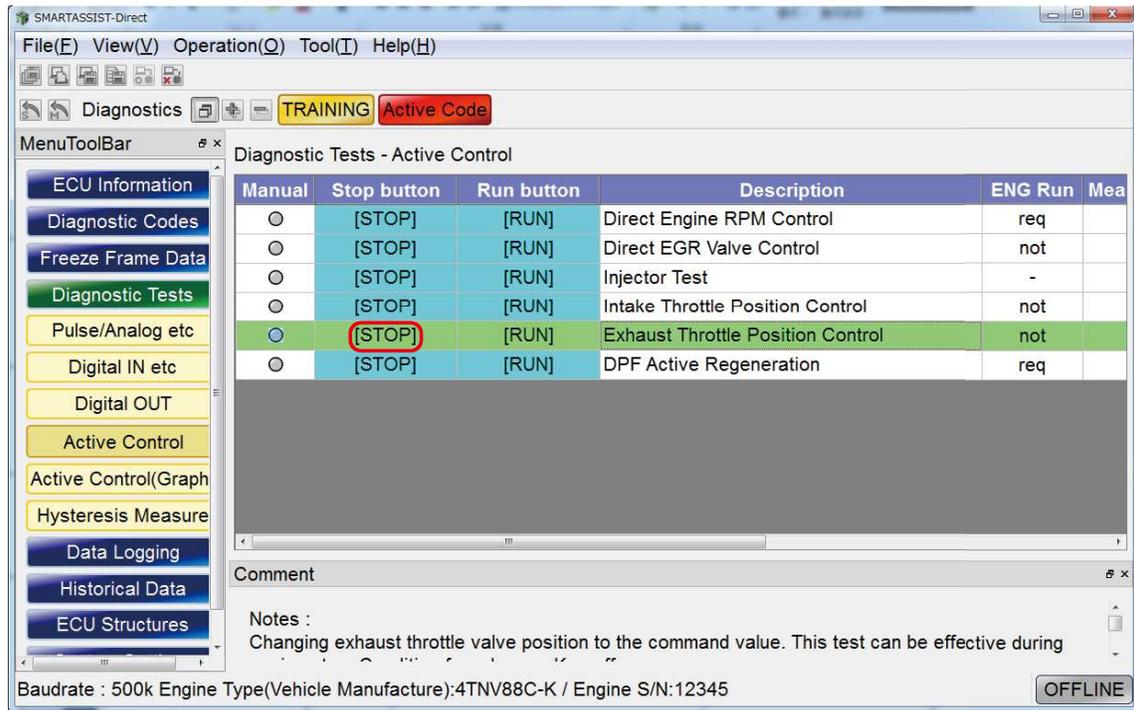
Click "Set", then the directive value setting is confirmed.



■ Exhaust Throttle Position Control

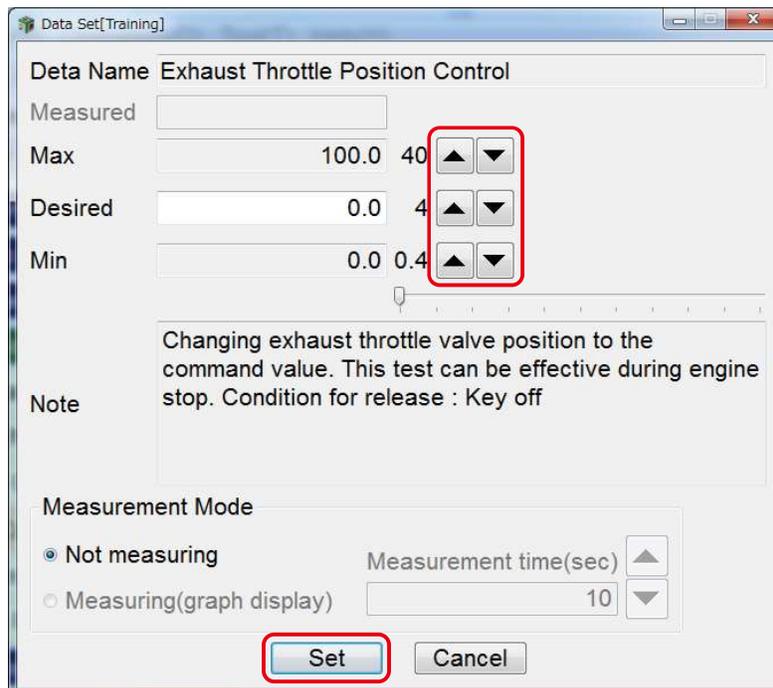
You can set the desired position of the intake throttle valve.

This is valid only when the engine is stopped.



Adjust the directive value with the ▼ / ▲. The minimum value is 0.4.

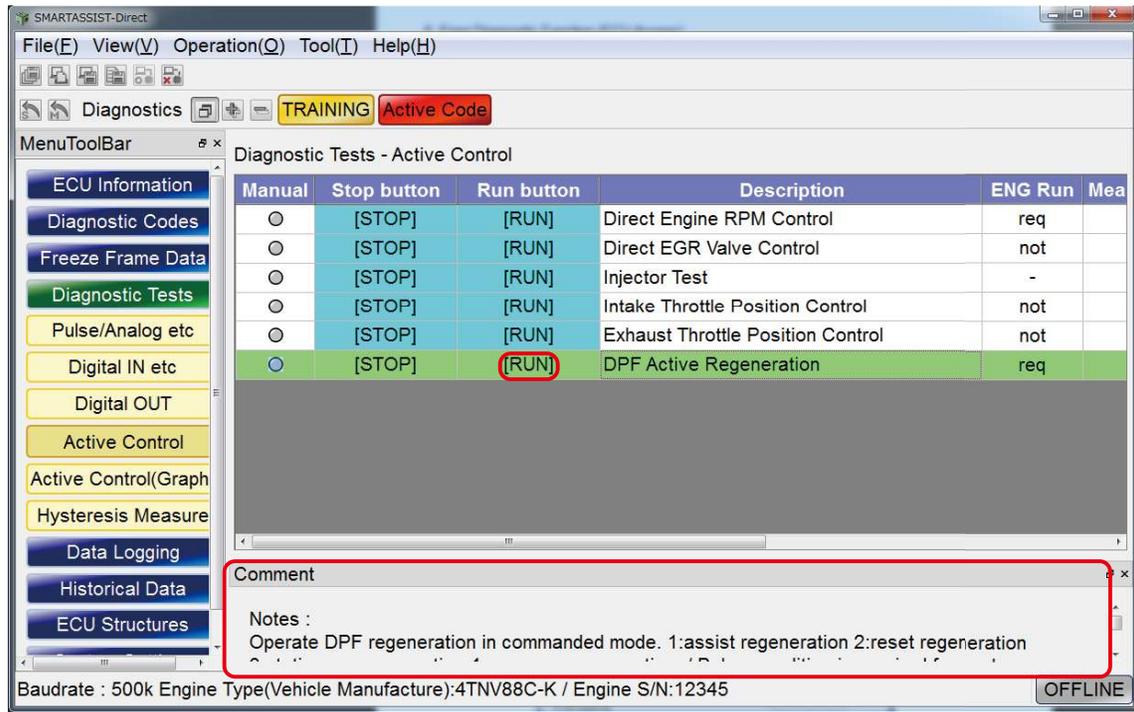
Click "Set", then the directive value setting is confirmed.



■DPF Active Regeneration

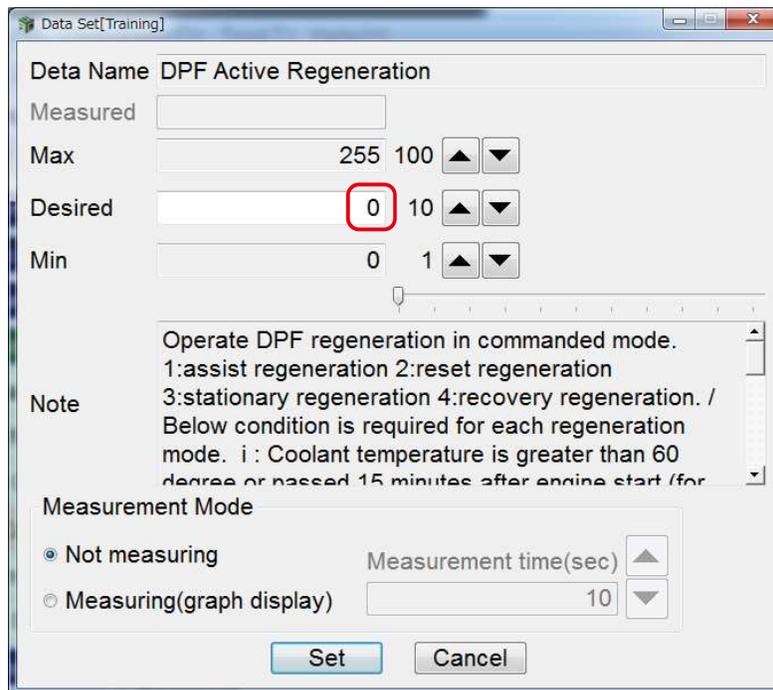
Perform the DPF regeneration.

In order to perform the DPF regeneration, the conditions mentioned in the "Notes" below should be satisfied.



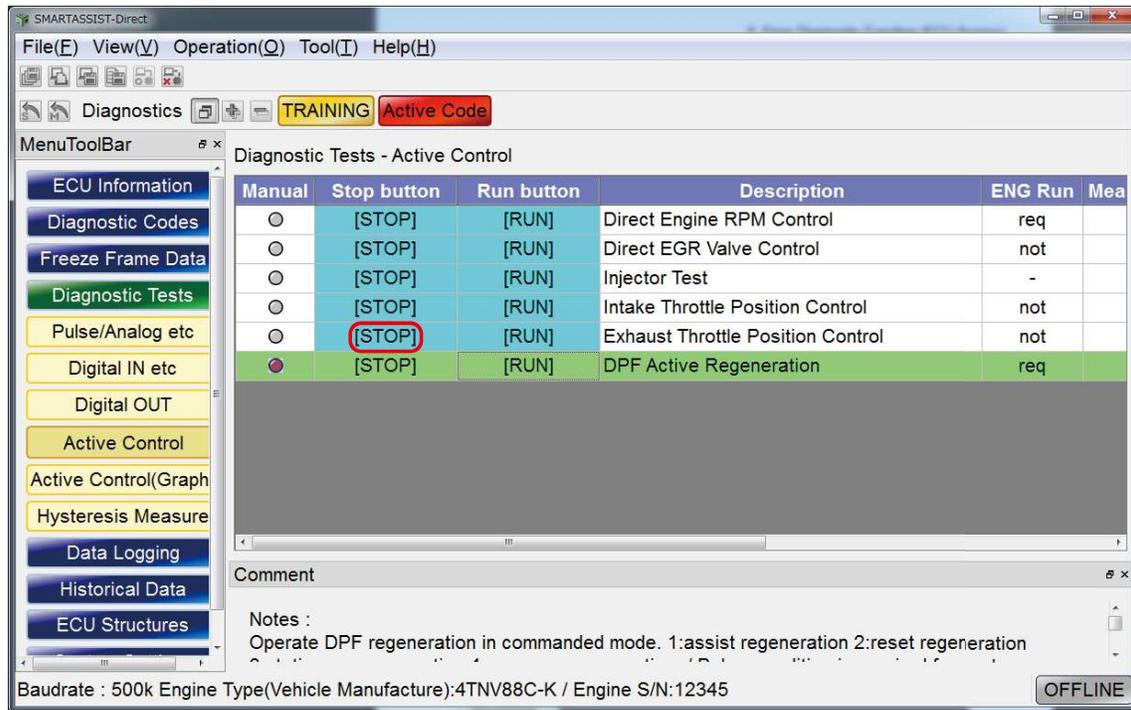
Set the command mode to the action you wish to perform.

1. Assist regeneration, 2. Reset regeneration, 3. Stationary regeneration, 4. Recovery regeneration



Regeneration is completed automatically or click "STOP" to stop the regeneration manually.

When the regeneration process is stopped before completion, the active regeneration may not be completed successfully.

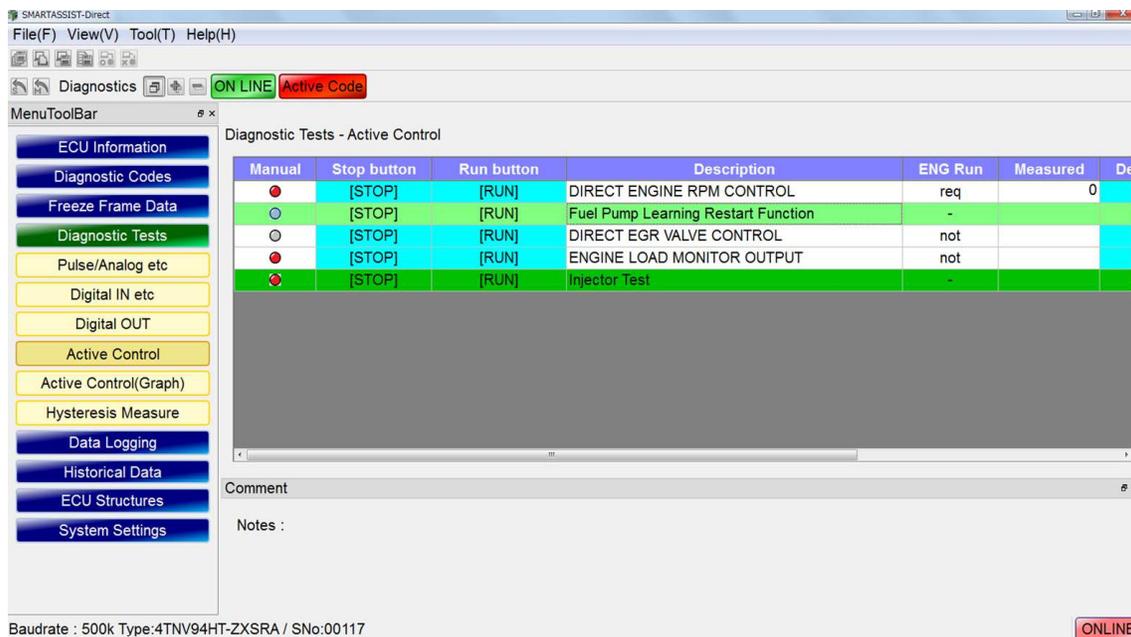


Fuel Pump Learning

When replacing the supply pump using the DENSO CR System, it is necessary to perform fuel pump learning using forced operation after replacement.

Also, when replacing the ECU for CR for the 4TNV94HT-Z engine type or when replacing the ECU for CR with the management ECU at the same time, fuel pump learning after replacement is necessary.

In order to perform the above, the conditions mentioned in the "Notes" below must be satisfied.



After completing training, check the value displayed in the measurement value field and if other than "2", check the training parameters, and perform training again.

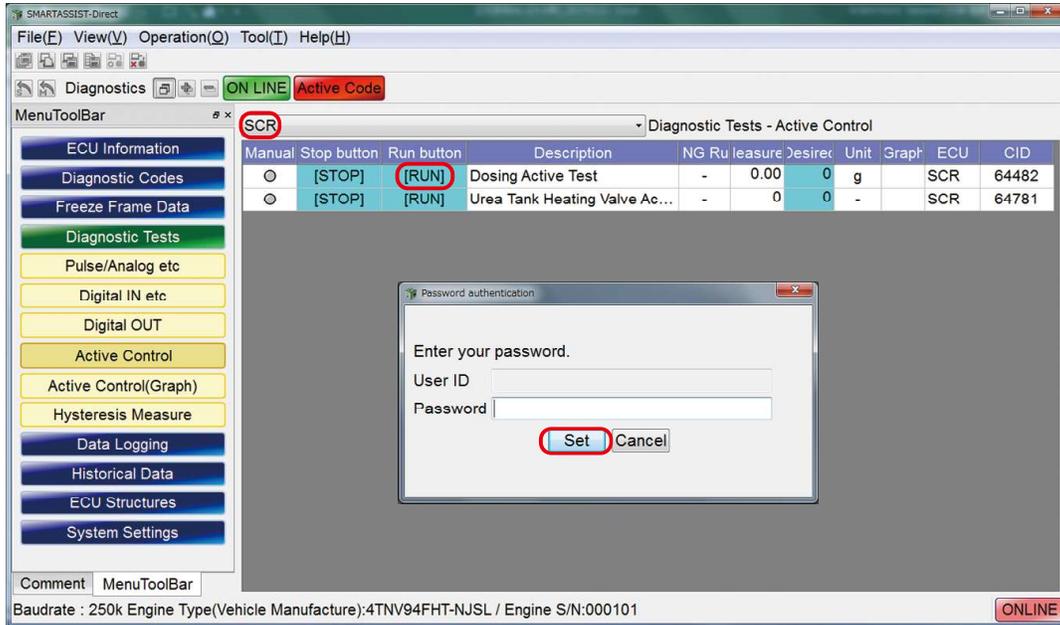
6. Error Diagnostic Function (ECU Access)

■Aqueous Urea Injection Test (4TNV94FHT)

4TNV94FHT which equips SCR with FT4 can perform aqueous urea injection test.

Change ECU type to "SCR" from forced operation screen.

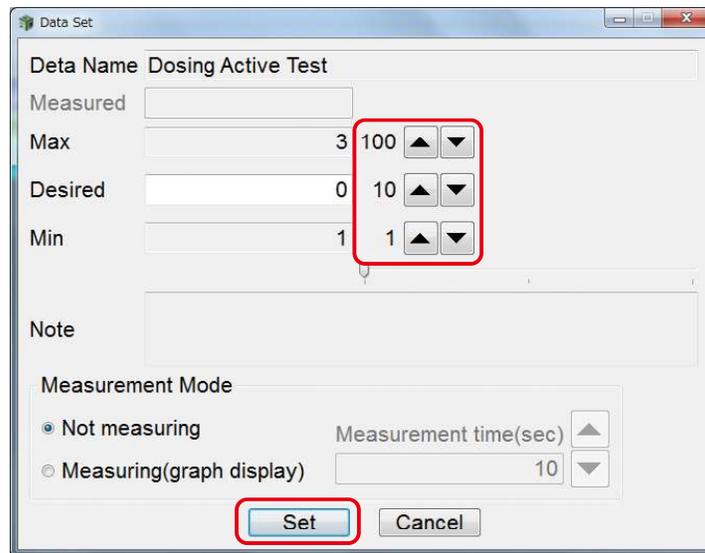
Select Aqueous Urea injection test then click [RUN]. Password authentication screen is displayed.



Enter your password, and click "set" to open Data Set screen.

Adjust the directive value with the ▼ / ▲. Minimum unit is 1.

After setting the directive value, click "Set", and the directive value setting is confirmed.

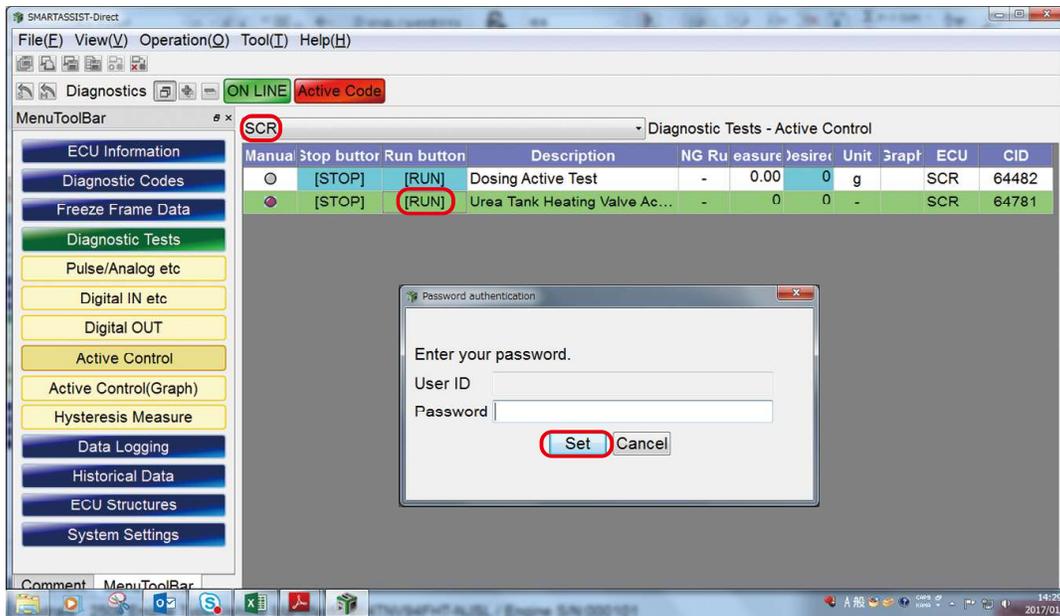


■Aqueous Urea Tank Heating Valve Forced Operation (4TNV94FHT)

4TNV94FHT which equips SCR with FT4 can perform forcing operation of aqueous urea tank heating valve.

Change ECU type to "SCR" from forced operation screen.

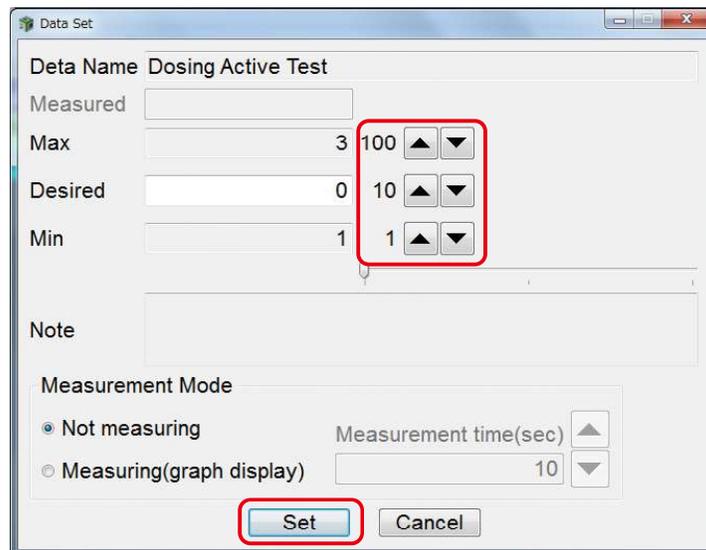
Select Tank Heating Valve Forced Operation, and then click [RUN]. Password authentication screen is displayed.



Enter your password, and click "set" to open Data Set screen.

Adjust the directive value with the ▼ / ▲. Minimum unit is 1.

After setting the directive value, click "Set", and the directive value setting is confirmed.

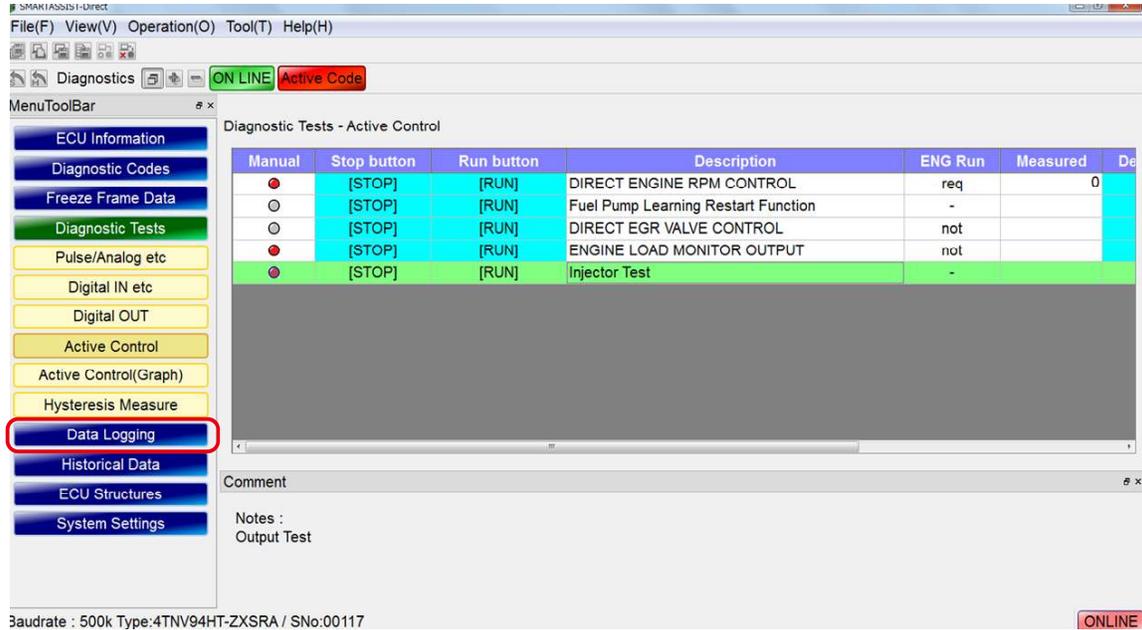


6. Error Diagnostic Function (ECU Access)

■ Data logging during active control

Detailed explanation of data logging is given in chapter 6.6. However, the data can be logged during active control on CR engines compliant with the Tier 4 exhaust emission regulation shown in the table below.

Select "Data Monitor" during active control.



When "Data Monitor" is selected, you are asked to stop active control. Click "No" to log the data during active control.

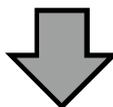


6. Error Diagnostic Function (ECU Access)

Only 1s can be selected for the sample rate setting during active control.

Other procedures for data logging are the same as the normal operation.

The screenshot shows the SMARTASSIST-Direct software interface. The main window is titled "Data Logging - Data Monitor". On the left, there is a "MenuToolBar" with various options, including "Data Logging" which is highlighted in green. The main area contains a table with columns for "Description", "Value", "Max", and "Min". The table lists several diagnostic parameters such as "2483:ENGINE RUN HOURS(unit:h)(ERH)", "63769:REQUEST ENGINE SPEED(RES)", etc. To the right of the table, there are settings for "Select Diagnostics" (set to "AnySetting"), "Trigger Setting" (Trigger: OFF, Level: 0, Pre-trigger: 50, Strage: 30000), and "Logging status" (Status: Data, Counter: 0, Mon. Start: 00:00:00.000, Run: 00:00:00.000). At the bottom left, it shows "baudrate : 500k Type:4TNV94HT-ZXSRA / SNo:00117". At the bottom right, there is a red "ONLINE" indicator.



The screenshot shows the "Sample Rate Set" dialog box. It has a title bar and a close button. The main content area contains several radio button options: "100 ms (Indicate and save)", "1s", "10s", and "60s". The "1s" option is selected and highlighted with a red circle. Below these options, there is a numeric input field with "1" entered, and a range selector with "100", "10", and "1" values. The range selector also includes "MIN MAX" labels and "sec", "min", and "hour" units. At the bottom, there are "Set" and "Cancel" buttons.

■Additional Descriptions

When clicking another tab, a confirmation dialog for the end of the active control is displayed.

- 1 **Yes** : Stop all Items and move to another tab.
- 2 **No** : Keep all current executed statuses and move to another tab.

* After switching the tab, the digital out will remain displayed in light blue.



When necessary, save as CSV, save a screenshot or make a printout of the screen.

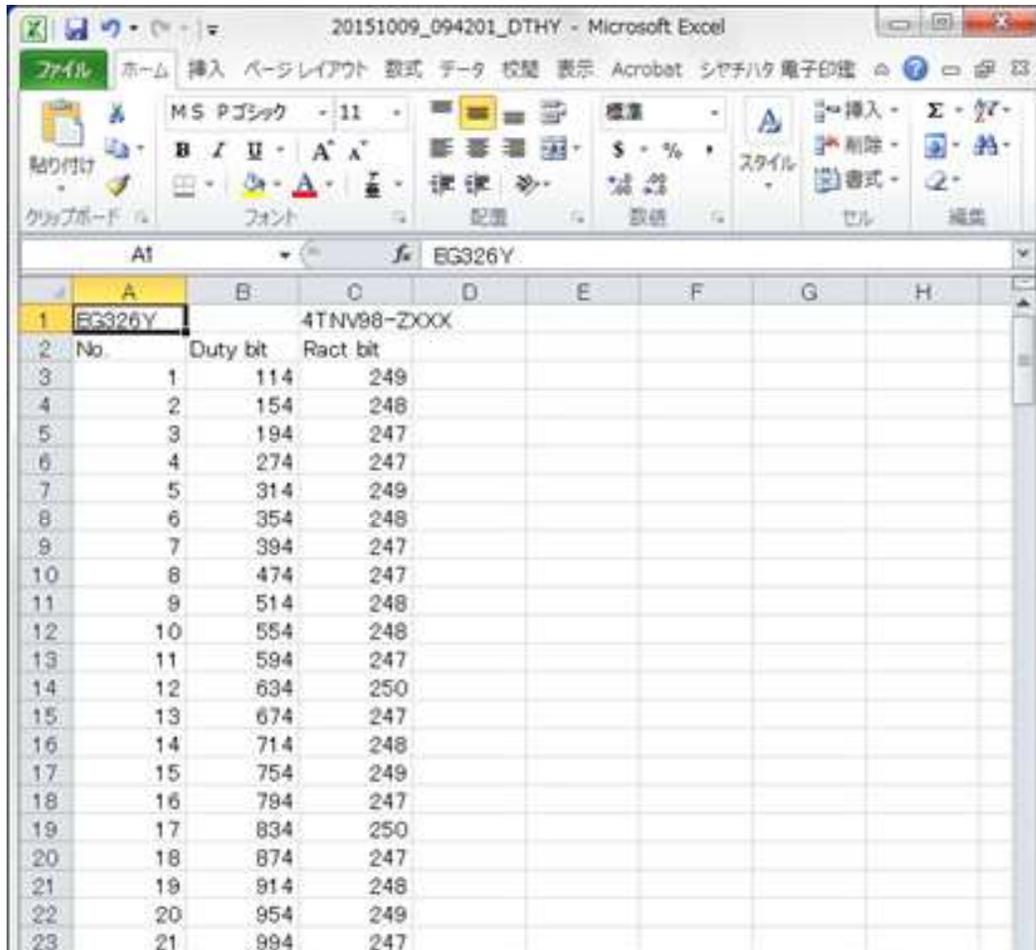
- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions])
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the screen data in CSV format. (Refer to [6.2.4])

	A	B	C	D	E
1			4TNV94HT-ZXSRA	117	20151026 test
2	System Group	Detail	Value	Unit	ECU
3	Engine	Type	4TNV94HT-ZXSRA		Engine
4	Engine	Rated RPM		2200 r/min	Engine
5	Engine	SNo		117	Engine
6	Engine	Manufacturing Test Date		110121	Engine
7	Engine	Run Hr		0 h	Engine
8	Pump	Pump Learning Completion Time		0 h	Engine
9	ECU	Part No.	129978-75520		Engine
10	ECU	SNo.	9960900888		Engine
11					

The graph measured during active control is overwritten when other Items are measured, so save the graph screen as bitmap or save the data in CSV format.

Be careful: The graph is deleted when other Items are executed in active control.

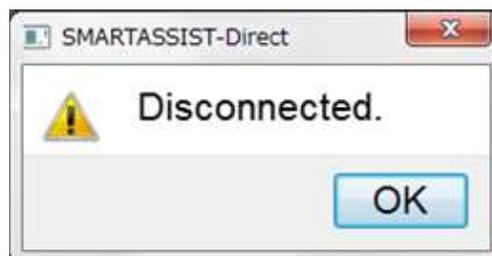
- 1  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 2  : Save the screen data in CSV format. (Refer to [6.2.4])



20151009_094201_DTHY - Microsoft Excel			
EG326Y			
No.	Duty bit	4TNV98-ZXXX	
		Ract bit	
1	1	114	249
2	2	154	248
3	3	194	247
4	4	274	247
5	5	314	249
6	6	354	248
7	7	394	247
8	8	474	247
9	9	514	248
10	10	554	248
11	11	594	247
12	12	634	250
13	13	674	247
14	14	714	248
15	15	754	249
16	16	794	247
17	17	834	250
18	18	874	247
19	19	914	248
20	20	954	249
21	21	994	247

If the communication with the ECU is interrupted and active control is performed, the below dialog box is displayed.

- 1  : The communication with the ECU starts.



6.5.10 Reference material "Pulse/Analog Input/Output" (TNV series compatible with Engine Tier4)

■DPF PM deposition amount check

When history data from the old ECU was not carried over at time of ECU replacement, perform a DPF PM deposition amount check. Connect to the SA-D, select the pulse/analog input/output diagnosis test, and check the DPF PM deposition concentration (P method) physical value data.

The screenshot shows the SMARTASIST-Direct software interface. The 'MenuToolBar' on the left has 'Diagnostic Tests' selected, and 'Pulse/Analog etc' is highlighted in red. The main window displays a table of diagnostic tests. The row for 'DPF PM Accumulation Density_P' is highlighted in green and has a red border around it. The table shows the following data:

Description	Physical Value	Unit	Raw Data	Notes
Intake Manifold Temperature Sensor Voltage	4.95	V	99	
Exhaust Pressure Sensor Voltage	0.00	V	0	
DPF Differential Pressure Sensor Voltage	0.00	V	0	
DPF Inlet Temperature Sensor Voltage	4.95	V	99	
DPF Inside Temperature Sensor Voltage	4.95	V	99	
NotUsed	99	-	99	
DPF PM Accumulation Density_C	0.0000	g/l	0	
DPF Ash Accumulation_T	0.0000	g	0	
Consumed Fuel Mass Since Last Active Regeneration	0.0000	kg	0	
DPF PM Accumulation Density_P	0.0000	g/l	0	
DPF Ash Accumulation	0.0000	g	0	
Engine Time On Since Last Active Regeneration	50.00	h	1000	
Engine Load Rate(Gross)	0	%	0	

At the bottom of the window, the status bar shows 'baudrate : 250k Engine Type(Vehicle Manufacture):TK488CR / Engine S/N:R02018' and 'ONLINE'.

6.6 Data Logging

From the submenu of the graph display, you can select the data monitor that displays logged data in real-time or save data. The logged data is gathered by a tool that can determine defects and analyze the operating status during operation of the product. The logged data contains freeze frame data (Refer to [6.4]) and arbitrarily set optional data. There is also a trigger setting that makes saving data easier.

6.6.1 Data Monitor

The measurement data of the ECU sensor and the control data are received at a sample interval set in advance (minimum 0.1 sec). A trigger that starts the recording of the data can be set.

● Operation Tool Bar

- 1  : Print the screen. (Refer to [6.2.2])
- 2  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 3  : Save the measured data. For the display of the saved data, refer to [7. Error Diagnostic Data Save and Display Functions].
- 4  : The receiving of data starts. (Data that has not been saved according to [6.5.6 Saving the Measured Data] is overwritten and lost.)
- 5  : Manually stop the receiving of data.
- 6  : Settings of the option data that run the data monitor. When clicking, the option data set subwindow is displayed and the settings can be changed.
- 7  : Set the trigger conditions (trigger on/off, data selection, level (trigger value) selection, trigger type), number of delays and number of saved data sets. When clicking, a trigger setting subwindow is displayed and the settings can be changed.
- 8  : Set the sampling rate. When clicking, a sampling rate set subwindow is displayed and the settings can be changed.
- 9  : Set the data that is displayed in the main box. When clicking, a data set sub-window is displayed and the settings can be changed.

● Main Box

- 10 **Description** : Display the name of the logged data.
- 11 **Value** : Display the measurement values.
- 12 **Max** : Maximum value
- 13 **Min** : Minimum value
- 14 **Unit** : Unit
- 15 **Notes** : Annotation box
- 16 **ECU** : Display the ECU/controller that controls the devices. (Only if multiple ECU are connected.)

6. Error Diagnostic Function (ECU Access)

The screenshot shows the 'Data Monitor' window of a diagnostic tool. The interface is divided into several sections:

- Menu Bar:** File(F), View(V), Operation(O), Tool(T), Help(H)
- Toolbar:** Includes icons for diagnostics and status indicators: 'ON LINE' (green) and 'Active Code' (red).
- Left Panel (MenuToolBar):** A vertical list of diagnostic functions:
 - ECU Information
 - Diagnostic Codes
 - Freeze Frame Data
 - Diagnostic Tests
 - Pulse/Analog etc
 - Digital IN etc
 - Digital OUT
 - Active Control
 - Active Control(Graph)
 - Hysteresis Measure
 - Data Logging
 - Data Monitor
 - Recorded Data
 - Trend Graph
 - Historical Data
 - ECU Structures
- Central Panel (Data Logging - Data Monitor):** A table with columns: Description, Value, Max, Min.

Description	Value	Max	Min
91:Accelerator Pedal Position(APP)			
63766:Engine Load Rate(Gross)(ELRG)			
63770:Engine Speed(ES)			
63774:Request Engine Speed(Final)(ERSF)			
64368:Total Injection Quantity(QFIN)			
64362:Final Maximum Injection Quantity(QMXFIN)			
64055:Engine Control Status(ENGST)			
64150:DPF PM Accumulation Density_P(DPFPMADP)			
64145:Actual High Pressure Pump Current(AHPPC)			
64146:Target High Pressure Pump Current(THPPC)			
64087:Actual Rail Pressure(NPC)			
64050:Target rail Pressure(PFIN)			
- Right Panel (Configuration):**
 - Manual Trigger button
 - Select Diagnostics: AnySetting
 - Trigger Setting:
 - Trigger: OFF
 - Level: 0
 - Pre-trigger: 50
 - Trigger Type: f
 - Stroke: 30000
 - Logging status:
 - Status: Run
 - Counter: 0
 - Mon. Start: 00:00:00.000
- Bottom Panel:** Comment field.
- Status Bar:** baudrate : 250k Engine Type(Vehicle Manufacture):TK488CR / Engine S/N:R02018 ONLINE

Figure 6-18 Data Monitor Screen

● **Additional Information Box**

• **Trigger Setting**

Displays the trigger setting information.

- 1 **Manual Trigger** : Click to manually apply the trigger.
- 2 **Select Diagnostics** : Package data sets with the most appropriate settings sorted per event
- 3 **Trigger** : Display the status of the trigger setting.
- 4 **Level** : Display the values of the trigger setting.
- 5 **Pre-trigger** : Display the number of data sets from start of memorization to the trigger event.
- 6 **Data** : Display the data abbreviations of the trigger setting.
- 7 **Type** : Display the set trigger type (leading/trailing).
- 8 **Storage** : Display the number of data sets memorized. (Counting as one set the data collected at a given time.)

• **Logging status**

Displays the data logging status.

- 9 **Status** : Display the measurement status. "Data saving (awaiting trigger)", "Data saving in progress", "Data saving complete"
- 10 **Counter** : Display the number of collected data sets.
- 11 **Mon. Start** : Display the time when the monitor was started.
- 12 **Run** : Display the time passed since start of measurement.
- 13 **Rest** : Display the time left until end of measurement.

• **Sample Rate Setting**

Displays the current settings.

- 14 **Mode** : Displays "discharge" if the sampling rate is set to 100 msec; displays "polling" for all other sampling rates.
- 15 **Interval** : Displays the sampling interval.

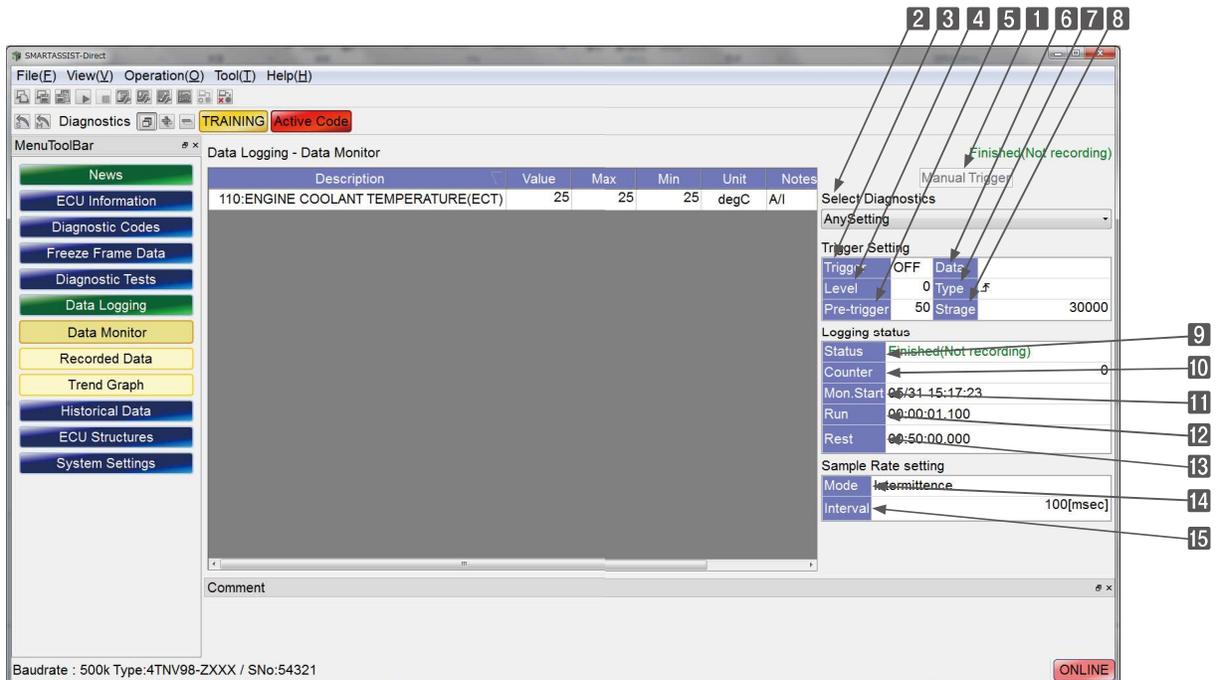


Figure 6-19 Data Monitor Screen

6. Error Diagnostic Function (ECU Access)

● Data Select Subwindow

The Items that display data and the display order can be set arbitrarily. Click the  button on the operation tool bar to make the settings. You can select and register data from the arbitrarily displayed data that was registered before the event and is separated by category except freeze frame data (Refer to [6.4]). For details, refer to [Data Select Window].

● Option Data Set Subwindow

You can select and register data from the arbitrarily displayed data that was registered before the event and is separated by category except freeze frame data.

Click the  button of the operation tool bar to open the selection screen.

- 1 Data: List all available data.
- 2 ◀ / ▶ : Select/deselect data for display.
- 3 Set data: The data displayed in the main box.
- 4 **Set** : Confirm the entry.
- 5 **Cancel** : Close the entry screen.

Point

Data monitor Items	Screen display
• Freeze Frame Data	Data Items selected in the Data Set window on the left.
• Optional data	

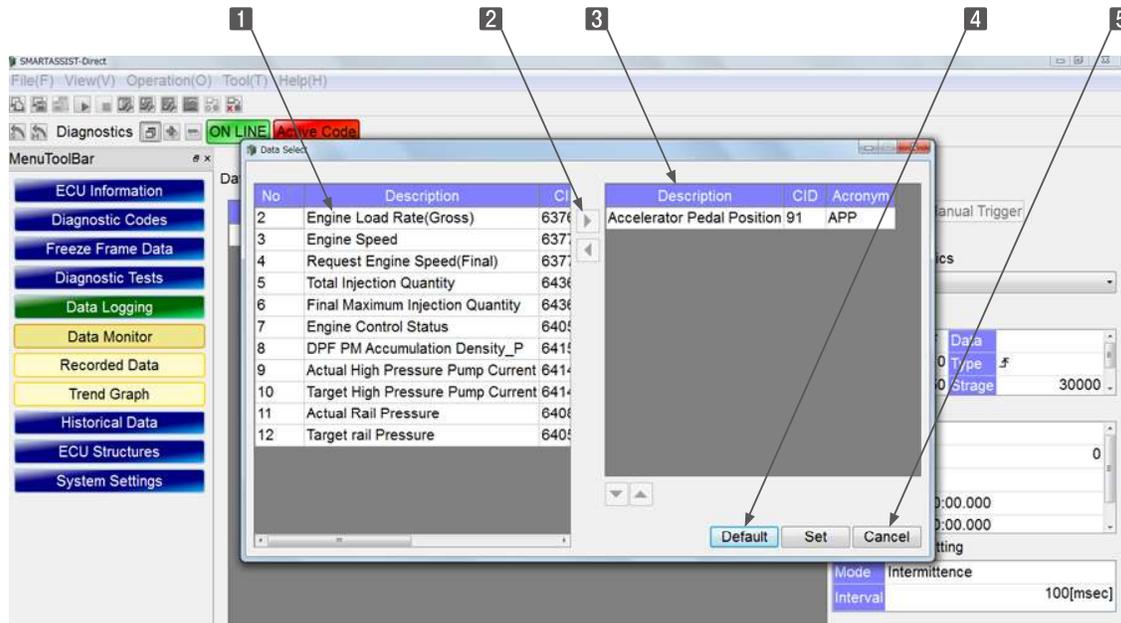


Figure 6-20 Option Data Set Subwindow

● Trigger Setting Subwindow

Click the  button on the operation tool bar to change the trigger setting.

- 1 **Trigger (ON)** : Activate the trigger.
- 2 **Data Select** : Select the trigger data.
- 3 **Level** : Set the trigger value.
- 4 **Type** : Set the set trigger type (leading/trailing).
 Leading  : Start saving if the value of the selected data exceeds the trigger value.
 Trailing  : Start saving if the value of the selected data falls under the trigger value.
- 5 **Delay** : Display the number of data sets from start of memorization to the trigger event.
- 6 **Storage** : Set the number of data sets memorized. (Counting as one set the complete data monitor items at a given time.)
- 7 **Set** : Confirm the entry.
- 8 **Cancel** : Close the entry screen.

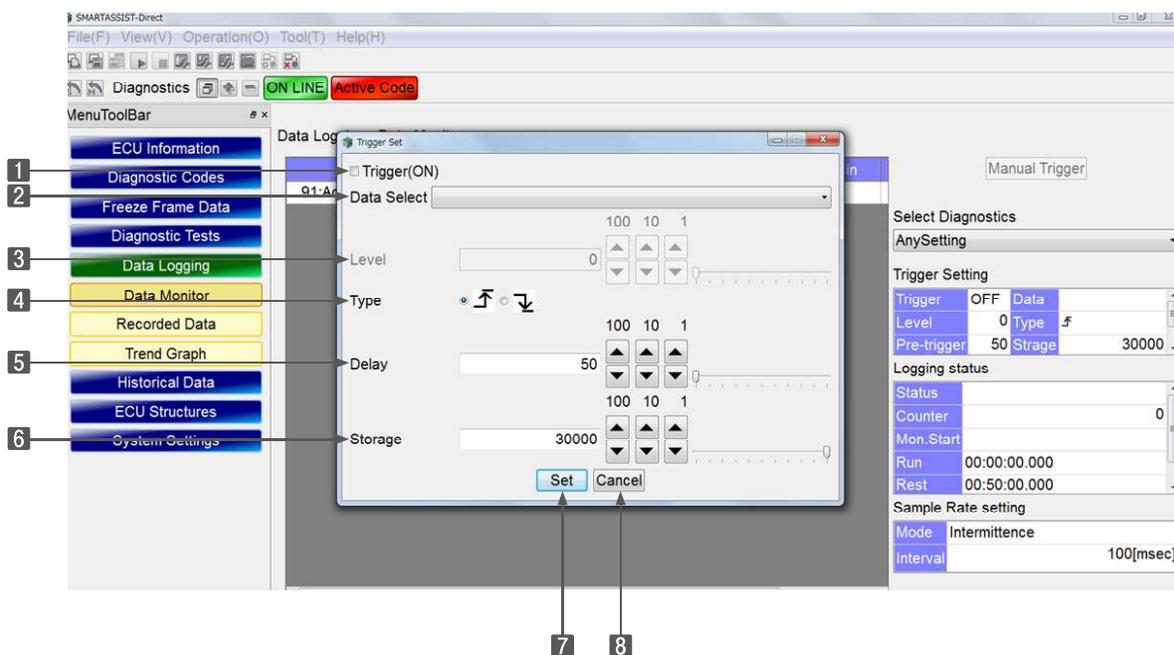


Figure 6-21 Trigger Setting Subwindow

6. Error Diagnostic Function (ECU Access)

● Sample Rate Setting Subwindow

Click the  button on the operation tool bar to change the sample rate setting.

1 **Select** : Add a checkmark to the button to select the sampling rate.

2  : When inserting a checkmark to the desired setting, the sampling rate is adjustable in increments of 1, 10, and 100.

3 **Unit** : Select the unit.

4 **Set** : Confirm the entry.

5 **Cancel** : Close the entry screen.

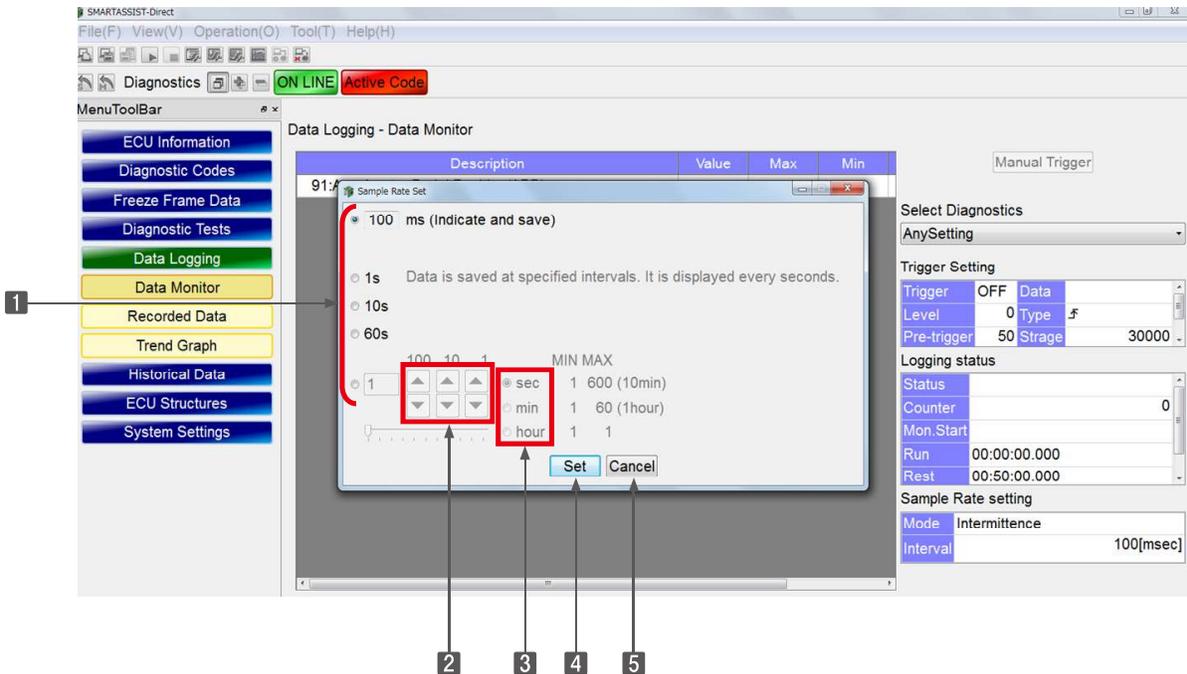
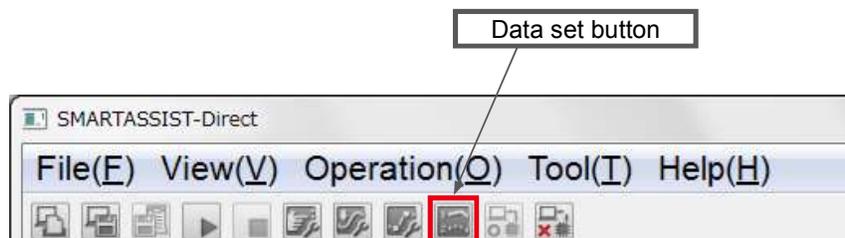


Figure 6-22 Sample Rate Setting Subwindow

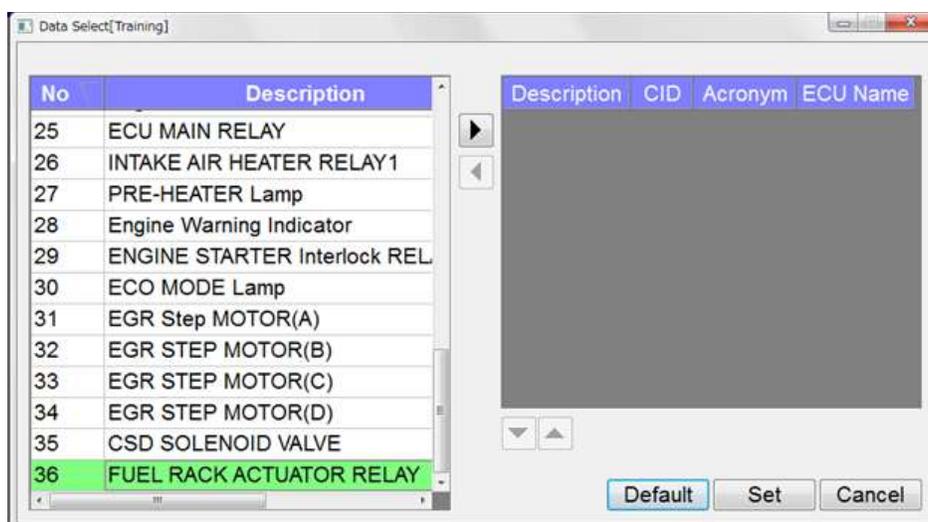
6.6.2 Overview of the Data Sampling Operation

* This description applies to the TNV series engine.

- 1 Select the data you want to display.



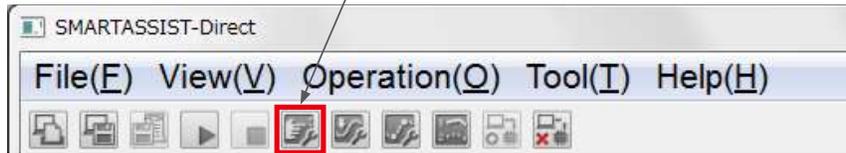
* If you wish to monitor Items that are not displayed on this list, go to 2. Option Settings.



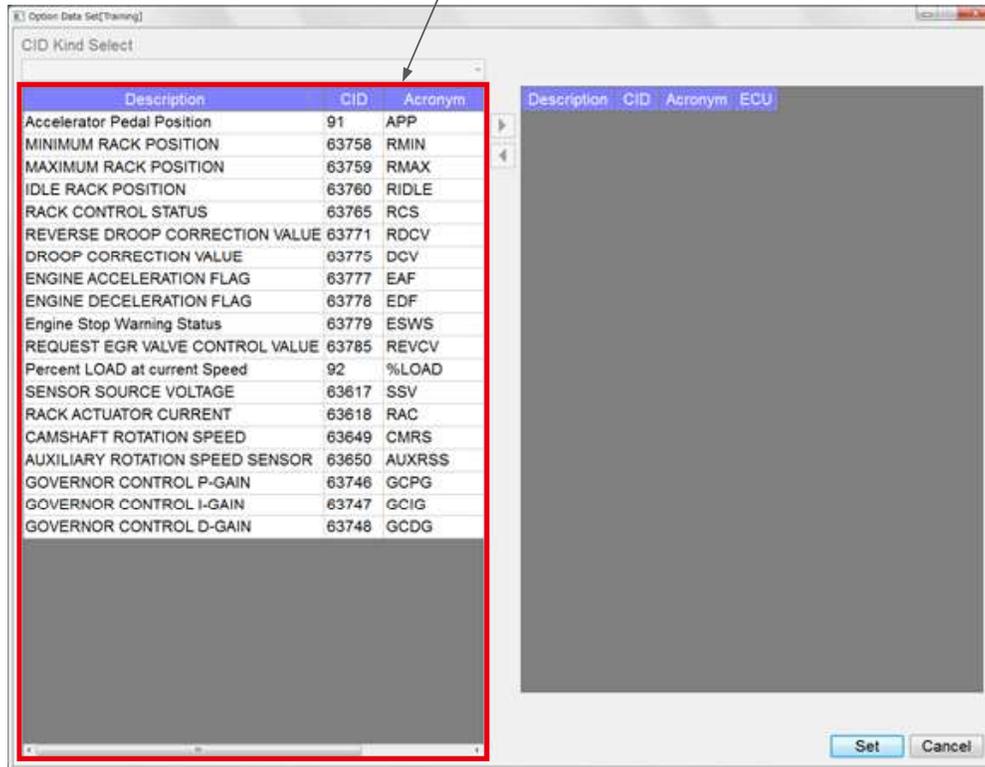
6. Error Diagnostic Function (ECU Access)

2 Option Settings

Option set button

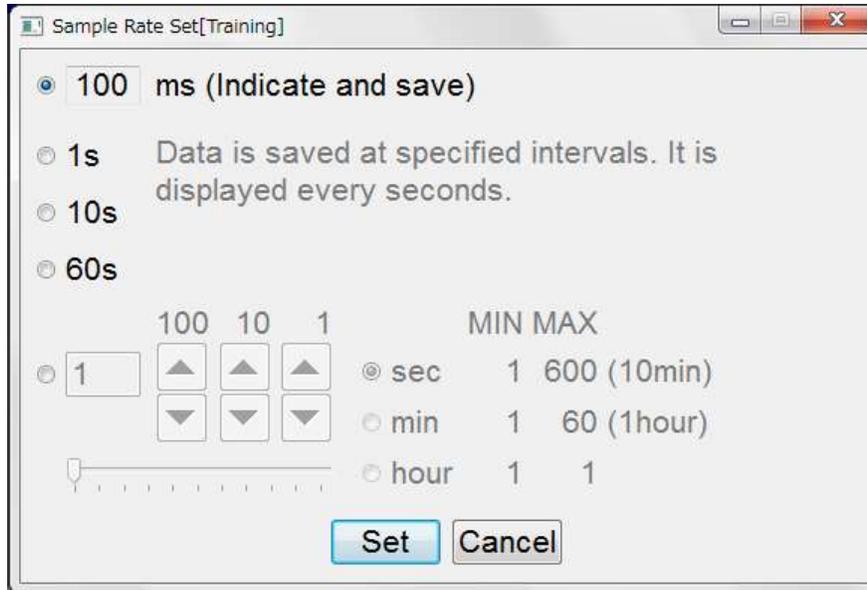
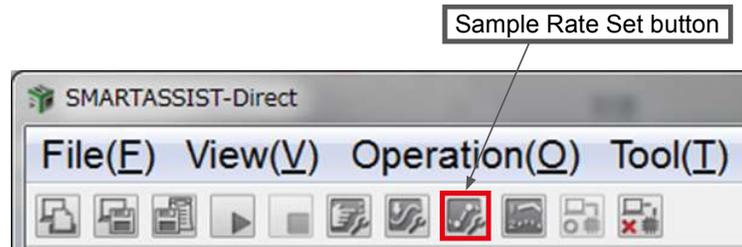


Items for data logging (option item)



3 Set the sampling rate as necessary.

* Normally, a change is not necessary.

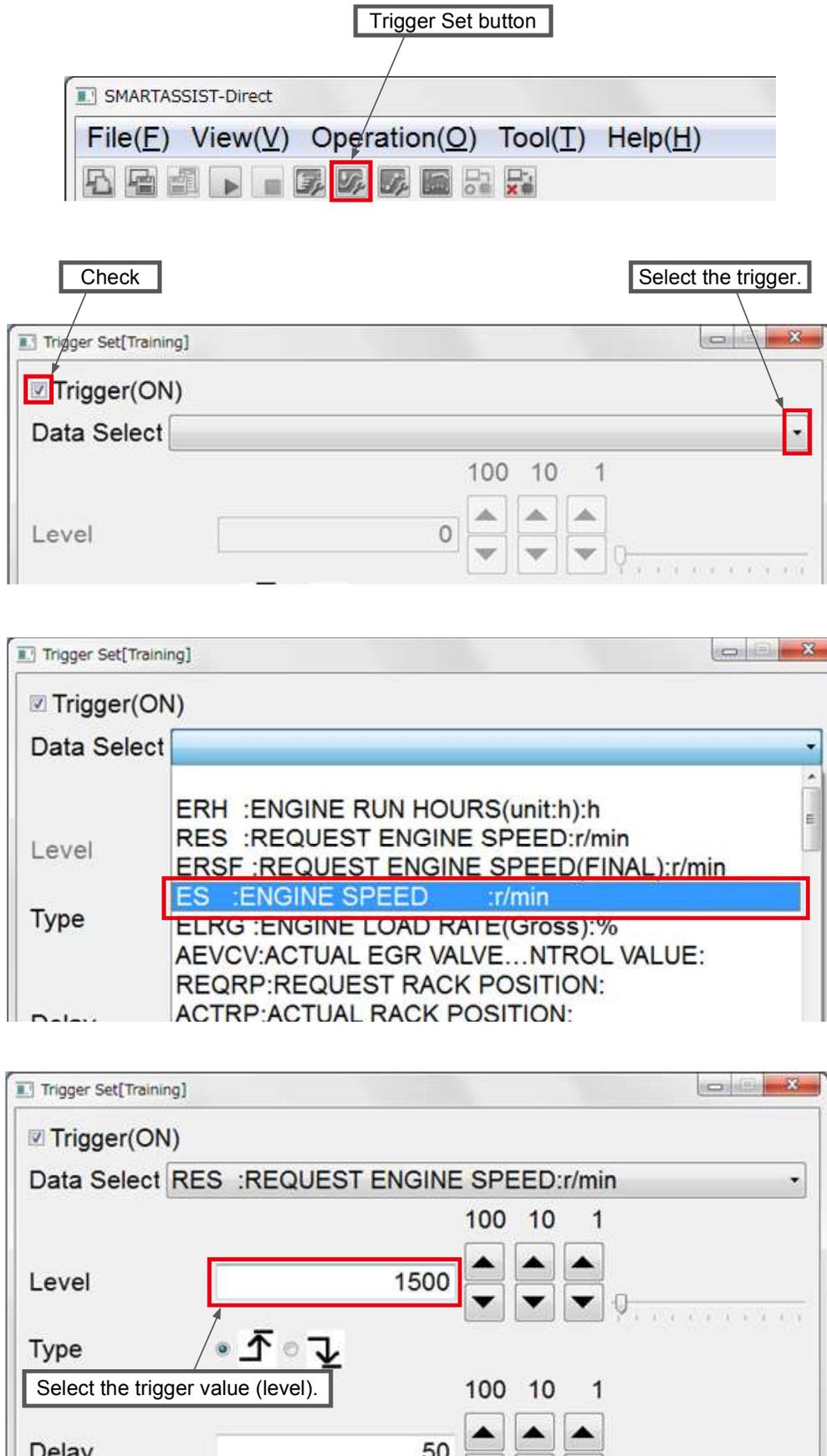


- Note**
- The standard is 100 msec.
 - On ECU that do not support a change, the other values are grayed-out.

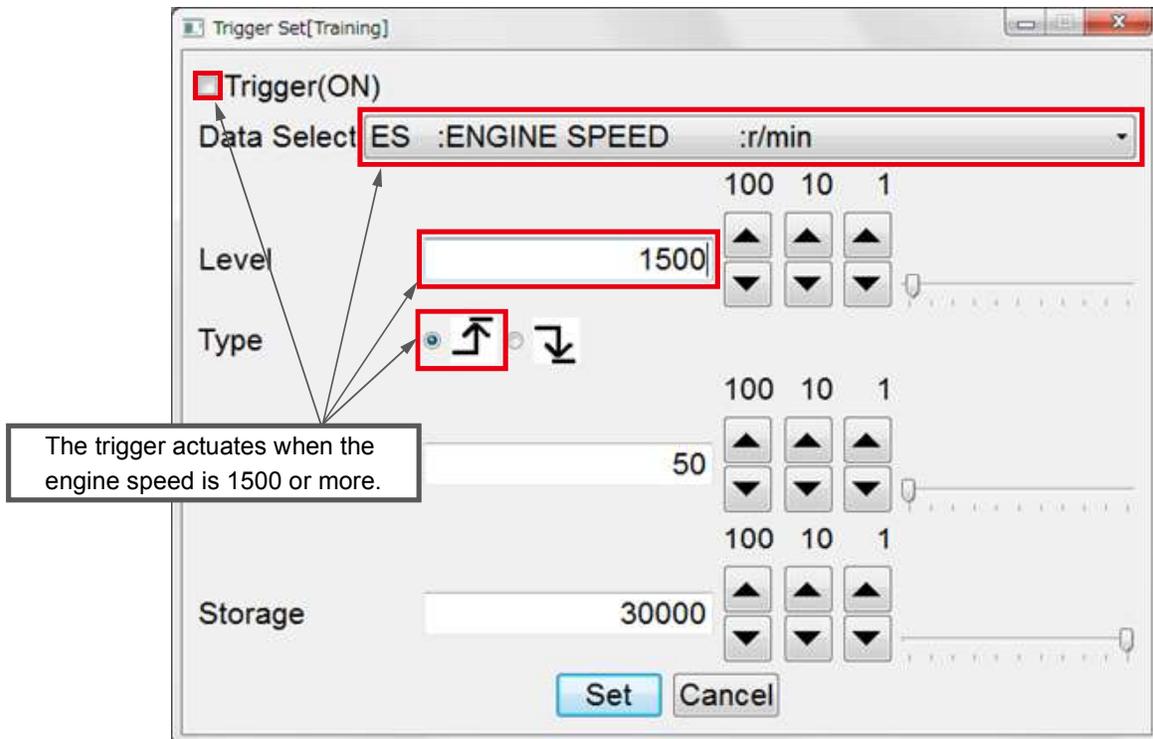
6. Error Diagnostic Function (ECU Access)

4 Set the trigger.

A change is not necessary if the monitor was started by manual trigger.



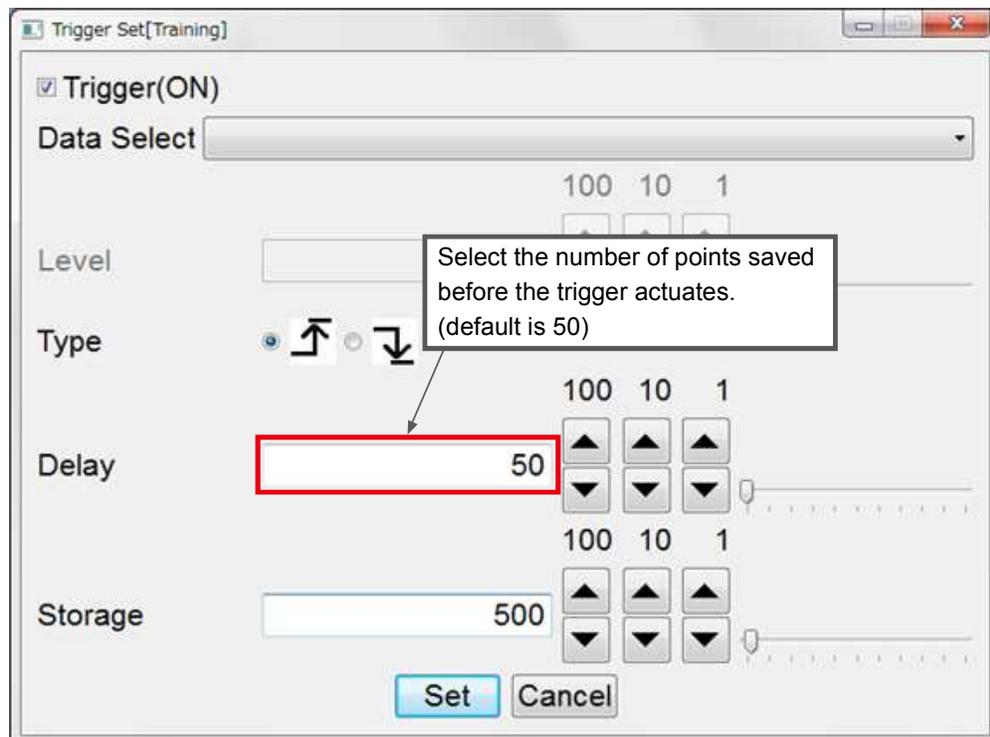
5 Description of the trigger setting



In trigger mode, the values before the trigger is applied can be saved.

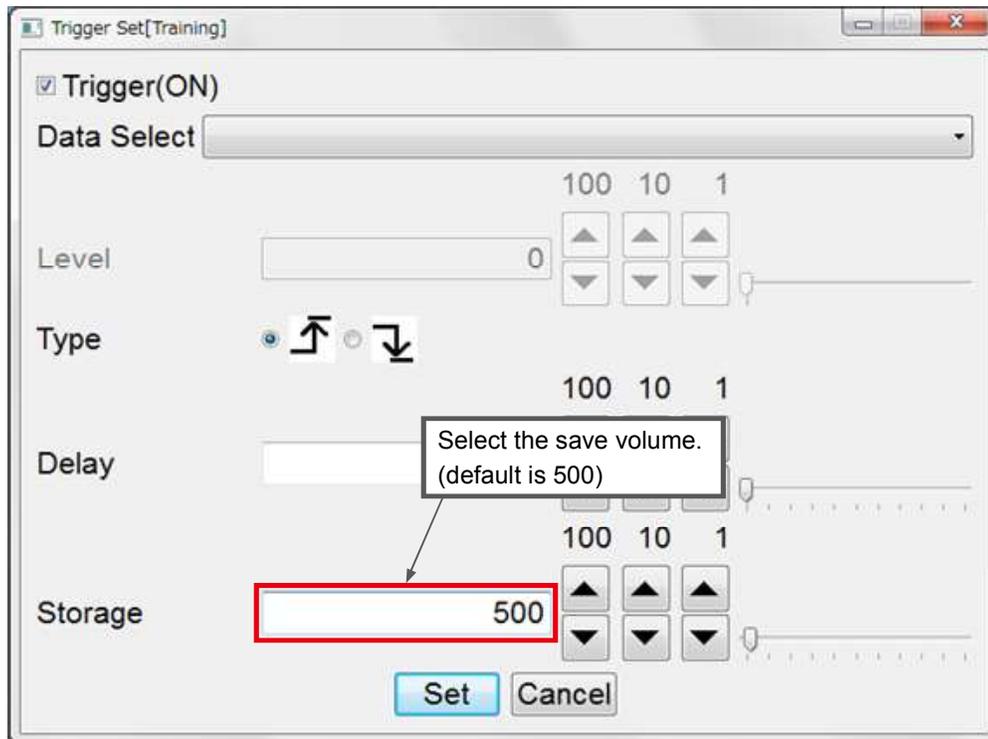
* Normally, a change is not necessary.

Change if necessary.



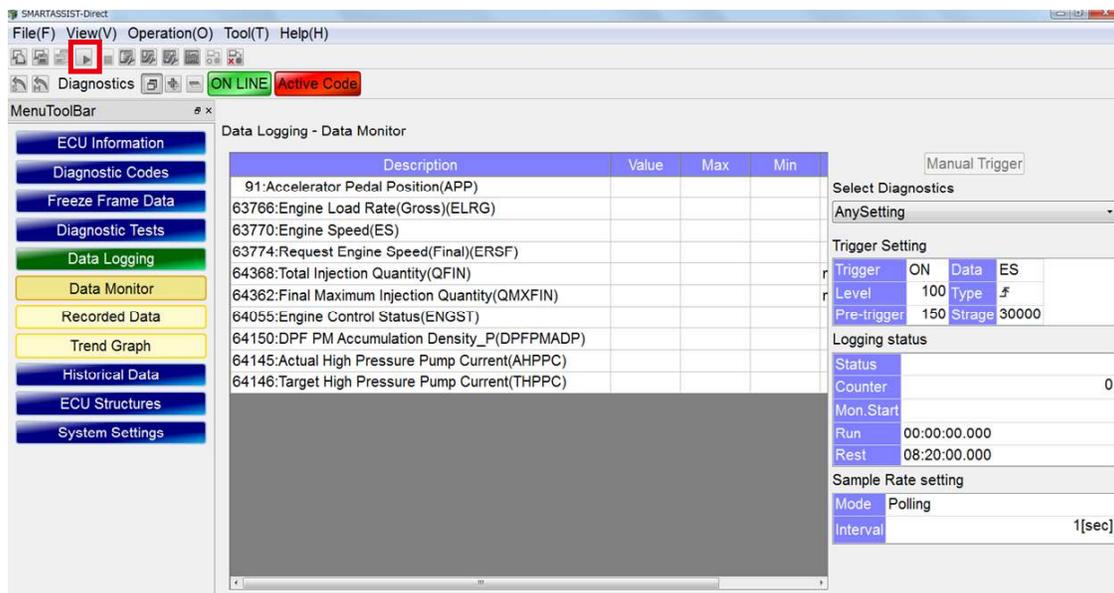
Example: If the sampling time is 100 msec, $50 \times 100 = 5000$ msec (5 sec), thus the values are saved from 5 seconds before the trigger is applied.

6. Error Diagnostic Function (ECU Access)

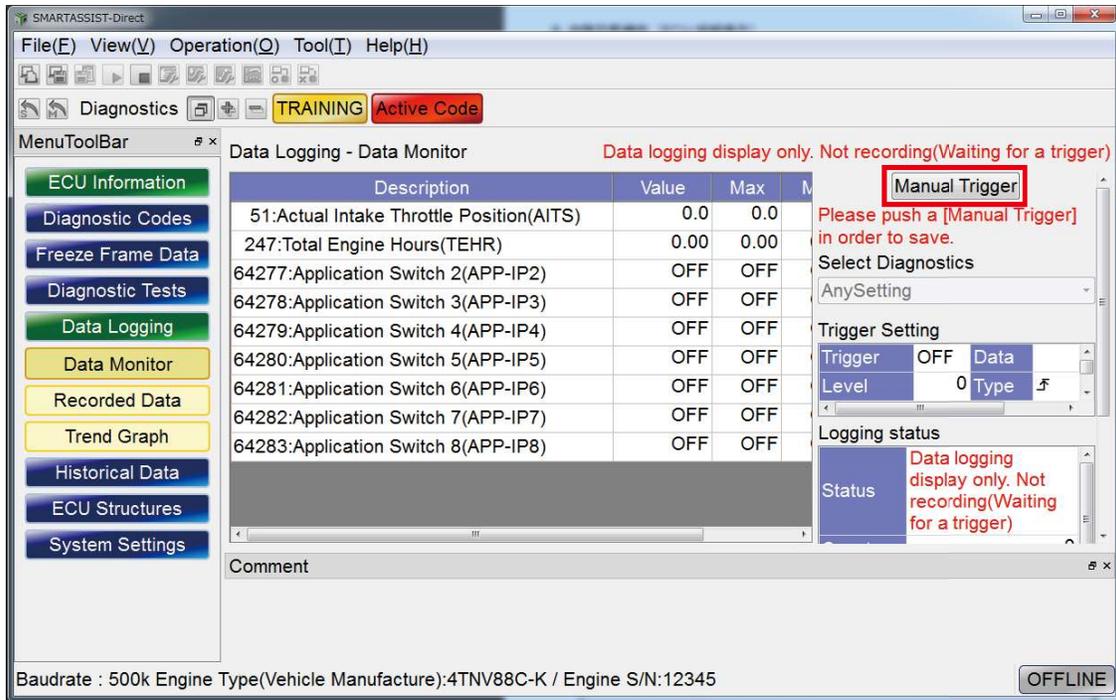


Example: If the sampling time is 100 msec, $500 \times 100 = 50000$ msec (50 sec), thus the values are saved from 50 seconds before the trigger is applied.

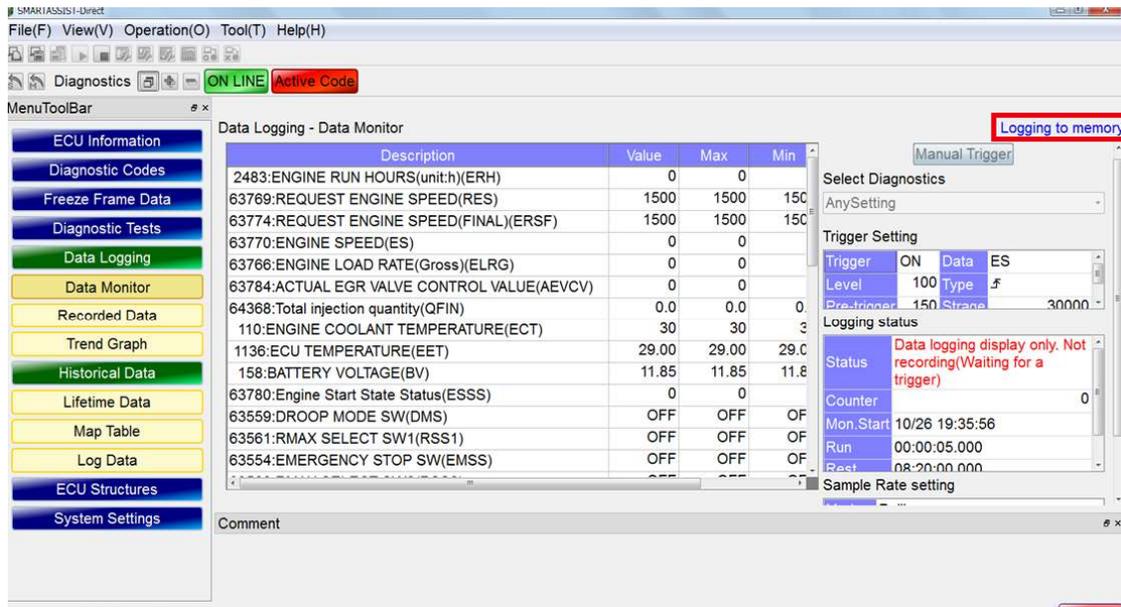
6 Click the  button to start the monitor.



* Click the **Manual Trigger** button if necessary.

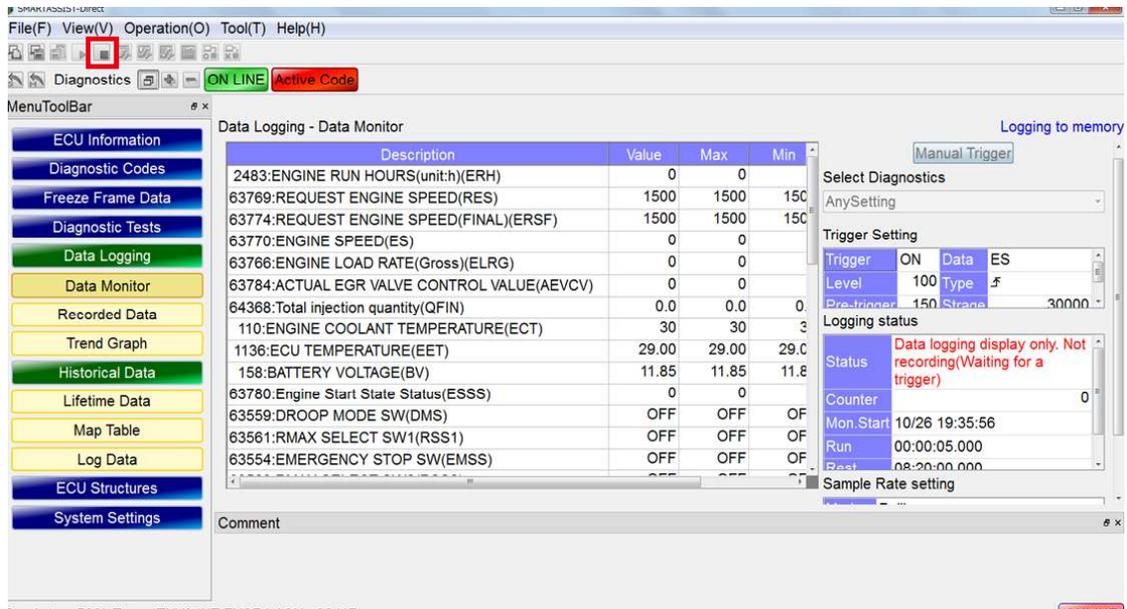


7 If the trigger is applied, "Logging to memory" is displayed.



6. Error Diagnostic Function (ECU Access)

8 Click the button  to end the monitor.



SPARK ASSIST 1-Direct

File(F) View(V) Operation(O) Tool(T) Help(H)

Diagnosics ON LINE Active Code

MenuToolBar

- ECU Information
- Diagnostic Codes
- Freeze Frame Data
- Diagnostic Tests
- Data Logging
- Data Monitor**
- Recorded Data
- Trend Graph
- Historical Data
- Lifetime Data
- Map Table
- Log Data
- ECU Structures
- System Settings

Data Logging - Data Monitor

Description	Value	Max	Min
2483:ENGINE RUN HOURS(unit:h)(ERH)	0	0	0
63769:REQUEST ENGINE SPEED(RES)	1500	1500	1500
63774:REQUEST ENGINE SPEED(FINAL)(ERSF)	1500	1500	1500
63770:ENGINE SPEED(ES)	0	0	0
63766:ENGINE LOAD RATE(Gross)(ELRG)	0	0	0
63784:ACTUAL EGR VALVE CONTROL VALUE(AEVCV)	0	0	0
64368:Total injection quantity(QFIN)	0.0	0.0	0.0
110:ENGINE COOLANT TEMPERATURE(ECT)	30	30	30
1136:ECU TEMPERATURE(EET)	29.00	29.00	29.00
158:BATTERY VOLTAGE(BV)	11.85	11.85	11.85
63780:Engine Start State Status(ESSS)	0	0	0
63559:DROOP MODE SW(DMS)	OFF	OFF	OFF
63561:RMAX SELECT SW1(RSS1)	OFF	OFF	OFF
63554:EMERGENCY STOP SW(EMSS)	OFF	OFF	OFF

Logging to memory

Manual Trigger

Select Diagnostics

AnySetting

Trigger Setting

Trigger	ON	Data	ES
Level	100	Type	f
Pre-trigger	150	Strage	30000

Logging status

Status Data logging display only. Not recording (Waiting for a trigger)

Counter 0

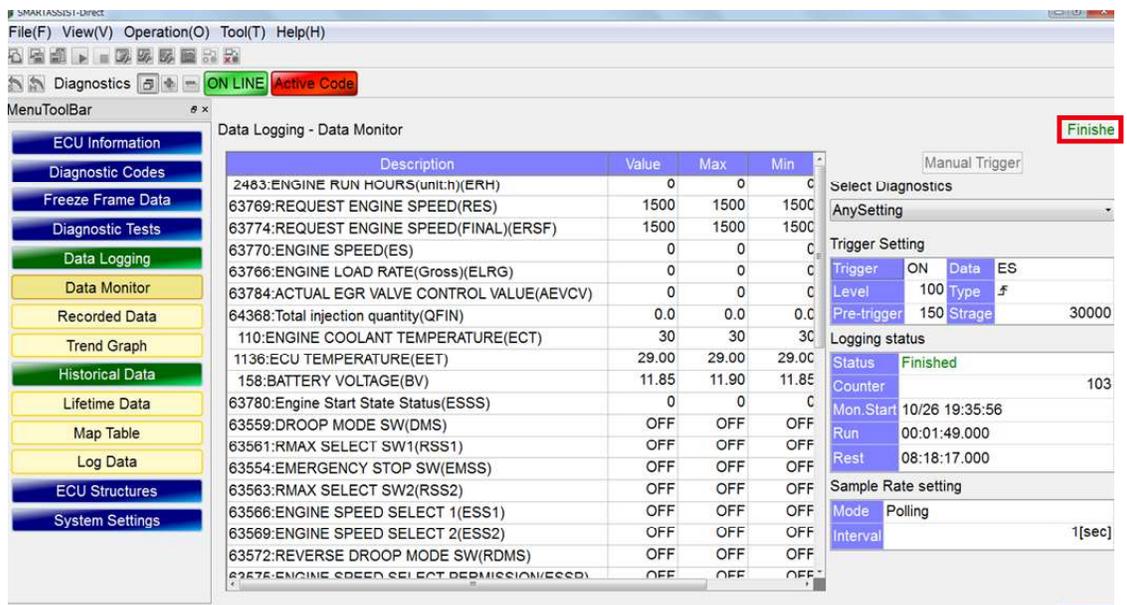
Mon.Start 10/26 19:35:56

Run 00:00:05.000

Rest 08:20:00.000

Sample Rate setting

Comment



SPARK ASSIST 1-Direct

File(F) View(V) Operation(O) Tool(T) Help(H)

Diagnosics ON LINE Active Code

MenuToolBar

- ECU Information
- Diagnostic Codes
- Freeze Frame Data
- Diagnostic Tests
- Data Logging
- Data Monitor**
- Recorded Data
- Trend Graph
- Historical Data
- Lifetime Data
- Map Table
- Log Data
- ECU Structures
- System Settings

Data Logging - Data Monitor

Description	Value	Max	Min
2483:ENGINE RUN HOURS(unit:h)(ERH)	0	0	0
63769:REQUEST ENGINE SPEED(RES)	1500	1500	1500
63774:REQUEST ENGINE SPEED(FINAL)(ERSF)	1500	1500	1500
63770:ENGINE SPEED(ES)	0	0	0
63766:ENGINE LOAD RATE(Gross)(ELRG)	0	0	0
63784:ACTUAL EGR VALVE CONTROL VALUE(AEVCV)	0	0	0
64368:Total injection quantity(QFIN)	0.0	0.0	0.0
110:ENGINE COOLANT TEMPERATURE(ECT)	30	30	30
1136:ECU TEMPERATURE(EET)	29.00	29.00	29.00
158:BATTERY VOLTAGE(BV)	11.85	11.90	11.85
63780:Engine Start State Status(ESSS)	0	0	0
63559:DROOP MODE SW(DMS)	OFF	OFF	OFF
63561:RMAX SELECT SW1(RSS1)	OFF	OFF	OFF
63554:EMERGENCY STOP SW(EMSS)	OFF	OFF	OFF
63563:RMAX SELECT SW2(RSS2)	OFF	OFF	OFF
63566:ENGINE SPEED SELECT 1(ESS1)	OFF	OFF	OFF
63569:ENGINE SPEED SELECT 2(ESS2)	OFF	OFF	OFF
63572:REVERSE DROOP MODE SW(RDMS)	OFF	OFF	OFF
63575:ENGINE SPEED SELECT PERMISSION(ESSP)	OFF	OFF	OFF

Manual Trigger

Select Diagnostics

AnySetting

Trigger Setting

Trigger	ON	Data	ES
Level	100	Type	f
Pre-trigger	150	Strage	30000

Logging status

Status Finished

Counter 103

Mon.Start 10/26 19:35:56

Run 00:01:49.000

Rest 08:18:17.000

Sample Rate setting

Mode Polling

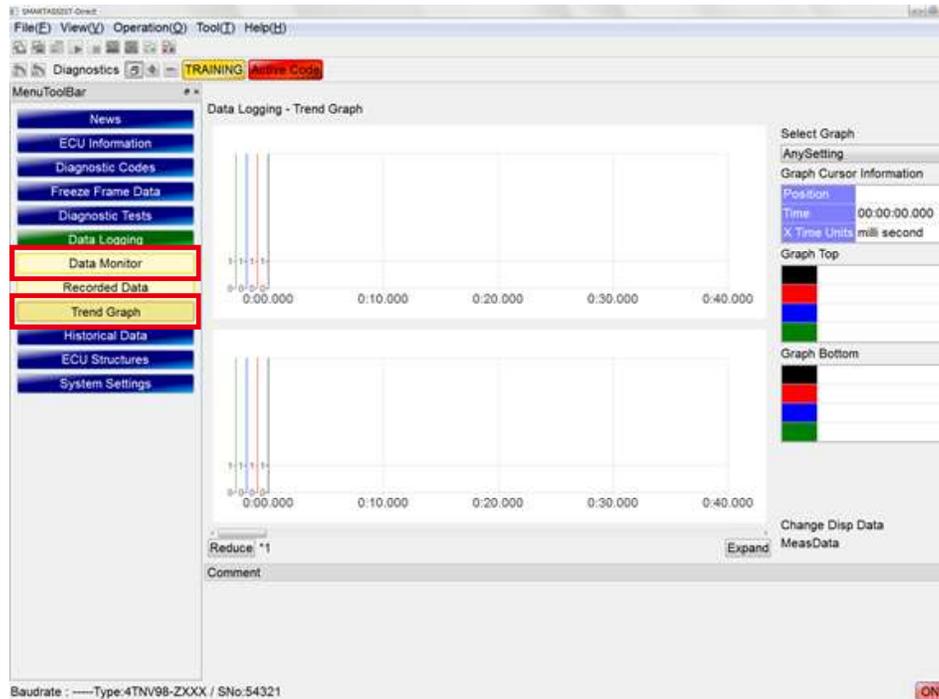
Interval 1[sec]

Finishe

* If the memory is full, the data saving ends automatically.

6.6.3 Switching Screens

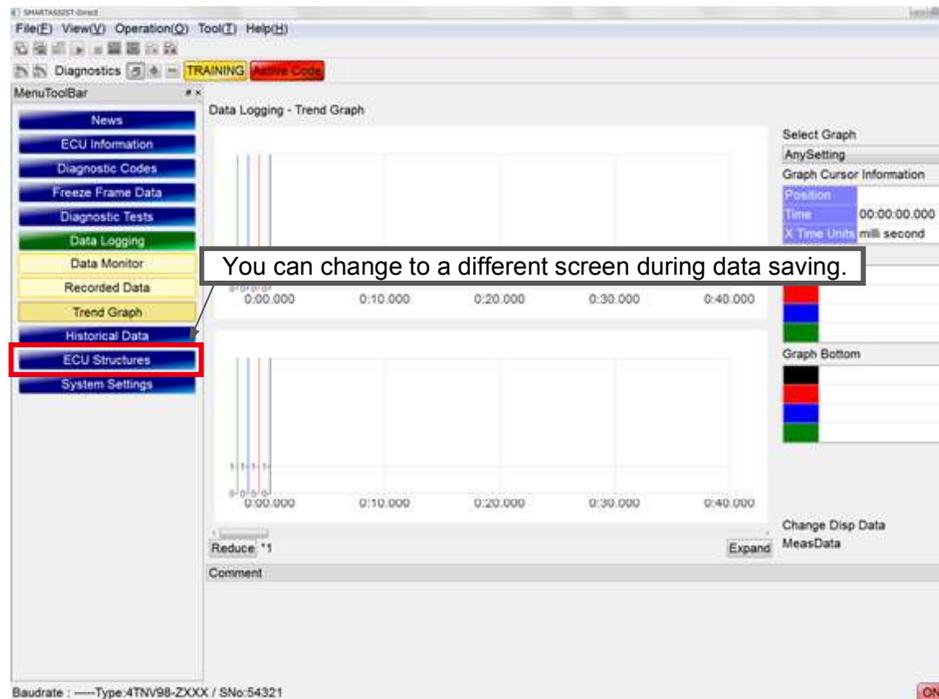
You can select Data Display and Graph Display during data monitoring and data saving



6.6.4 Continued Data Saving

If you switch to a different screen during data saving, the process stops temporarily.

But when returning to the Data Logging screen, the save process resumes automatically.



6.6.5 Monitor Data Confirmation

The monitor results are saved primarily on the PC, and all data values can be confirmed. This submenu is not available during receiving of data. If stopped without the trigger applied, no data has been memorized, thus the Item display is not available.

● Operation Tool Bar

- 1  : Print the screen. (Refer to [6.2.2])
- 2  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 3  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 4  : Save the measured data. Save the data of the active control after measurement. For the display of the saved data, refer to [7. Error Diagnostic Data Save and Display Functions].
- 5  : Open the subwindow, and set the display Items and the order of the received data. For details, refer to [Data Select Window].

● Main Box

- 6 : Display the time line number of the data.
- 7 : Display the time axis data. Also, the maximum and minimum values are displayed at the bottom of the list.
- 8 : The first letter of the selected data name is displayed. (Contents, such as the name and unit, can be confirmed on the ECU Structures screen.) Right-click the Item box to switch the display format from binary to decimal to hexadecimal.

6.6.6 Trend Graph

Displays the currently received data or saved data in a graph. Select related Items for and display them together in a graph. Digital data can be displayed as 1/0 by changing the display mode. The data-receiving graph is automatically shown as additional plot display.

● Additional Information Box

- 1 Graph display Item selection: Package data sets with the most appropriate settings sorted per event
The data Item names set for graph display and the cursor position where the graph is clicked are displayed.
Graph 1 shows top cursor values, graph 2 shows bottom cursor values.
- 2 **Position** : Display data number for the cursor position.
- 3 **Time** : Display time passed for the cursor position.
- 4 **Time Units** : Display the time unit.
- 5 Display Item and data: Display the Item name and data; The Item color corresponds to the graph line color.

● Operation Tool Bar

- 6  : Print the screen. (Refer to [6.2.2])
- 7  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 8  : The receiving of data starts. (Data that has not been saved according to [6.4.1 Recoded Data] is overwritten and lost.)
- 9  : Save the measured data. Save the data of the active control after measurement. For the display of the saved data, refer to [7. Error Diagnostic Data Save and Display Functions].
- 10  : Do the settings for the display Item and the scaling of the top graph.
- 11  : Do the settings for the display Item and the scaling of the bottom graph.

● Main Box

Graph 1 and graph 2 are displayed. For details regarding operation of the graph, refer to [7.1 Error Diagnostic Data Save and Display Functions].

● Comment Box

- 12 Comment: The full name of the displayed data is displayed.

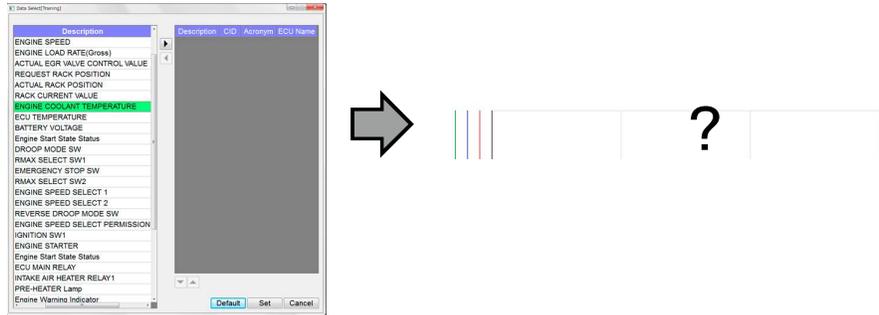


Figure 6-23 Trend Graph Screen

6. Error Diagnostic Function (ECU Access)

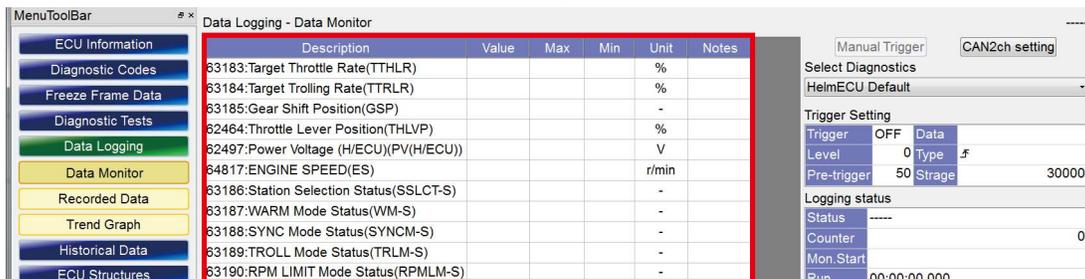
6.6.7 Package Data Set

It is difficult to determine without experience from the multiple data sets which Item is active when monitored (data setting/option setting) or displayed as a graph. SMARTASSIST-Direct offers package data sets that allow you to set in advance the most appropriate Item for each incident.

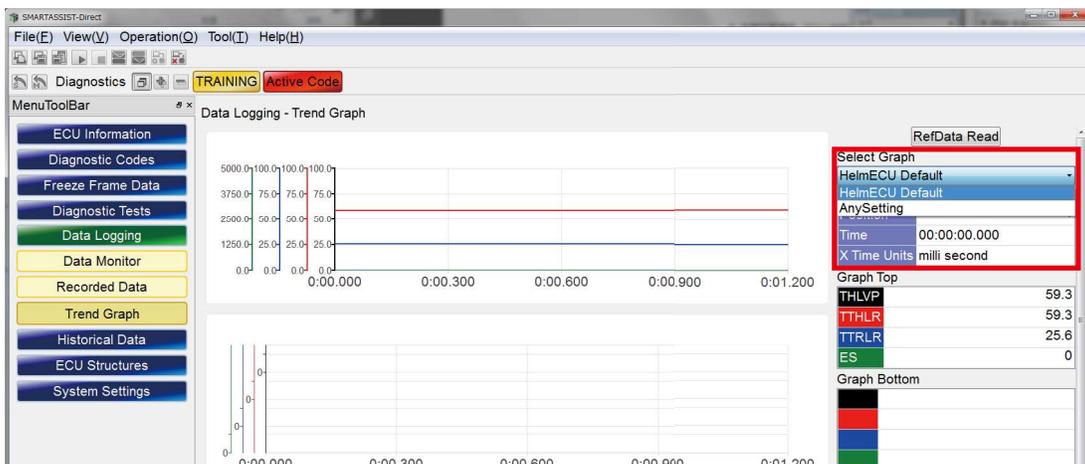


■ Package Data Set Selection

The Item is set from the selected analysis selection content.



The trend graph display selection is also set to the content set before the event by the package data.

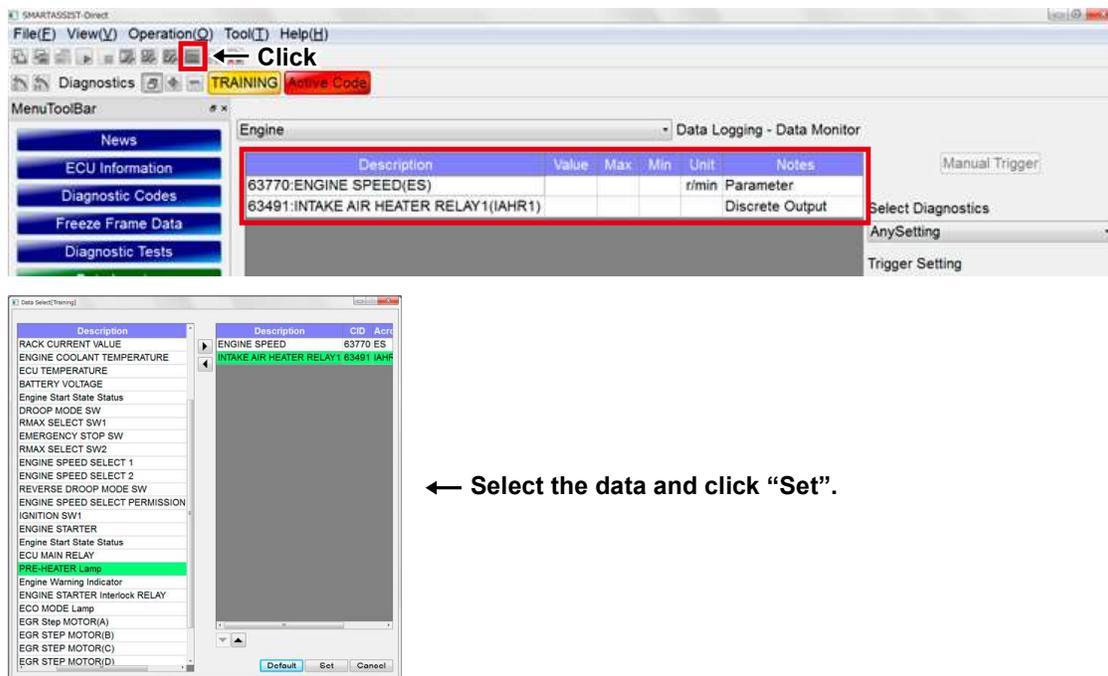


■ Setting User for Package Data Sets

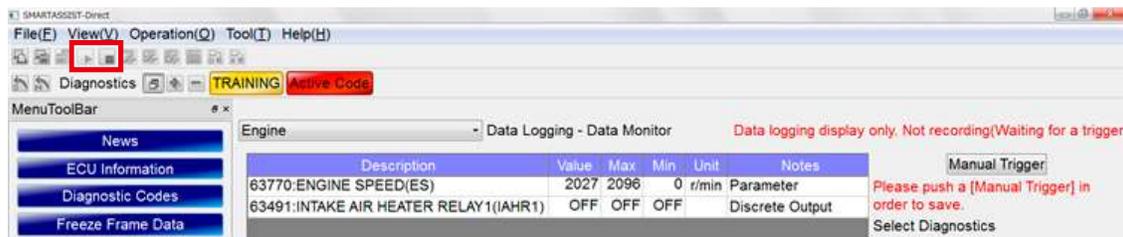
Package data can be created for each user.

(The user can be set at the time when data logging is executed as the data setting saving function.)

1 It is set arbitrarily with the Data Set button.



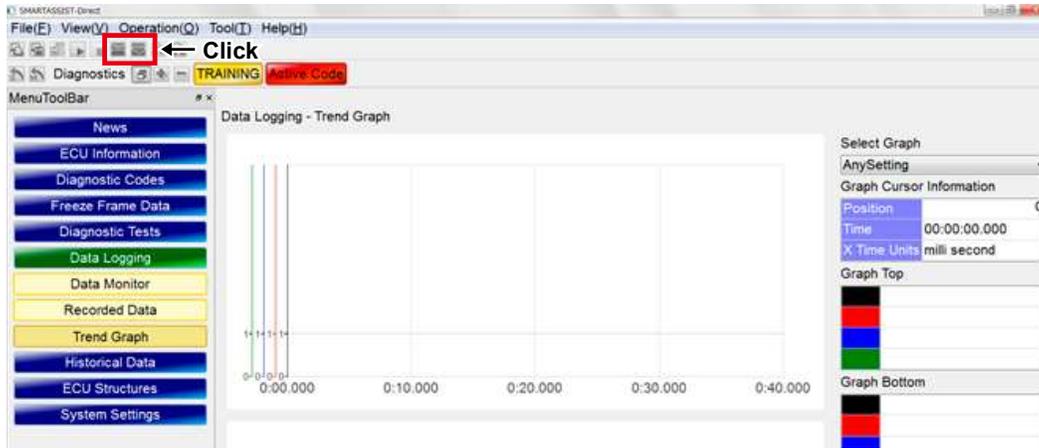
2 To check whether the setting is valid, conduct the measurement once under the usual conditions.



- ① Click the Start button.
- ② Use the manual or automatic trigger and do a measurement.
- ③ When necessary, press the Stop button to end the measurement.

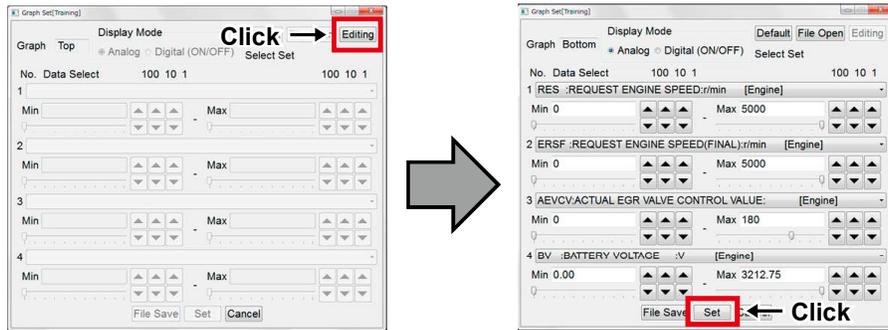
6. Error Diagnostic Function (ECU Access)

3 After the measurement, arbitrarily set the graph settings.



Note For package data sets created by the user, the graph can only be set to one kind.

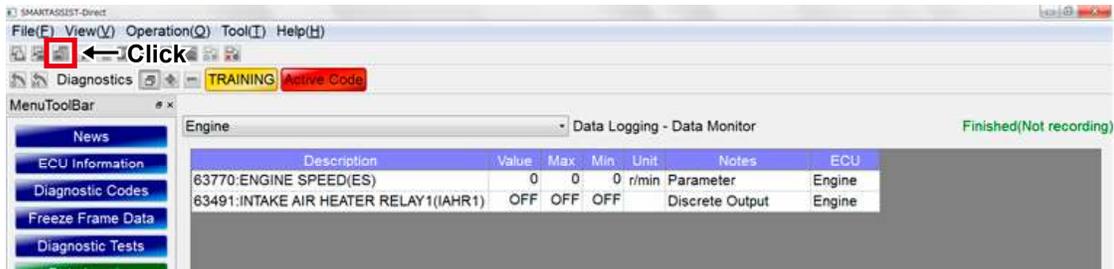
4 Click Editing button, arbitrarily set the graph settings, and click the SET button.



Point Click File Save to separately save only the graph settings. (This will not save the settings for the package data set.)

This is useful when saving multiple graph settings for the data set of one set.
For details, refer to [7.1 Error Diagnostic Data Save and Display Functions].

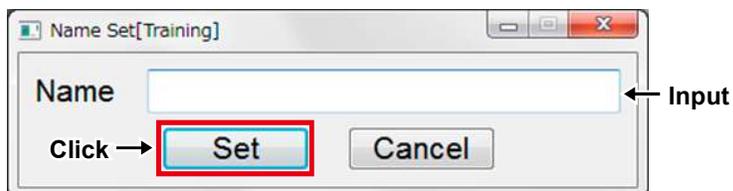
5 Click the "Meas data save" button that is activated on the data monitor screen and trend graph screen. (You may use either of the screens.)



- 6 The confirmation screen for the user setting file creation is displayed. Click **Yes**



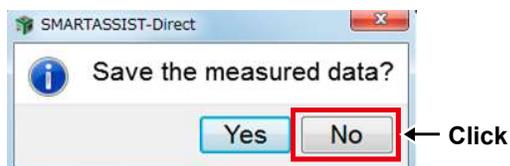
- 7 Enter the desired name for the setting file and click the **Set** button.



- 8 The end display is shown. Click **OK**



- 9 Then, the confirmation screen for saving the measurement data is displayed. If you wish to save only the settings, click **No**.



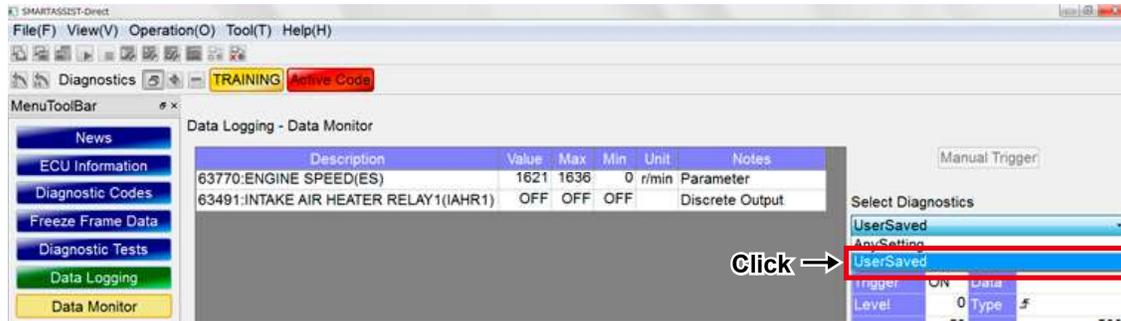
Note For details on how to save the measured data, refer to [7. Error Diagnostic Data Save and Display Functions].

6. Error Diagnostic Function (ECU Access)

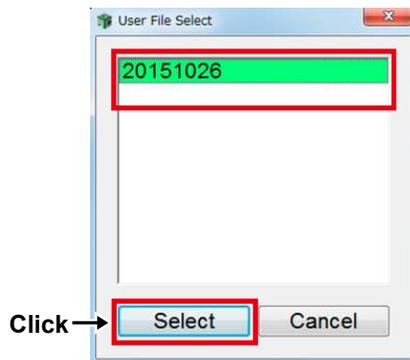
■ Package Data Set with User Settings Selection

Select the saved package data in the following manner.

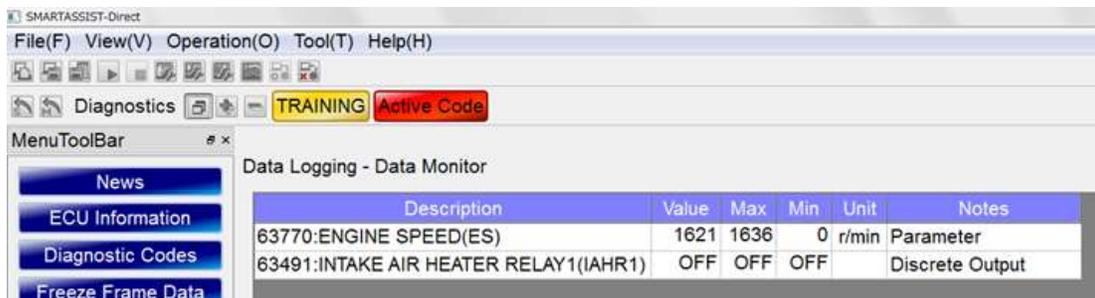
- 1 Click "User Saved" in the Analysis Selection window.



- 2 Refer to its name and select the settings file for the package data set, and click the **Select** button.



- 3 The data will be set according to the user settings.



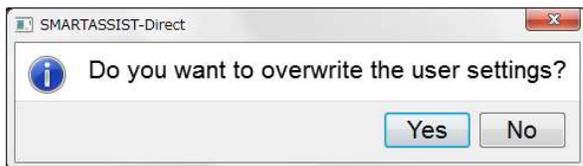
■ Package Data Set Editing

Edit the package data set in the following manner.

- Package Data Set in Advance within SMARTASSIST-Direct.

Cannot be edited (overwritten)

After selecting the package data and changing the data Item/graph display settings, create a new user setting to save the changes.



- Package Data Set with User Settings

Overwrite Saving

Can be edited (overwritten).

After selecting the package data and changing the data Item/graph display settings, press the "Meas Data Save" button to overwrite and a confirmation screen is displayed.

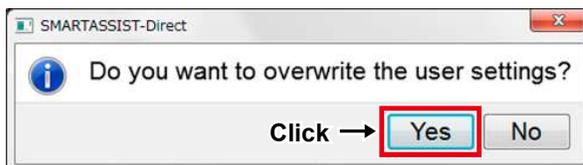
Click .



Save as New File

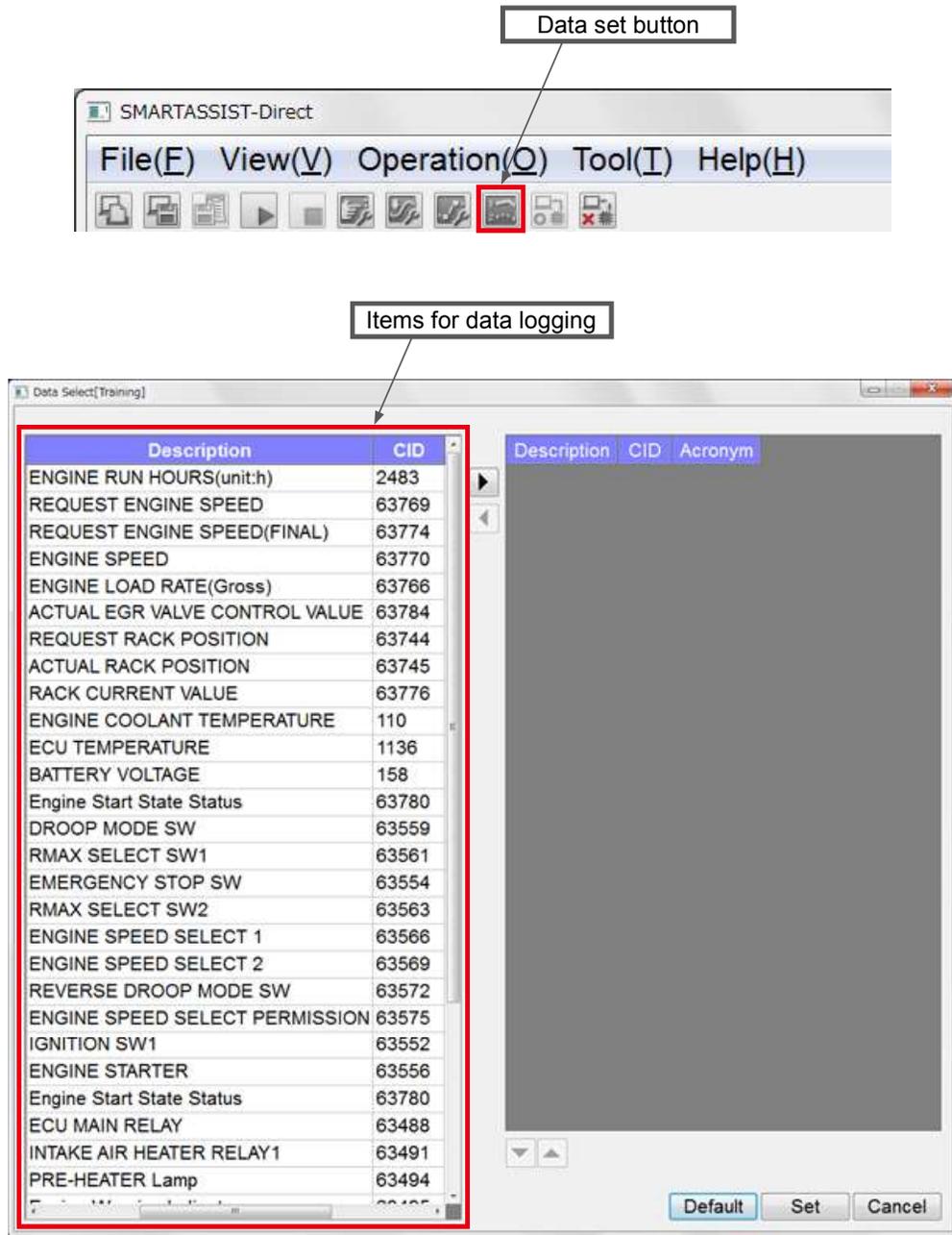
If you want to save the changed content separately, click "No" on the confirmation screen when asked to overwrite.

A confirmation to create a new file is displayed, so click .



6.6.8 Reference material: Data logging (Engine/2G Eco TNV series)

■ Data Set



* Item that are not displayed on this list can be set in the Data Logging Options (see below).

6. Error Diagnostic Function (ECU Access)

Select items to monitor

Click

The monitored items are listed.
(The PC may slow down if you select too many items. Pick 10 at a time.)

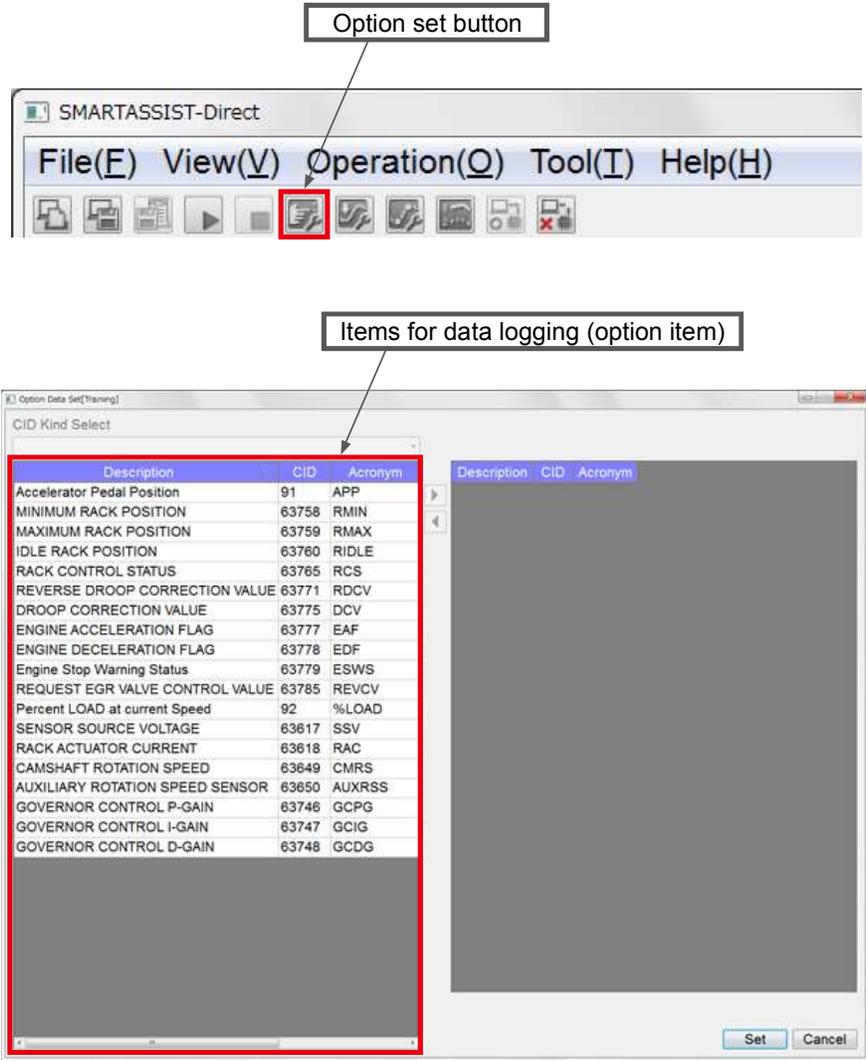
Click to automatically pick the top 10 items.

Description	CID
ENGINE RUN HOURS(unit:h)	2483
REQUEST ENGINE SPEED	63769
REQUEST ENGINE SPEED(FINAL)	63774
ENGINE SPEED	63770
ENGINE LOAD RATE(Gross)	63766
ACTUAL EGR VALVE CONTROL VALUE	63784
REQUEST RACK POSITION	63744
ACTUAL RACK POSITION	63745
RACK CURRENT VALUE	63776
ENGINE COOLANT TEMPERATURE	110
ECU TEMPERATURE	1136
BATTERY VOLTAGE	158
Engine Start State Status	63780
DROOP MODE SW	63559
RMAX SELECT SW1	63561
EMERGENCY STOP SW	63554
RMAX SELECT SW2	63563
ENGINE SPEED SELECT 1	63566
ENGINE SPEED SELECT 2	63569
REVERSE DROOP MODE SW	63572
ENGINE SPEED SELECT PERMISSION	63575
PRE-HEATER Lamp	63494

Click to confirm your entry.

Description	CID
ENGINE RUN HOURS(unit:h)	2483
REQUEST ENGINE SPEED	63769
REQUEST ENGINE SPEED(FINAL)	63774
ENGINE SPEED	63770
ENGINE LOAD RATE(Gross)	63766
ACTUAL EGR VALVE CONTROL VALUE	63784
REQUEST RACK POSITION	63744
ACTUAL RACK POSITION	63745
RACK CURRENT VALUE	63776
ENGINE COOLANT TEMPERATURE	110
ECU TEMPERATURE	1136
BATTERY VOLTAGE	158
Engine Start State Status	63780
DROOP MODE SW	63559
RMAX SELECT SW1	63561
EMERGENCY STOP SW	63554
RMAX SELECT SW2	63563
ENGINE SPEED SELECT 1	63566
ENGINE SPEED SELECT 2	63569
REVERSE DROOP MODE SW	63572
ENGINE SPEED SELECT PERMISSION	63575
IGNITION SW1	63552
ENGINE STARTER	63556
Engine Start State Status	63780
ECU MAIN RELAY	63488
INTAKE AIR HEATER RELAY1	63491
PRE-HEATER Lamp	63494

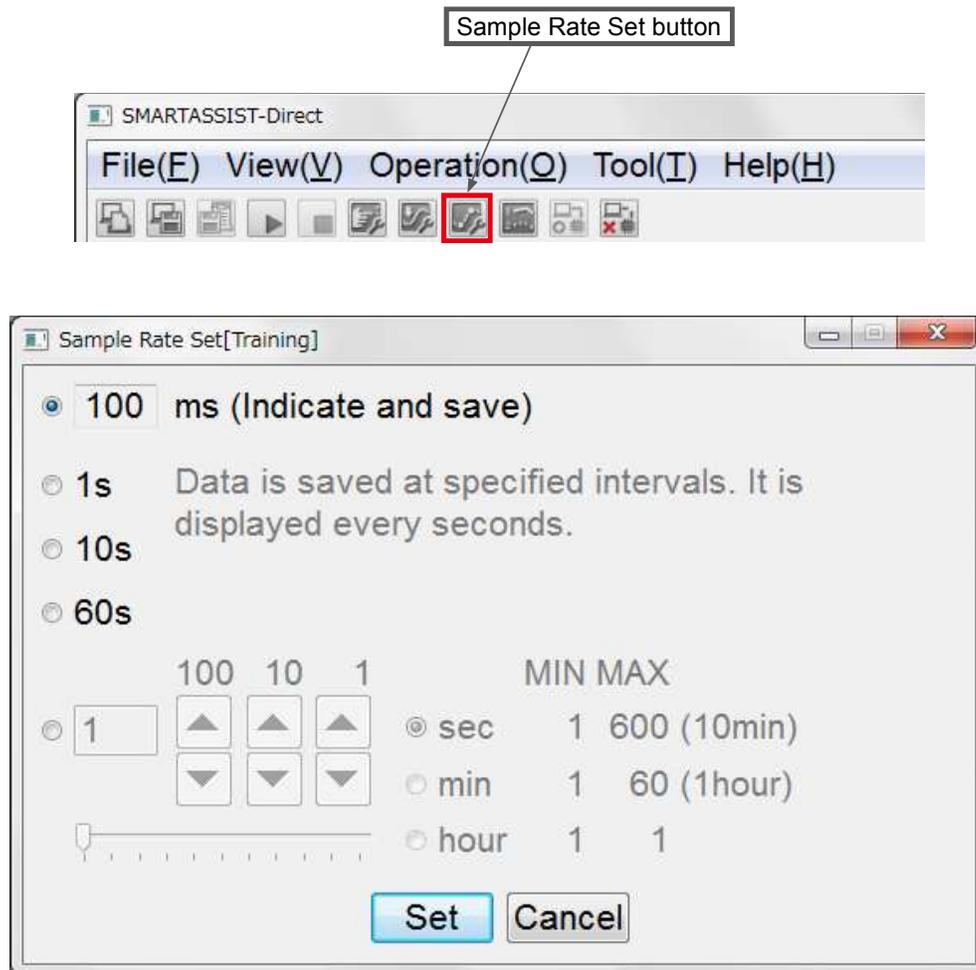
■Option Settings



■ Sampling Time Settings

* Normally, a change is not necessary.

Change if necessary.



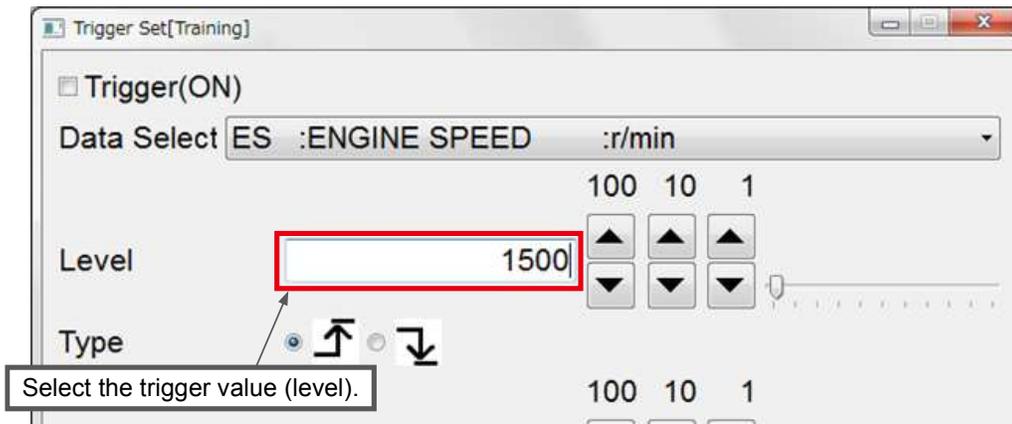
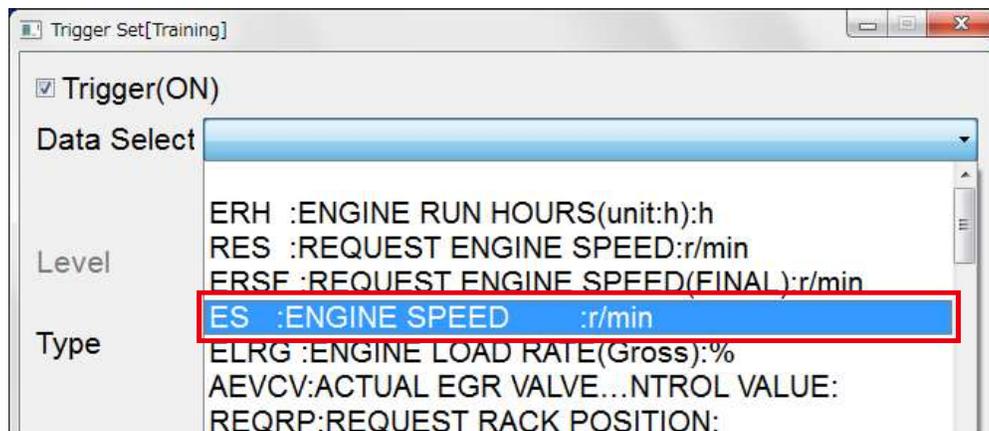
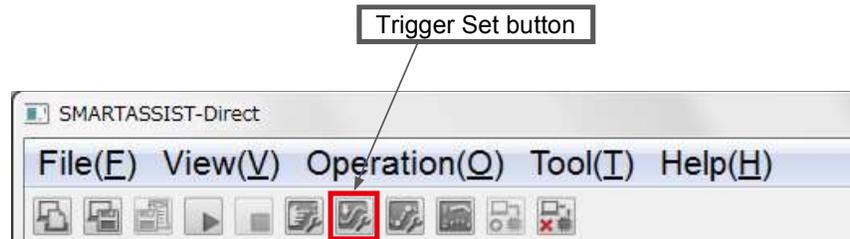
* The standard is 100 msec.

* On ECU that do not support a change, the other values are grayed-out.

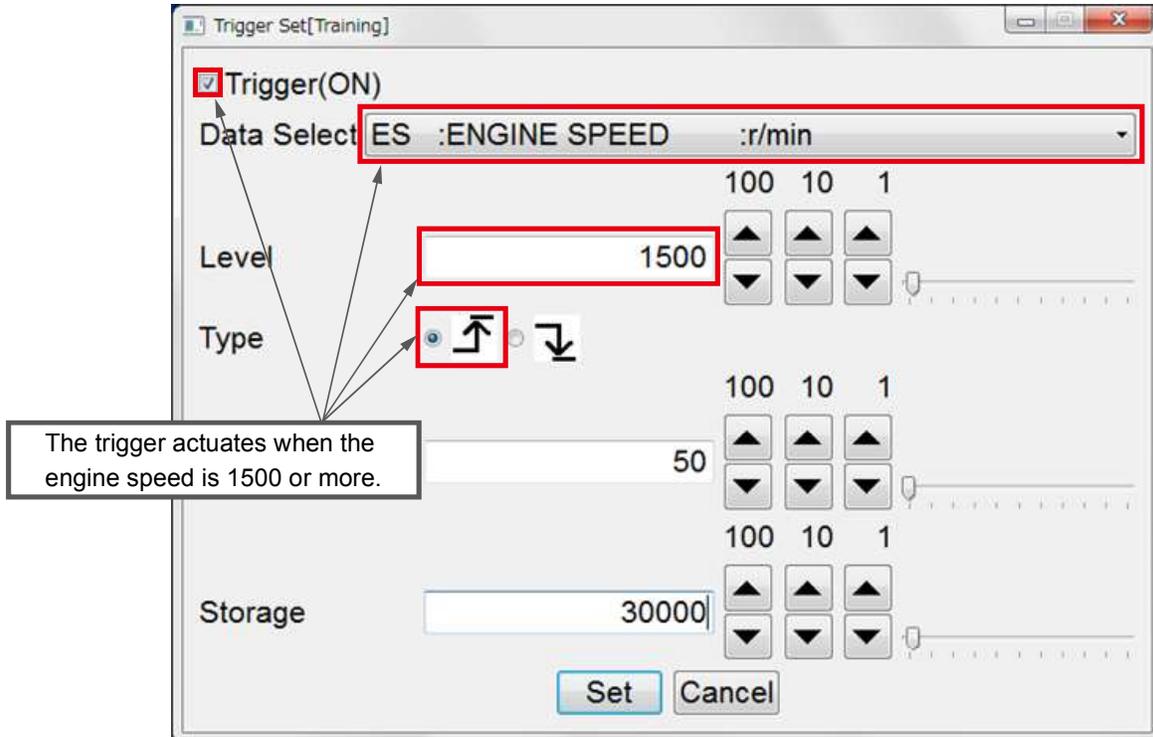
■ Trigger Setting

* Normally, a change is not necessary.

Change if necessary.



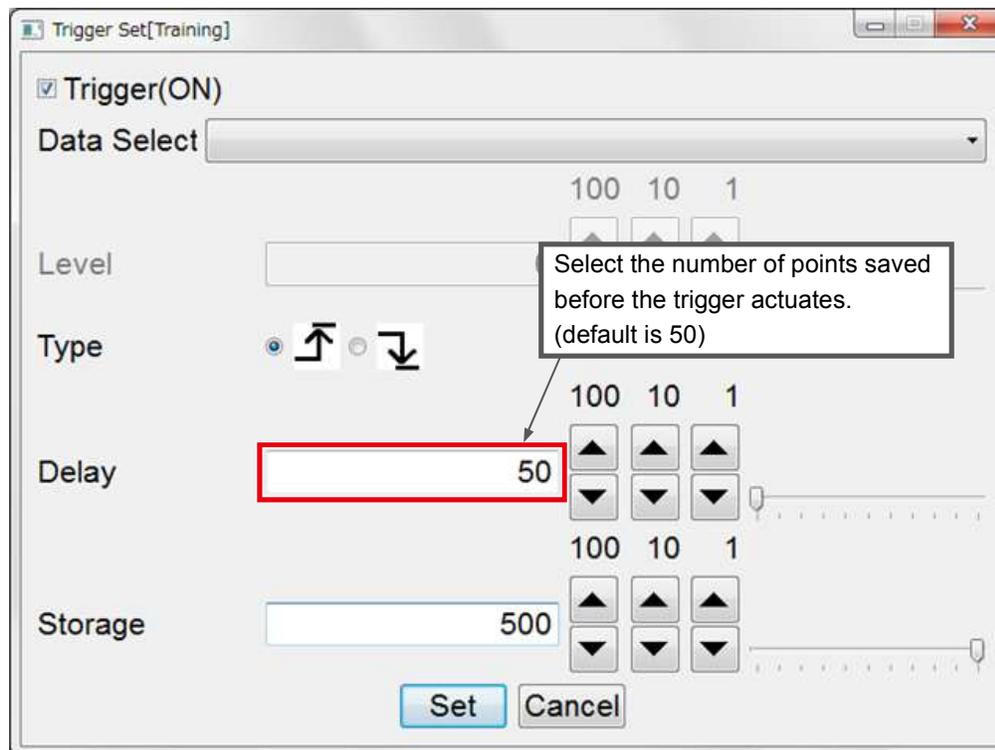
■Description of the Trigger Setting



In trigger mode, the values before the trigger is applied can be saved.

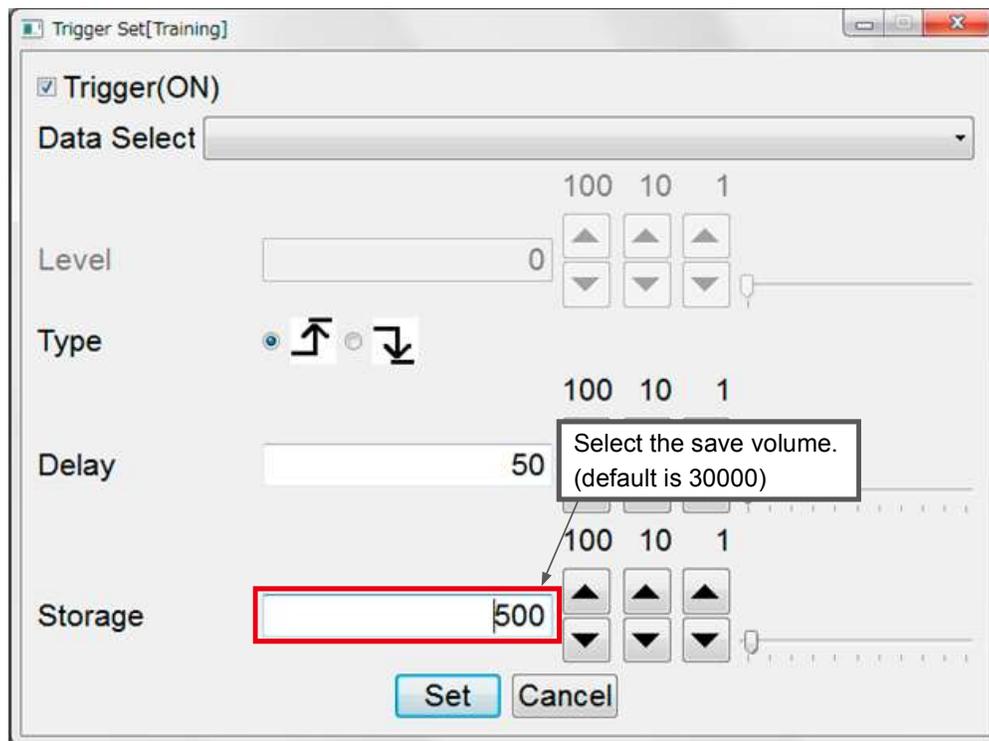
* Normally, a change is not necessary.

Change if necessary.



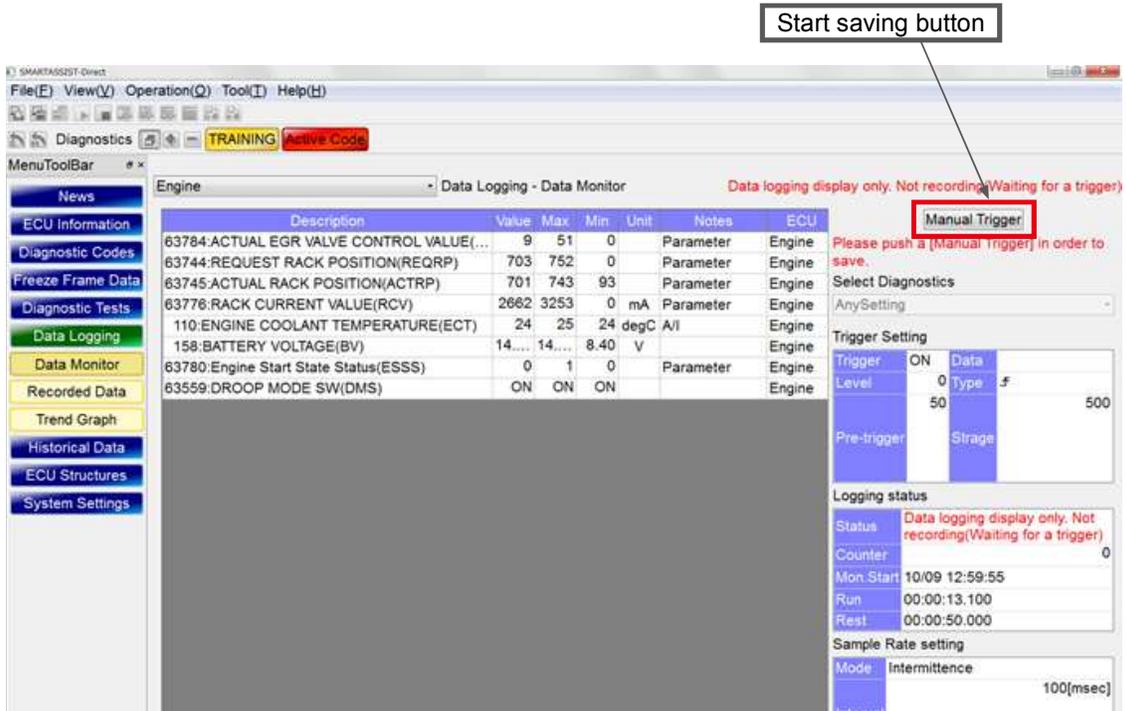
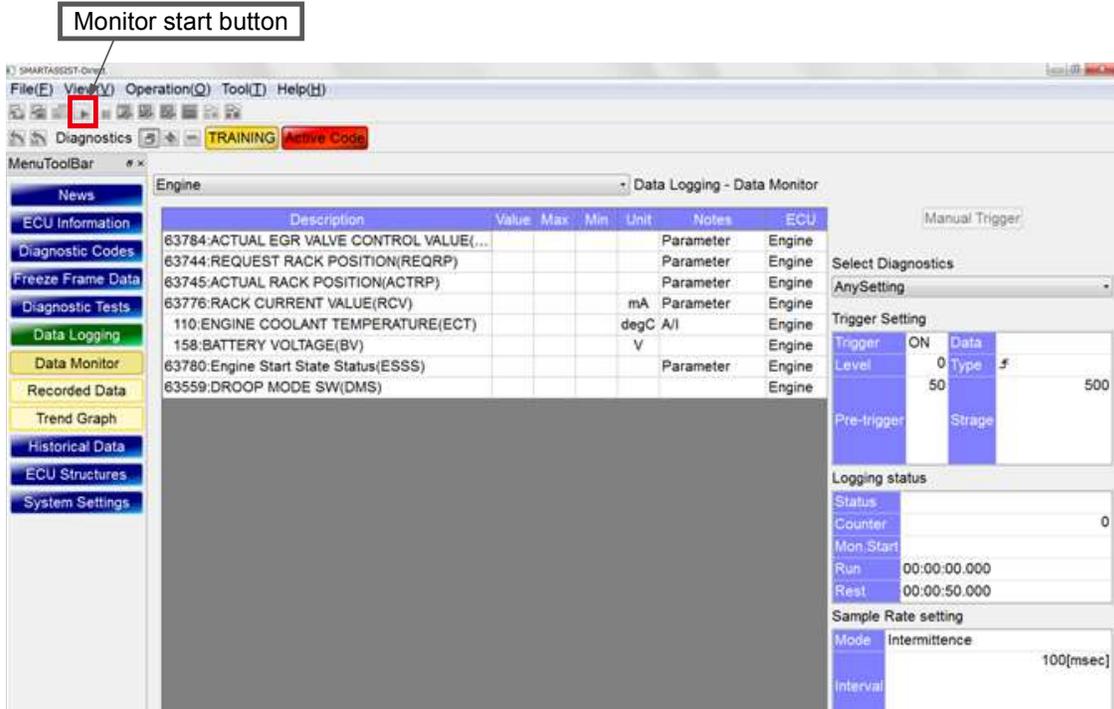
Example: If the sampling time is 100 msec, $50 \times 100 = 5000$ msec (5 sec), thus the values are saved from 5 seconds before the trigger is applied.

6. Error Diagnostic Function (ECU Access)



Example: If the sampling time is 100 msec, $500 \times 100 = 50000$ msec (50 sec), thus the values are saved from 50 seconds before the trigger is applied.

■ Data Monitor Save Function



6. Error Diagnostic Function (ECU Access)

SMARTASST-Direct

File(E) View(V) Operation(O) Tool(T) Help(H)

Diagnosics [TRAINING] Active Code

MenuToolBar # x

Engine - Data Logging - Data Monitor

Description	Value	Max	Min	Unit	Notes	ECU
63784:ACTUAL EGR VALVE CONTROL VALUE(...)	0	51	0		Parameter	Engine
63744:REQUEST RACK POSITION(REQRP)	465	752	0		Parameter	Engine
63745:ACTUAL RACK POSITION(ACRTP)	461	743	93		Parameter	Engine
63776:RACK CURRENT VALUE(RCV)	1887	3253	0	mA	Parameter	Engine
110:ENGINE COOLANT TEMPERATURE(ECT)	28	28	20	degC	A/I	Engine
158:BATTERY VOLTAGE(BV)	14....	14....	8.40	V		Engine
63780:Engine Start State Status(ESSS)	0	1	0		Parameter	Engine
63559:DROOP MODE SW(DMS)	ON	ON	ON			Engine

Manual Trigger

Select Diagnostics

AnySetting

Trigger Setting

Trigger	ON	Data	
Level	0	Type	f
Pre-trigger	50	Strage	500

Logging status

Status	Logging to memory
Counter	85
Mon-Start	10/09 12:59:55
Run	00:02:01.000
Rest	00:00:41.500

Sample Rate setting

Mode	Intermittence
Interval	100[msec]

Logging to memory

SMARTASST-Direct

File(E) View(V) Operation(O) Tool(T) Help(H)

Diagnosics [TRAINING] Active Code

MenuToolBar # x

Engine - Data Logging - Data Monitor

Description	Value	Max	Min	Unit	Notes	ECU
63784:ACTUAL EGR VALVE CONTROL VALUE(...)	0	51	0		Parameter	Engine
63744:REQUEST RACK POSITION(REQRP)	465	752	0		Parameter	Engine
63745:ACTUAL RACK POSITION(ACRTP)	461	743	93		Parameter	Engine
63776:RACK CURRENT VALUE(RCV)	1887	3253	0	mA	Parameter	Engine
110:ENGINE COOLANT TEMPERATURE(ECT)	28	28	20	degC	A/I	Engine
158:BATTERY VOLTAGE(BV)	14....	14....	8.40	V		Engine
63780:Engine Start State Status(ESSS)	0	1	0		Parameter	Engine
63559:DROOP MODE SW(DMS)	ON	ON	ON			Engine

Manual Trigger

Select Diagnostics

AnySetting

Trigger Setting

Trigger	ON	Data	
Level	0	Type	f
Pre-trigger	50	Strage	500

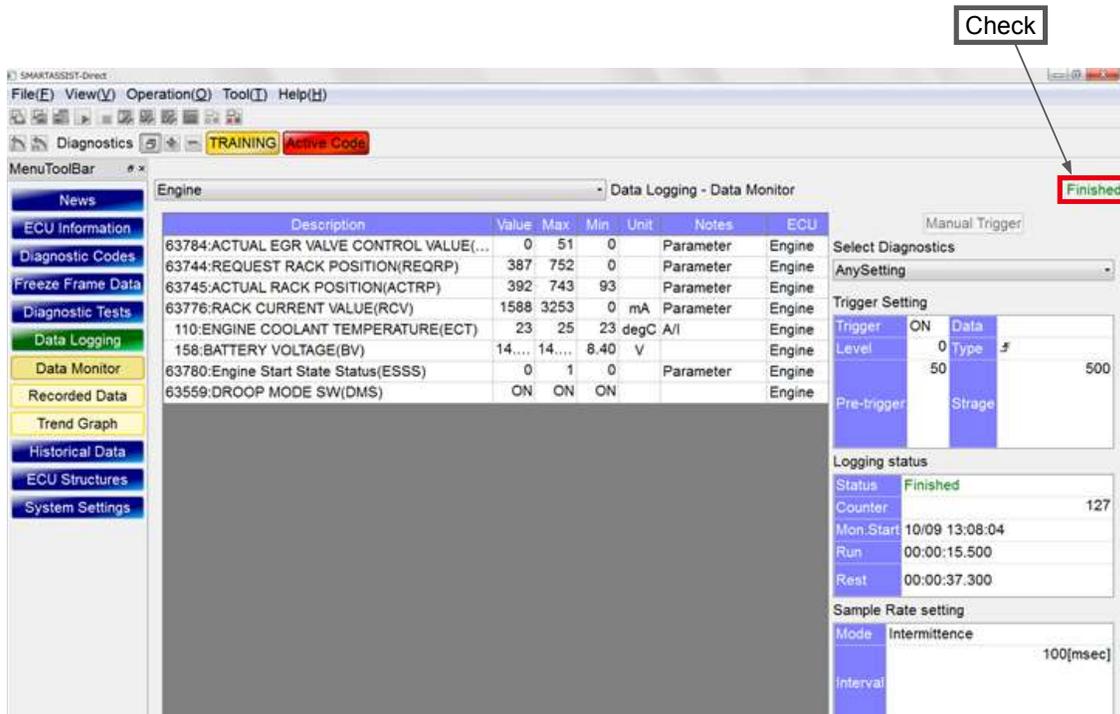
Logging status

Status	Logging to memory
Counter	85
Mon-Start	10/09 12:59:55
Run	00:02:01.000
Rest	00:00:41.500

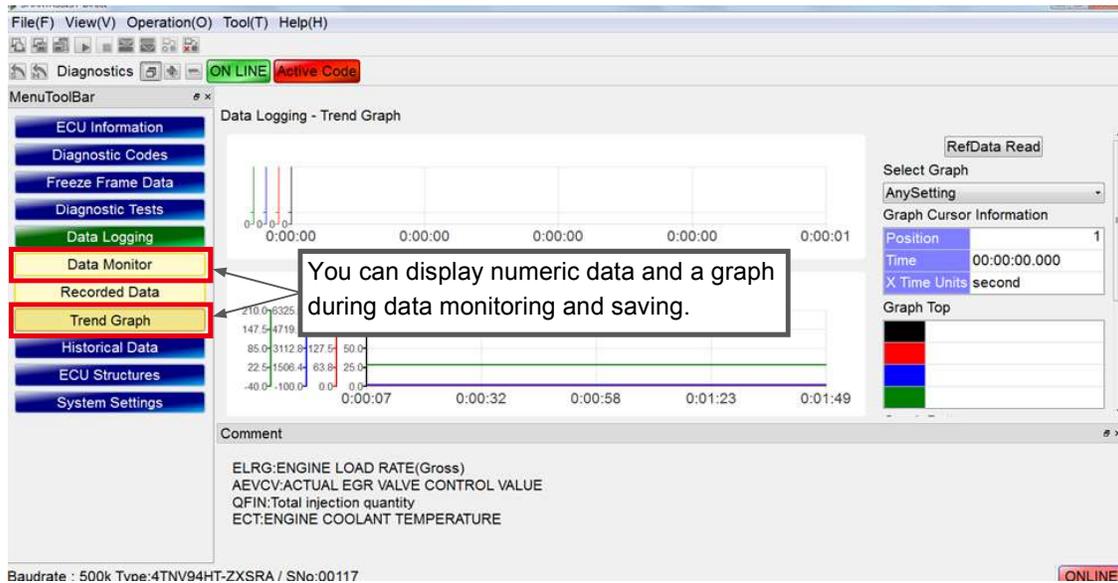
Sample Rate setting

Mode	Intermittence
Interval	100[msec]

Logging to memory



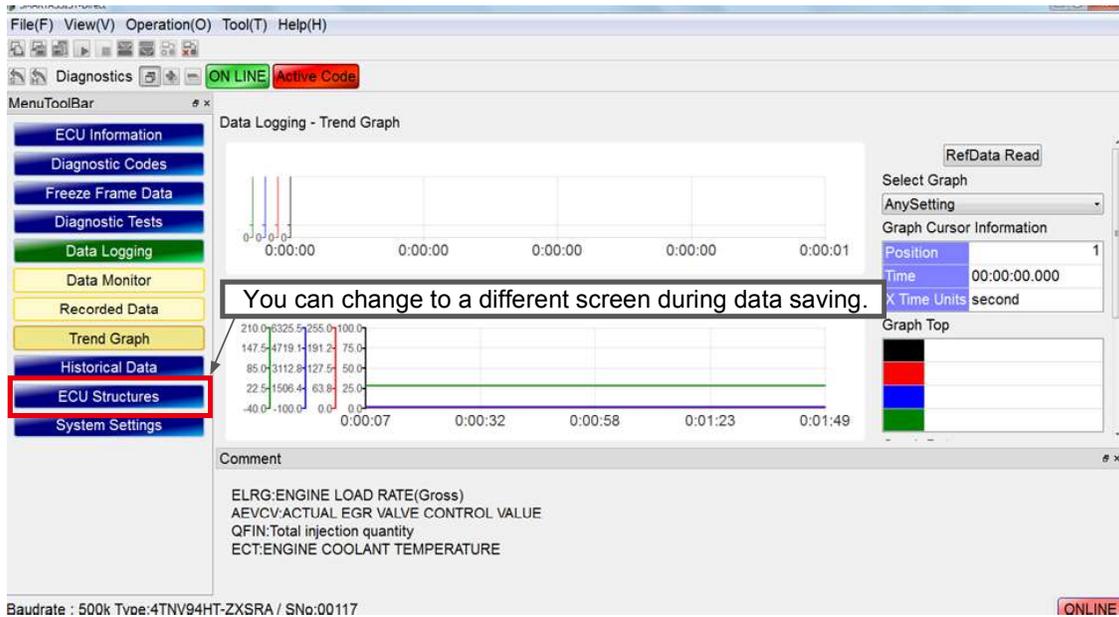
Switching Screens



■ Additional Function (Continued Data Saving)

If you switch to a different screen during data saving, the process stops temporarily.

But when returning to the Data Logging screen, the save process resumes automatically.



6.7 Historical Data

Display the product's operating data saved to the ECU/controller. There are submenus for the lifetime data, map table, and log data.

- Note**
- **The saved content is different for each product.**
 - **The historical data is saved in a precision range that does not affect the control of the product. Thus, use the historical data as a guideline.**

6.7.1 Lifetime Data Display

Displays these values: total operating hours, total time and speed etc. during alarms (status when operation is limited due to fault detection), total values and total mean values such as distance.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5  : Refresh the current data.

● Function Buttons

- 6  : Select the ECU/controller that is displayed.
- 7 **Clear Trip Time**  : Delete the data of the selected (checkmark) Item. After pushing the button **Selection Item Clear**, the password is confirmed.

Note If the clear box does not have a checkbox, the data cannot be deleted.

6. Error Diagnostic Function (ECU Access)

● Main Box

8 **Clear** : Box selected for deletion (click to insert checkmark)

9 **Description** : Save data

10 **Value** : Display total time

11 **Unit** : Value unit

12 **ECU** : ECU/controller where data is saved

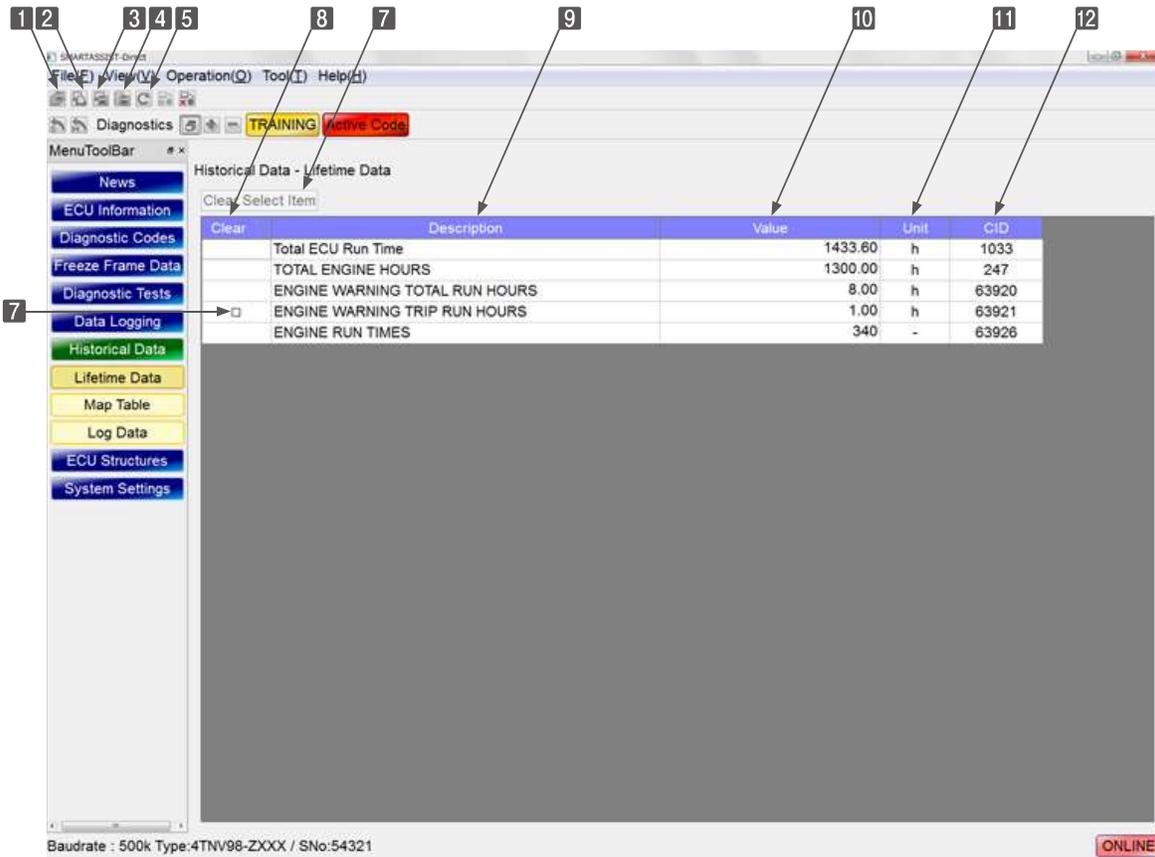


Figure 6-24 Total Time Display Screen

6.7.2 Map Table

Visualizes the operation status and displays a map table of the frequency information saved in the ECU/controller. The integrated data cannot be deleted. (E.g. the engine load pattern)

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5  : Refresh the current data.
- 6  : Open the adjustment subwindow; full scale of all axes is adjustable in 3 steps (25%, 50%, 100%).

● Function Buttons

- 7  : Select the displayed ECU/controller.
- 8  : Select the data that is displayed.

● Main Box

- 9 : Total operating hours under all loads and speeds
- 10 : Total operating hours for all lines (rows)
- 11 : Ratio for total operating hours for all lines (rows)
- 12 : Bar graph for all axes full scale

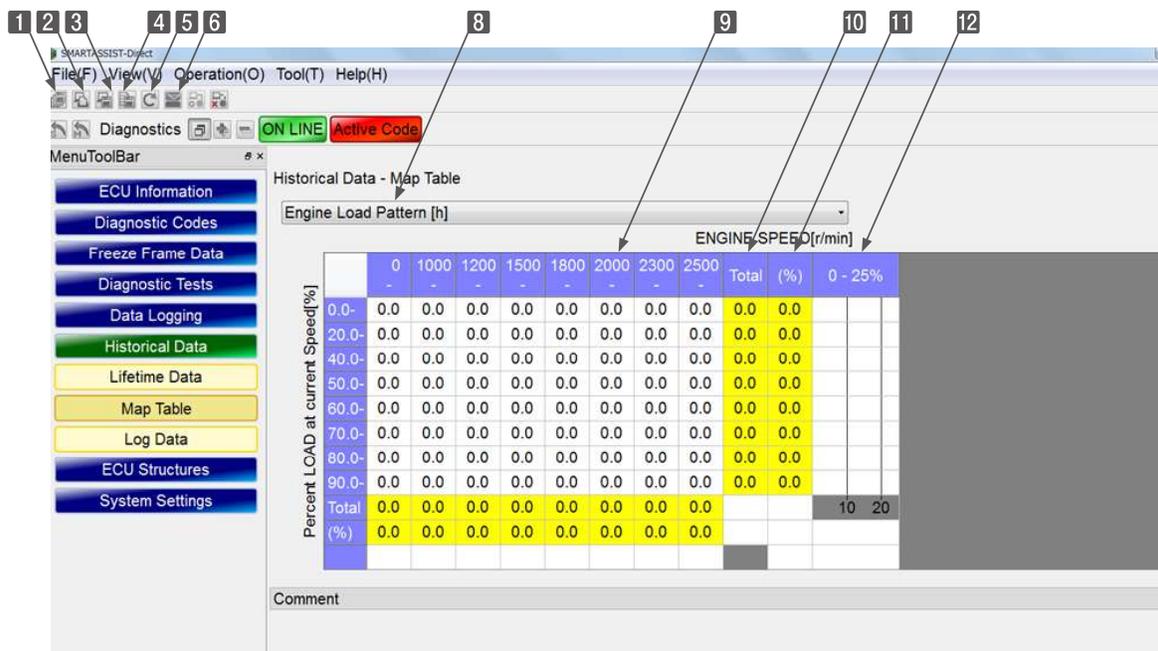


Figure 6-25 Map Table Screen

6. Error Diagnostic Function (ECU Access)

● Scale Change

Click **5** to open the below screen.

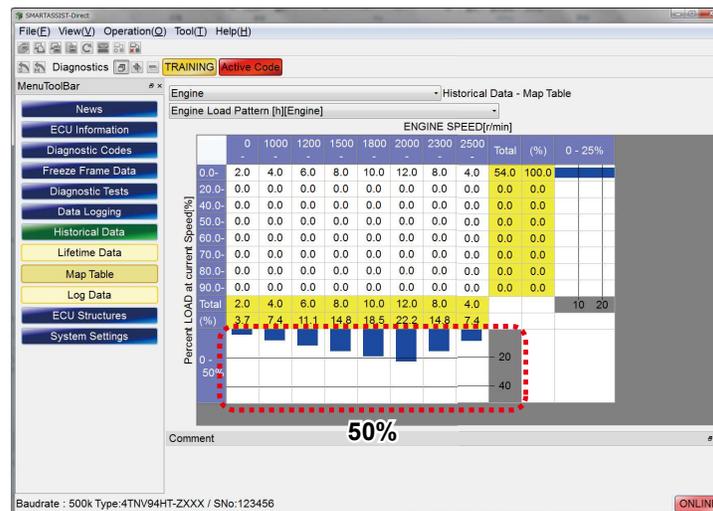
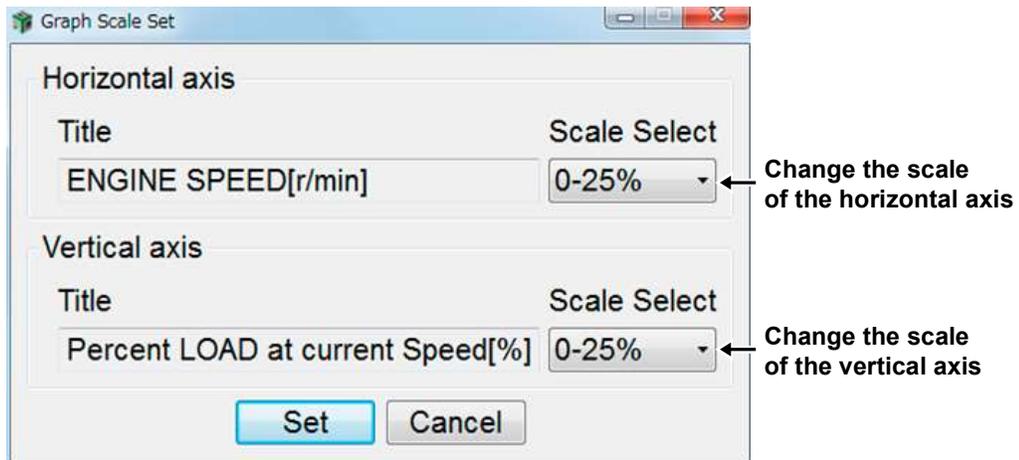


Figure 6-26 50% Example Display Screen

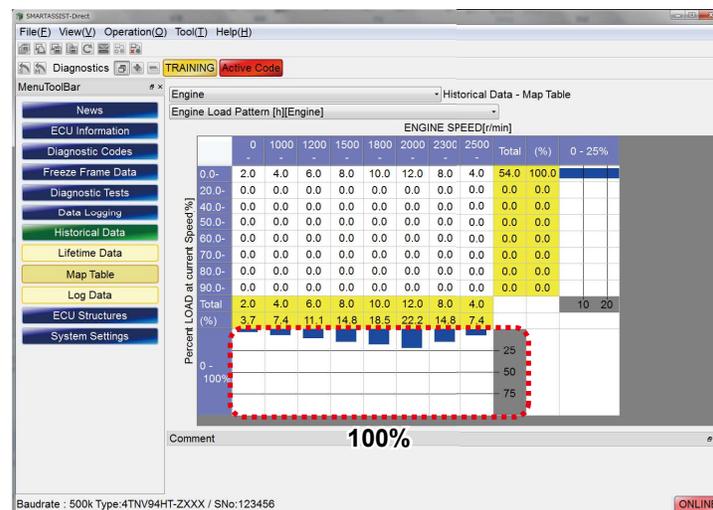


Figure 6-27 100% Example Display Screen

6.7.3 Log Data

The log data is displayed in two formats of save data.

- Total operating hours when the specified incident occurred
- Number of times and average value that the specified incident occurred during a certain range of operating hours

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5  : Refresh the current data.

● Main Box

- 6 : Display the number of the data.
- 7 : Display the factor of the specified Item separated in bits.
(By right-clicking, the data can be changed to "binary number", "decimal number" and "hexadecimal number".)
- 8 : Display the operating hours at the time of the incident

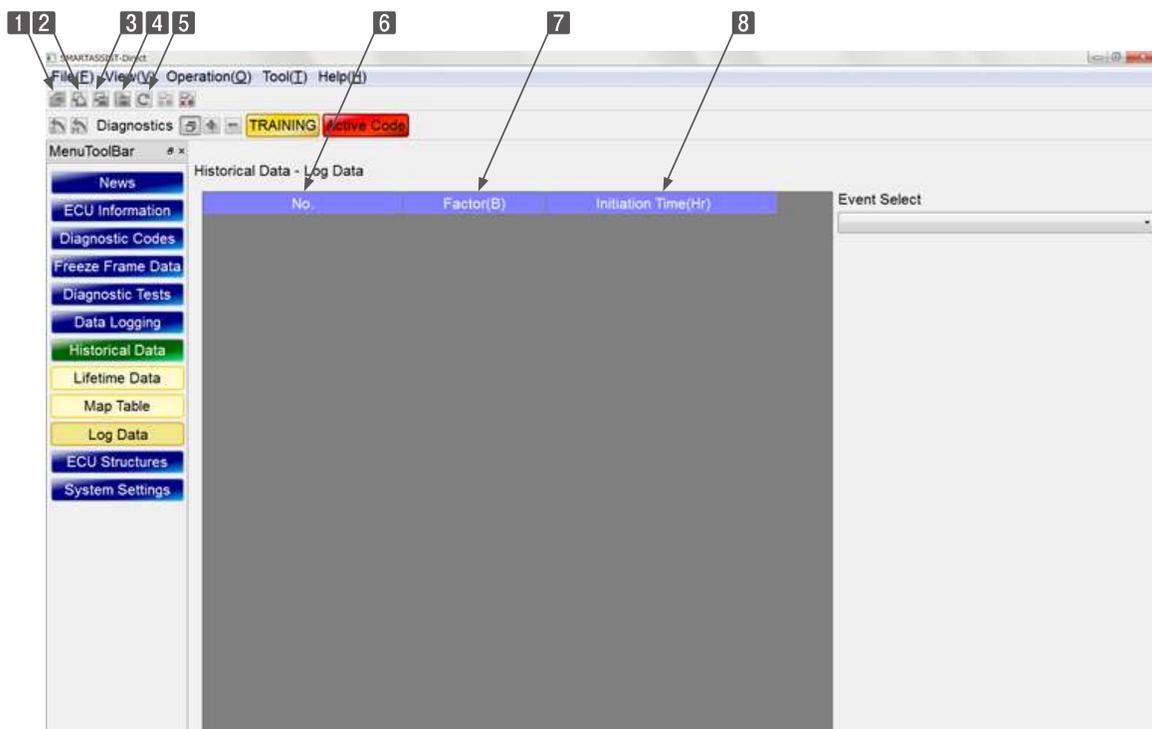


Figure 6-28 Log Data Screen

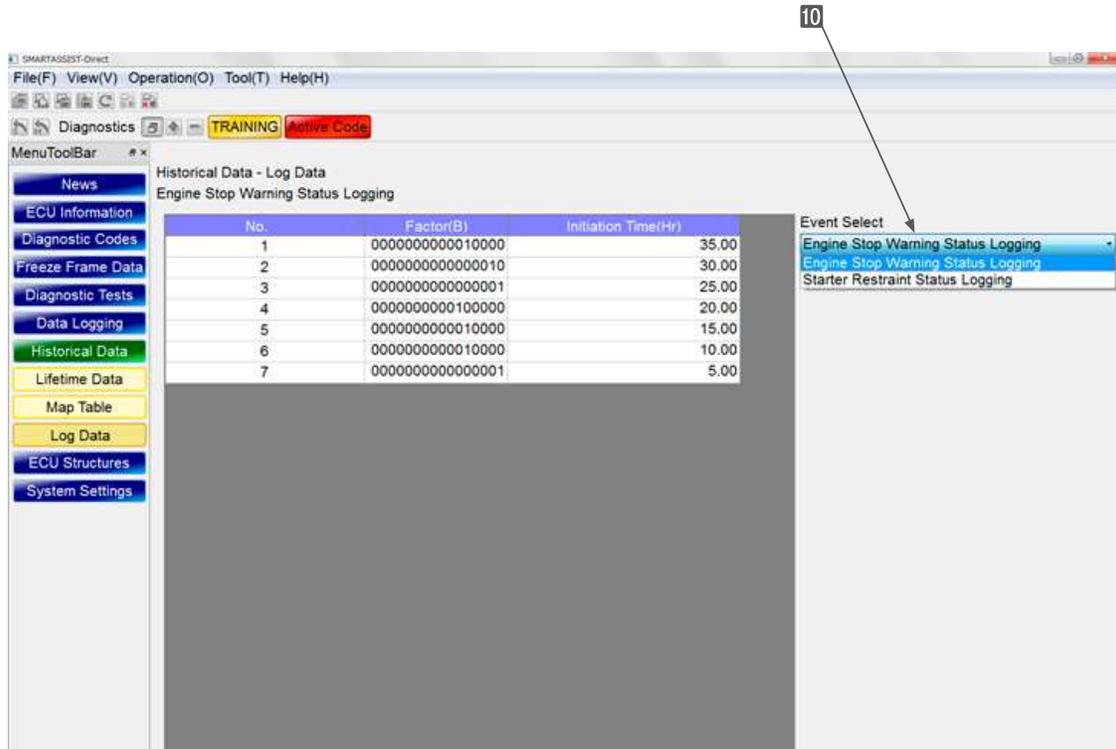
6. Error Diagnostic Function (ECU Access)

● Event Select

9 : Select the displayed ECU/controller.

10 : Select the data saved to the ECU/controller selected at 9.

If no data has been saved, an empty box is displayed.



Example for binary display

No.	Factor(B)	Initiation Time(Hr)
1	0100100000000000	0.00
2	0100100000000000	0.00

Example for decimal display

No.	Factor(D)	Initiation Time(Hr)
1	18432	0.00
2	18432	0.00

Example for hexadecimal display

No.	Factor(H)	Initiation Time(Hr)
1	4800	0.00
2	4800	0.00

● Example incident data for TNV series engine

Starter Restraint Status Logging
(Engine)

: Click to display in the main box a recording of the incident cause that occurred when the engine stopped.

Engine Stop Warning Status Logging
(Engine)

: Click to display in the main box a recording of the incident cause that occurred when the starter restraint actuated.

6.8 ECU Structures

This function displays the ID information of the product's electronic control system/ECU/controller and the distribution of the ECU input/output channel.

6.8.1 Analog Channels

This screen is mainly used for communication between developers and the development department.

Information such as units, scaling, and channel information of the analog channels is displayed.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])

● Function Buttons

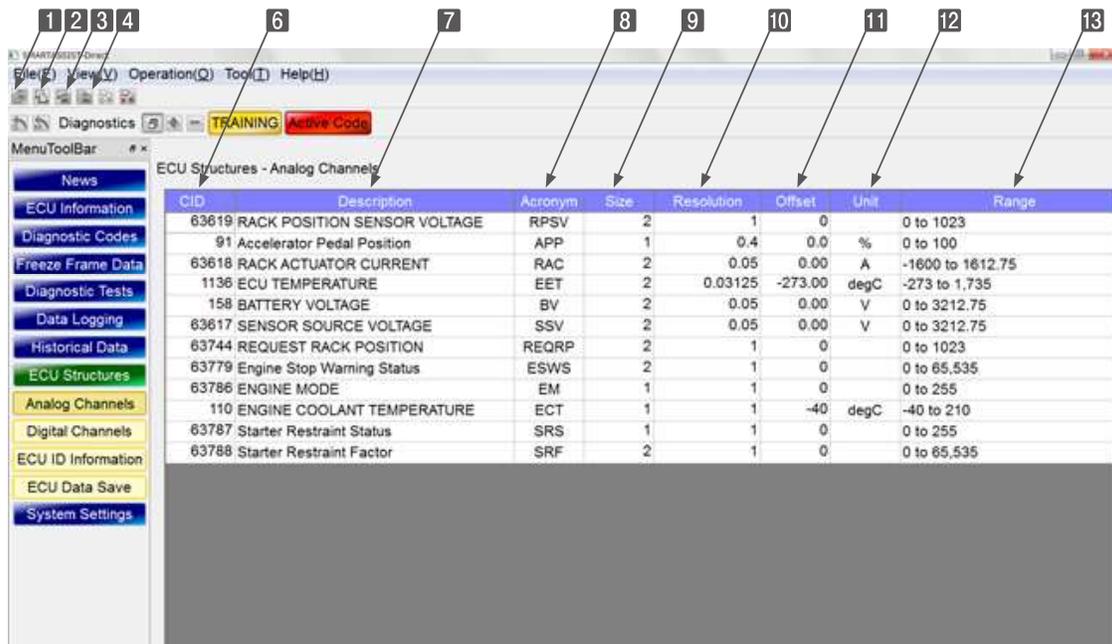
- 5 : Select the displayed ECU/controller.

● Main Box

- 6 : Used as common ID number for SAE J1939 compliant parameters
- 7 : Contents of sensors, signals etc.
- 8 : Abbreviation number (SAE compliant)
- 9 : Data Length
- 10 : Resolution
- 11 : Offset
- 12 : Unit
- 13 : Range

● Comment Box

- 14 Comment: Display information for the selected line (colored in green).



CID	Description	Acronym	Size	Resolution	Offset	Unit	Range
63619	RACK POSITION SENSOR VOLTAGE	RPSV	2	1	0		0 to 1023
91	Accelerator Pedal Position	APP	1	0.4	0.0	%	0 to 100
63618	RACK ACTUATOR CURRENT	RAC	2	0.05	0.00	A	-1600 to 1612.75
1136	ECU TEMPERATURE	EET	2	0.03125	-273.00	degC	-273 to 1,735
158	BATTERY VOLTAGE	BV	2	0.05	0.00	V	0 to 3212.75
63617	SENSOR SOURCE VOLTAGE	SSV	2	0.05	0.00	V	0 to 3212.75
63744	REQUEST RACK POSITION	REQRP	2	1	0		0 to 1023
63779	Engine Stop Warning Status	ESWS	2	1	0		0 to 65,535
63786	ENGINE MODE	EM	1	1	0		0 to 255
110	ENGINE COOLANT TEMPERATURE	ECT	1	1	-40	degC	-40 to 210
63787	Starter Restraint Status	SRS	1	1	0		0 to 255
63788	Starter Restraint Factor	SRF	2	1	0		0 to 65,535

Figure 6-29 Analog Channels Screen

6.8.2 Digital Channels

This screen is mainly used for communication between developers and the development department. It displays information such as acceptance or rejection of the forced output for output, logic, and channel information of the contact input/output signal.

● Operation Tool Bar

- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5 : Refresh the current data.

● Function Buttons

- 6 : Select the displayed ECU/controller.

● Main Box

- 7 : Input/output division
- 8 : ID numbers for SAE J1939 compliant parameters
- 9 : Contents of sensors, signals etc.
- 10 : Abbreviation number (SAE compliant)
- 11 : Byte position of data
- 12 : Bit position of data
- 13 : Logic reversal
- 14 : Authorization mask for active control (0 means no change possible)

● Comment Box

- 15 Comment: Display information for the selected line (colored in green).

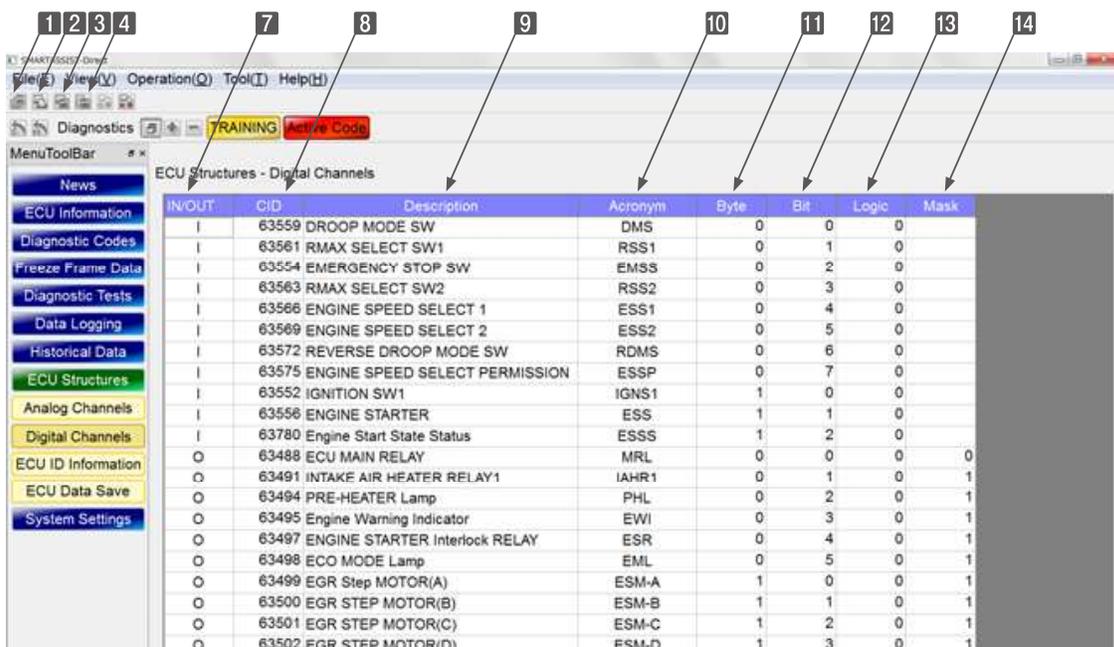


Figure 6-30 Digital Channels Screen

6.8.3 ECU ID Information

Displays detailed ID information for each ECU/controller. (Related to "Summary Information" of "ECU Information")

● Operation Tool Bar

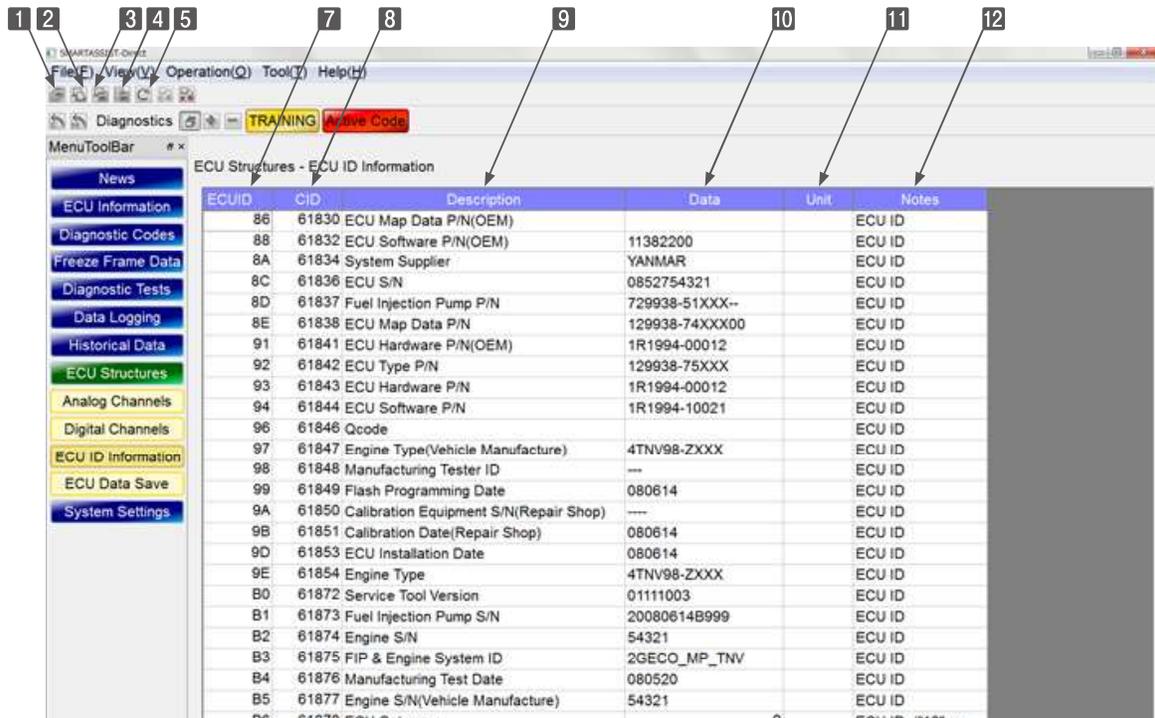
- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5  : Refresh the current data.

● Function Buttons

- 6  : Select the displayed ECU/controller.

● Main Box

- 7 : Management number for the data saved in the ECU
- 8 : Management number for the data called common ID
- 9 : Item name that is displayed
- 10 : Item content
- 11 : Unit
- 12 : Annotation box



ECUID	CID	Description	Data	Unit	Notes
86	61830	ECU Map Data P/N(OEM)			ECU ID
88	61832	ECU Software P/N(OEM)	11382200		ECU ID
8A	61834	System Supplier	YANMAR		ECU ID
8C	61836	ECU S/N	0852754321		ECU ID
8D	61837	Fuel Injection Pump P/N	729938-51XXX--		ECU ID
8E	61838	ECU Map Data P/N	129938-74XXX00		ECU ID
91	61841	ECU Hardware P/N(OEM)	1R1994-00012		ECU ID
92	61842	ECU Type P/N	129938-75XXX		ECU ID
93	61843	ECU Hardware P/N	1R1994-00012		ECU ID
94	61844	ECU Software P/N	1R1994-10021		ECU ID
96	61846	Qcode			ECU ID
97	61847	Engine Type(Vehicle Manufacture)	4TNV98-ZXXX		ECU ID
98	61848	Manufacturing Tester ID	---		ECU ID
99	61849	Flash Programming Date	080614		ECU ID
9A	61850	Calibration Equipment S/N(Repair Shop)	----		ECU ID
9B	61851	Calibration Date(Repair Shop)	080614		ECU ID
9D	61853	ECU Installation Date	080614		ECU ID
9E	61854	Engine Type	4TNV98-ZXXX		ECU ID
B0	61872	Service Tool Version	01111003		ECU ID
B1	61873	Fuel Injection Pump S/N	20080614B999		ECU ID
B2	61874	Engine S/N	54321		ECU ID
B3	61875	FIP & Engine System ID	2GECO_MP_TNV		ECU ID
B4	61876	Manufacturing Test Date	080520		ECU ID
B5	61877	Engine S/N(Vehicle Manufacture)	54321		ECU ID
B6	61878	ECU Category			ECU ID

Figure 6-31 ECU ID Information Screen

6.8.4 ECU Data Save

Saves the previously made settings in CSV format. The settings include correction values, adjustment values, initialization values and ECU ID information that are saved in the ECU.

Note This function is different from **1 Saving the ECU's screen display data.**

● **Operation Tool Bar**

- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 5 : Refresh the current data.

● **Function Buttons**

- 6 : Select the displayed ECU/controller.

● **Main Box**

- 7 **Browse** : Calls up a report format that contains the settings which data Items are saved. This function is mainly used by developers. It is not necessary to change it during service work. You can select whether to save "only data" or save "with title".

	A
1	4TNV98-ZNSA
2	729939-51390--
3	129988-75000
4	54686
5	20070914B080
6	680000065
7	1
8	2
9	3
10	4

Example "only data"

	A	B	C
1	Engine Type(Vehicle Manufacture)		4TNV98-ZNSA
2	Fuel Injection Pump P/N		729939-51390--
3	ECU Type P/N		129988-75000
4	Engine S/N		54686
5	Fuel Injection Pump S/N		20070914B080
6	ECU S/N		680000065
7	Pump	PUMP POWER COMPENSATION 1	1
8		PUMP POWER COMPENSATION 2	2
9		PUMP POWER COMPENSATION 3	3
10		PUMP POWER COMPENSATION 4	4

Example "with title"

- 8 **Title** : Display the title.
- 9 **Sub Title** : Display the sub-title.
- 10 **Value** : Display the data values.

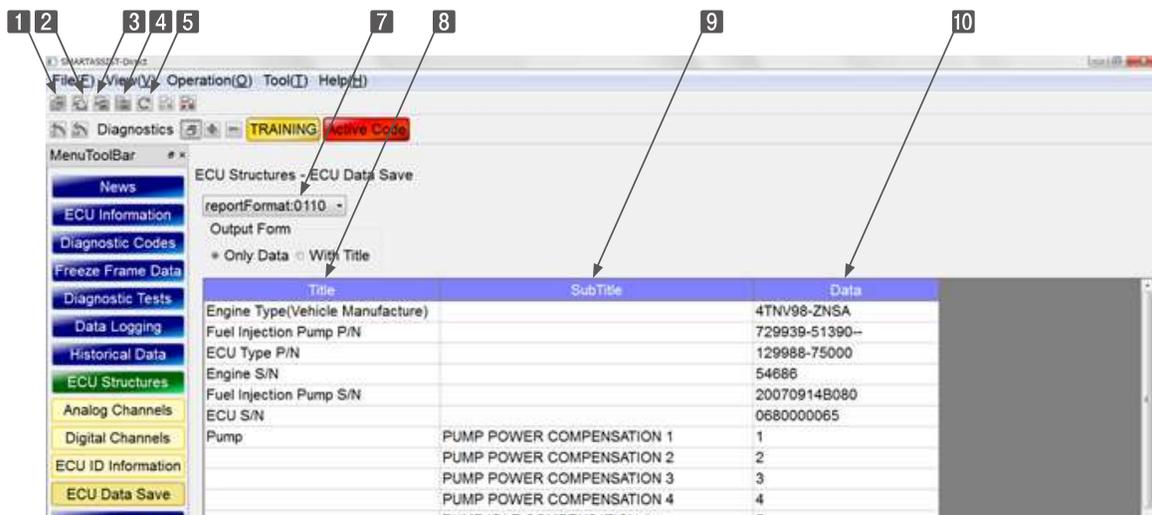


Figure 6-32 ECU Data Save Screen

6.9 System Settings

This function allows you to change the settings necessary for replacing, repairing and adjusting the ECU/controller, fuel injection pump, fuel injection valve (injector), and all sensors and switches after mounting and installation of the product. It has the submenus "Configuration", "Calibration", "Tuning", and "Initial Settings". You can create a report file after finishing the settings.

Important Follow the instructions in the technical manuals of the relevant product when changing values with any functions within the system settings. If you change settings without due care, the product might stop working or the performance may decrease.

6.9.1 Configuration

You can backup and write the settings and setting values of the product's basic functions.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the screen data in CSV format. (Refer to [6.2.4])

● Function Buttons

- 5  : Select the displayed ECU/controller.
- 6 **Exchanges**  :
 - This function saves the initial settings saved in the ECU and the correction values (ECU Data Backup (ECU to PC)) and writes these settings and values to the PC.
 - This function writes the correction values of the fuel injection pump to the ECU after it was replaced.

The function by this button is the same as for the ECU Exchange (Execution), part replacement and adjustment, and it is in the location as in YDT, the predecessor to SMARTAS-SIST-Direct.

Refer to the relevant page for instructions.

6. Error Diagnostic Function (ECU Access)

● Main Box

The adjustable Items are listed.

7 **Description** : Display the setting Items.

8 **Value** : Clicking the blue digits of the current setting value opens a window to change the setting value. To make the change, it is necessary to enter the password.

9 **Notes** : Reference information for the setting entry is displayed.

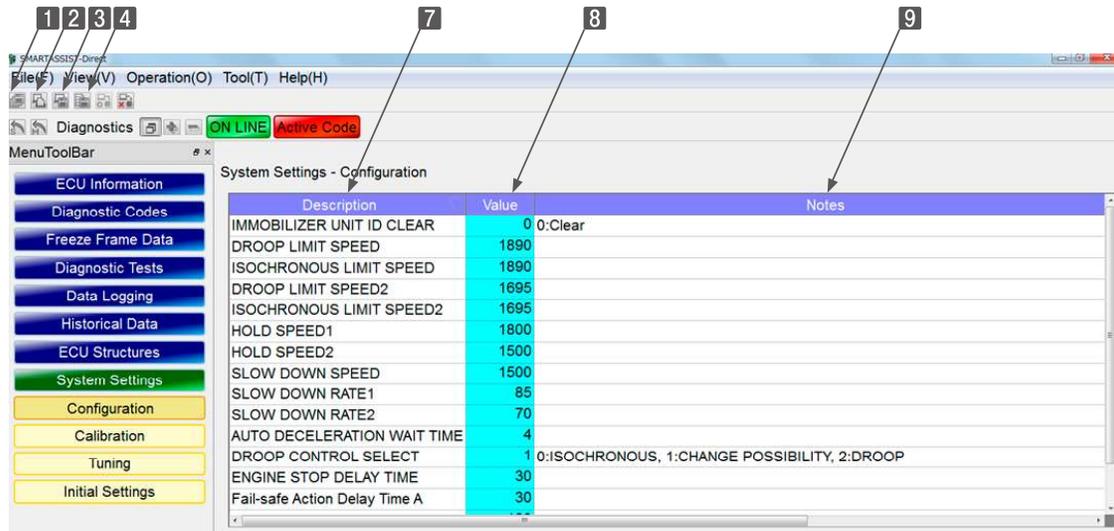


Figure 6-33 Configuration Screen

● Subwindow

10 **Set To** : Display the setting values.

11 **▲ / ▼** : Adjust the settings.

12 **Set** : Confirm the settings value.

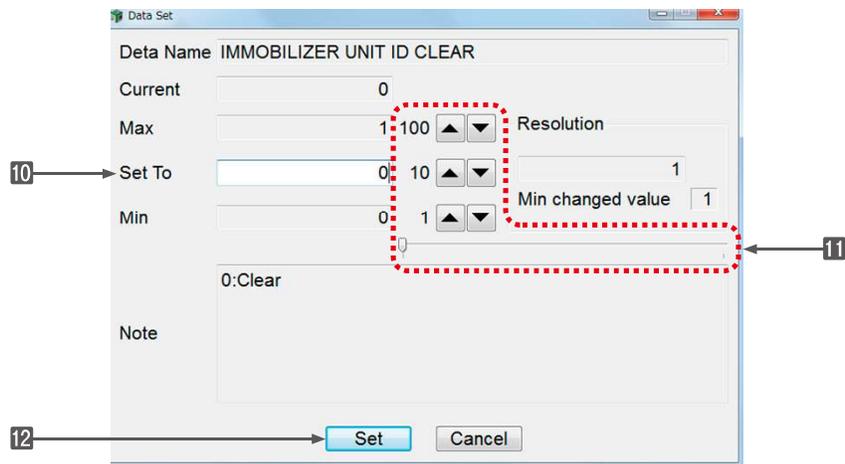


Figure 6-34 Example Change Screen

6.9.2 Calibration

This function allows adjusting the standard position for sensors such as the accelerator position sensor.

Note When using this function, refer to the service manual and technical information of the relevant product.

● Operation Tool Bar

- 1  : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions].)
- 2  : Print the screen. (Refer to [6.2.2])
- 3  : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4  : Save the screen data in CSV format. (Refer to [6.2.4])

● Function Buttons

- 5  : Select the displayed ECU/controller.

● Main Box

The adjustable Items are listed.

- 6 : Display the correction category.
- 7 : Display the current offset quantity. Clicking opens a window to change the quantity. To apply the change, click "Set".
- 8 : Display the relevant comment.

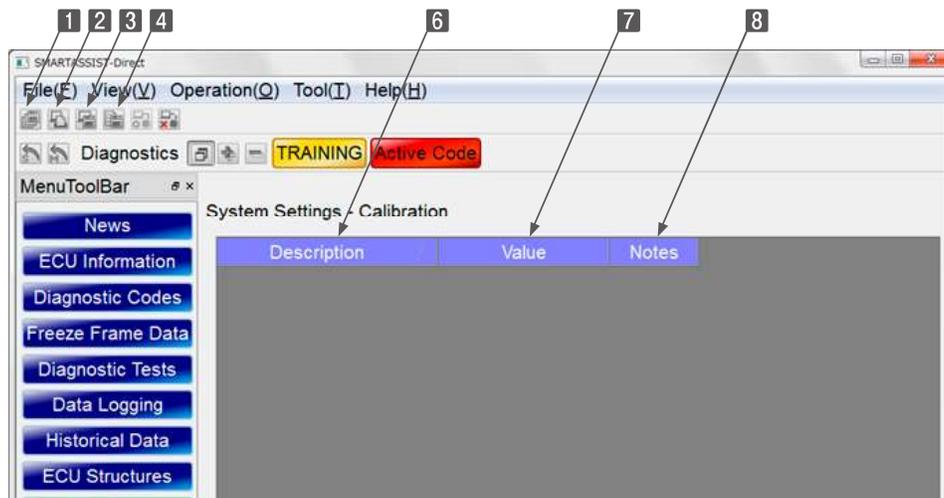


Figure 6-35 Calibration Screen

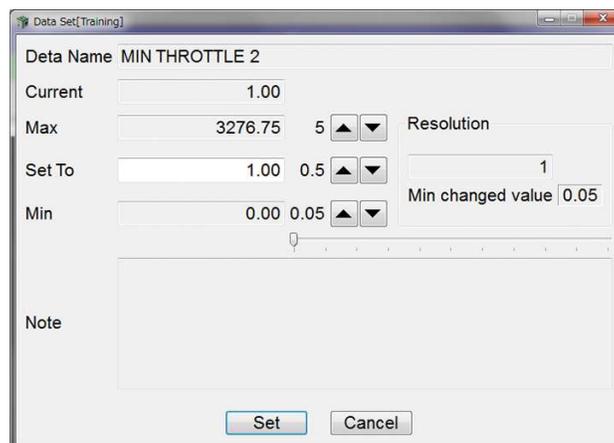


Figure 6-36 Example Change Screen

6.9.3 Tuning

You can adjust and set all performance parameters in accordance with industry standards and Yanmar Industrial Standards.

Note When using this function, refer to the service manual and technical information of the relevant product.

● **Operation Tool Bar**

- 1 : Save the ECU's screen display data. (Refer to [7. Error Diagnostic Data Save and Display Functions])
- 2 : Print the screen. (Refer to [6.2.2])
- 3 : Save a screenshot in BMP format. (Refer to [6.2.3])
- 4 : Save the screen data in CSV format. (Refer to [6.2.4])

● **Function Buttons**

- 5 : Select the displayed ECU/controller.

● **Main Box**

- 6 **Description** : Display the setting category.
- 7 **Value** : Display the current parameter quantity. Clicking opens a window to change the parameters.
- 8 **Unit** : Display the unit.
- 9 **Notes** : Display the relevant comment.

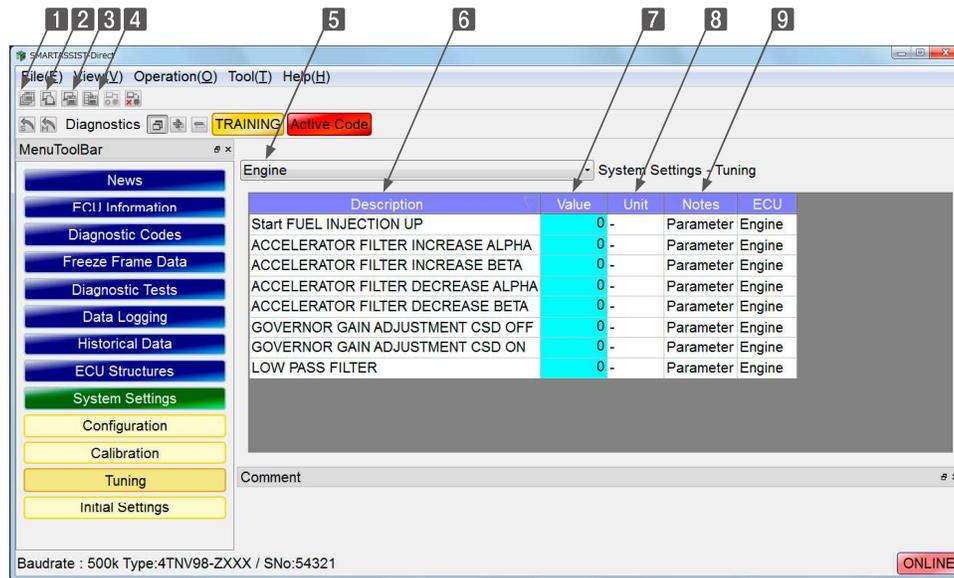


Figure 6-37 Tuning Screen

6.9.4 Initial Settings

This function allows to combine all feedback values of the sensor and set the ECU/controller accordingly when replacing or adjusting the ECU/controller or sensors. There are a number of types and subwindows with concrete instructions.

Warning

- **Initial settings involve many Items that actually operate the product. Only personnel who have taken the SMARTASSIST-Direct training may perform the test, and must pay due attention to their surroundings. If not, the product may move unexpectedly and cause serious accidents.**

Important

- **In an emergency, turn off the power of the ECU/controller (turn the key switch to "Off") to stop the product.**
- **"Maintain the previous status" or "Return to the automatically controlled status" are the operations when the initial setting is canceled under the below conditions. The setting of the operation varies by product.**
 - **The buttons "Abort, "Stop" or "Cancel" were clicked.**
 - **The connection harness between the product and the PC is disconnected.**
 - **The SMARTASSIST-Direct software was exited.**

Important

Reset

- **Turn off the power of the ECU/controller after the initial settings are completed. (Turn the key switch to "Off".)**
- Put the product to the initial settings with the SMARTASSIST-Direct, and the ECU/controller will change to initial settings mode. If you continue using the device in this state, the automatic control will become unoperational.**

● Operation Tool Bar

- 1  : Print the screen. (Refer to [6.2.2])
- 2  : Save a screenshot in BMP format. (Refer to [6.2.3])

● Function Buttons

- 3  : Select the displayed ECU/controller.

● Main Box

- 4 **Description** : Display the setting Items.
- 5 **Control** : Clicking the Execute button opens a window to change the parameters.
- 6 **Notes** : Annotation box
- 7 **ECU** : Display the ECU.

6. Error Diagnostic Function (ECU Access)

SMARTASSIST-Direct

File(F) View(V) Operation(O) Tool(T) Help(H)

Diagnostics **TRAINING** Active Code

MenuToolBar UFO Control System Settings Initial Settings

Description	Control	Notes	ECU	CID
Initial Setting (All Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62102
Initial Setting (3P Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62109
Initial Setting (Position Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62110
Initial Setting (Lift Angle Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62111
Initial Setting (Rear Cover Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62112
Initial Setting (Machine Sensor)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62113
Initial Setting (Tilt Set Dial)	[RUN]	After the initial adjustment, turn OFF the key.	UFO Control	62114

Comment

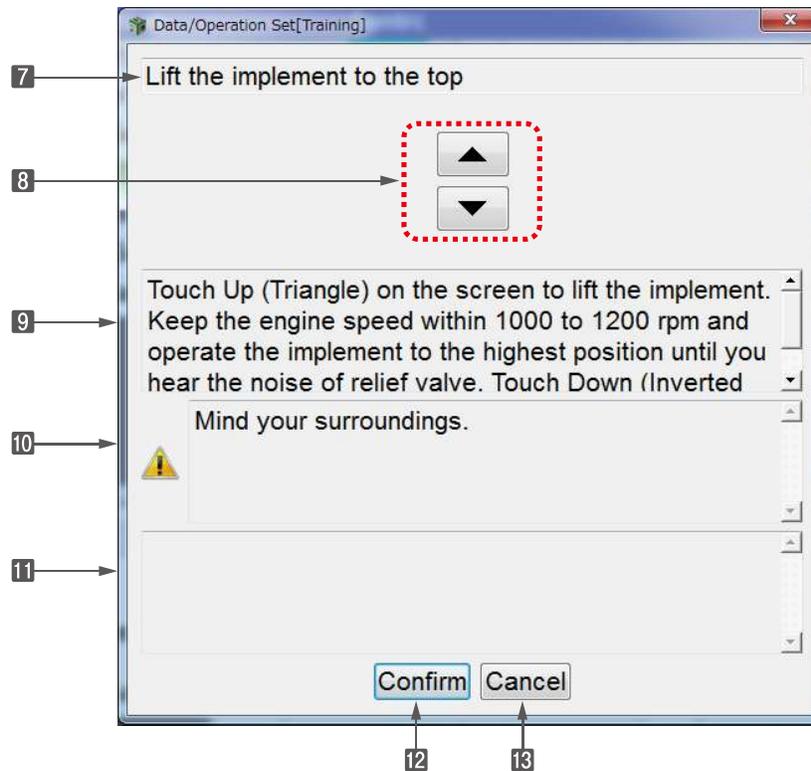
Notes :
After the initial adjustment, turn OFF the key.

Baudrate : 500k Type:4TNV94HT-ZXXX / SNo:123456 **ONLINE**

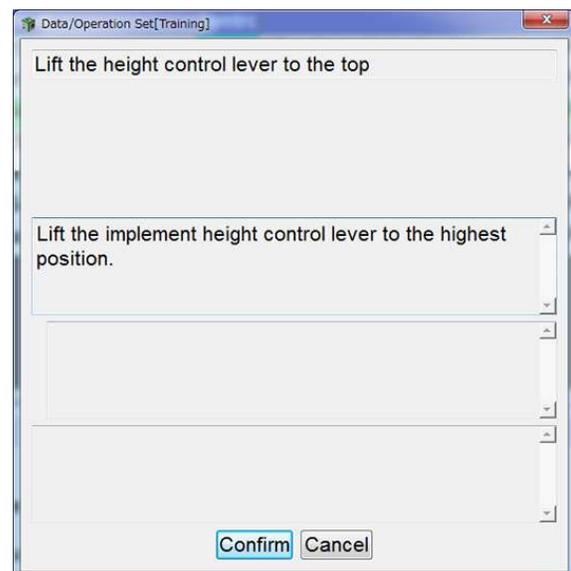
Figure 6-38 Initial Settings Screen

● Data Set Subwindow

- 7 **Data Name** : Display the name of the selected Items.
- 8 ▲/▼ : Display operation buttons such as Up (▲) and Down (▼).
- 9 **Operation Message** : Display conditions set before operation.
- 10 **Precaution Message** : If the operation is dangerous, a precaution reminder is displayed.
- 11 **Assistance Message** : If the active control is unavailable, a notice is displayed.
- 12 **Confirm** : This button is green when the operation conditions are met. Click to switch to the next screen.
- 13 **Cancel** : When aborting the initialization, the sub-window closes.



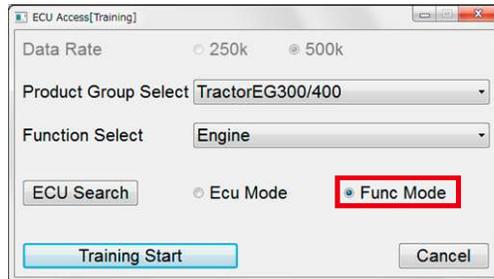
Sample 1



Sample 2

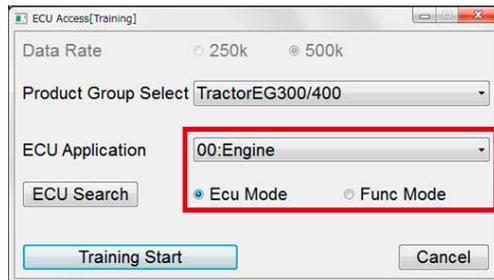
7.2 Saving the ECU Data for Screen Display

- 1 If the product allows selecting the screen display method of the error diagnosis, the content of the data to be saved is different depending on the selected screen display method.



Func Mode

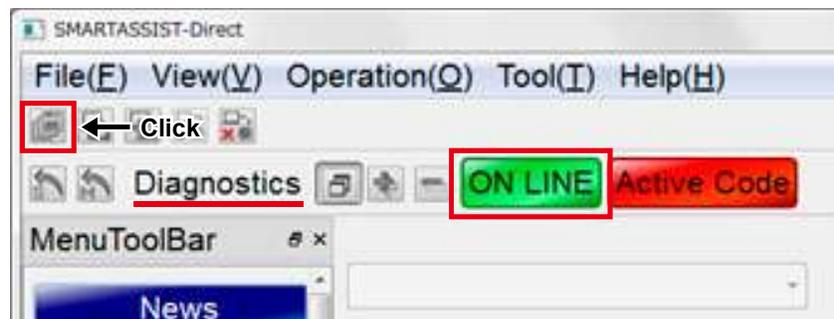
Save the connected ECU's screen display data.



ECU Mode

Save the selected ECU's screen display data only.

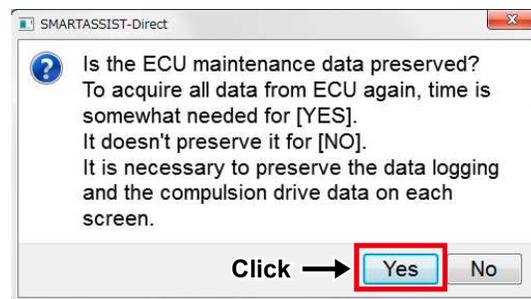
- 2 Click the "ECU Data Save" button after executing the error diagnosis.



Note The data cannot be saved when the product is not connected.

The save confirmation screen is displayed.

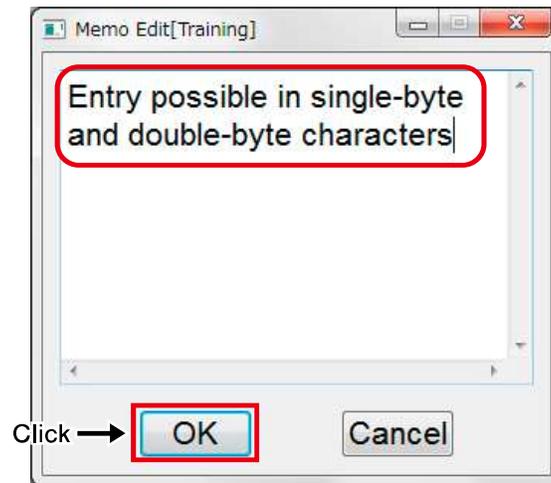
Click "Yes" to save the data.



7. Error Diagnostic Data Save and Display Functions

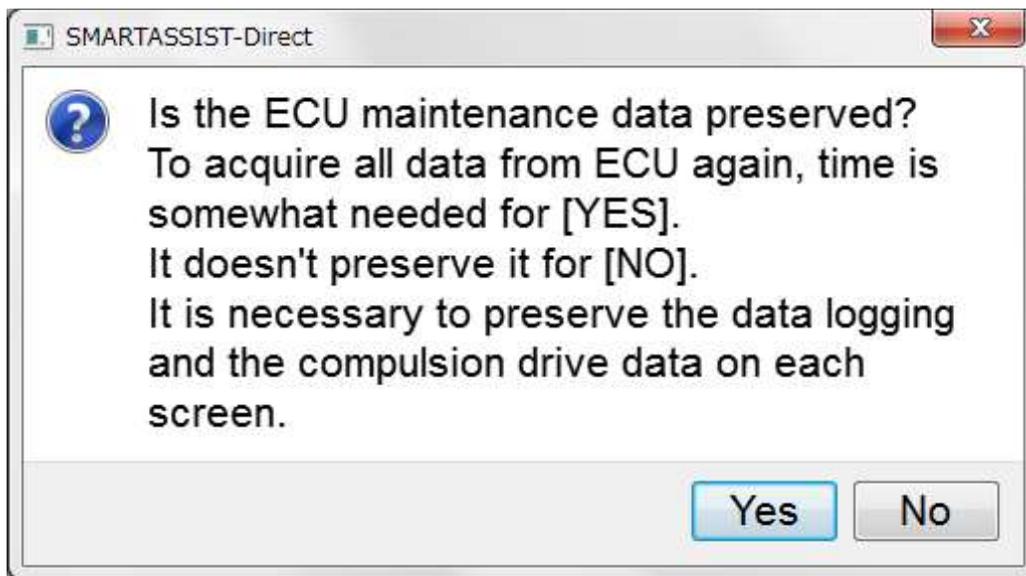
The memo entry screen is displayed.

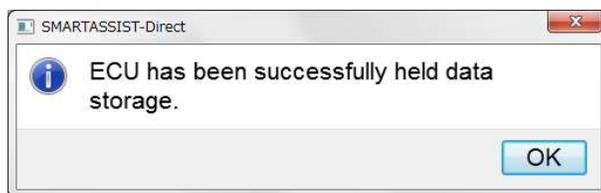
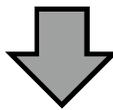
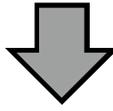
Enter a memo and click "OK".



Point Even if you select "Cancel" in the memo screen, the error diagnosis data is saved. You can edit the memo with the saved data function after saving the data.

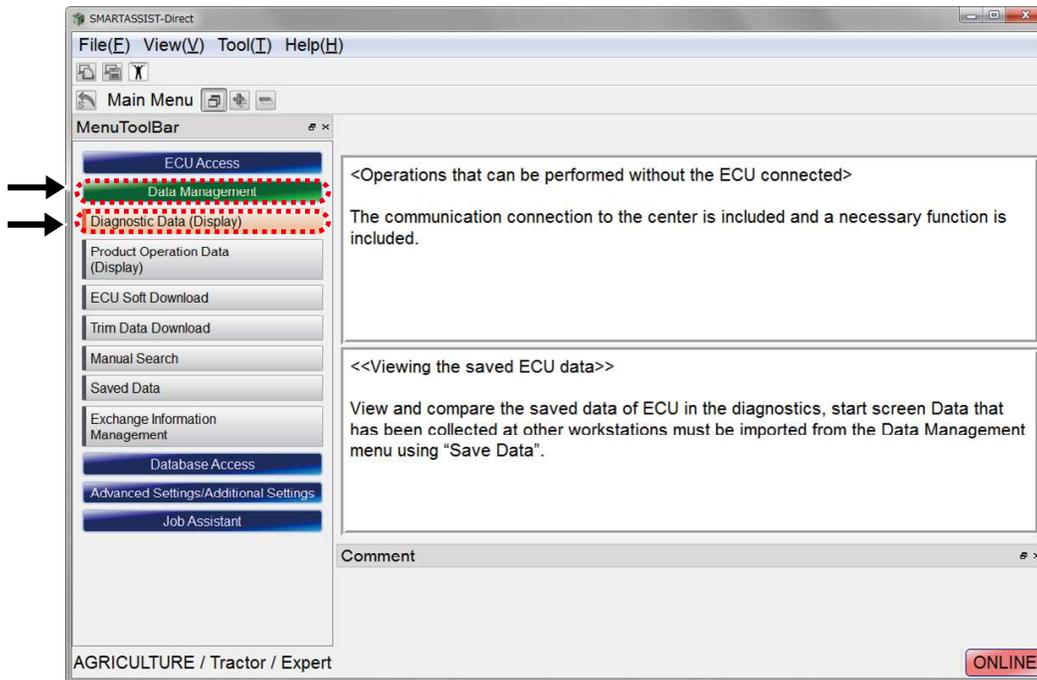
The communication with the product starts and the data is collected and saved.





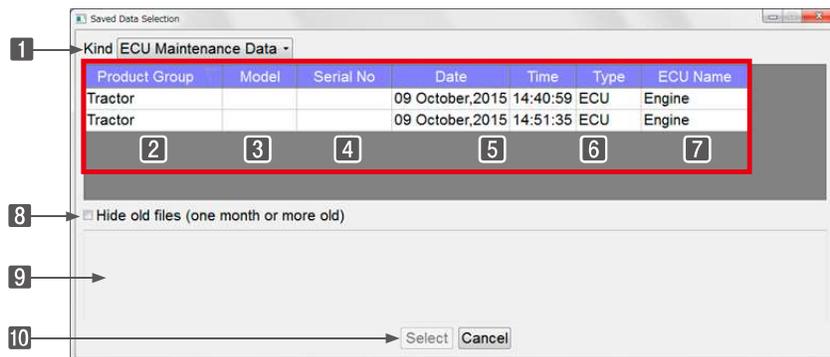
7.3 Displaying the Saved ECU Display Data

Select "Diagnostic Data (Display)" of the tab "Data Management".



The ECU Maintenance Data for screen display and the three types of the diagnosis execution result selection screen are displayed.

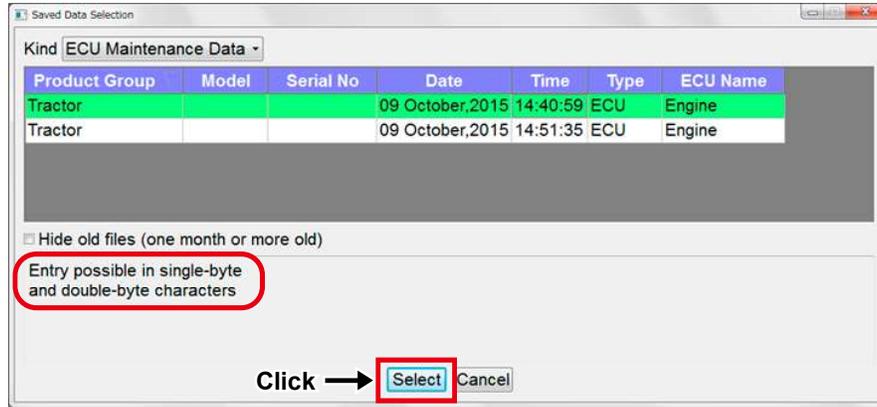
- 1 Select the data type "ECU Maintenance Data".
- 2 Machine model selected in the main menu at the time of saving
- 3 Model
- 4 Serial No
- 5 Date when data was saved
- 6 Display class ("Func Mode" or "ECU Mode") selected at the time of saving
- 7 ECU name of the original data
- 8 Display selection for the data saved more than 1 month ago
- 9 Memo display box at the time of saving
- 10 Selection button



Remark Click 2 - 7 within the red frame and change the sorting order (ascending/descending) of the display.

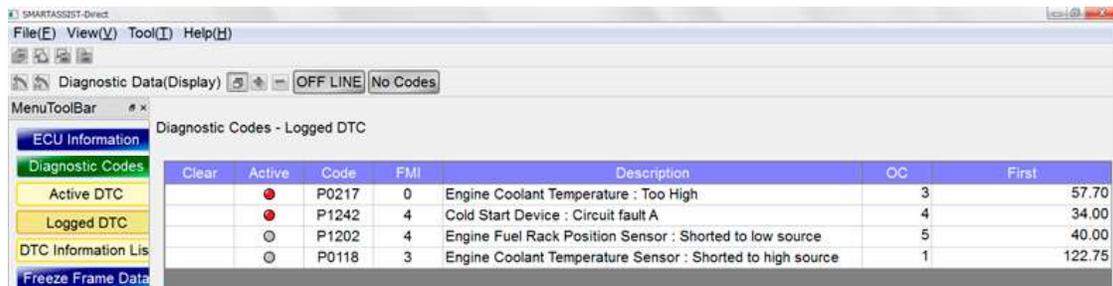
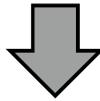
7. Error Diagnostic Data Save and Display Functions

Select the data you want to display and click the "Select" button.

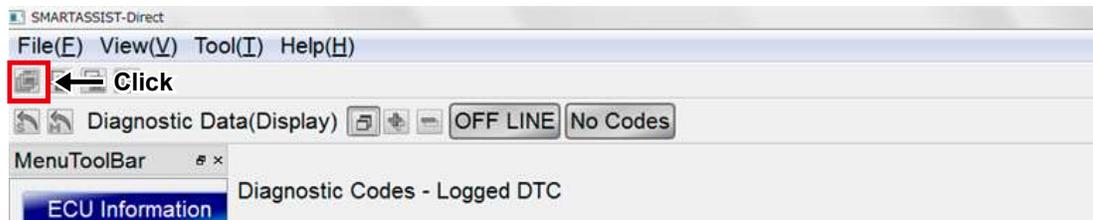


The Diagnostic Data (Display) screen appears.

Open the Item that you want to confirm. The saved information is displayed.

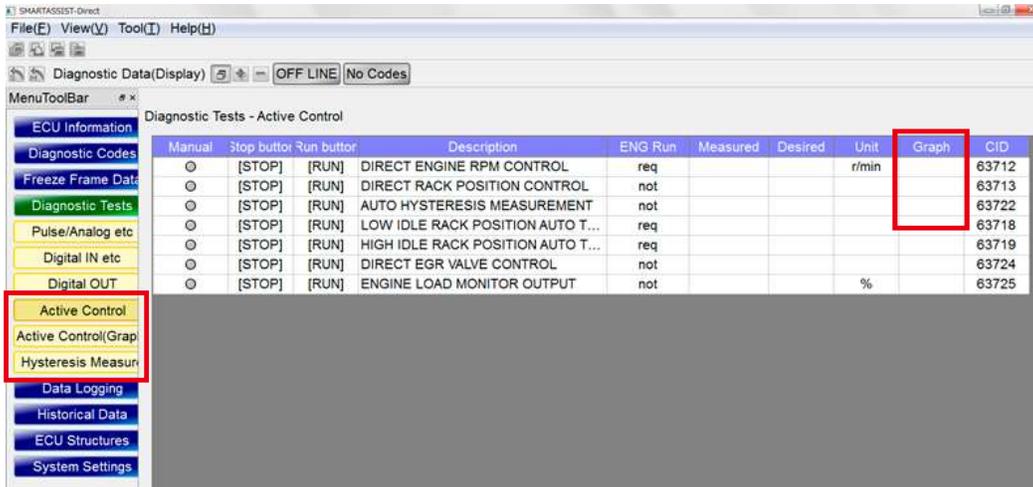


To change the save data that you want to display, click the "ECU Data Load" button. The data selection screen is displayed.



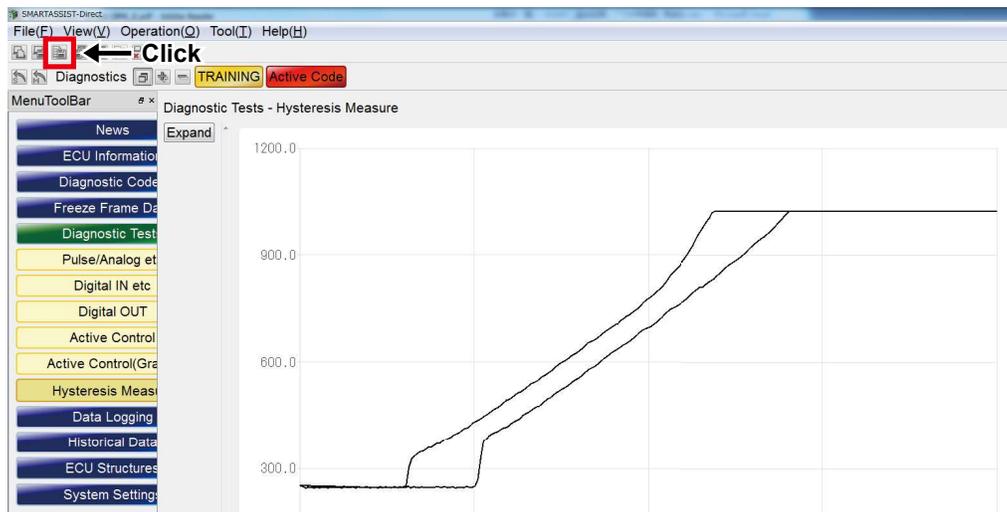
7.4 Saving the Active Control and Hysteresis Measure Execution Data

The "Active Control" function allows to save the measurement data for Items with "Graph" output.



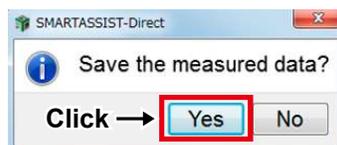
Click the "Meas Data Save" button on the "Active Control (Graph)" or "Hysteresis Measure" screen after executing the active control.

When the "Graph" is not displayed, you cannot click the button.



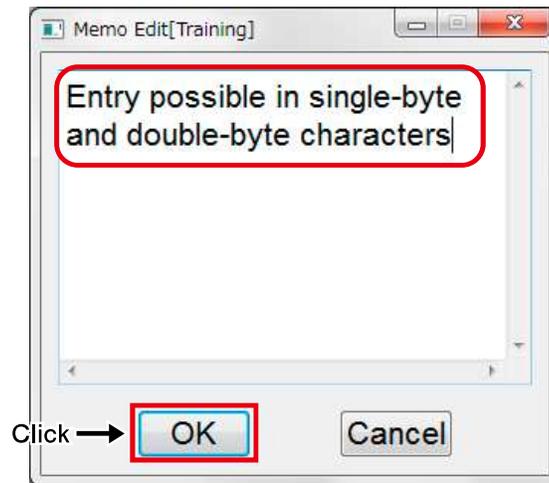
The save confirmation screen is displayed.

Click "Yes" to save the data.



The memo entry screen is displayed.

Enter a memo and click "OK".

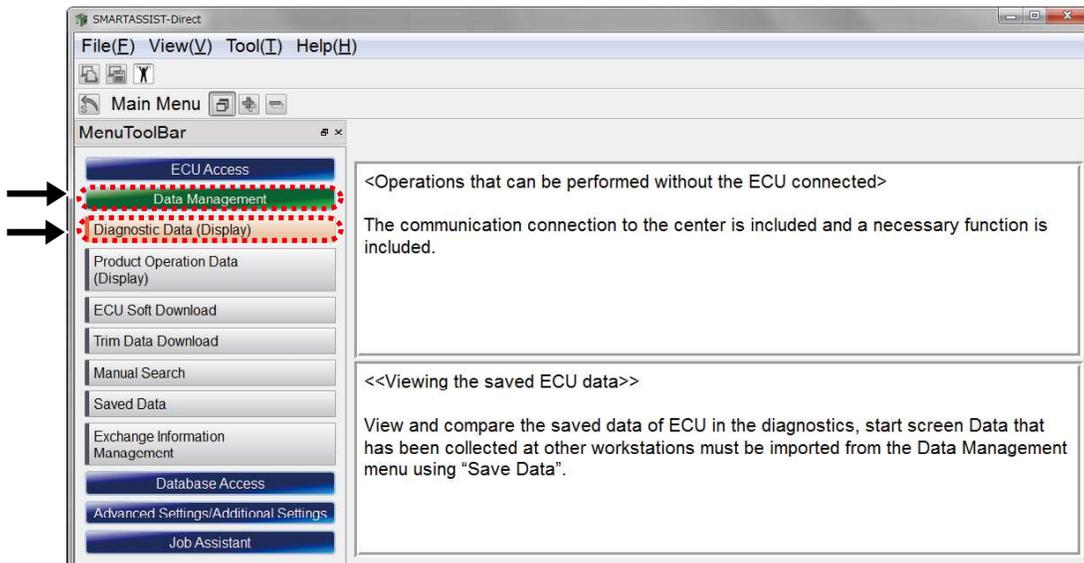


Point Even if you select "Cancel" in the memo screen, the measurement data is saved. You can edit the memo with the saved data function after saving the data.

7.5 Displaying the Saved Active Control and Hysteresis Measurement Execution Data

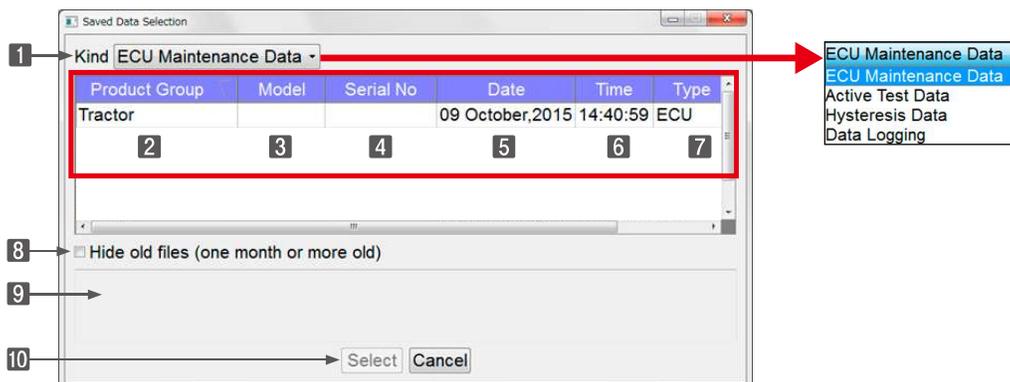
7.5.1 Displaying the Data

Select "Diagnostic Data (Display)" of the tab "Data Management".



The ECU Maintenance Data for screen display and the three types of the diagnosis execution result selection screen are displayed.

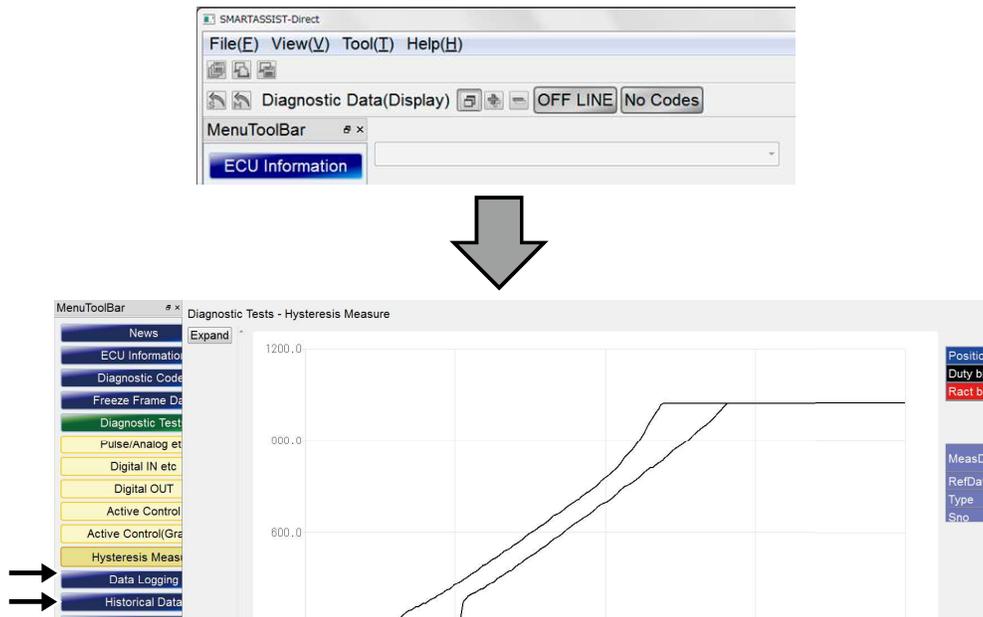
- 1 Select the data types "Active Test Data" and "Hysteresis Data".
- 2 Machine model selected in the main menu at the time of saving
- 3 Model
- 4 Serial No
- 5 Date when data was saved
- 6 Display class ("Func Mode" or "ECU Mode") selected at the time of saving
- 7 ECU name of the original data
- 8 Display selection for the data saved more than 1 month ago
- 9 Memo display box at the time of saving
- 10 Selection button



Point Click 2 - 7 within the red frame and change the sorting order (ascending/descending) of the display.

7. Error Diagnostic Data Save and Display Functions

The error Diagnostic Data (Display) screen appears after selecting the data. Open "Active Control (Graph)" and "Hysteresis Measure" of "Diagnostic Tests" and check the content.



To change the save data that you want to display, click the "SavedData Read" button. The data selection screen is displayed.

Active Control (Graph)



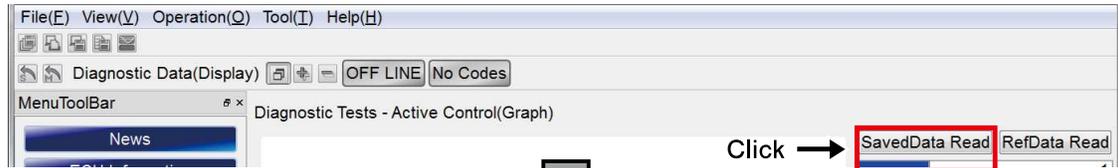
Hysteresis Measure



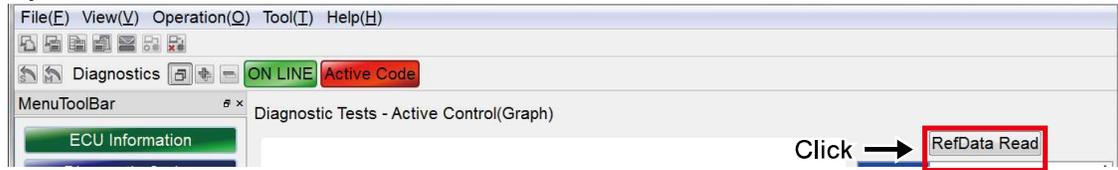
7.5.2 Reading the Reference Data

If the save data is on your PC, read the "RefData Read" after "Measuring (graph display) " or "SavedData Read" to match the data.

Operations with ECU Disconnected



Operations with ECU Connected



- Point**
- The reference data is displayed in a different line color.
 - "RefData Read" can be selected in the tab screen "ECU Access" in the main menu.

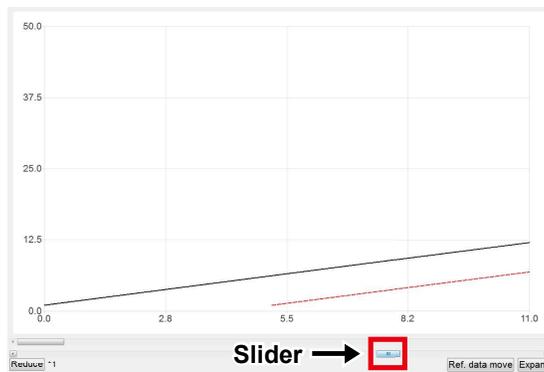
7.5.3 Moving the Display Location of the Reference Data

The reference data in the overlap display can be moved horizontally.

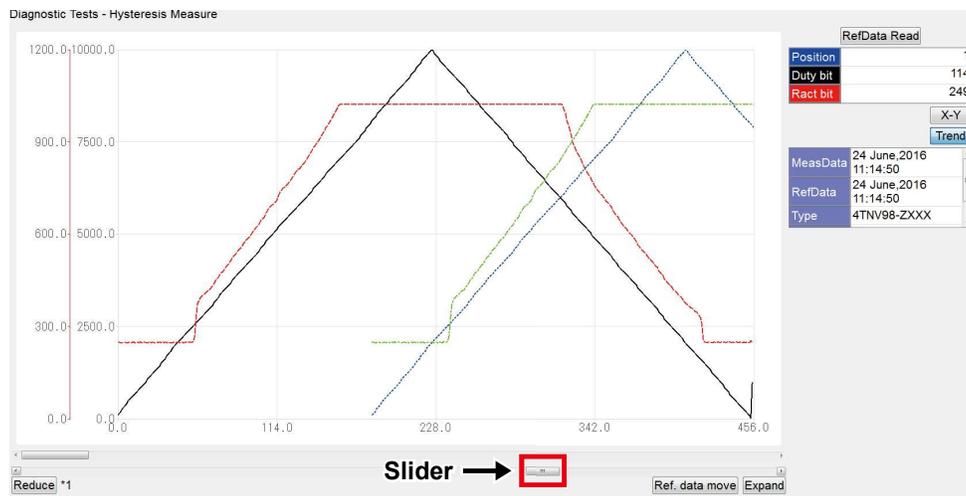
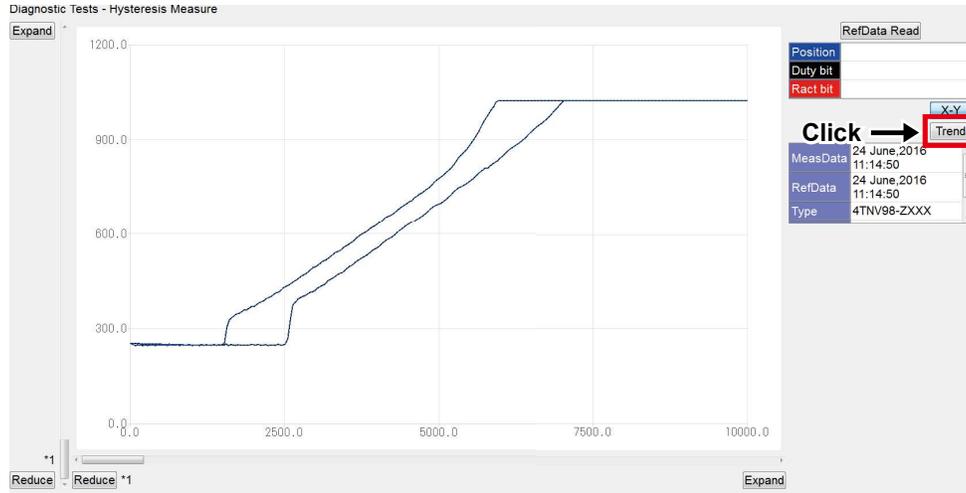
Use this to compare characteristic parts of the data.

- Remark**
- In the "Hysteresis Measure", the "Reference Data" can be moved with the "Trend Graph" display.

Active Control (Graph): example of moving the reference data horizontally



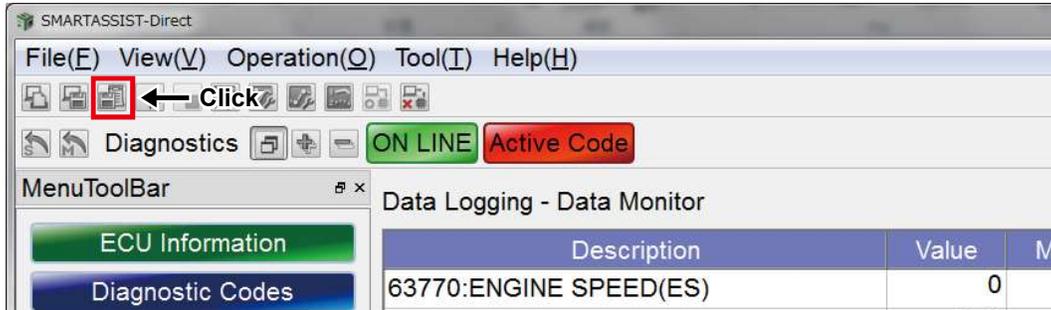
Hysteresis Measure: example of moving the reference data horizontally



7.6 Saving the Data Logging Measurement Data

The data logging function allows to save the measurement data in the "Data Monitor" or "Trend Graph" screen.

- 1 Click the "Meas Data Save" button.

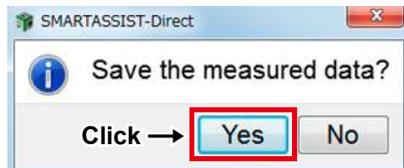


- 2 A screen is displayed to confirm that you want to create a user settings file for the measurement data. ^{Note)}
Click "No" to only save the measurement data.

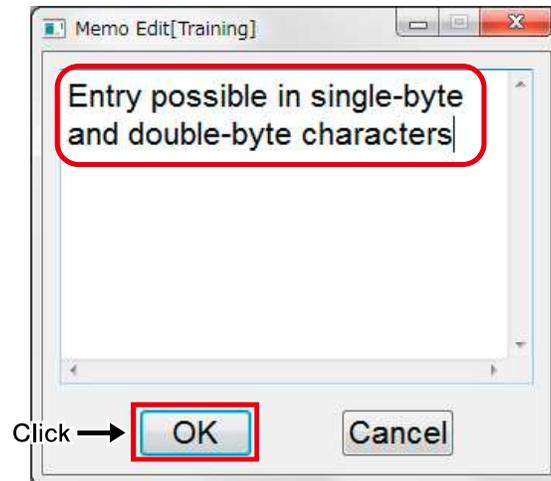


- Note**
- When the package data set is performed on the "Diagnostic Selection Window", this screen is not displayed.
 - For details on creating the user settings file, refer to "User Settings for Package Data".

- 3 The confirmation screen for saving the measurement data is displayed. Click "Yes".



- 4 The memo entry screen is displayed. Enter a memo and click "OK".



Point Even if you select "Cancel" in the memo screen, the measurement data is saved. You can edit the memo with the saved data function after saving the data.

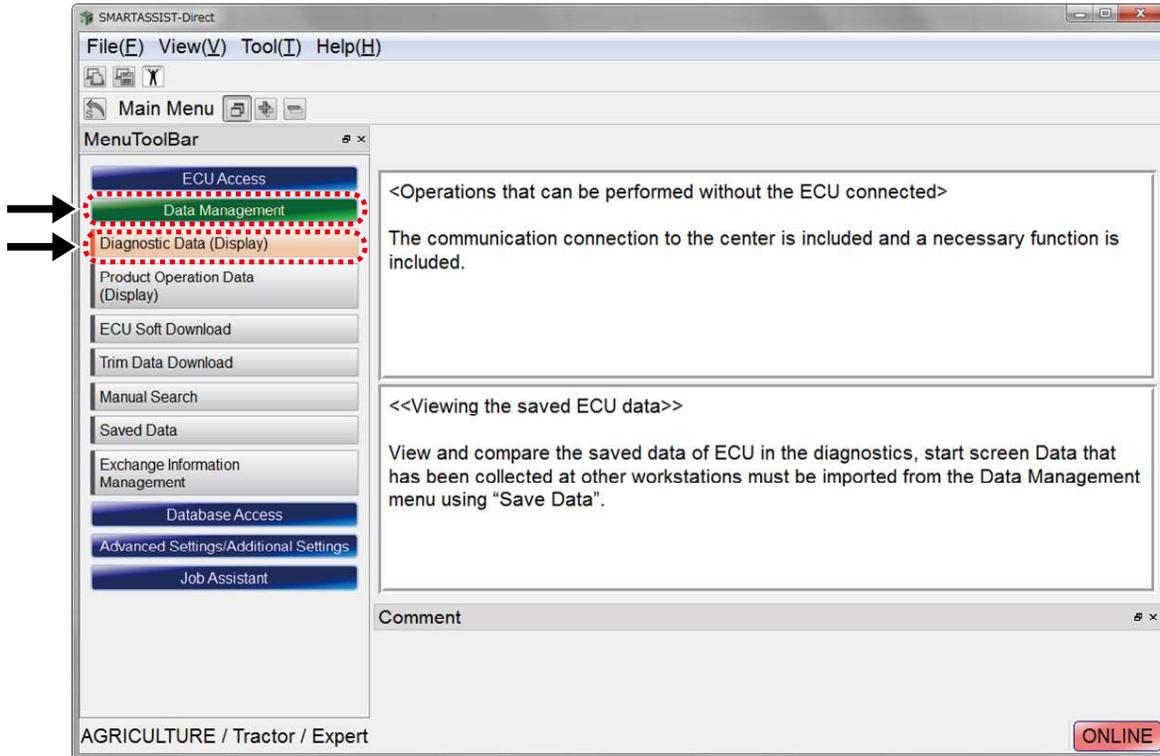
- 5 The Save Complete screen is displayed. Click "OK".



7.7 Displaying the Saved Data Logging Measurement Data

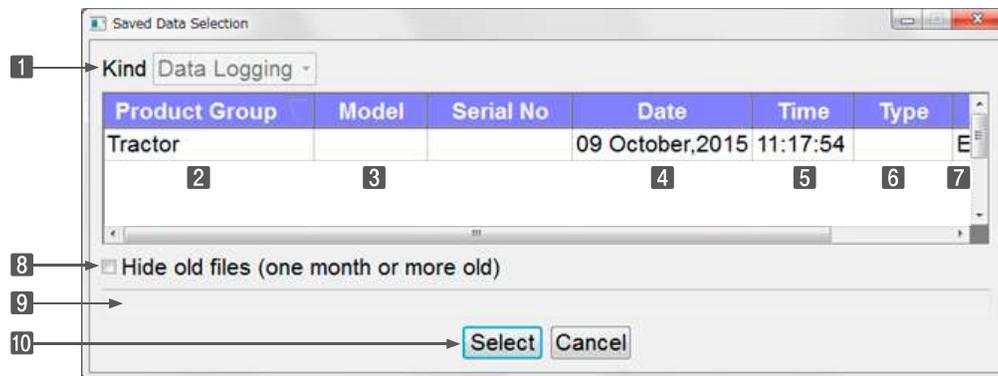
7.7.1 Displaying the Save Data

Select "Diagnostic Data (Display)" of the tab "Data Management".



Click the "Diagnostic Data (Display)" button. The selection screen appears. Select the save data that you want to display.

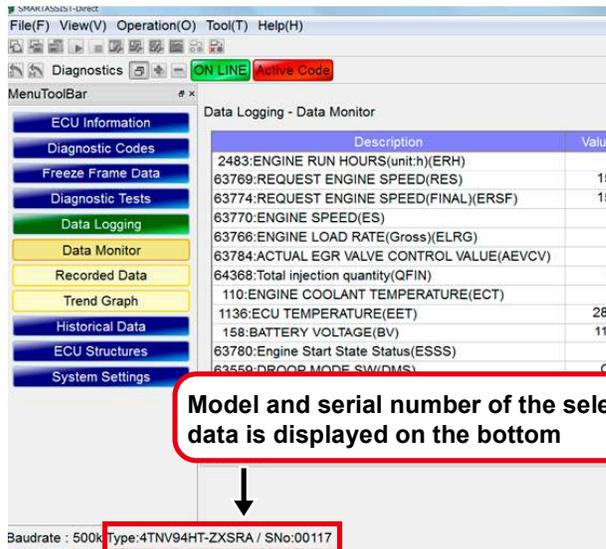
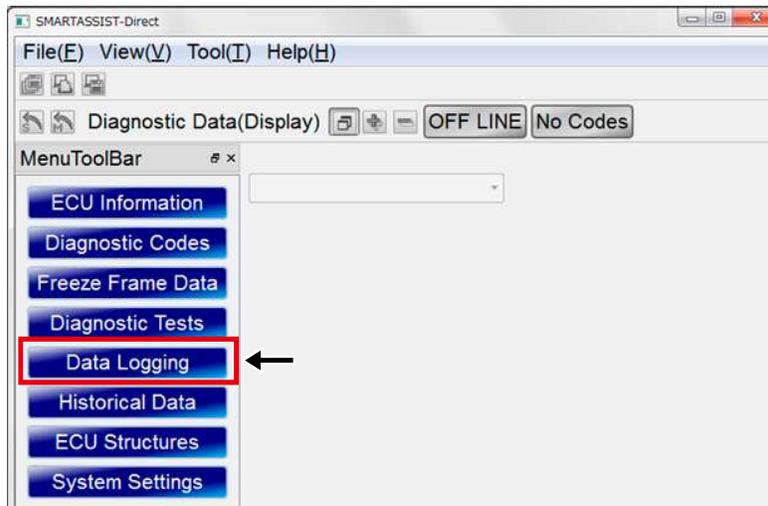
- 1 Select the "Data Logging" data type.
- 2 Product category selected in the main menu at the time of saving.
- 3 Model
- 4 Serial No
- 5 Date when data was saved
- 6 Not displayed
- 7 ECU name of the original data
- 8 Display selection for the data saved more than 1 month ago
- 9 Memo display box at the time of saving
- 10 Selection button



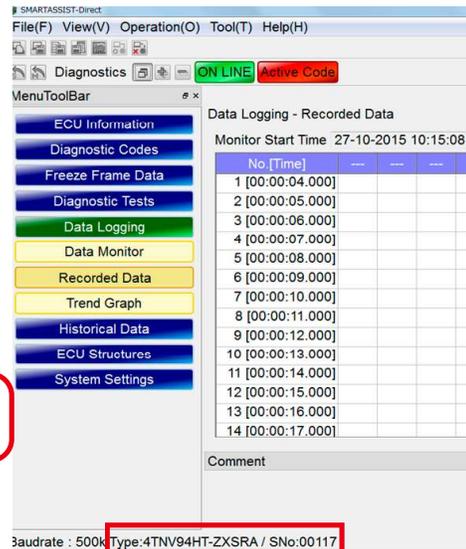
7. Error Diagnostic Data Save and Display Functions

The error Diagnostic Data (Display) screen appears after selecting the data.

Open the data logging menu and confirm the content.



Data monitor screen

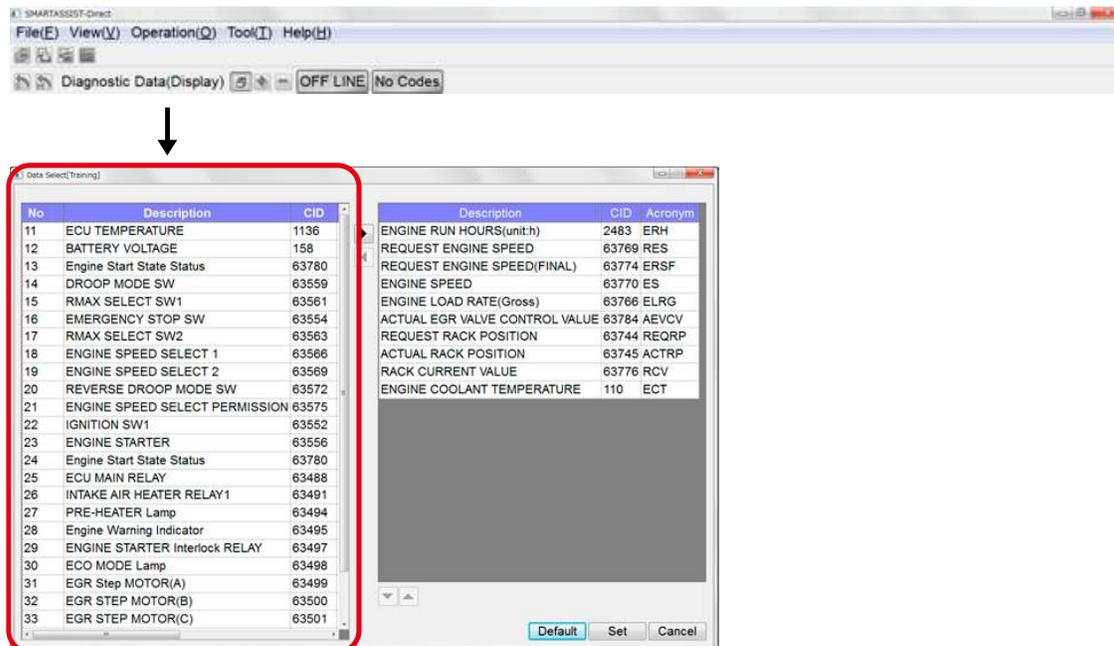


Recorded Data screen

7. Error Diagnostic Data Save and Display Functions

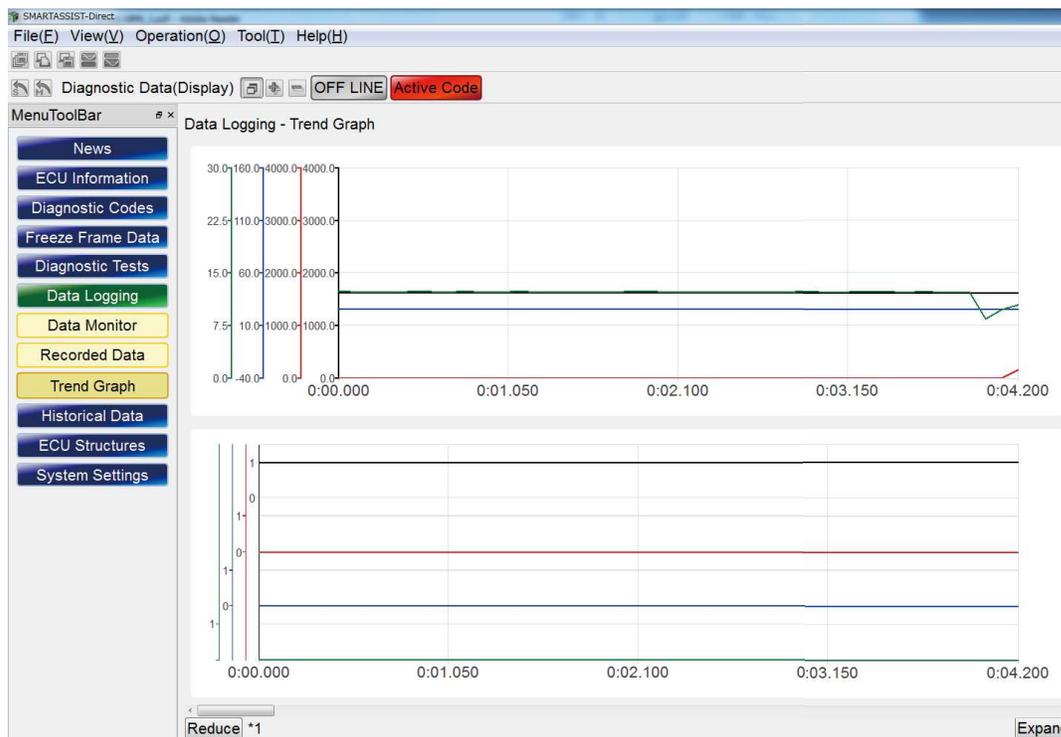
In the saved measurement data, not only the display Items at the time of storing but all logging data is included. The displayed data can be changed by clicking the "Set" button.

For details on the Data Select screen, refer to [6.6.2 Overview of the Data Sampling Operation].



Point Items that are not displayed in the data selection box cannot be saved.

To change the save data that you want to display, click the "SavedData Read" button on the trend graph screen. The data selection screen is displayed.

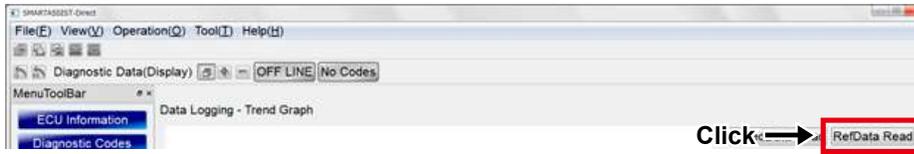


Trend graph screen

7.7.2 Reading the Reference Data

If the save data is on your PC, read the "Reference Data" after "Measuring (graph display)" or "SavedData Read" to sort the data vertically.

Data Management



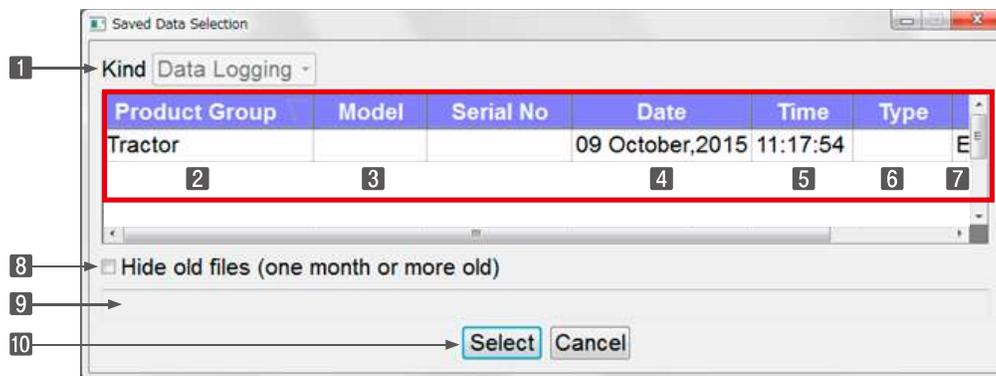
ECU Access



Point "RefData Read" can be operated on the "Diagnostic (Execution)" screen in the tab "ECU Access" in the main menu.

Click the "RefData Read" button. The selection screen appears. Select the save data that you want to display.

- 1 Select the "Data Logging" data type.
- 2 Machine model selected in the main menu at the time of saving
- 3 Model
- 4 Serial No
- 5 Date when data was saved
- 6 Not displayed
- 7 ECU name of the original data
- 8 Display selection for the data saved more than 1 month ago
- 9 Memo display box at the time of saving
- 10 Selection button



Point Click 2 - 7 within the red frame and change the sorting order (ascending/descending) of the display.

7. Error Diagnostic Data Save and Display Functions

The reference data and the "Reference" button appear.

The screenshot shows the diagnostic software interface. On the left is a navigation menu with options like 'News', 'ECU Information', 'Diagnostic Codes', 'Freeze Frame Data', 'Diagnostic Tests', 'Data Logging', 'Data Monitor', 'Recorded Data', 'Trend Graph', 'Historical Data', 'ECU Structures', and 'System Settings'. The main area contains two graphs. The top graph has a y-axis from 0.0 to 100.0 and an x-axis from 0:01.300 to 0:17.200. The bottom graph has a y-axis from 0.0 to 30.0 and an x-axis from 0:01.300 to 0:17.200. On the right, a 'RefData Read' panel shows a table of parameters:

Parameter	Value
RES	1618
ERSF	1618
ES	0
APP	0.0
ELRG	0
%LOAD	0.0
ECT	25
BV	12.25

A red box highlights the text 'Change Disp Data MeasData 20160531 16:55:20'. An arrow points to a second screenshot where the table now includes 'RefData 20160531 16:55:20' and a 'Reference' button is visible.

Click the "Reference" button. The "Top Graph" and "Bottom Graph" buttons appear.

Select the graph (top or bottom) for the reference.

Display example when "Top Graph" is clicked

The screenshot shows the diagnostic software interface with two graphs. The top graph is labeled 'Measurement or save data' and the bottom graph is labeled 'Reference data'. On the right, a 'RefData Read' panel shows a table of parameters:

Parameter	Value
RES	1618
ERSF	1618
ES	0
APP	0.0

A red box highlights the 'Reference' button and the 'Top Graph' button.

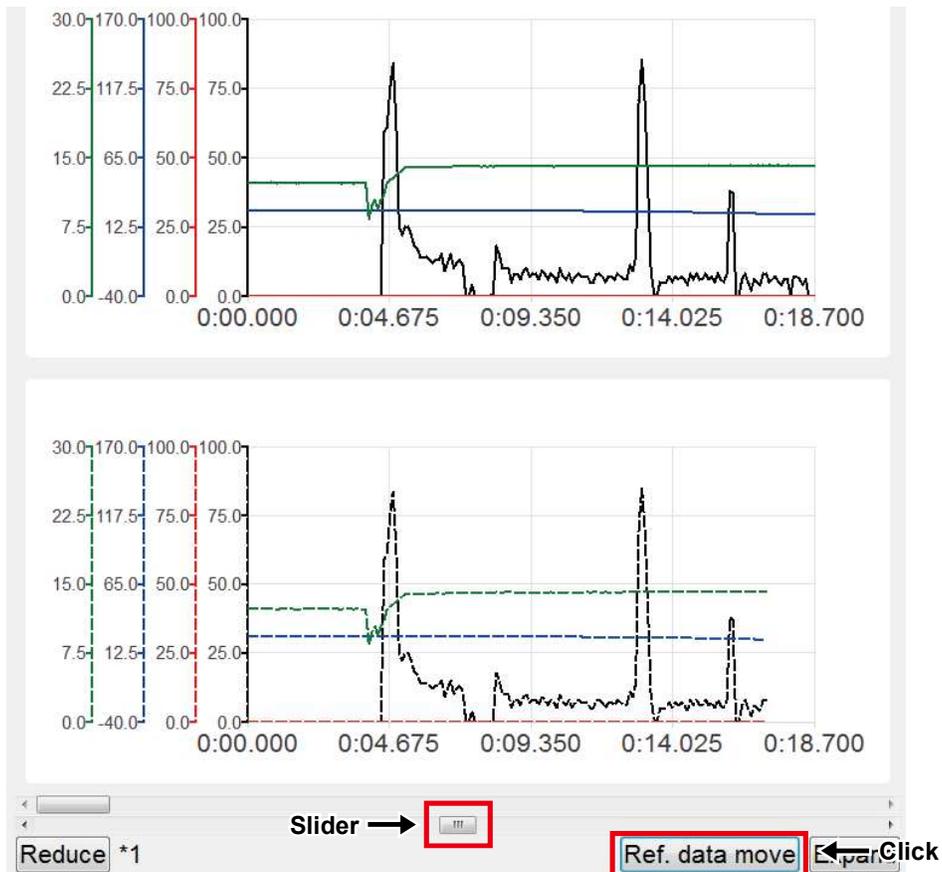
7. Error Diagnostic Data Save and Display Functions

Display example when "Bottom Graph" is clicked

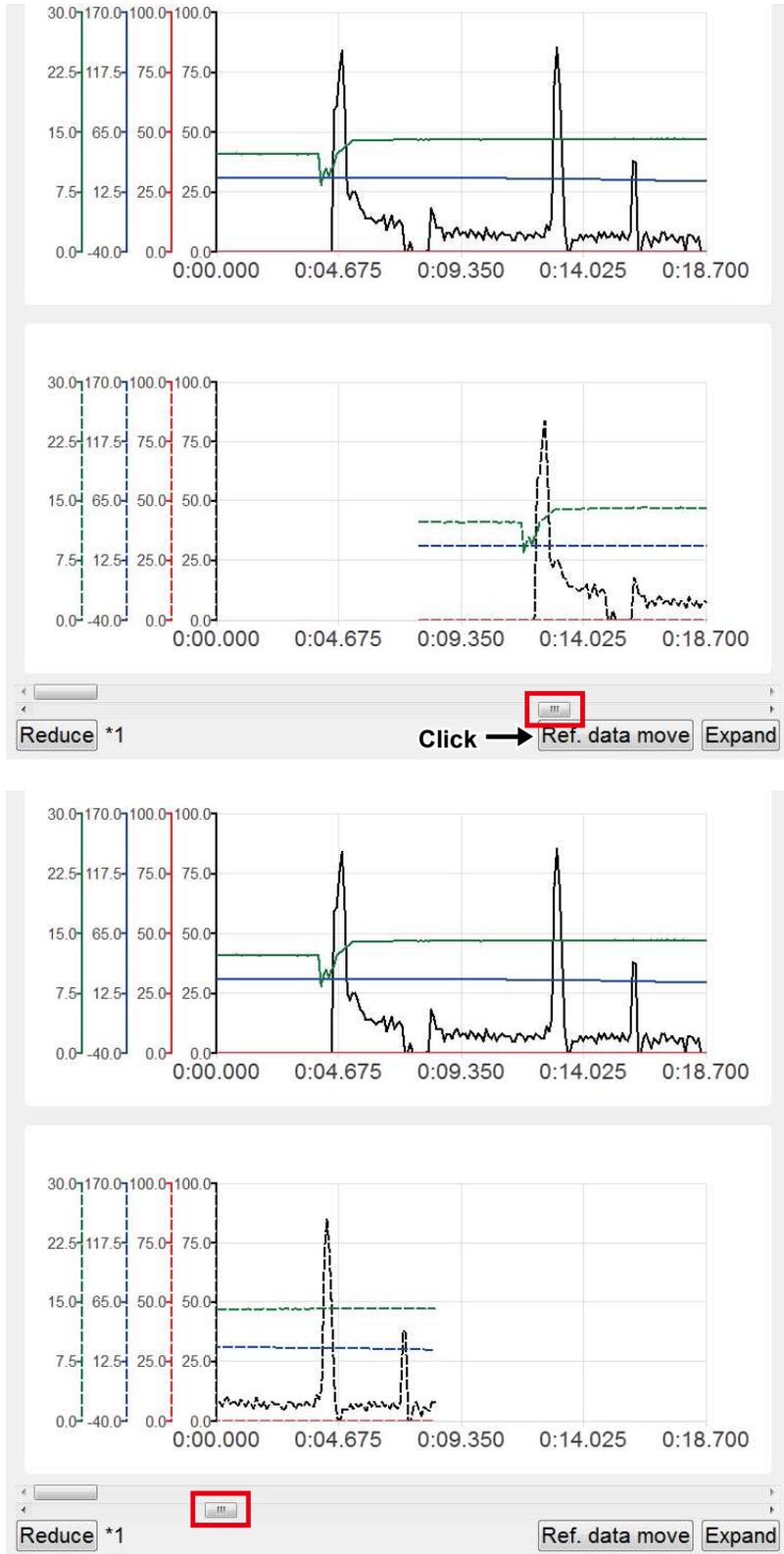


7.7.3 Moving the Display Location of the Reference Data

The display location of the graph for the "Reference Data" (bottom graph) can be moved horizontally. Use this to compare characteristic parts of the graph.



Example of horizontal movement for the bottom graph



To change the data that is displayed in a graph, refer to "[8. Graph Function]".

8. Graph Function

The graph display and basic operation function have the common specification on the screen as shown below.

- "Freeze Frame Data" - "Trend Graph"
- "Diagnostic Tests" - "Active Control (Graph)" "Hysteresis Measure"
- "Data Logging" - "Trend Graph"

8.1 Graph Settings

The graph settings have the following characteristics:

- With the  and  buttons on the control tool bar, the two graph screens on the top and the bottom can be set, respectively.

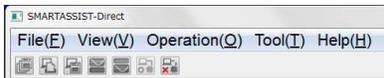


Figure 8-1 Freeze Frame Data



Figure 8-2 Diagnostic Tests

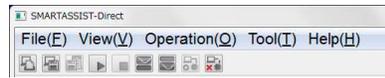


Figure 8-3 Data Logging

Note In "Diagnostic Tests" of "Active Control (Graph)" "Hysteresis Measure", the graph is displayed on one screen.

- Four line graphs can be displayed in one graph.
- "Analog mode" or "Digital mode" can be selected in the graph display.

Point The separate mode can be set for the top and the bottom screens.

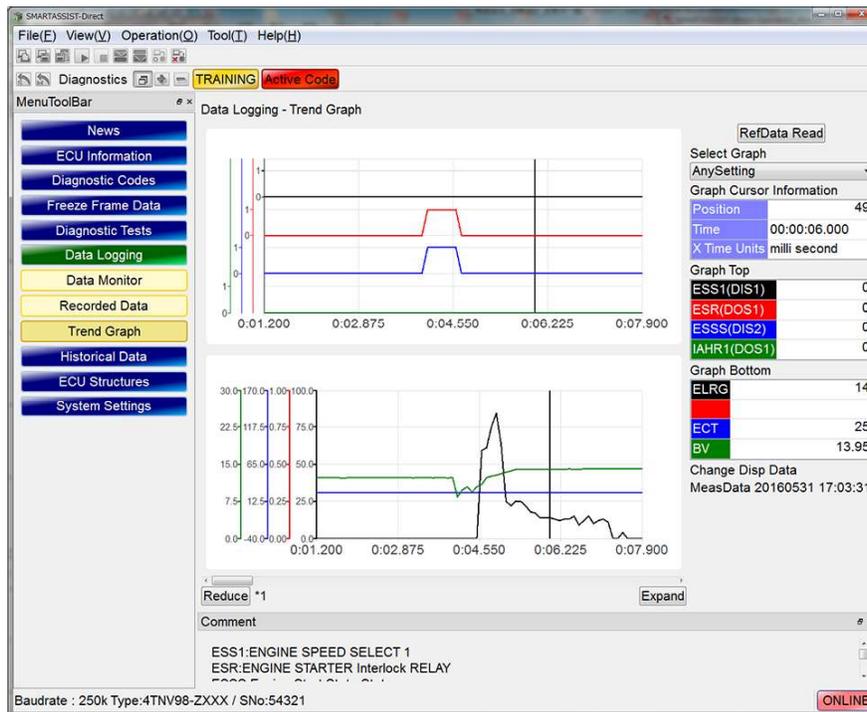


Figure 8-4 Graph display example (top: digital, bottom: analog)

- You cannot display the combination of analog/digital data within the same graph screen.

- The minimum and maximum graph values can be set in the analog mode.
- The content of the graph settings can be saved as the user settings file. The graph settings can be called up for problem analysis.
- Click the "Editing" button to perform the graph settings.

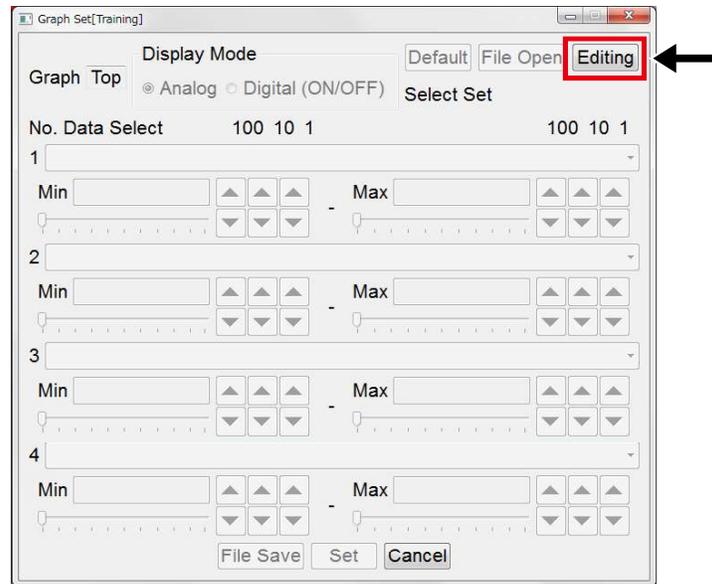


Figure 8-5 Graph set screen

8.1.1 Analog Mode Basic Operation

The basic operation in the analog mode is as follows:

- 1 Graph to be set : "Top" and "Bottom" are displayed.
In case of the screen with only one graph, the "Top" is displayed.
- 2 Analog mode selection : Click Analog of the display mode to insert a checkmark.
- 3 Default : All items are automatically set to the default SMARTASSIST-Direct settings.
- 4 Read file : The saved settings are read.
(Refer to [8.1.3 Saving and Reading the Settings Value] on page 180.)
- 5 Data selection : Select the data that you want to display. Set up to 4 data sets.
- 6 Minimum value : Set the minimum graph value with the lever button and ▲ / ▼ buttons.
- 7 Maximum value : Set the maximum graph value with the lever button and ▲ / ▼ buttons.
- 8 File Save : Save the entered values to the settings file.
(Refer to [8.1.3 Saving and Reading the Settings Value] on page 180.)
- 9 Set : Set the entered values and display the graph.

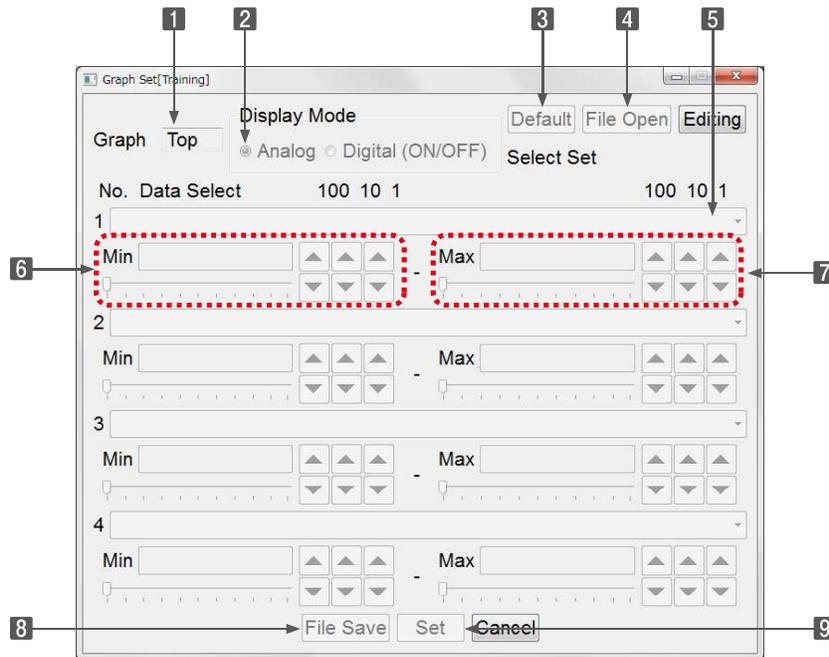
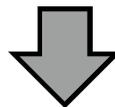
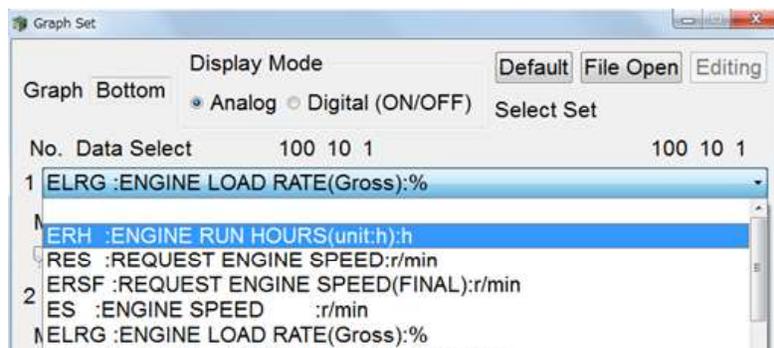


Figure 8-6 Analog mode basic operation screen



Click 5 to display the selectable data items.



8.1.2 Digital mode

Use this mode to display the ON/OFF information of digital IN / OUT and control flag. The available data can be confirmed at the ECU ID ([6.8.2 Digital Channels] on page 144).

Point As the graph is displayed in "0" or "1" in the digital mode, it is not required to set the minimum/maximum values. (Unable to enter.)

- 1 Digital mode : Click Digital of the display mode to insert a checkmark.
- 2 Data selection : Select the data that you want to display. Set up to 4 data sets.
- 3 Settings confirmation : Click the button to confirm the settings and display the graph.

Saving the file and opening operation can be performed in the same procedures as the analog mode.

(Refer to [8.1.3 Saving and Reading the Settings Value] on page 180.)

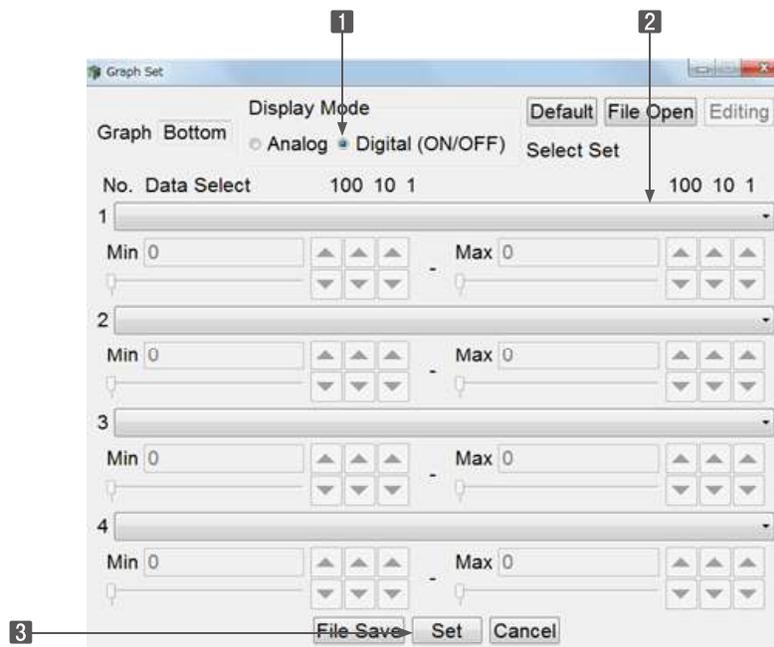


Figure 8-7 Digital mode screen

8.1.3 Saving and Reading the Settings Value

The content of the graph settings can be saved and called up later.

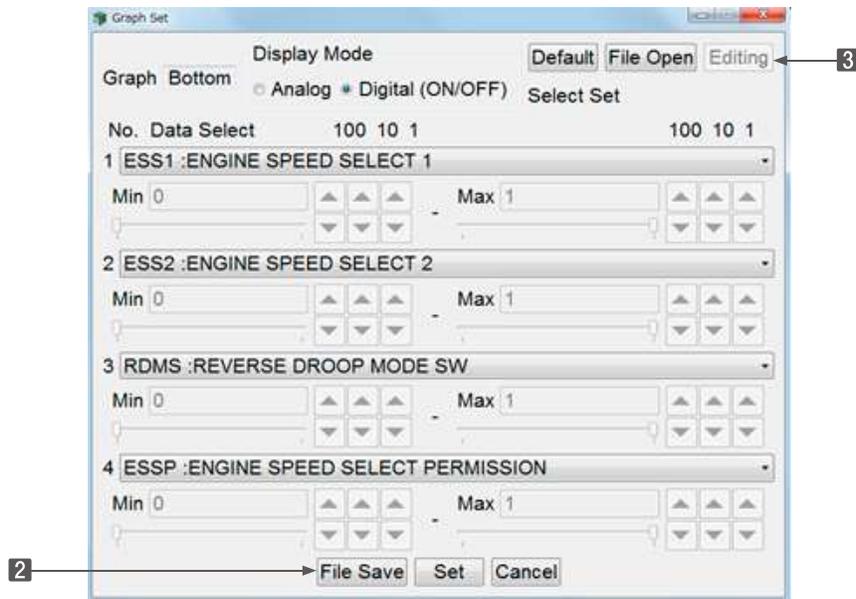
Note This function is different from the user settings of [6.6.7 Package Data Set].

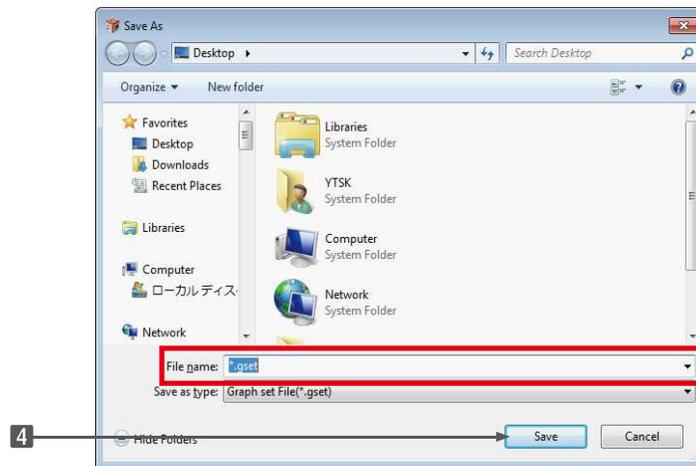
■ Saving the Settings Value

- 1 Opening the Graph Set screen : Click the  or  button of the operation tool bar to open the subwindow.
- 2 Open the File Save screen : Click the "File Save " button in the bottom of the graph set subwindow to open the save screen.

Point To save the graph settings after the error diagnosis, click the 3 "Editing" button on the top right, and then click the "File Save" button.

- 4 File Save : Save the file with a name that you can easily remember or search for. You can save the data to any location, but do not change the ".gset" file extension.



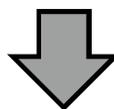
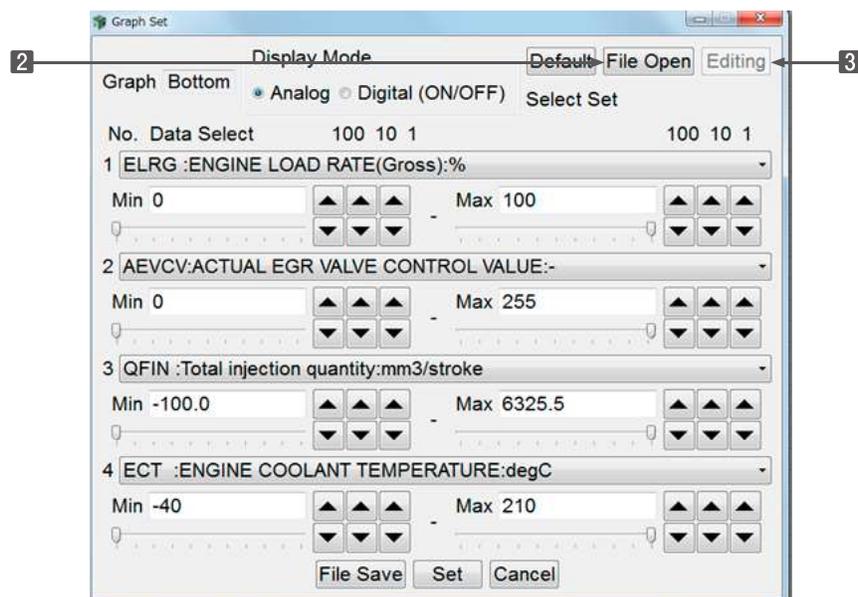


■ Reading the Settings Value

- 1 Opening the Graph Set screen : Click the  or  button of the operation tool bar to open the subwindow.
- 2 File Open screen : After the operation of 1, click the **File Open** button in the upper right of the subwindow to open the file open screen.

Point To save the graph settings after the error diagnosis, click the 3 "Editing" button on the top right, and then click the "File Save" button.

- 4 File Selection : Select the file name displayed in the subwindow and click the Open button to automatically insert the saved graph setting value.

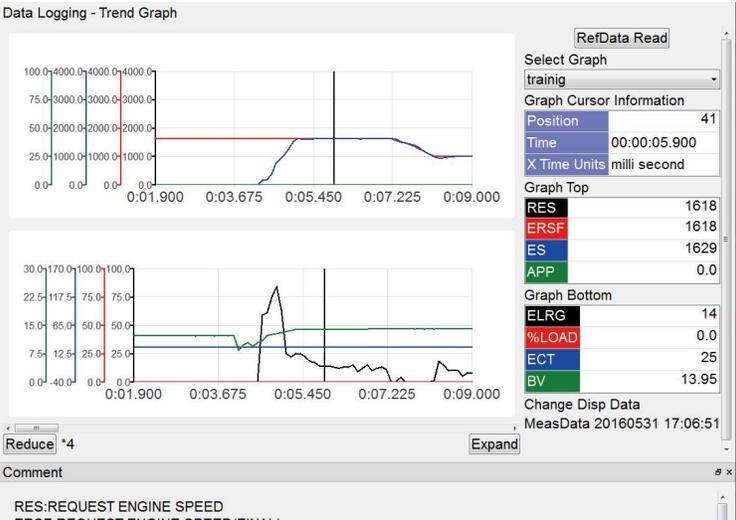
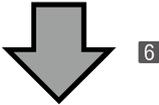
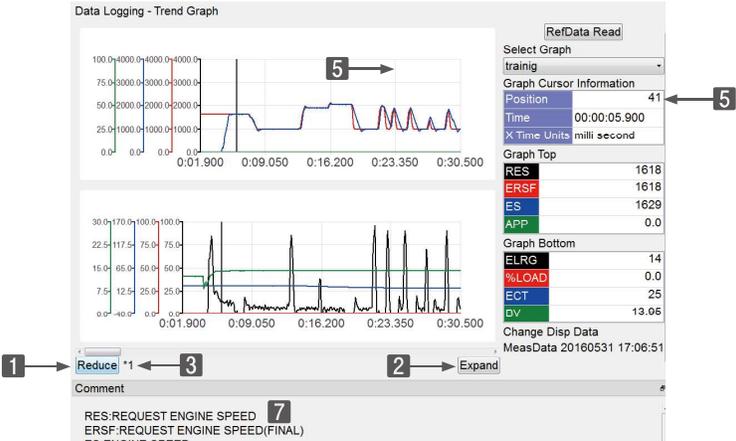


8. Graph Function



8.2 Graph Control

- 1 Minimize the time axis : Click the **Reduce** button to minimize the time axis and see the approximate tendency of the data transition. The display scale factor is shown in the right side of the button. "*1" is the smallest minimize value.
- 2 Expand the time axis : To look at a part of the graph in detail, click the **Expand** button to expand. The maximum scale factor is 10.
- 3 Scale factor of the time axis : It is possible to change the scale factor to 1, 2, 4, 6, 8, and 10.
- 4 Moving the window : The display range of the enlarged graph can be moved with the scroll bar.
- 5 Moving the cursor and checking the values : Click on the graph to move the cursor and the cursor value box is displayed for the data value of that point.
- 6 Expand/minimize the y-axis : Drag the comment box to the top to widen it, and expand/minimize the y-axis.
- 7 Comment : The full name of the data displayed in the graph is displayed.



8. Graph Function

● Display color of the graph

The background color **1** for each cursor value box is displayed in the common color as the display color of the data value scale and the line color **2** of the line graph.

Data selection No.	Cursor value box	Line graph	Scale of data value
	Background color	Line color	Display color
1	Black	Black	Black
2	Red	Red	Red
3	Blue	Blue	Blue
4	Green	Green	Green

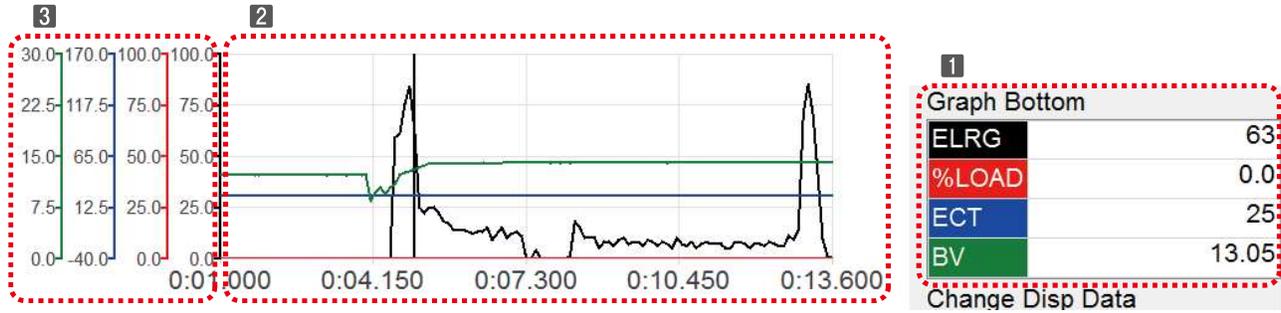
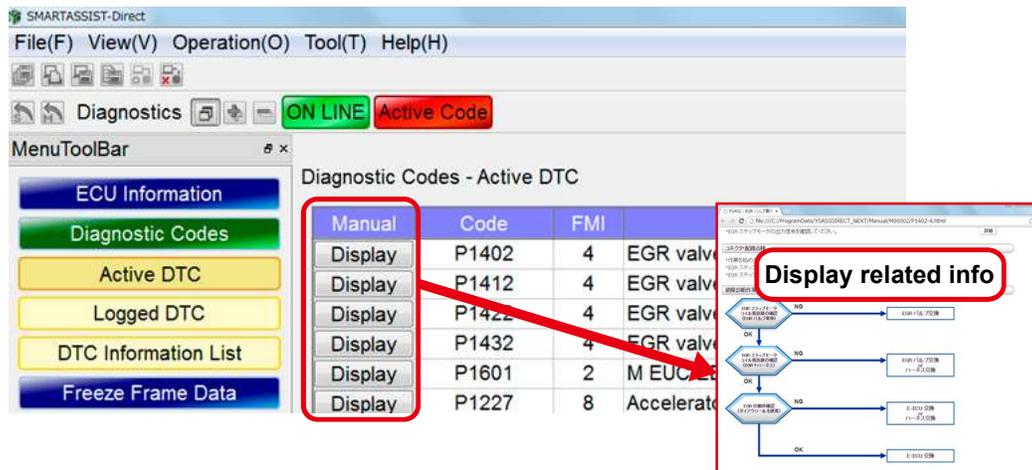


Figure 8-8 Graph Control Screen

9. Manual Link Function

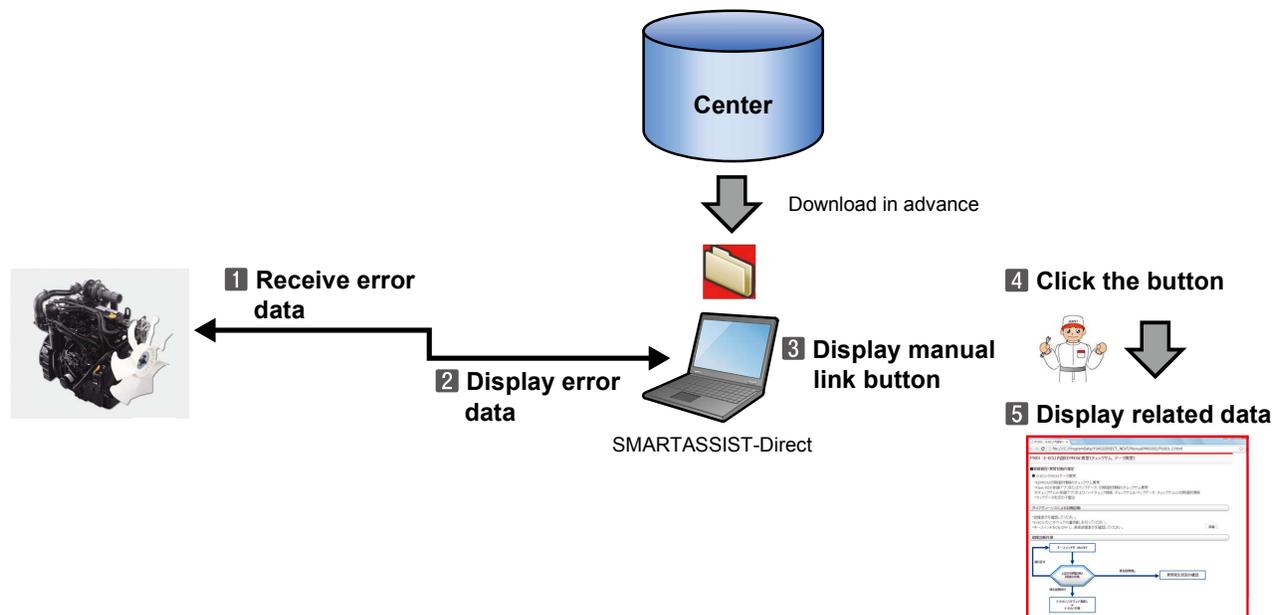
Manual link is the current error screen for the diagnostic (execution) function. By clicking the Defect Display item, this function allows you to link to the data related to maintenance and service.

With this function, service technician can promptly obtain the corresponding data for the defect (failure).



- Note**
- Yanmar provides the data displayed with manual link function separately from the normal technical and service manuals.
 - The images used in this chapter are all example screens.
 - Depending on the product, the data may not be available.

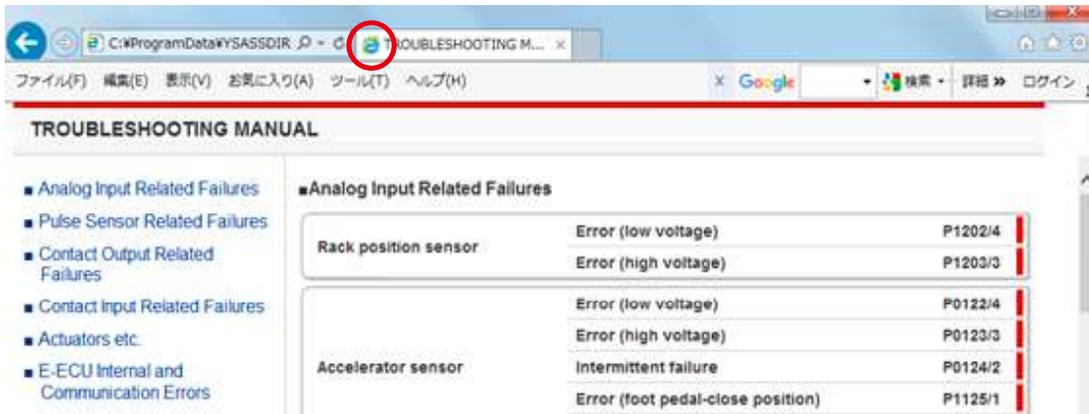
9.1 Structure of the manual link function



- Note**
- The manual link button is only displayed if the manual link data that was from the center by model is the same as the model of the connected product and information relevant to the error signal is included.

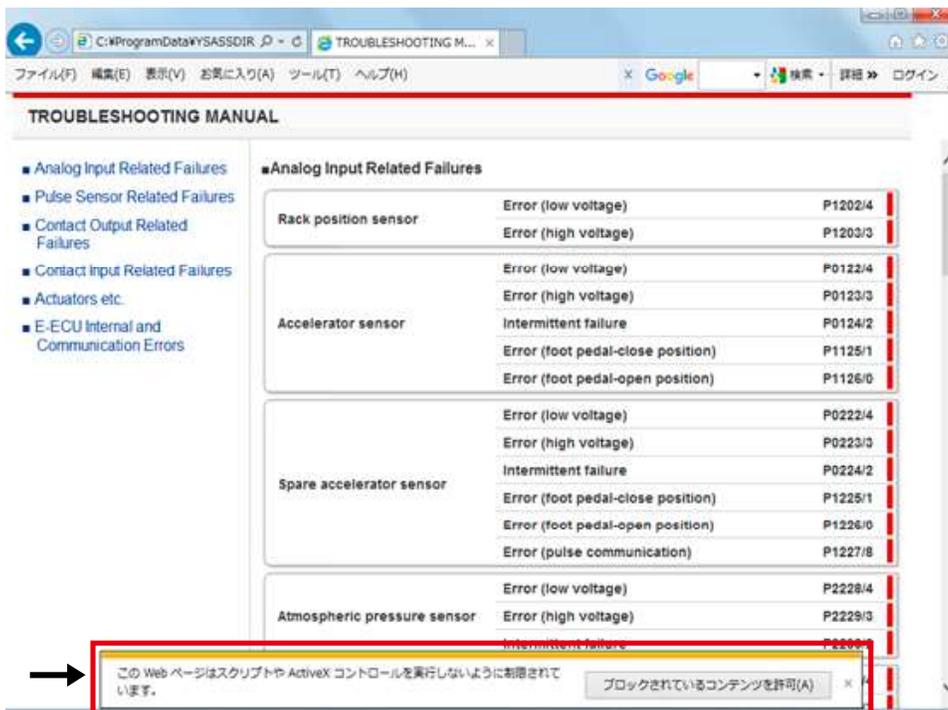
9.2 PC functions required for display

The related information data is displayed in the browser, e.g. Internet Explorer (IE).



- Note**
- The following browsers are supported:
 - Internet Explorer 6.0 or higher
 - Mozilla Firefox 5.0 or higher
 - The displayed (called up) data is an independent, stand-alone HTML document. After display, the functions are not related to the SMARTASSIST-Direct functions.

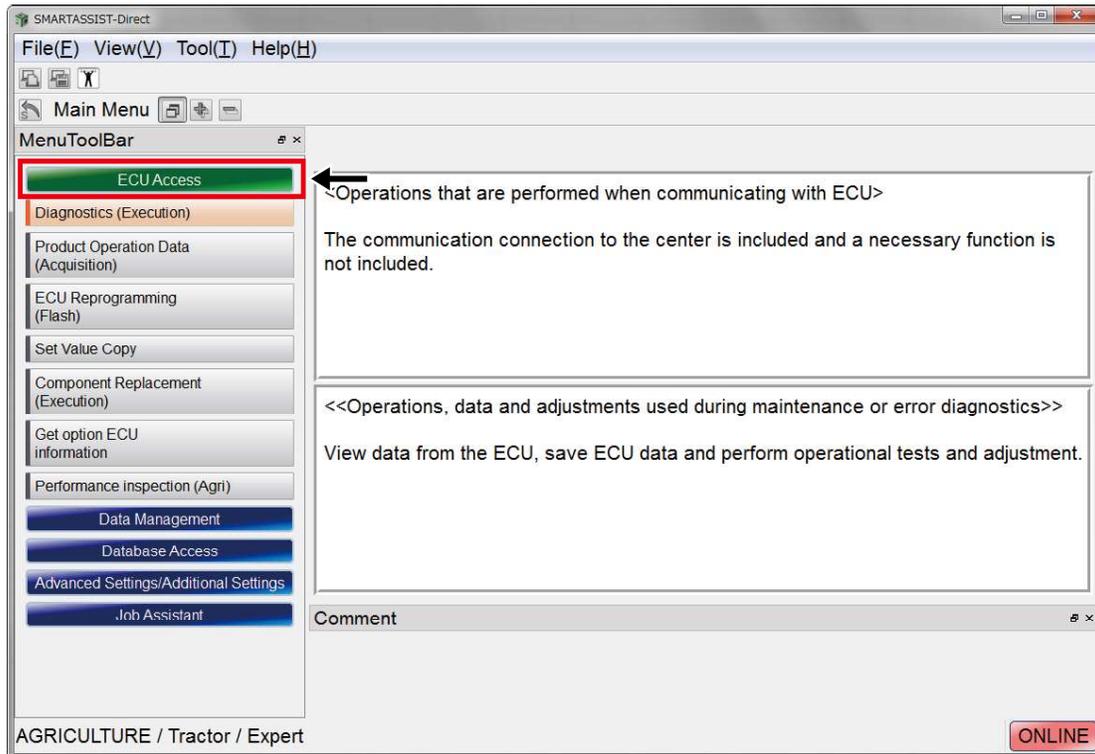
<Browser warnings>



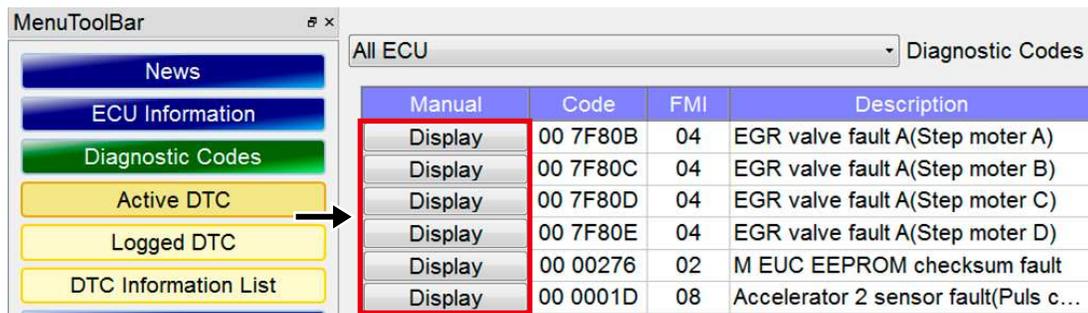
- Note**
- Depending on the security settings on your PC, the above message may be displayed. This is not a problem.

9.3 Displaying Manual Link Data

Manual link function operates on the "Diagnostic (Execution)" menu of "ECU Access".



When there is an item for manual link data related to the current error item, the "Display" button is displayed.



Items without display data are blank.



9. Manual Link Function

Click the "Display" button to display related information. The displayed page may have a further link to other related information.

The screenshot shows a web browser displaying a troubleshooting manual. The main content is a table of error codes under the heading "Analog Input Related Failures".

Sensor	Error Code	Description
Rack position sensor	P1202/4	Error (low voltage)
	P1203/3	Error (high voltage)
Accelerator sensor	P0122/4	Error (low voltage)
	P0123/3	Error (high voltage)
	P0124/2	Intermittent failure
	P1125/1	Error (foot pedal-close position)
	P1125/0	Error (foot pedal-open position)
Spare accelerator sensor	P0222/4	Error (low voltage)
	P0223/3	Error (high voltage)
	P0224/2	Intermittent failure
	P1125/1	Error (foot pedal-close position)

Below the table is a flowchart for diagnosing a "Foot pedal" issue:

```

    graph TD
      A[Continuity check  
(foot pedal only)] -- NG --> B[Foot pedal replacement]
      A -- OK --> C[Continuity check  
(foot pedal + harness)]
      C -- NG --> D[Continuity check  
(harness)]
      C -- OK --> E[Continuity check  
(harness)]
      D -- NG --> F[Harness replacement]
      D -- OK --> E
  
```

Not only buttons but also images and characters displayed in another color have links to other information.

The first screenshot shows a diagnostic procedure for a "Crank speed sensor". A red box highlights the following steps:

1. Checking the crank speed sensor resistance value (sensor):
 1. Remove the wire harness from the accelerator speed sensor.
 2. Use the circuit tester to measure the resistance value between the crank speed sensors A and B.

Reference: The resistance value between the crank speed sensor terminals

Terminal	Specification
Sensor A - B	1050 Ω (Error 10 %)

NG: Replace the crank speed sensor.
OK: Refer to "Checking the crank speed sensor resistance value (sensor + harness)".

The second screenshot shows a vehicle diagram with a red box highlighting the "Management ECU" and "Common Rail ECU" components. A red arrow points from the highlighted area to a detailed photo of the engine compartment, where green arrows point to the "Management ECU" and "Common Rail ECU" components.

9.4 Notice Screen When Starting the Diagnostic (Execution) Screen

The notice screen about available manual link data on your PC from the ECU data of the connected product is displayed.

Display when there is multiple data

The selection screen for available data is displayed.

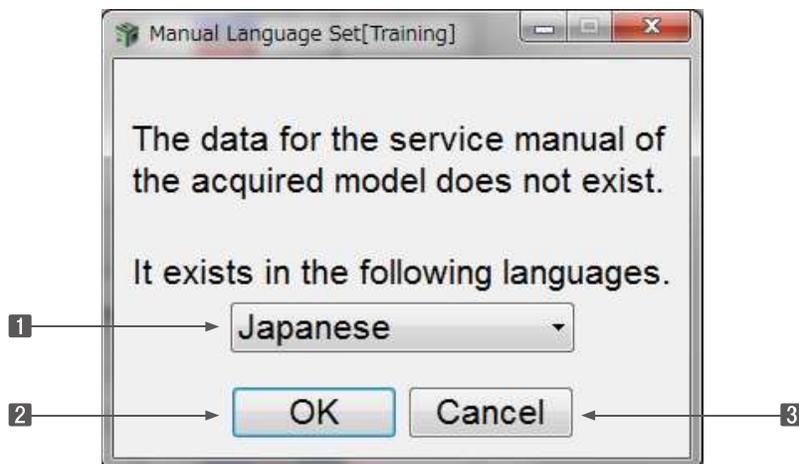
Select the data and click "OK". Then, the main screen is displayed.



Example screen

If manual link data in a language different from your OS is saved on your PC, the following notice screen is displayed. You can select the data in a different language.

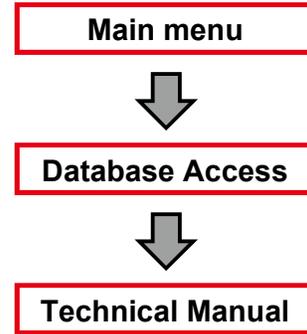
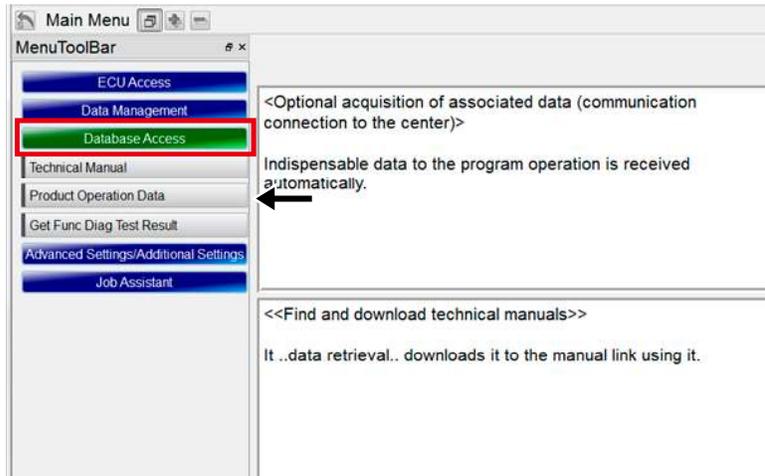
- 1 Selection window for different languages
- 2 If used.
- 3 If not used.



Note When the manual display language setting and the OS language are different, the manual display language setting is prioritized.

9.5 Downloading Manual Link Data

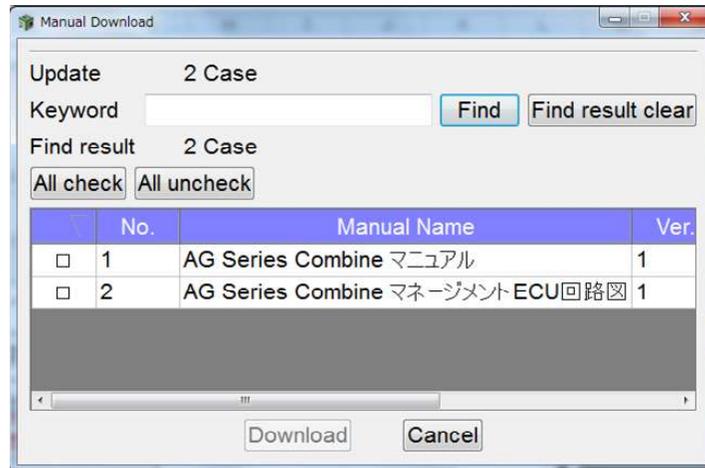
You can download manual link data by manual selection from the center.



Note Note: You can only download manual link data from the available product category.

The selection screen for manual link data is displayed.

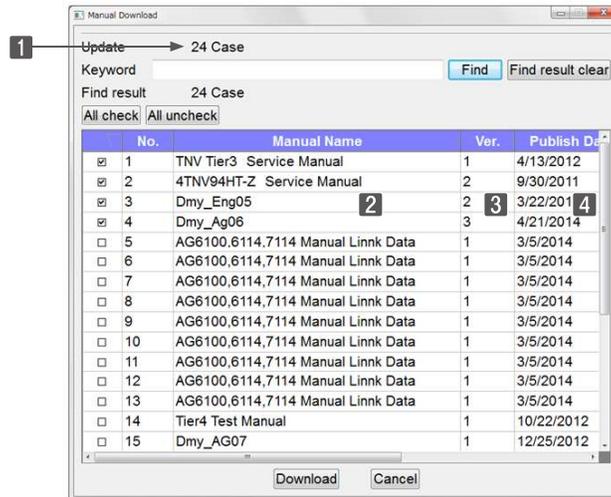
Firstly, connect to the center and obtain the download candidate list.



After communicating to the center, the available data list appears.

(The already downloaded data is not displayed)

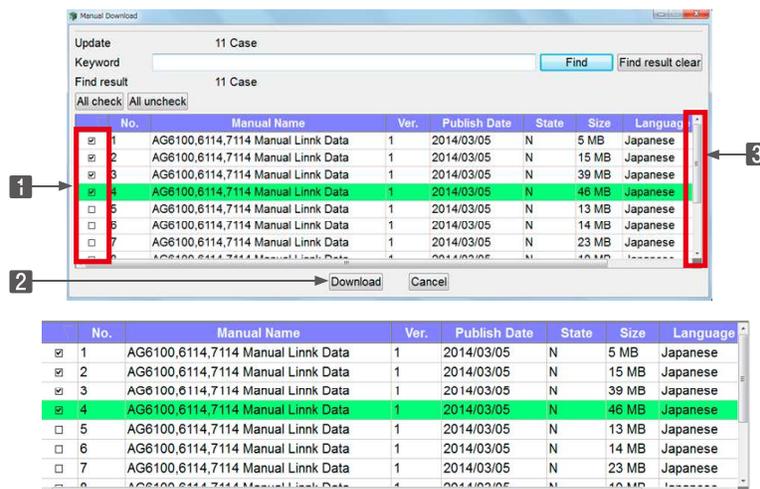
- 1 Number of available downloads
- 2 Manual name (applicable model name)
- 3 Data version
- 4 Date of data release (correction)
- 5 "N (New)" or "C (Correction)"
- 6 Data volume
- 7 Display language



Note The list is not displayed for models without the issued manual link data.

Select the item you want to download and click the "Download" button. Download begins.

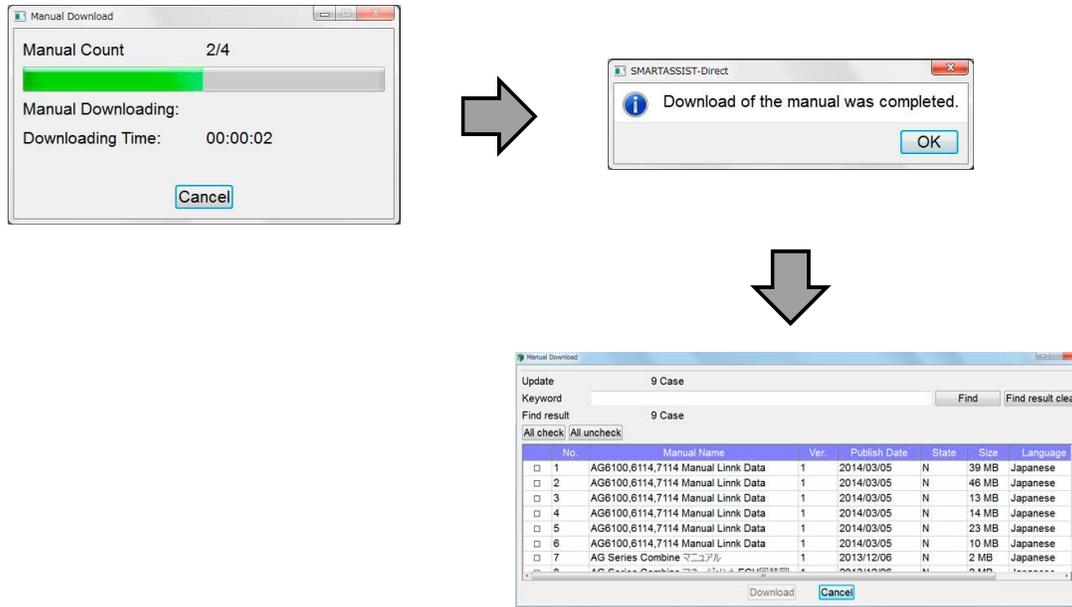
- 1 Tick the checkbox. You can download multiple items at the same time.
- 2 Download Execution button
- 3 Scroll Bar



Point ● It takes time to download multiple items at the same time. Control the scroll bar 3 and check all checkbox.
● All checkboxes are selected when displayed.

9. Manual Link Function

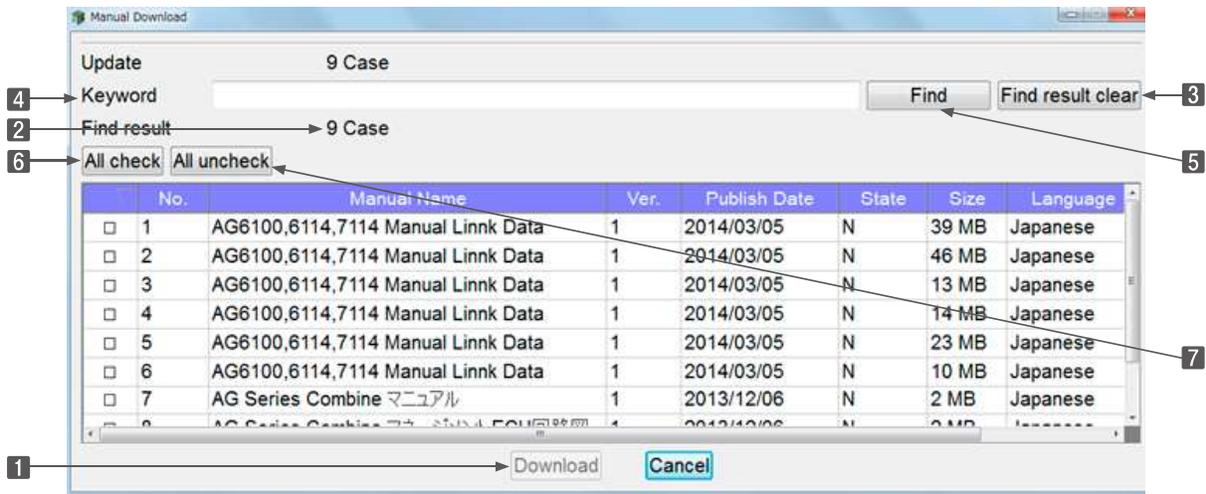
The download condition is displayed. After the download is complete, you are back to the selection screen.



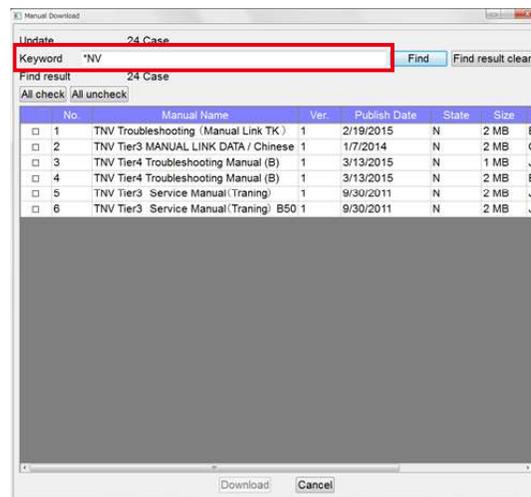
Remark The downloaded data is automatically stored at a specified folder in your PC.

Search refinement is possible for the download data. Select the item you want to download and click the "Download" button **1** to start downloading.

- 1** Download Execution button
- 2** Number of search results
- 3** Clear the search results and display all results.
- 4** Keyword input field
- 5** Start Keyword Search button
- 6** Select all checkboxes for the data that you want to download.
- 7** Clear all ticked checkbox for the data you want to download.



The keyword search is performed in "Partial match".

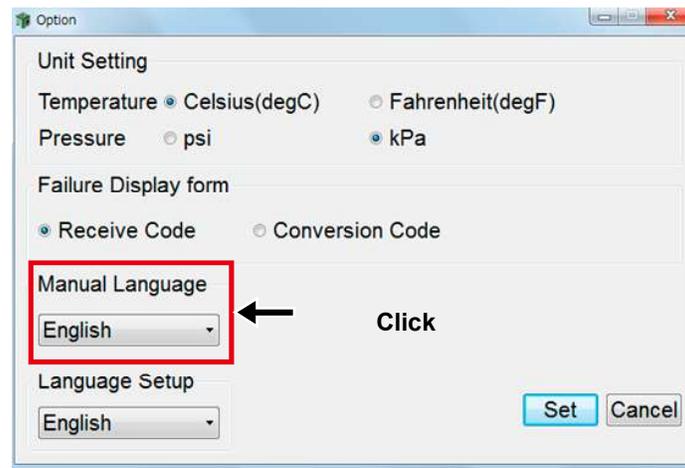
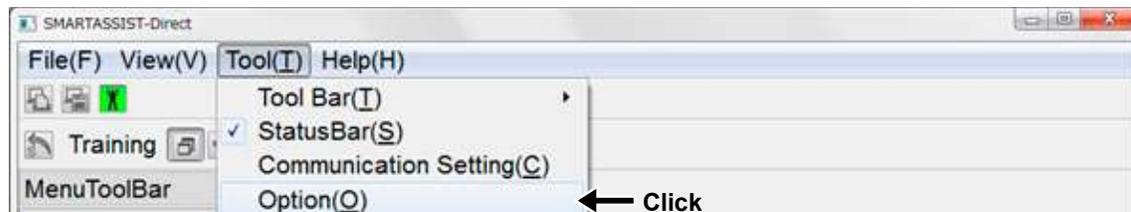


9.6 Language Change Setting of Manual Link Data

Language settings are available for the manual link data. (As of 2012, Japanese and English are available)
Regardless of the OS language setting on your PC, you can change the language of the manual link data.

- When you want to confirm English (correspondence for inquiries, etc.)
- When you want to confirm Japanese

Click "Option" in "Tool" on the main screen for setting method.

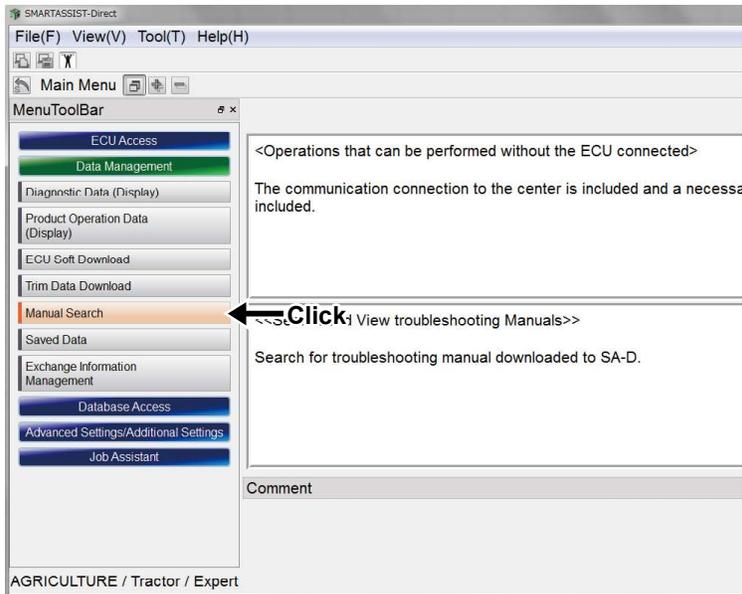


Note In the manual link function, the manual display language setting has priority over the OS language on your PC.

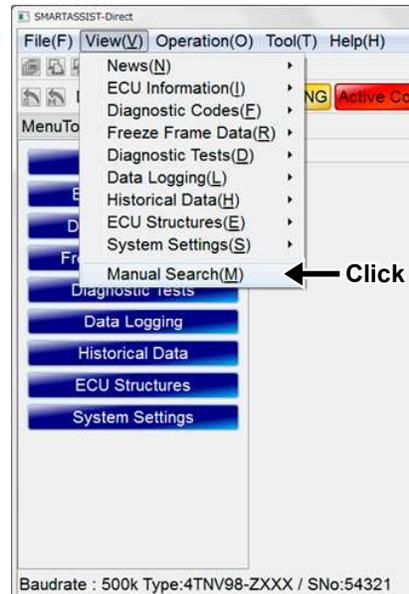
9.7 Searching and Displaying Manual Link Data

If necessary, the downloaded manual link data can be displayed from other locations than the Diagnostic Codes screen. It can be used like a normal technical manual.

Main menu: Data Management→Manual Search

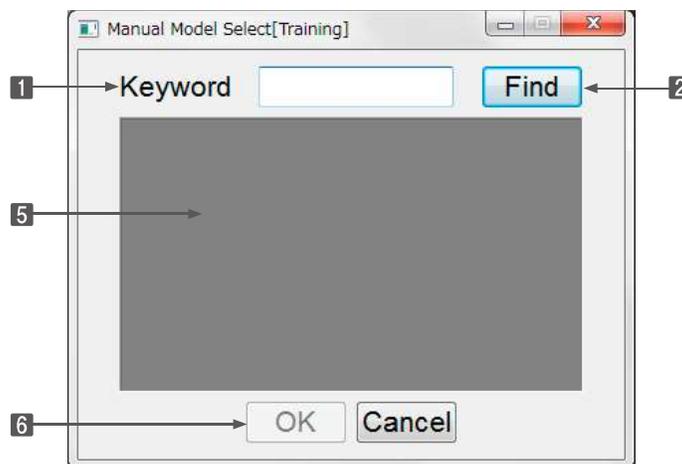


Main Screen: View→Manual Find



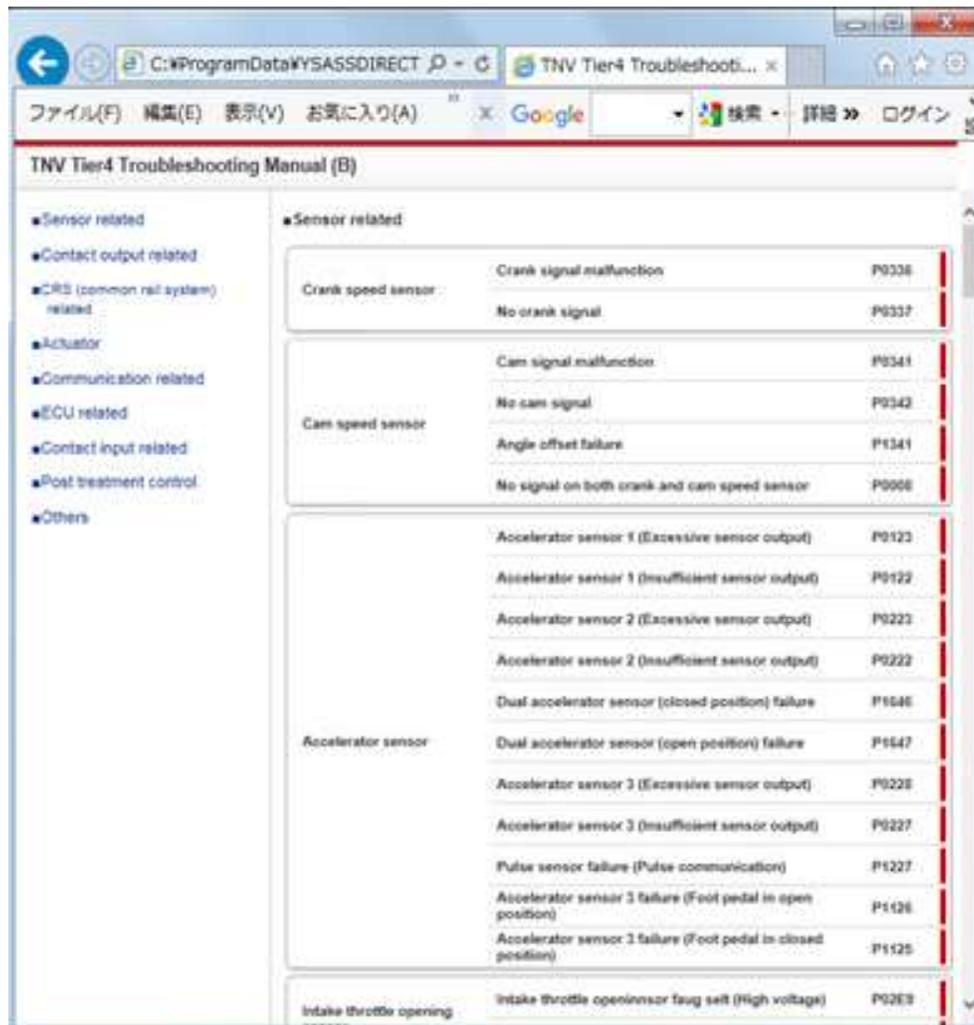
Display selection screen of manual link data

- 1 Keyword search character input field (enter either "Representative Model Name" or "Series Name")
- 2 Search Execution button
- 3 Change Sorting "Ascending/Descending"
- 4 Start Sorting button
- 5 Display/selection field of manual link data
- 6 Display button



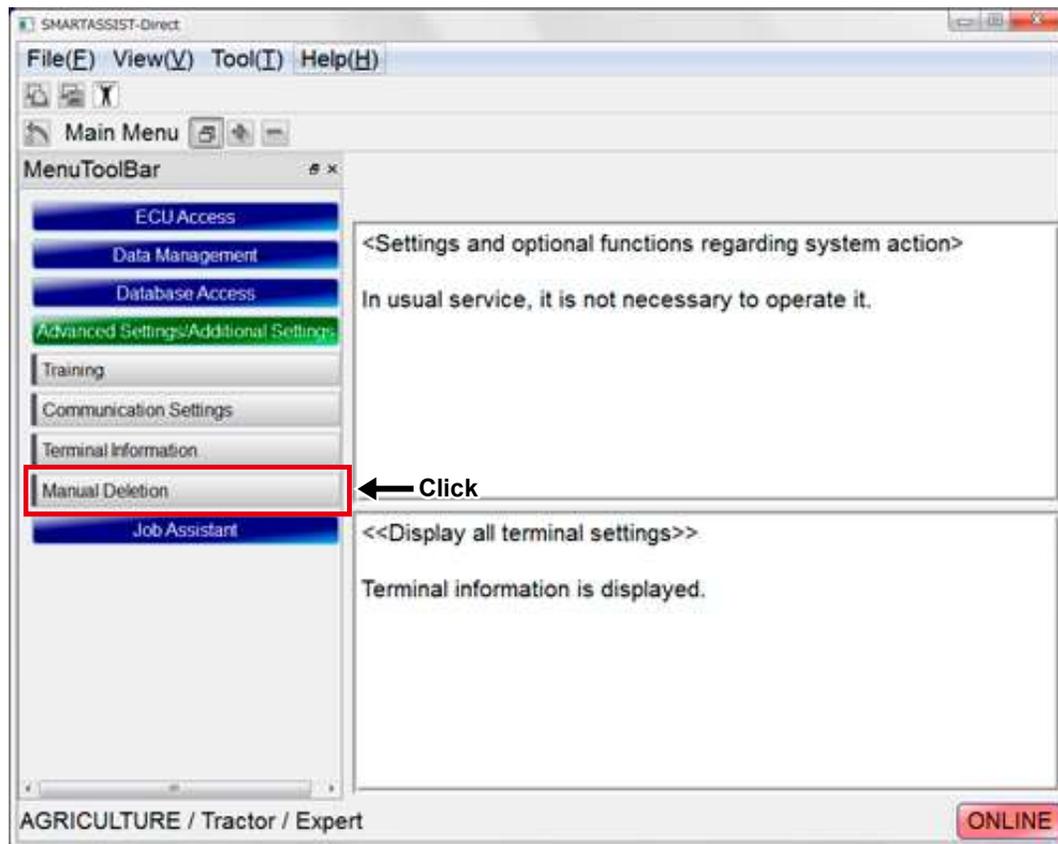
9. Manual Link Function

When the manual link data is displayed from the "Manual Serch" menu, the "Content Page" opens. This "Content Page" has links to each related page within the data.



9.8 Deleting Manual Link Data

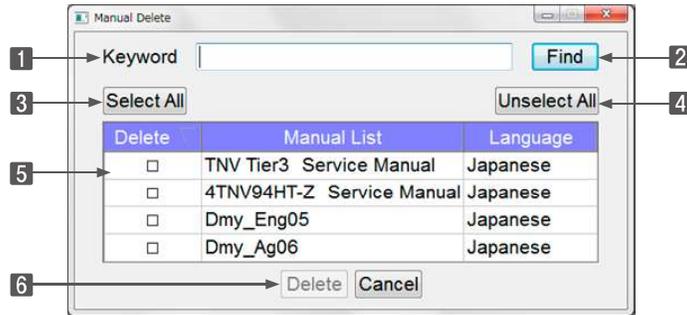
Deletion of the manual link data can be performed from the main menu.



9. Manual Link Function

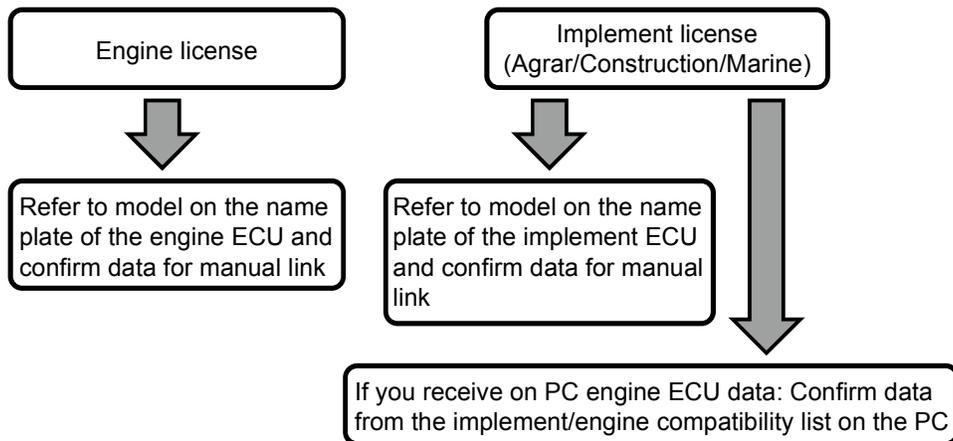
Delete selection screen of manual link data

- 1 Keyword search character input field
- 2 Search Execution button
- 3 Select All button
- 4 Deselect All button
- 5 Display/selection field of manual link data
- 6 Start Deletion button



Remark

Depending on the user's license, the confirmation method of manual link data for reference is different.

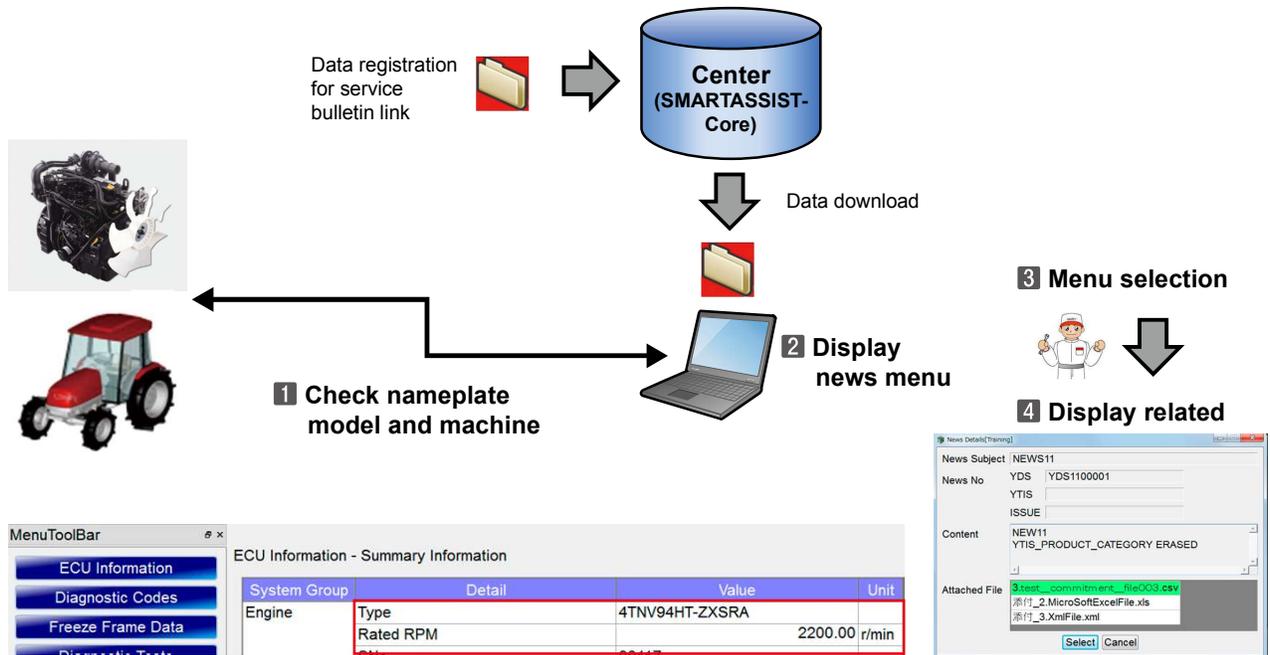


Based on the nameplate model information stored in the ECU, confirm the reference data.

10. News Link

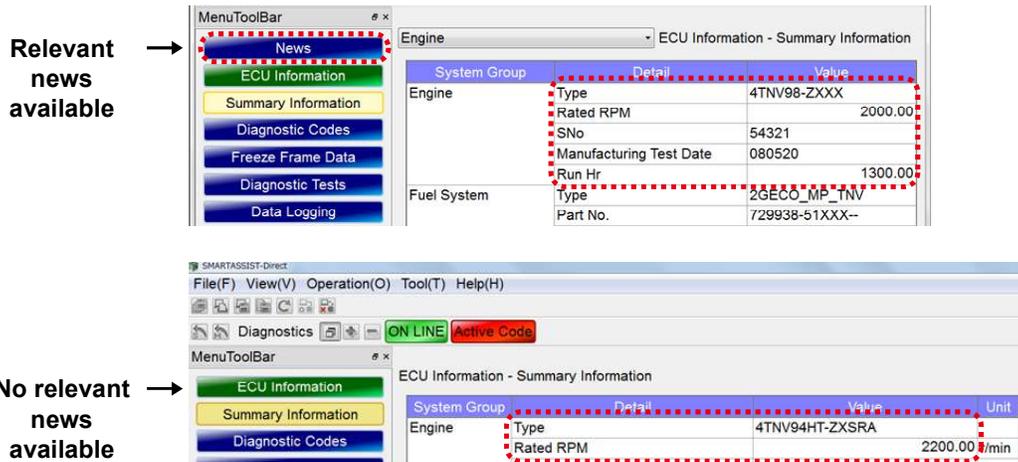
10.1 Development Background for the News Link

To develop a news link function for SMARTASSIST-Direct that uses a function that can read the nameplate mode and serial number from the ECU of the connected product, and that reliably delivers on screen quality-related and technical news to on-site personnel.



10.2 News Link

When news relevant to the connected product are available, the News Menu is displayed.

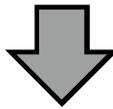


Remark Assuming that the user or owner of the product is looking at the screen, it is displayed in a plain way.

When clicking "News" and "News Link", the relevant news list is displayed.



All news numbers (YDS, YTIS, department publishing numbers) that are registered at the center (SMART-ASSIST-Core) are displayed.

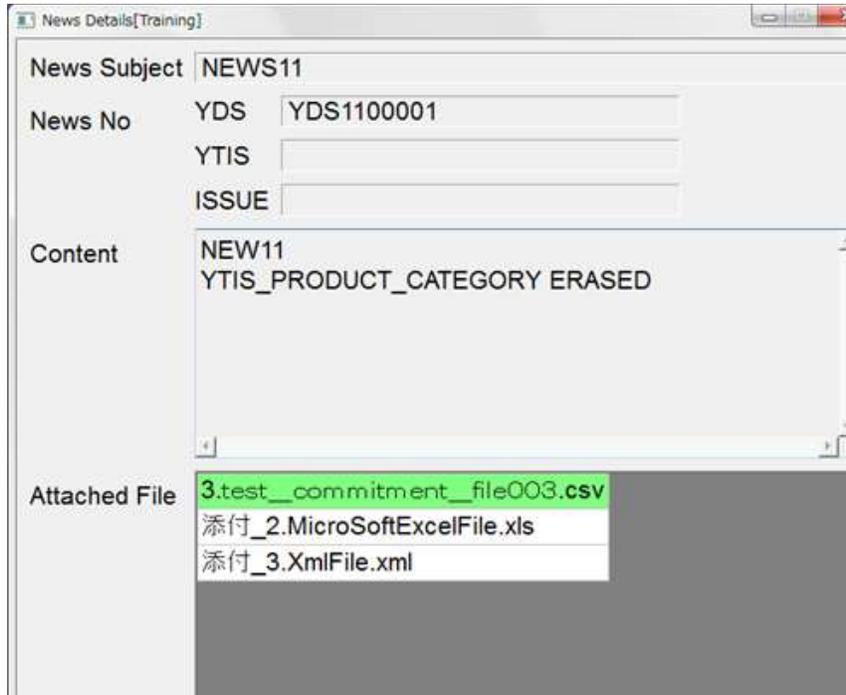
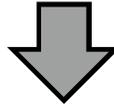


News numbers are displayed so that you can research them later with other systems in case that you cannot see the news details data.

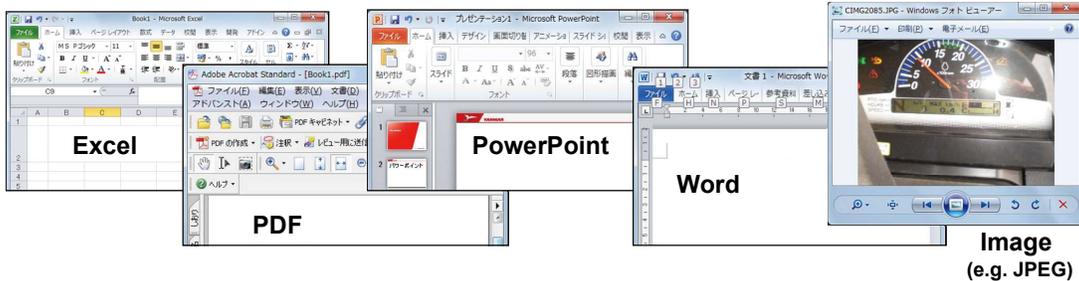
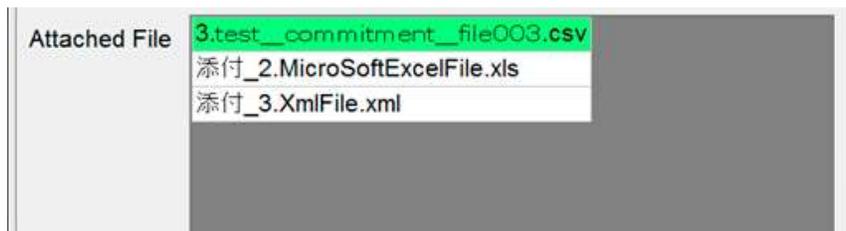
When more than one relevant news item is found, it is displayed like this.



When clicking the "Display" button, a screen to confirm the contents of the news and attached files is displayed.



Select the attached file and click the "Select" button to open it.



Note Whether the attached file opens, depends on the applications installed on the PC.

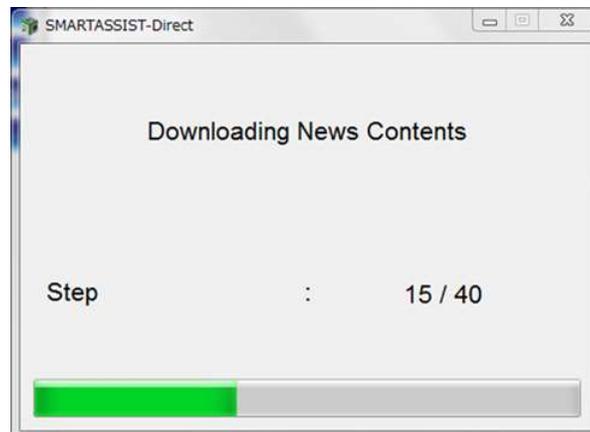
10. News Link

If no details are available for the news, the Details button is not displayed.

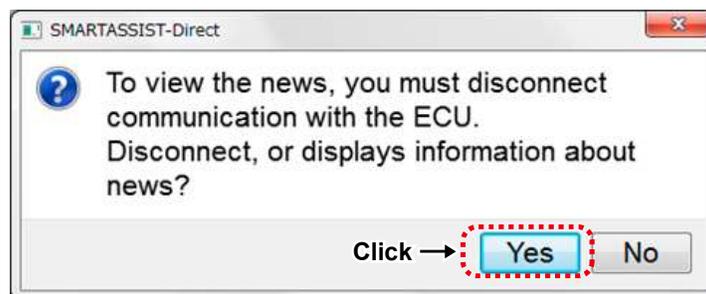


This may be the case in the following two conditions.

- When the news was registered at the center, no details were attached.
 - This is done when the purpose of the news is only to raise attention of the user
- After login, the SMARTASSIST of data updating was canceled.
 - Data is downloaded in the below order, so 2 may not be on the PC.
 - 1 News list
 - 2 Then, the contents of all news and attached files



When clicking "News Link" while the product is connected, a warning is displayed asking to disconnect the connection. The purpose of this is to exclude the possibility of misuse of the product.



News function starts not only during error diagnosis, but also when collecting product operation data.

Relevant news available →

MenuToolBar

- News
- Historical Data
- Lifetime Data
- Map Table
- Log Data

Historical Data - Lifetime Data

Save Data Disp Ref Data Disp Ave Disp Maintenance Info E

A: GET DATA DISP Description	A: Value
DateTime	2016/05/30 14:49:18
VehicleSignatureType	4TNV98-ESDB6
VehicleIdentificationNumber	H0824

No relevant news available →

MenuToolBar

- News
- ECU Information
- Diagnostic Codes
- Freeze Frame Data
- Diagnostic Tests
- Data Logging
- Historical Data
- Lifetime Data

Engine - Historical Data - Lifetime Data

Clear Select Item

Clear	Description	Value	Unit
	Total ECU Run Time	1433.60	h
	TOTAL ENGINE HOURS	1300.00	h
	ENGINE WARNING TOTAL RUN HOURS	8.00	h
<input type="checkbox"/>	ENGINE WARNING TRIP RUN HOURS	1.00	h
	ENGINE RUN TIMES	340	-

11. Functions Related to the Product Operation Data

■ About Functions Related to the Product Operation Data

- These are functions to call up, display and save information about the operation status of the machine (i.e. Product Operation Data) stored in each ECU/controller equipped in the product.

Also, it is possible to display the comparison of the past save data for the same product and the save data of the other product.

Understand and use the Product Operation Data for maintenance and usage guidance for the users.

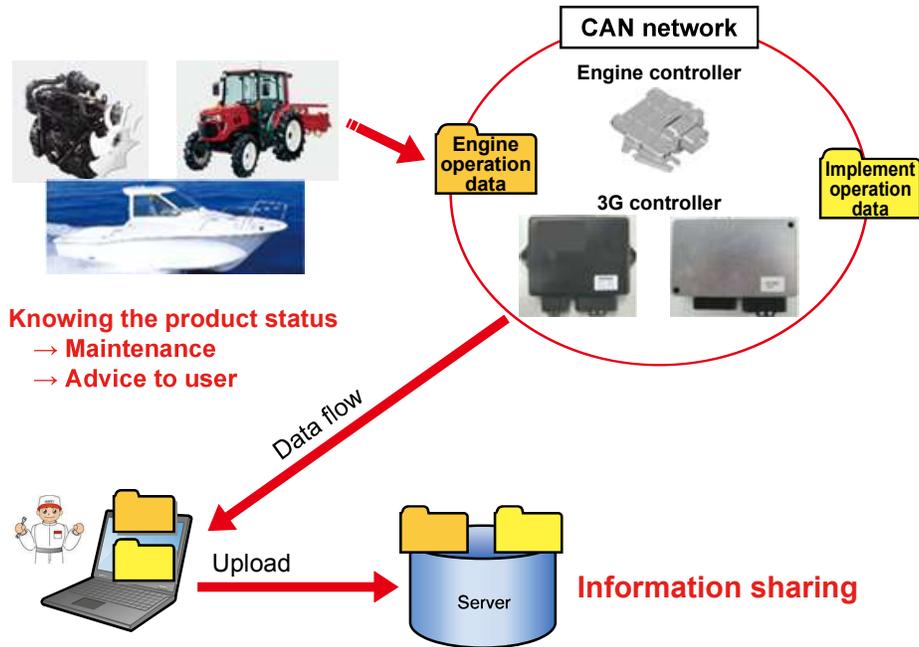


Figure 11-1 Outline of Product Operation Data

- The Product Operation Data is categorized into 3 types of information.

Historical Data - Lifetime Data

Save Data Disp Ref Data Disp Ave Disp Maintenance Info Exce

A:GET DATA DISP Description	A: Value	A: Unit
DateTime	2015/10/27 13:56:37	
VehicleSignatureType	4TNV94HT-ZXSRA	
VehicleIdentificationNumber	00117	
TotalEngineHour	0.00	h
TotalEngineHours(h)		h
ManufacturingTestDate	110121	
Total ECU Run Time	1.50	h
Total Engine Hours	0.00	h
Engine Trip Run Hours	0.00	h
Engine Warning Total Run Hours	0.00	h

Figure 11-2 Example screen of the lifetime data (integrated data for whole period)

Historical Data - Map Table (4TNV94HT-ZXSRA,00117,2015/10/27 13:56:37)

Engine Load Pattern [h]

Engine Load Rate [%]	Engine Speed [rpm]								Total	(%)	0 - 50%	
	0	1000	1200	1500	1800	2000	2300	2500				
0.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
20.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
40.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
50.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
60.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
70.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
80.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
90.0-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			20	40
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

Figure 11-3 Example screen of the distribution diagram data (integrated data for whole period)

Historical Data - Log Data

Starter Restraint Status Logging

No.	Data(B)	Save Time(Hr)
1	0100100000000000	0.00
2	0100100000000000	0.00

Figure 11-4 Example screen of the log data (integrated data for a given period)

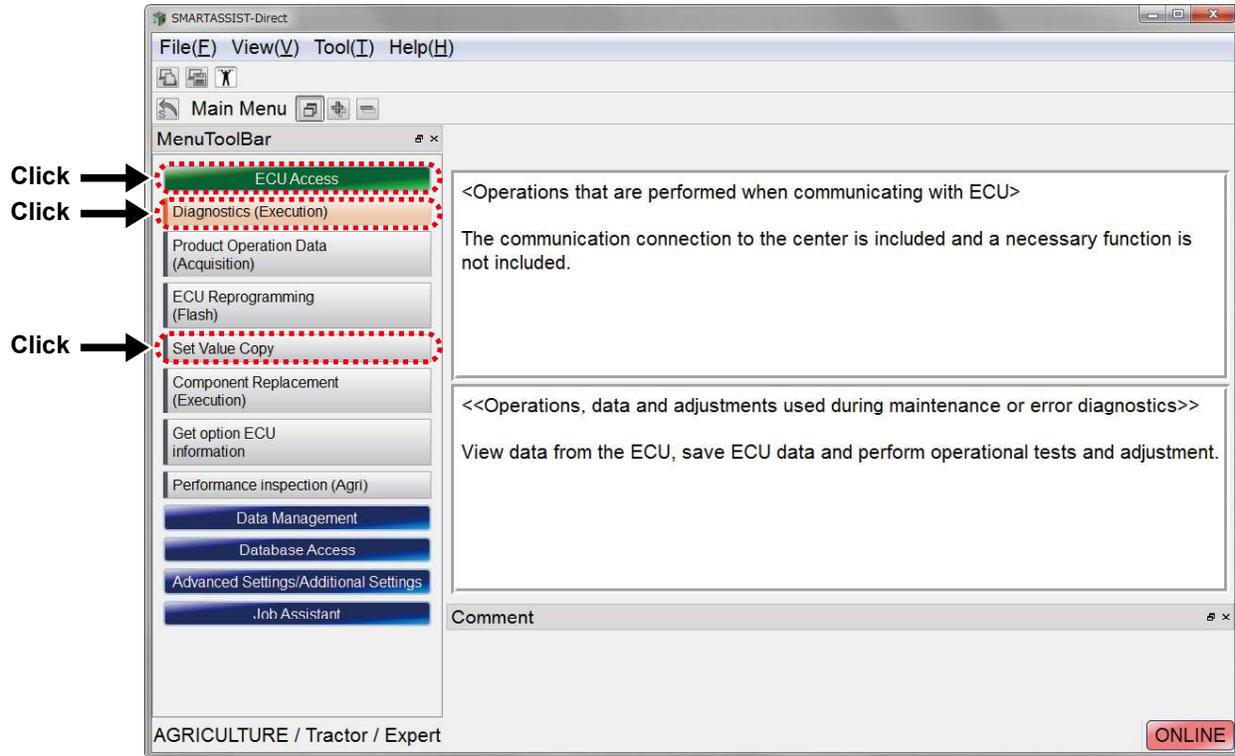
Note

- Each value of the obtained product operation data is not a strictly measured data. Use the values as a guideline.
- The product operation data stored in your PC is automatically uploaded when connected to the center, and accumulated as the product operation data database.
- When there is no stored information in the ECU, an empty box is displayed. Depending on the product, the content of the product operation data is different.
- As no information related to location, specific information on individuals, voice, or image is included in the product operation data, product Operation Data is not considered personal information. *

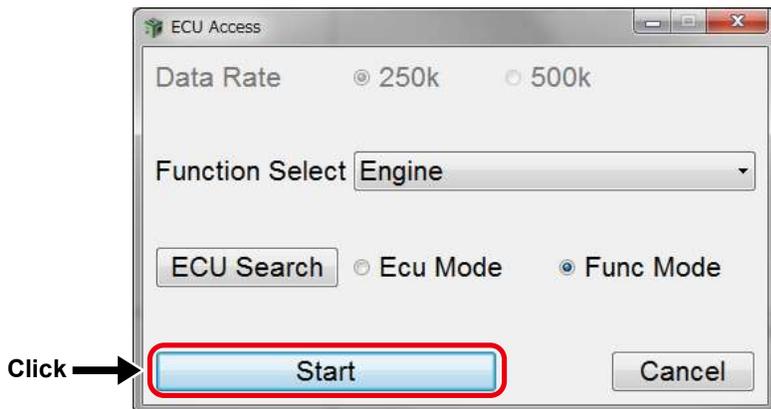
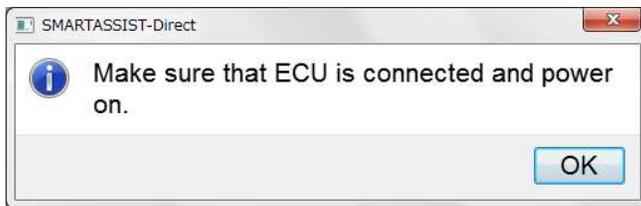
* In Japan

11.1 Acquisition of Product Operation Data (Auto)

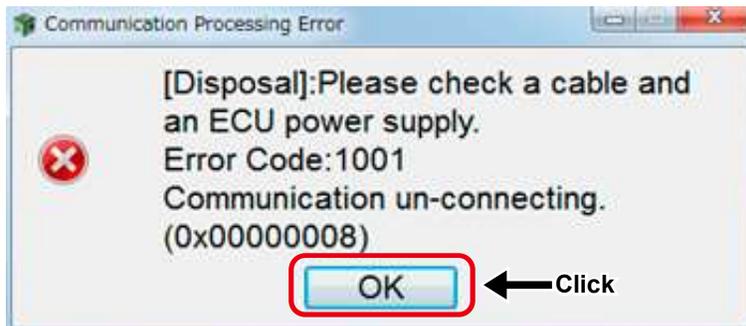
- 1 Select "Diagnostics (Execution)" or "Set Value Copy" of the tab "ECU Access".



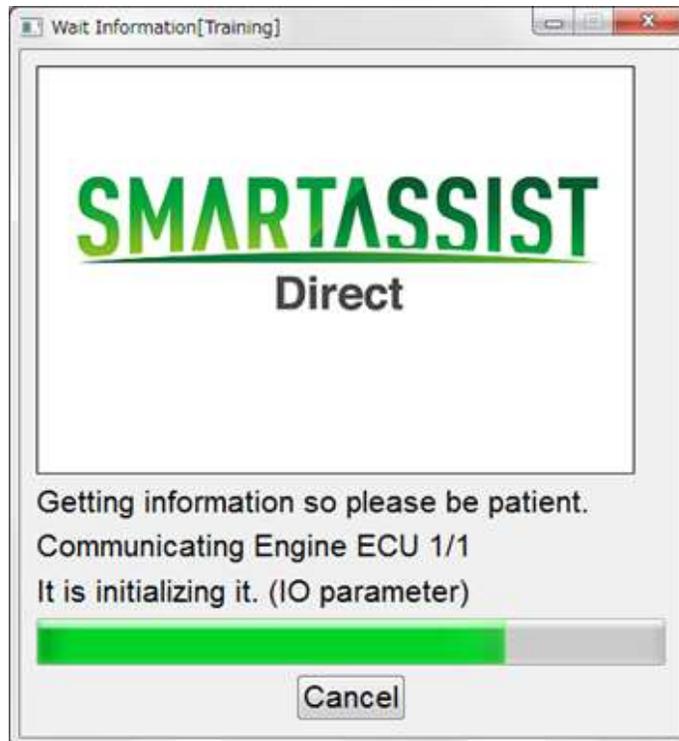
- 2 The connectable ECU is searched and the connection execution screen appears. Click "Start".



If there are problems including the power is not turned on, the power is unstable, and the communication cable is disconnected, an error appears. Click "Close" to determine the cause of problem.



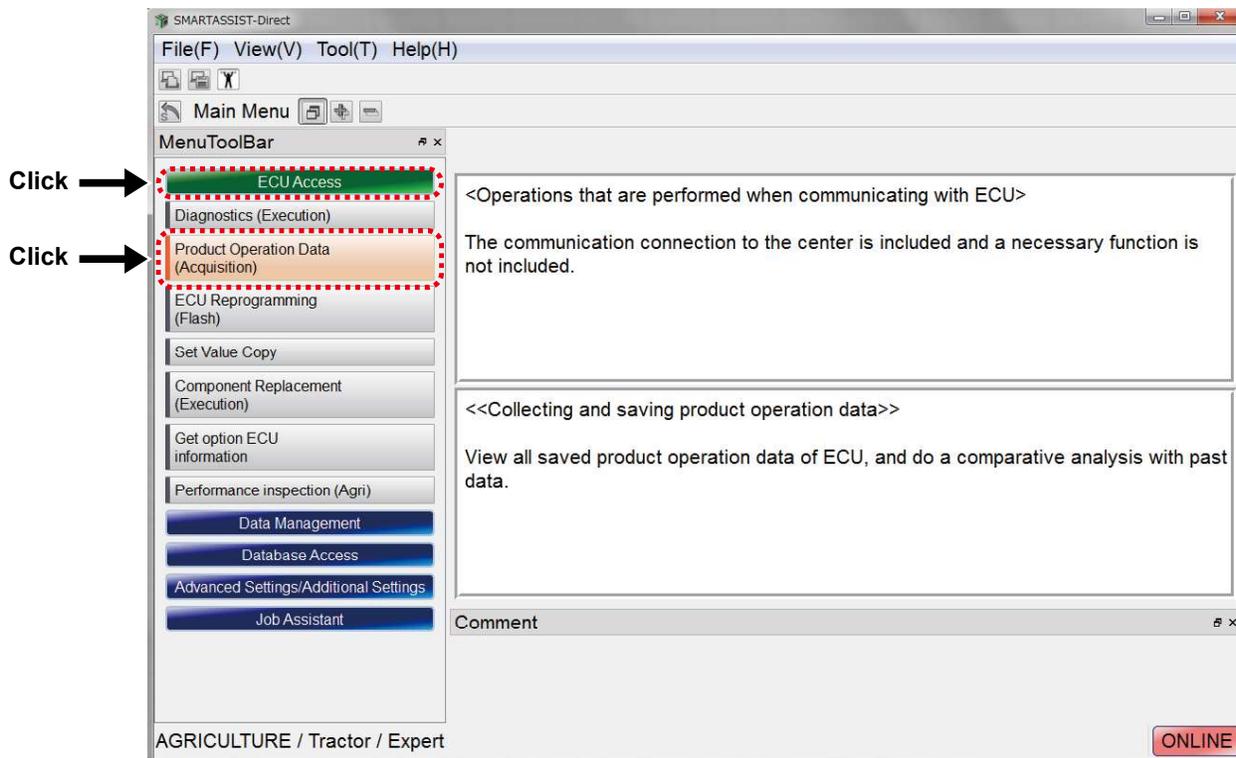
- 3 The communication with the ECU starts and the acquisition of product operation data starts.



Point The acquisition completion dialog box is not displayed after the automatic acquisition of product operation data. To confirm the completion, select "Product Operation Data (Display)" of the tab "Data Management" in the main menu.

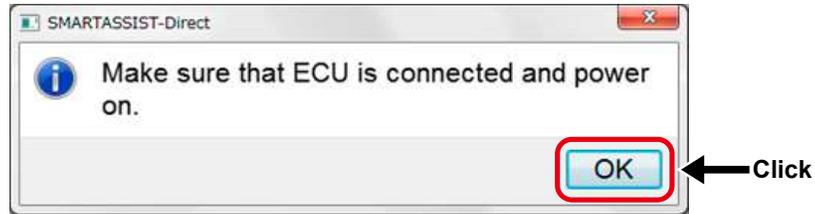
11.2 Acquisition of Product Operation Data (Manual)

- 1 Select Product Operation Data (Acquisition) of the tab "ECU Access" in the main menu.



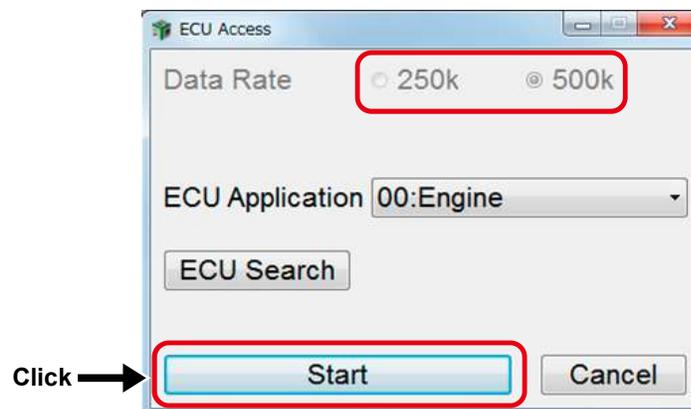
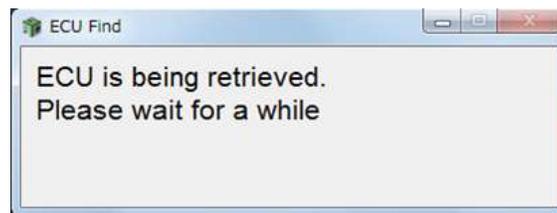
11. Functions Related to the Product Operation Data

- 2 The display that urges to connect your PC with the ECU (product) and the power supply appears.



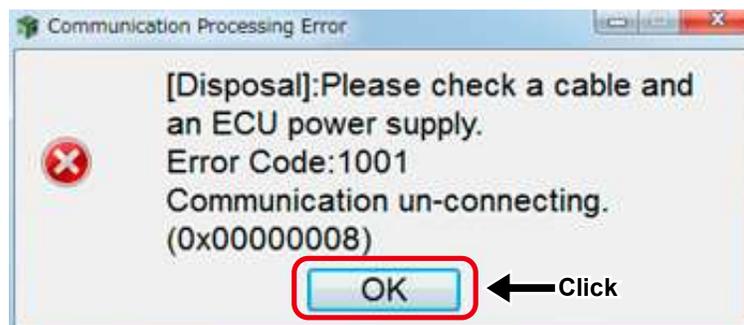
After connecting your PC and the check coupler of the product with an interface box and turning ON the power (key switch), click the "OK" button. The communication with the ECU starts.

- 3 A connectable ECU is searched for and the connection execution screen is displayed. Click "Start".

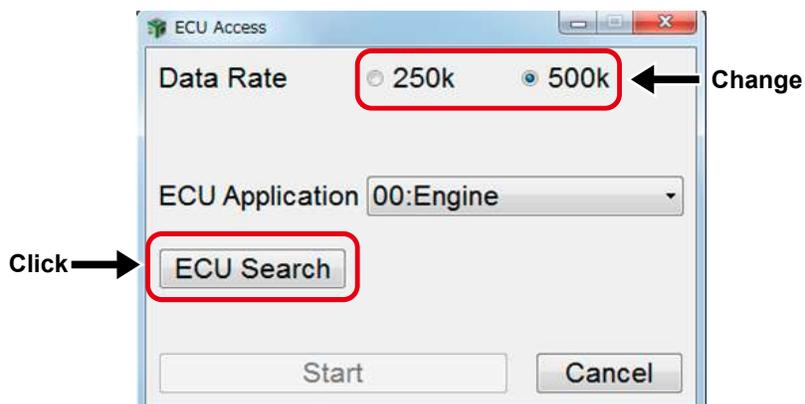


If there are problems such as the power is not turned on, the power is unstable, or the communication cable is disconnected, an error is displayed.

Click "Close" and determine the cause of problem.



- 4 If there is no connectable ECU in the preset Data Rate, the Data Rate change screen is displayed. Change the speed and click the "ECU Search" button.



Remark Right after turning on the power of the product (with the key switch), ECU searches from external devices may be disabled. This is for internal processes such as system checks. In such a case, click "Cancel" once and restart the procedures from 1. later.

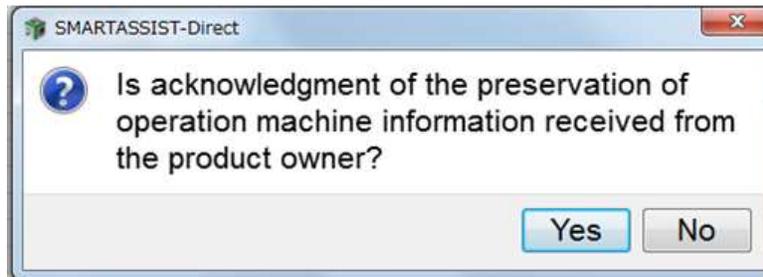
- 5 The communication with the ECU starts and the acquisition of product operation data starts.



Example screen

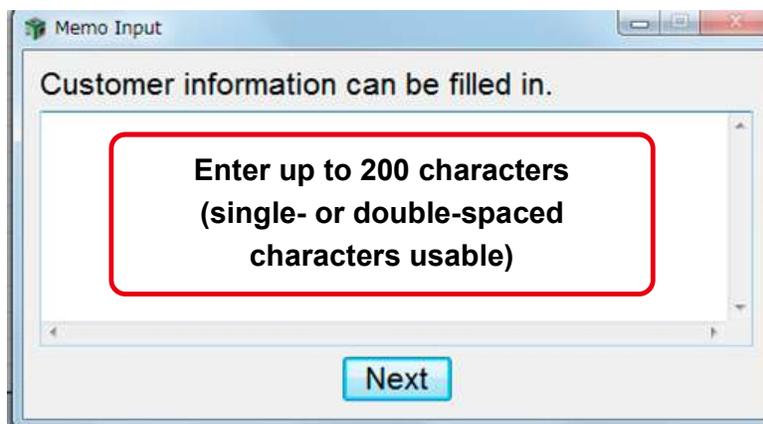
11. Functions Related to the Product Operation Data

- 6 When the communication with the ECU is complete, the below message appears.
- Click "Yes (Y)" to display the product operation data after saving it on your PC.
 - Click "No (N)" to display the product operation data without saving it.



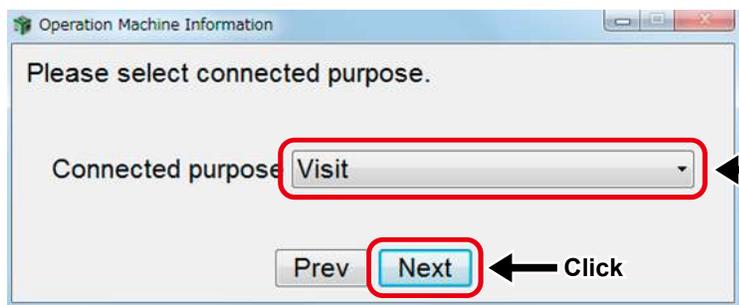
Point As no information related to location, specific information on individuals, voice, or image is included in the product operation data, product operation data is not considered personal information.
* In Japan

- 7 Click "OK". The memo entry screen is displayed.

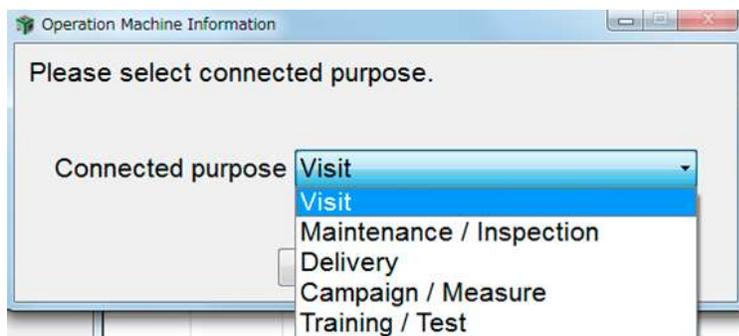


Point Even you select "Cancel" in the memo screen, the product operation data is saved.
You can edit the memo with the saved data after saving the data.

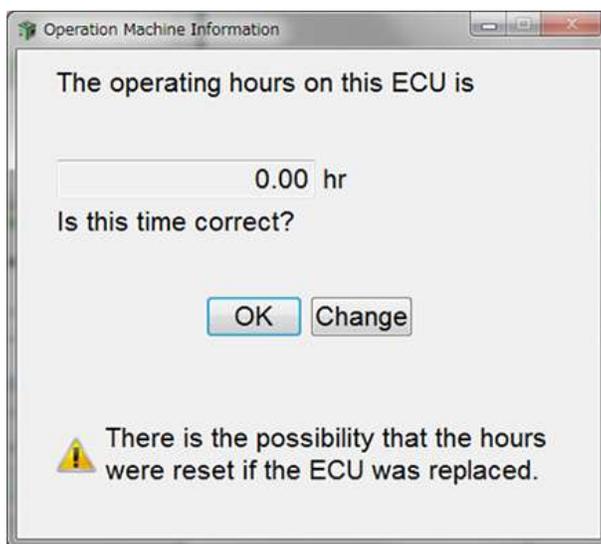
- 8 Then, enter the connection purpose.
 Select the most suitable item from the choices.



- Use this as a filter when you use or search the obtained product operation data.
- To obtain data for training and practise, select "Training/test" to keep it separate from the actual data.



- 9 Then, the operating hours check screen is displayed.
 Click "OK". The collection information is displayed. Click "Change". The operating hours entry screen is displayed.



Operating hours check screen

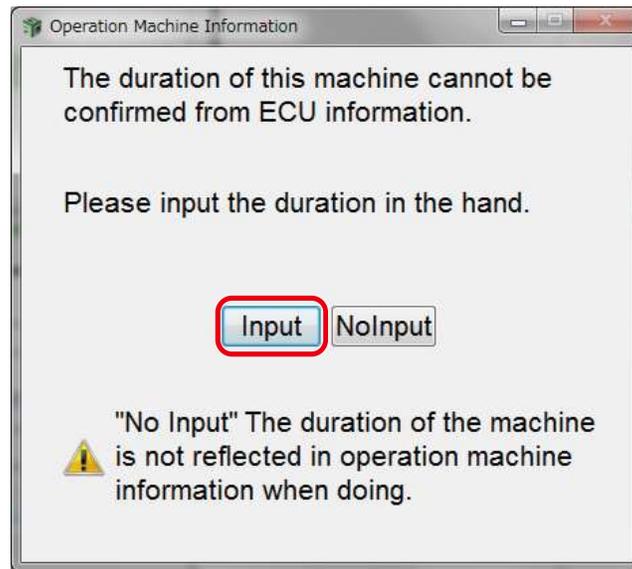
Reason for Confirmation

- The operating hours of the machine is the most important item of the product operation data.
- When maintenance using the service ECU is performed, the information in the ECU is reset.

11. Functions Related to the Product Operation Data

10 When there is no operating hours information in the ECU information, the warning screen is displayed.

Click "Input". The operating hours entry screen is displayed. Click "Cancel" to display product operation data without saving it.

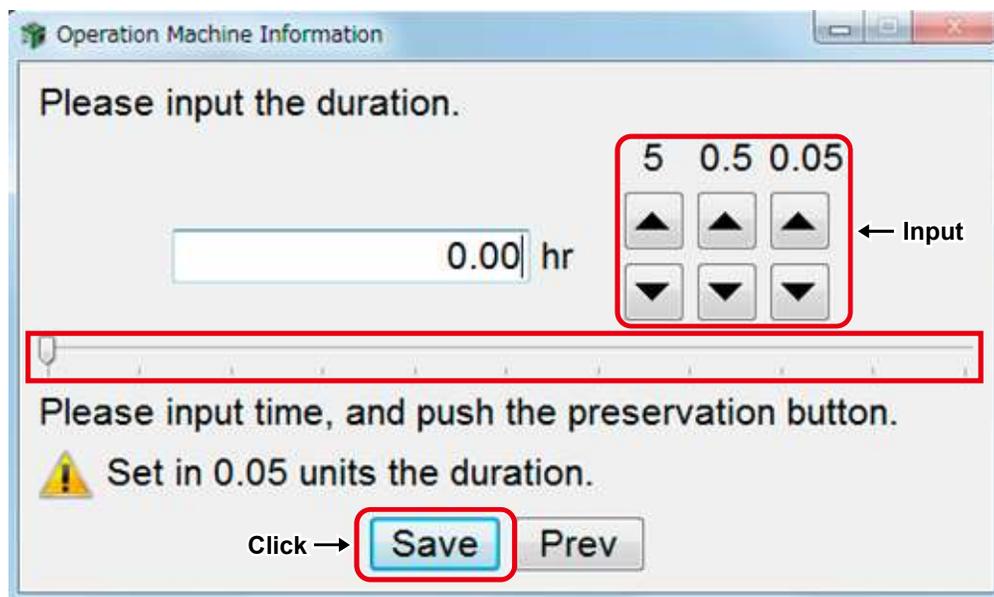


Screen when the operating hours cannot be confirmed

Reason for Entry

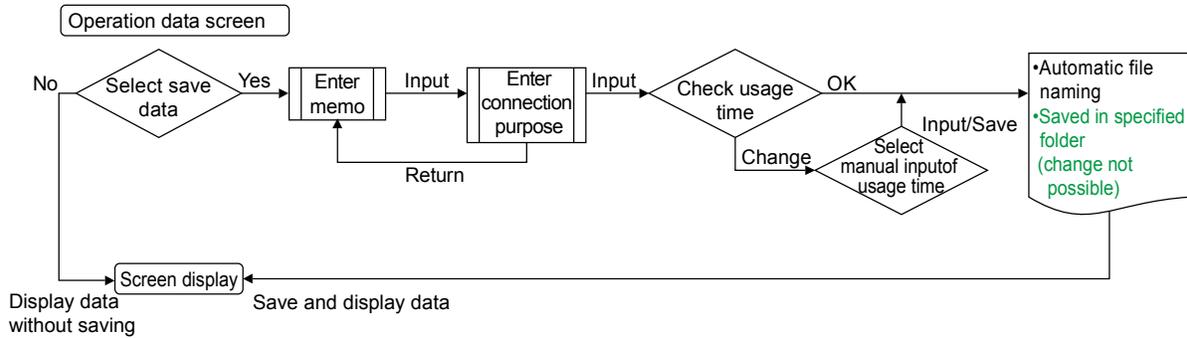
- The operating hours of machine is the most important item of product operation data.
- There are many cases in which the operating hours of the 3G controller is not recorded.

11 After manually entering the operating hours by controlling the button, click the "Save" button. The collection information display screen is displayed.



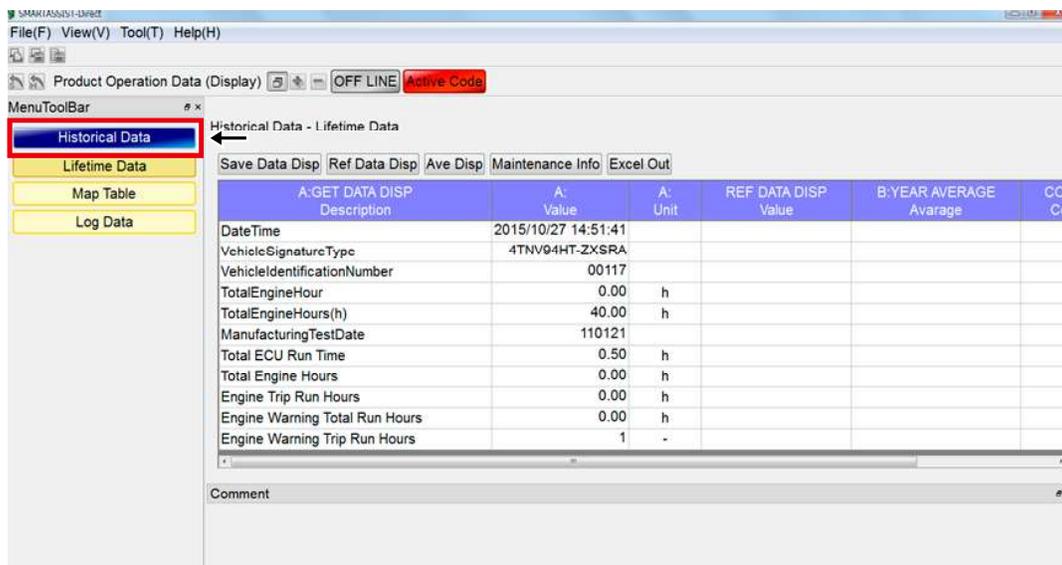
Important If you select "Cancel" in the operating hours manual entry screen, product operation data is not saved.

■ Summary of flow up to saving product operation data



11.3 Display Screen of Product Operation Data

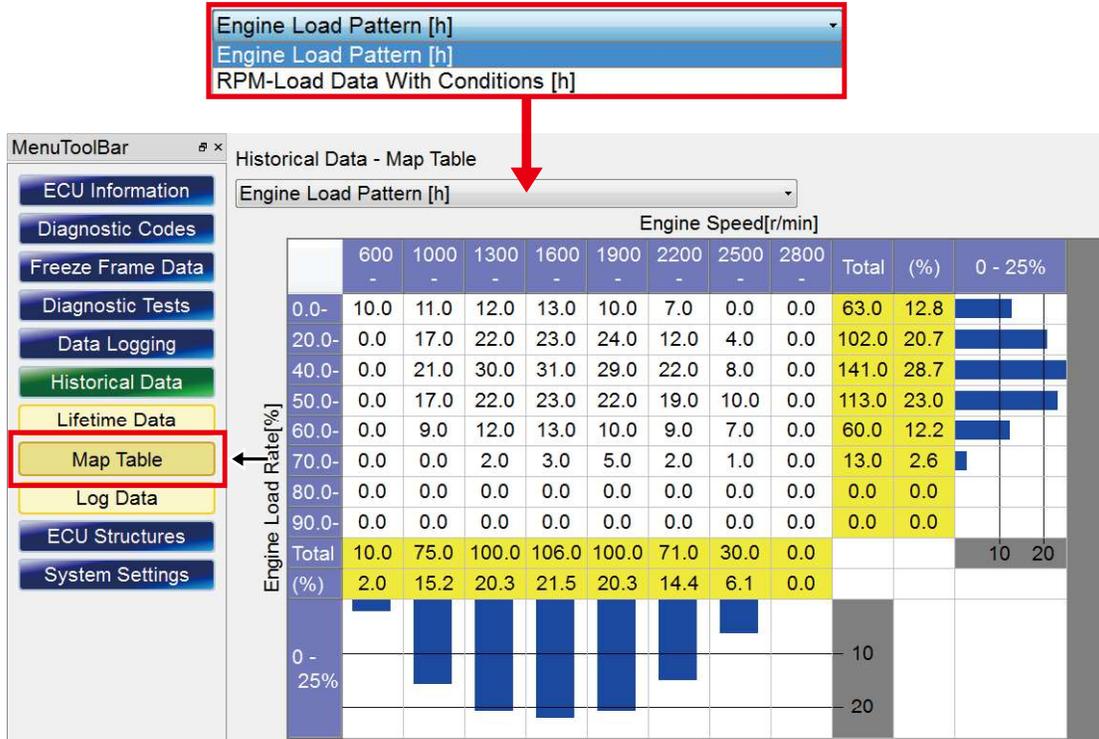
- Access to all ECU on the same CAN network, and display the saved product operation data. (Even if the saved product operation data is in multiple ECU, it is displayed in one screen.)
 - The model is displayed in the stored information in the ECU.
 - The model of the machine equipped with multiple ECU is displayed under the model of the "Machine ECU".
 - The historical data saved in the engine ECU is also collected and displayed as product operation data.
- "Lifetime Data" Display Screen of Product Operation Data



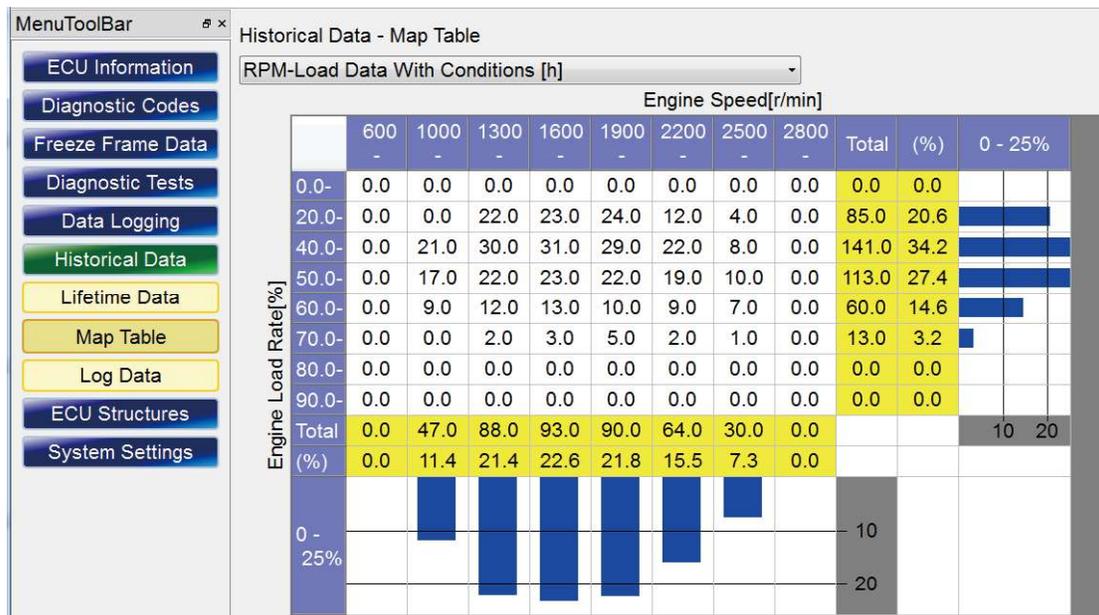
11. Functions Related to the Product Operation Data

● "Map Table" Display Screen of Product Operation Data

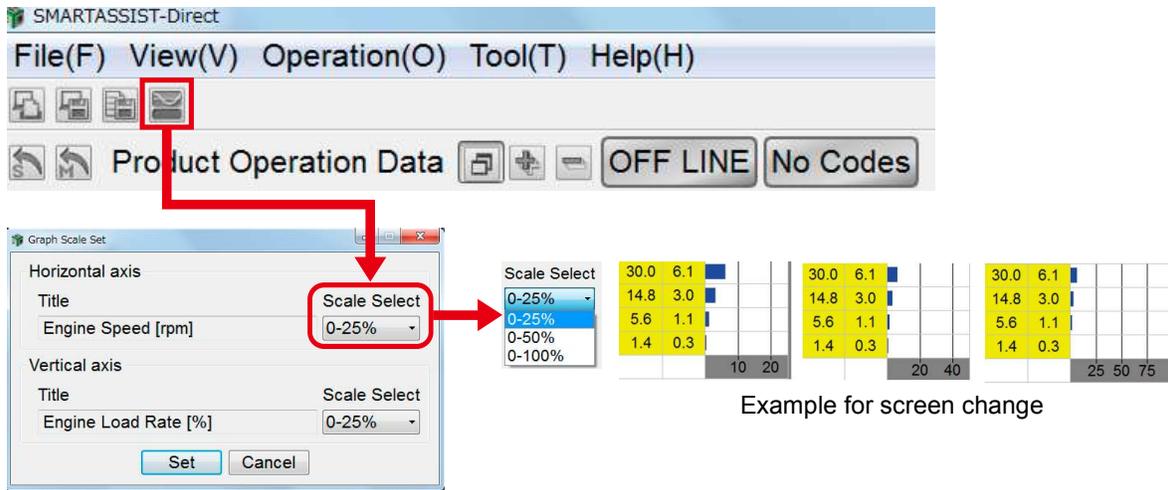
- This is the display screen for product operation data stored as the map table. (The maximum display for maps is 16 rows x 16 columns.)
- The historical data for the existing engine is also collected and displayed as product operation data.
- The display can be selected and changed when the multiple map table information is saved.



Display change



The scale value of the bar graph can be changed to 25%, 50% and 100%.

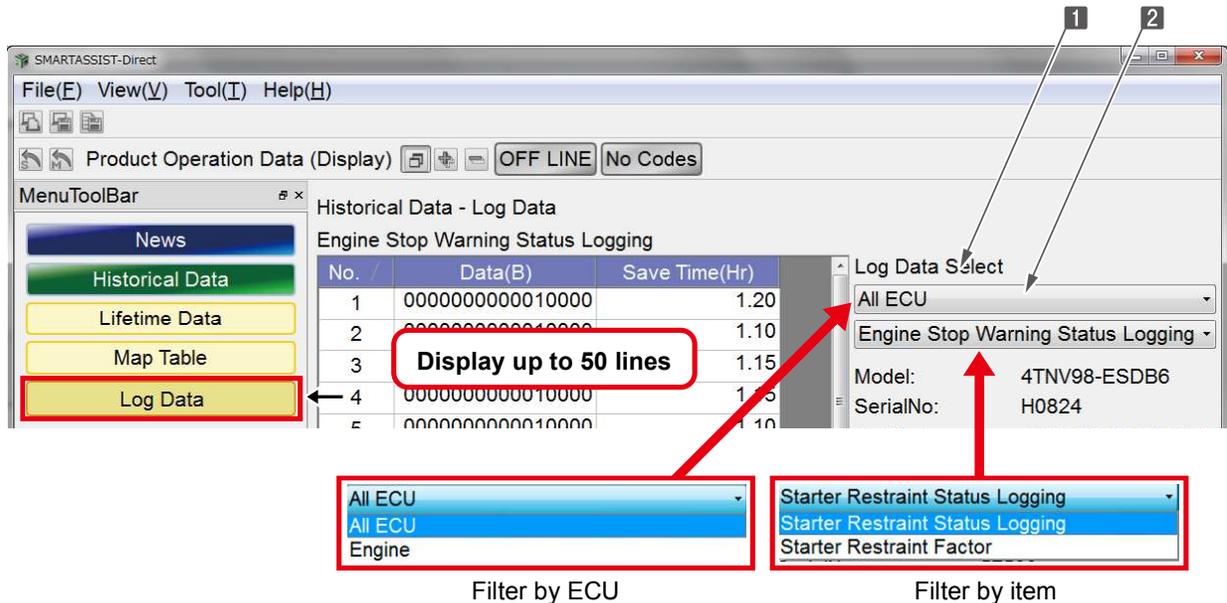


● "Log Data" Display Screen of Product Operation Data

- Two display systems are supported: save the time of the event occurrence and save the values per unit time.
- The displayed data can be divided by ECU and type of data.
- The historical data saved in the engine ECU is also collected and displayed as product operation data.

1 Example for ECU Selection Display

2 Product Operation Data Selection Display



11. Functions Related to the Product Operation Data

By right-clicking the "Factor (D)" box, the data display can be changed to binary, decimal and hexadecimal numbers.

The screenshot shows the SMARTASST-Direct interface. On the left, the 'MenuToolBar' has a 'Data(D)' button highlighted in red. An arrow labeled 'Right-click' points to this button. To the right, two data tables are shown. The top table, labeled 'Hexadecimal', has columns 'No.', 'Data(H)', and 'Save Time(Hr)'. The bottom table, labeled 'Binary', has columns 'No.', 'Data(B)', and 'Save Time(Hr)'. Arrows indicate the transition from the 'Data(D)' button to these two display formats.

No.	Data(H)	Save Time(Hr)
1	4800	0.00
2	4800	0.00
3	4800	0.00
4	4800	0.00
5	4800	0.00

No.	Data(B)	Save Time(Hr)
1	0100100000000000	0.00
2	0100100000000000	0.00
3	0100100000000000	0.00
4	0100100000000000	0.00
5	0100100000000000	0.00

● Function buttons on the accumulated information screen

- 1 : Print the screen. (Refer to [6.2.2])
- 2 : Save a screenshot in PNG format. (Refer to [6.2.3])
- 3 : Save the complete historical data in CSV format. (Refer to [6.2.4])
- 4 **Save Data Disp** : Select and display the save data.
- 5 **Ref Data Disp** : Select and display the reference data.
- 6 **Ave Disp** : Comparison with the average values per model and year of shipment.
- 7 **Maintenance Info** : Maintenance information display
- 8 **Excel Out** : Out in Excel-format.
- 9 Explanation display for individual product operation data item

The screenshot shows the 'Accumulated Information' screen in SMARTASST-Direct. The 'MenuToolBar' on the left has buttons for 'Historical Data', 'Lifetime Data', 'Map Table', and 'Log Data'. The main area displays a table with columns: 'A: GET DATA DISP Description', 'A: Value', 'A: Unit', 'REF DATA DISP Value', 'B: YEAR AVERAGE Average', and 'CO'. The table contains various engine and maintenance data points. A red box highlights the 'Description' column, with a callout box stating: 'Description of the selected operation data (in green) is displayed.' Numbered callouts (1-9) point to various UI elements: 1-3 to the menu bar, 4-8 to the function buttons, and 9 to the description callout.

A: GET DATA DISP Description	A: Value	A: Unit	REF DATA DISP Value	B: YEAR AVERAGE Average	CO
DateTime	2015/10/27 14:51:41				
VehicleSignatureType	4TNV94HT-ZXSRA				
VehicleIdentificationNumber	00117				
TotalEngineHour	0.00	h			
TotalEngineHours(h)	40.00	h			
ManufacturingTestDate	110121				
Total ECU Run Time	0.50	h			
Total Engine Hours	0.00	h			
Engine Trip Run Hours	0.00	h			
Engine Warning Total Run Hours	0.00	h			
Engine Warning Trip Run Hours	1	-			

11.4 Operation for the product operation data (Life time data)

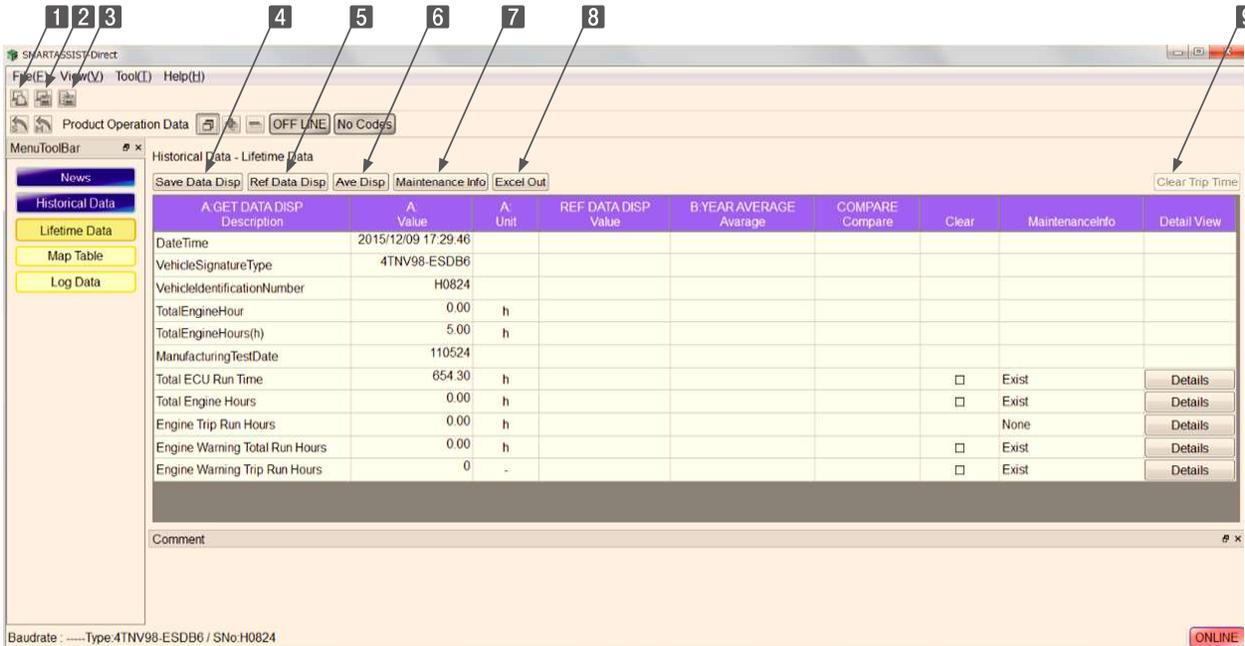
Function buttons and display screen

Operation Tool Bar

- 1  : Print the screen. (Refer to [6.2.2])
- 2  : Save a screenshot in PNG format. (Refer to [6.2.3])
- 3  : Save the complete historical data in CSV format. (Refer to [6.2.4])

Function Buttons

- 4 **Save Data Disp** : A: Call up and display the saved data in the collected (saved) data display box.
- 5 **RefData Disp** : Display the saved data as reference.
- 6 **Ave Disp** : Display and compare the "Average values per model and year of shipment".
- 7 **Maintenance Info** : Display the maintenance information.
- 8 **Excel Out** : Export the screen information in the specified EXCEL format.
- 9 **Selection Item Clear** : Clear the maintenance information.



The screenshot shows the SMARTASIST Direct software interface. The main window displays 'Historical Data - Lifetime Data'. The interface includes a menu bar (File, View, Tool, Help), a toolbar with icons 1, 2, and 3, and a menu toolbar with buttons 4, 5, 6, 7, and 8. A 'Clear Trip Time' button (9) is located at the top right. The data table below has the following columns: A: GET DATA DISP, A: Value, A: Unit, REF DATA DISP Value, B: YEAR AVERAGE Average, COMPARE Compare, Clear, MaintenanceInfo, and Detail View. The table contains the following data:

A: GET DATA DISP	A: Value	A: Unit	REF DATA DISP Value	B: YEAR AVERAGE Average	COMPARE Compare	Clear	MaintenanceInfo	Detail View
DateTime	2015/12/09 17:29:46							
VehicleSignatureType	4TNV98-ESDB6							
VehicleIdentificationNumber	H0824							
TotalEngineHour	0.00	h						
TotalEngineHours(h)	5.00	h						
ManufacturingTestDate	110524							
Total ECU Run Time	654.30	h				<input type="checkbox"/>	Exist	Details
Total Engine Hours	0.00	h				<input type="checkbox"/>	Exist	Details
Engine Trip Run Hours	0.00	h					None	Details
Engine Warning Total Run Hours	0.00	h				<input type="checkbox"/>	Exist	Details
Engine Warning Trip Run Hours	0	-				<input type="checkbox"/>	Exist	Details

At the bottom of the window, the status bar shows 'Baudrate : -----Type:4TNV98-ESDB6 / SNo:H0824' and an 'ONLINE' indicator.

11. Functions Related to the Product Operation Data

● Main Box

- 10 **A:GET DATA DISP** : Display the collected or saved data.
- 11 **Description** : Display the product operation data name.
- 12 **Value** : Display the saved value.
- 13 **Unit** : Display the unit.
- 14 **REF DATA DISP** : Display the reference data.
- 15 **B:YEAR AVERAGE** : Display the "average values per model and year of shipment".
- 16 **Average Value Comparison** : Display the comparison of the values 10 and 15 .
- 17 **Clear** : Display the maintenance information clear box.
- 18 **Maintenance Information** : Display the maintenance information "Details" button.

● Comment Box

- 19 Comment box: Display the comment for the clicked product operation data.

● Maintenance information screen

The screenshot shows the SMARTASSIST-Direct software interface. The main window displays a table of product operation data for a vehicle. The table has the following columns: A:GET DATA DISP, A: Value, A: Unit, REF DATA DISP, B:YEAR AVERAGE, COMPARE Compare, Clear, MaintenanceInfo, and Detail View. The data rows include fields like DateTime, VehicleSignatureType, VehicleIdentificationNumber, TotalEngineHour, TotalEngineHours(h), ManufacturingTestDate, Total ECU Run Time, Total Engine Hours, Engine Trip Run Hours, Engine Warning Total Run Hours, and Engine Warning Trip Run Hours. A 'Comment' box is located at the bottom of the screen. Arrows point from numbered labels (10-19) to specific elements in the interface.

A:GET DATA DISP	A: Value	A: Unit	REF DATA DISP	B:YEAR AVERAGE	COMPARE Compare	Clear	MaintenanceInfo	Detail View
Description	2015/12/09 17:29:46							
VehicleSignatureType	4TNV98-ESDB6							
VehicleIdentificationNumber	H0824							
TotalEngineHour	0.00	h						
TotalEngineHours(h)	5.00	h						
ManufacturingTestDate	110524							
Total ECU Run Time	854.30	h				<input type="checkbox"/>	Exist	Details
Total Engine Hours	0.00	h				<input type="checkbox"/>	Exist	Details
Engine Trip Run Hours	0.00	h				<input type="checkbox"/>	None	Details
Engine Warning Total Run Hours	0.00	h				<input type="checkbox"/>	Exist	Details
Engine Warning Trip Run Hours	0	-				<input type="checkbox"/>	Exist	Details

Comment

Baudrate : Type:4TNV98-ESDB6 / SNo:H0824

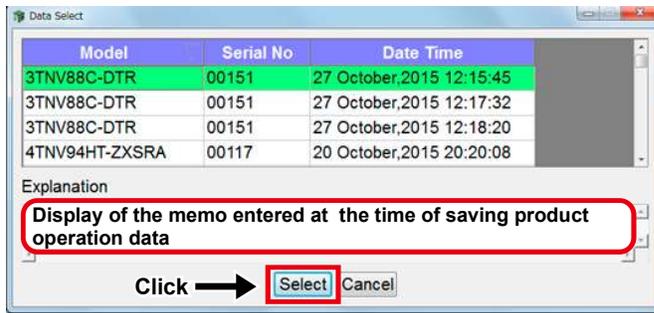
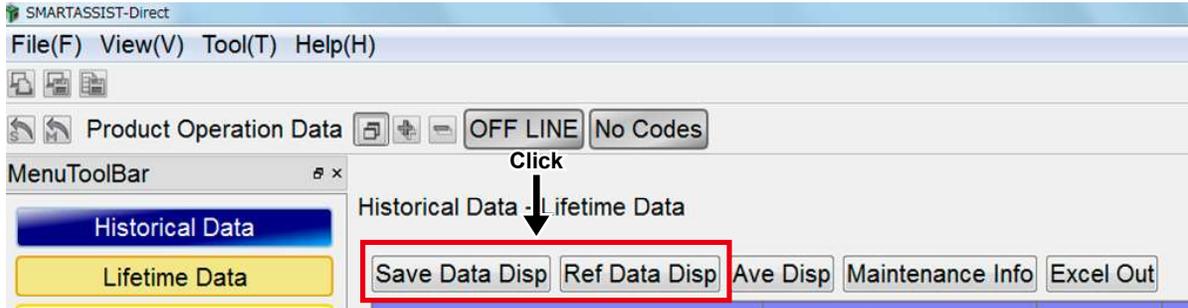
ONLINE

■ Display the Save Data and Reference Data

Product operation data stored in your PC can be displayed in comparison.

Utilization example

- Check the temporal change for the same machine.
- Check the difference in the usage condition with the other machine.



From the saved product operation data, select the data that refers to the below information and click "Select" .

- Model
- Machine number
- Date when data was saved
- Description (memo)

The get (read) data is displayed in the left row, the reference data is displayed in the right row.

A:GET DATA DISP Description	A: Value	A: Unit	REF DATA DISP Value
DateTime	2015/10/27 15:07:30		2015/09/04 16:37:02
VehicleSignatureType	4TNV94HT-ZXSRA		4TNV94HT-ZXSRA
VehicleIdentificationNumber	00117		00404
TotalEngineHour	0.00	h	
TotalEngineHours(h)		h	
ManufacturingTestDate	110121		
Total ECU Run Time	0.70	h	488.20
Total Engine Hours	0.00	h	0.00
Engine Trip Run Hours	0.00	h	0.25
Engine Warning Total Run Hours	0.00	h	0.00
Engine Warning Trip Run Hours	1	-	1

11. Functions Related to the Product Operation Data

Unlike serial numbers, product operation data for different models can be displayed as the reference data.

A:GET DATA DISP Description	A: Value	A: Unit	REF DATA DISP Value
DateTime	2015/10/27 14:21:10		
VehicleSignatureType	4TNV94HT-ZXSRA		
VehicleIdentificationNumber	00117		

A:GET DATA DISP Description	A: Value	A: Unit	REF DATA DISP Value
DateTime	2015/10/27 15:07:30		2012/09/20 17:01:41
VehicleSignatureType	4TNV94HT-ZXSRA		4TNV98T-ZNSA

Remark Only the matched product operation data items with the get (read) data are displayed for the reference data.

Example: If the **CONSTRUCTION** and the **AGRICULTURE** data are displayed, the common engine-related product operation data is displayed.

(In case of having the engine-related product operation data in both data.)

This is a function to export product operation data in the specified EXCEL format.

Assuming that the data is submitted to the end user and attached to the work report, it has the below characteristics.

- Output the required information in easy-to-see format.
- Unlike the output in CSV file format, reprocessing is not necessary.

Get Date					
User ID					
Engine			Vehicle		
Engine Signature Type		Vehicle Signature Type			
Engine Identification Number		Vehicle Identification Number			
Operating time		Operating time (Manual input)			
Date time				(Reference)	Compare
A:Description	Value	Unit	REF Data	B: Average	A/B (%)
1 Total ECU Run Time					
2 ENGINE RUN HOURS					
3 ENGINE WARNING TOTAL RUN HOURS					

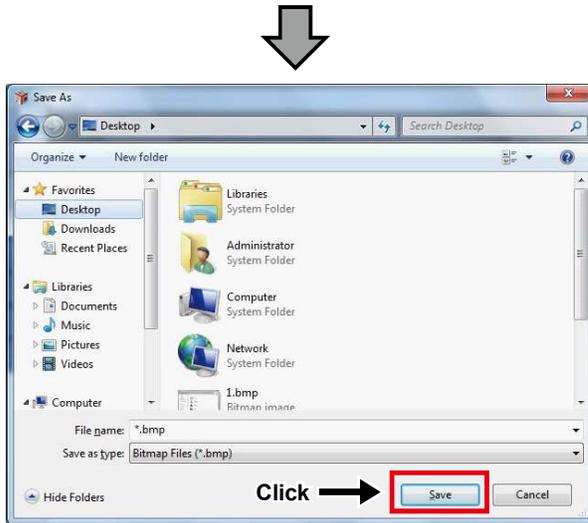
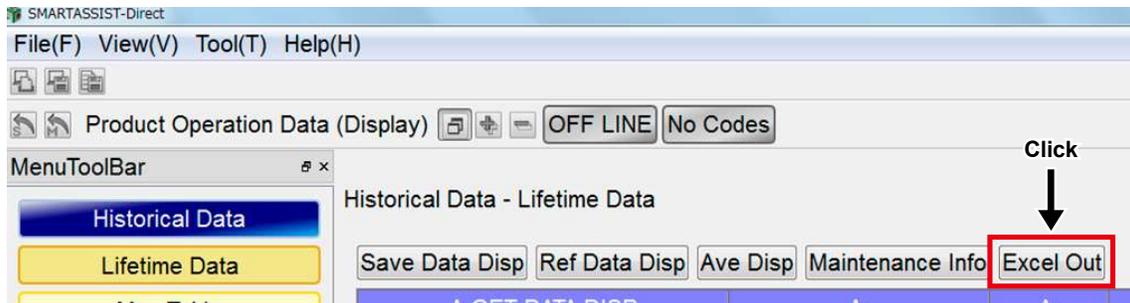
3D 回転を選択

グラフを右クリック

Note Output the lifetime data information and the map table information (2D and 3D) in EXCEL. (You cannot export the log data.)

11. Functions Related to the Product Operation Data

Click the "EXCEL Out" button, select the save location, and then click the "Save" button.



The default file name contains information of the obtained (saved) data in the below order.

- Model
- Serial number
- Date obtained

The file name can be changed.

Point The file created by "EXCEL Out" can be handled between PCs without processing "Export" and "Import" in the "Saved data Function".

● Display the Average Values

- 1 The average values calculated from the product operation data uploaded to the center are displayed.
- 2 The ratio of the collected data (right) for the average values is calculated.
- 3 The average values are calculated per model and year of shipment in the beginning of every month and automatically downloaded when logging in to the SMARTASSIST-Direct with an active Internet connection.

Historical Data - Lifetime Data

Save Data Disp Ref Data Disp Ave Disp Maintenance Info Excel Out

A:GET DATA DISP Description	A: Value	A: Unit	REF DATA DISP Value	B:YEAR AVERAGE Average	COMPARE Compare
DateTime	2016/04/22 10:54:04				
VehicleSignatureType	8LV370Z				
VehicleIdentificationNumber	0555				
TotalEngineHours(h)		h			
ManufacturingTestDate	110810				
Total ECU Run Time	66.45	h		166.15	39.994
Total Engine Hours	13.10	h		114.34	11.4571
ENGINE WARNING TOTAL RUN HOURS	0.00	h		0E	nan
ENGINE WARNING TRIP RUN HOURS	0.00	h		0E	nan

↑
1

↑
2

12. ECU Replacement and Update the ECU Software

When replacing the ECU or updating (overwriting/correcting) of the ECU software is required, it is necessary to write the software to the new ECU (Service ECU) or ECU equipped machine. The software can be downloaded by accessing the center through the SMARTASSIST-Direct, and a record of the download is uploaded to the center.

More specifically, it is necessary to perform the following things from (1) to (5) below, from the SMARTASSIST-Direct menu.

- 1 Download the ECU software
- 2 Read and save the setting values (correction values) from old ECU
- 3 Write to the software's ECU
- 4 Copy settings (correction values) to the new ECU
- 5 Upload the replacement and update data

However, there is no need to perform steps (2) to (4) when making a software update (overwriting/correction)

■ ECU Replacement

When replacing the ECU, the above indicated procedure is displayed in diagram 12-1.

- This procedure is displayed when writing the software to the ECU on-site, and the replacement of the 2 old ECU with the new ECU is performed after reading and saving the old ECU setting values.
- When sending an Service ECU with software that has already been written to in advance to an on-site location, the order of procedures for 2 and 3 are switched. Replacement of the old ECU with the new ECU is performed after reading and saving the old ECU setting values.
- If there is difficulty in reading the setting values (correction values) from the old ECU, history information cannot be continuous. Refer to page 236 for details.
- For 4TNV94FHT engines, besides engine ECU, there is another ECU called DCU (Dosing control unit) that controls SCR. When replacing the DCU or updating the DCU software, take the same steps as ECU.
- When performing steps 1 through 5, make sure to check your PC has an Internet connection.

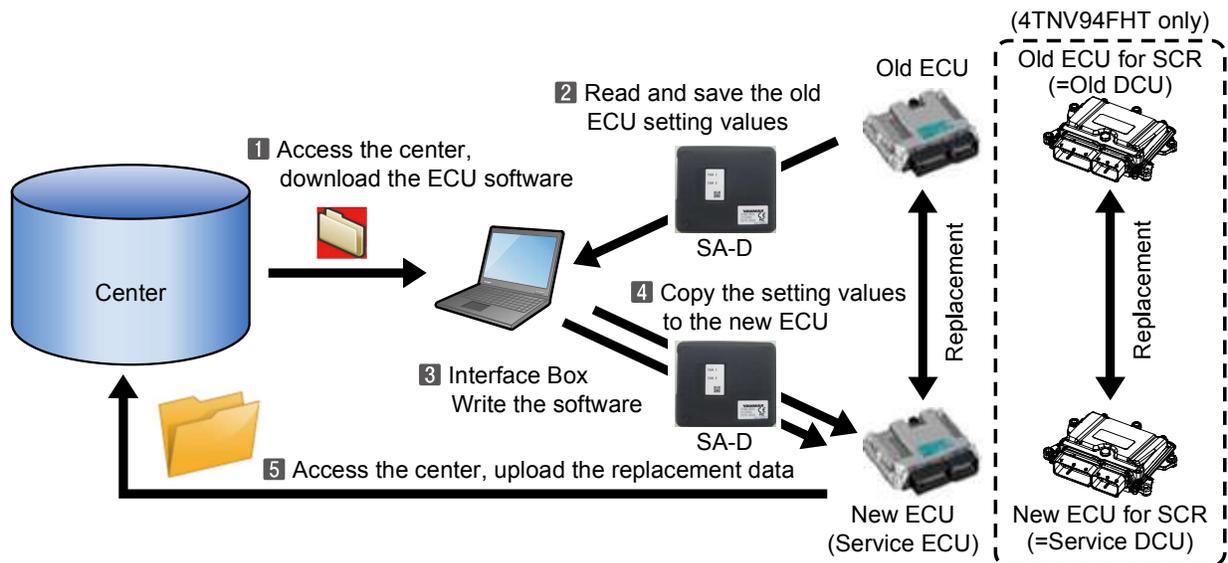


Fig.12-1

Note An Internet connection is required to access the center.

■ Updating software (overwriting/correcting)

Fig. 12-2 shows how to update (overwrite/correct) the ECU software.

- When performing steps 1 through 5, make sure to check your PC has an Internet connection.

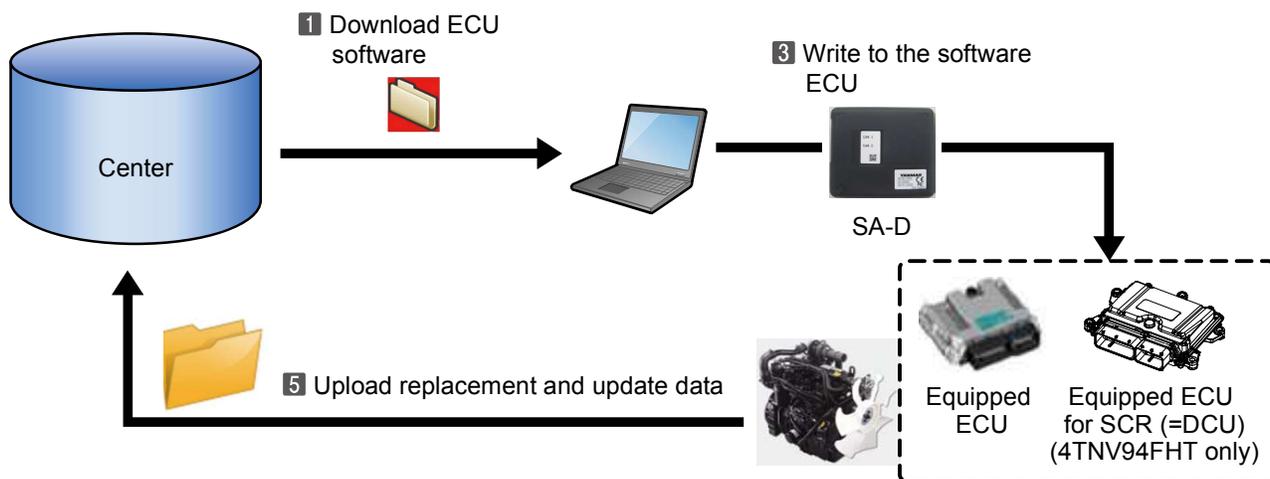


Fig.12-2

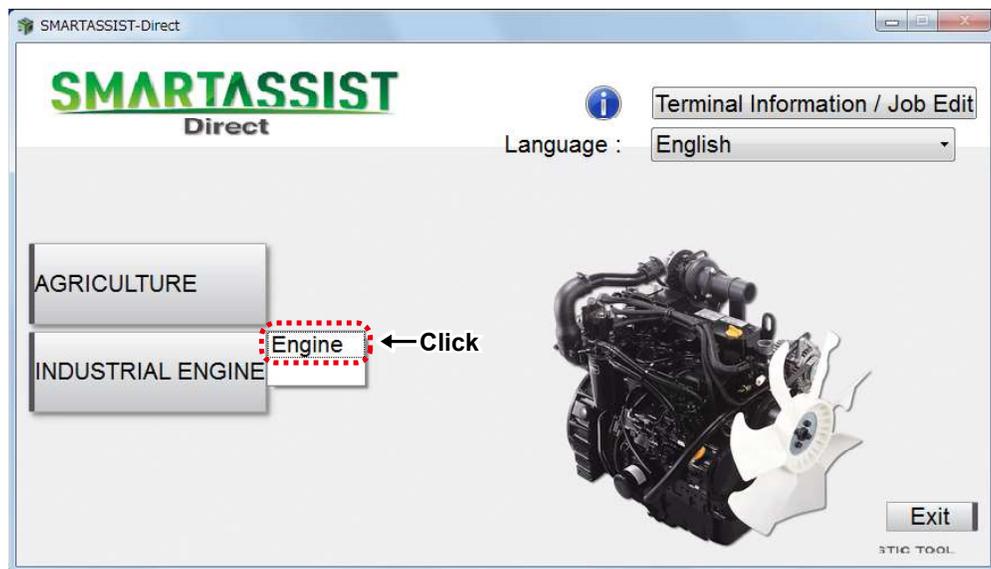
12.1 ECU Software Download

In order to reprogram new software when updating or replacing the ECU, the procedure for downloading the software from the center is described below.

- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

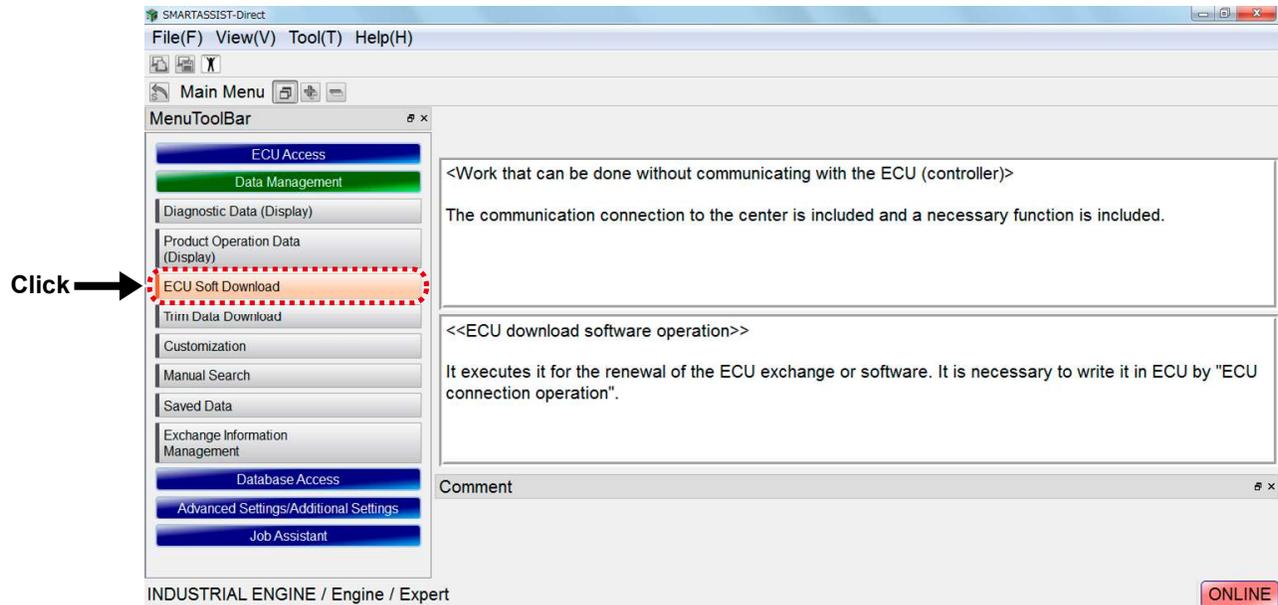


- 2 Select "Engine".



12. ECU Replacement and Update the ECU Software

3 Click "ECU Soft Download" on the tab "Data Management".



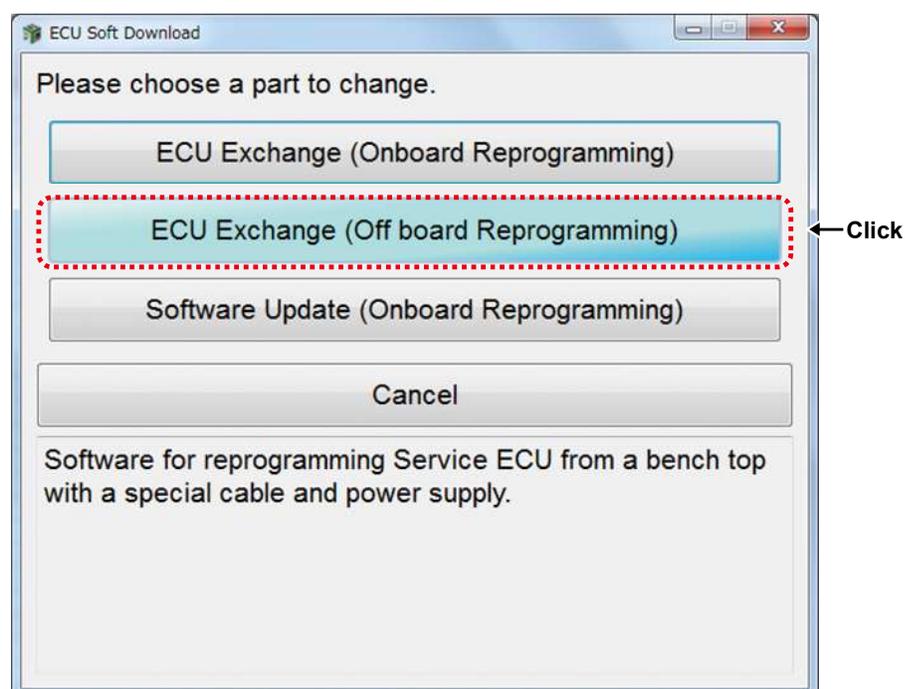
4 The ECU Reprogramming Screen is displayed.

On this screen, select one of the below processes.

- ECU Exchange (Onboard reprogramming) } When writing to a service ECU
- ECU Exchange (Offboard reprogramming) } When writing to an ECU equipped machine
- Software Update (Onboard reprogramming)

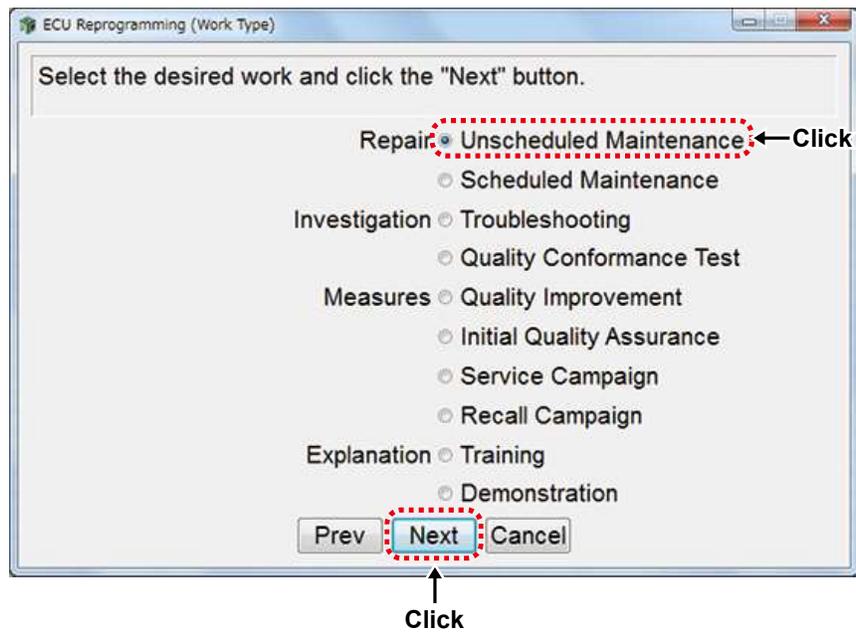
Select ECU replacement (Onboard reprogramming) when writing in a state where the Service ECU is equipped on the machine, or ECU replacement (Offboard reprogramming) when writing to an offboard Service ECU.

For example, Click "ECU Exchange (Off board Reprogramming)".



5 The selection screen for the ECU writing type is displayed.

Select the type of work and click "Next".



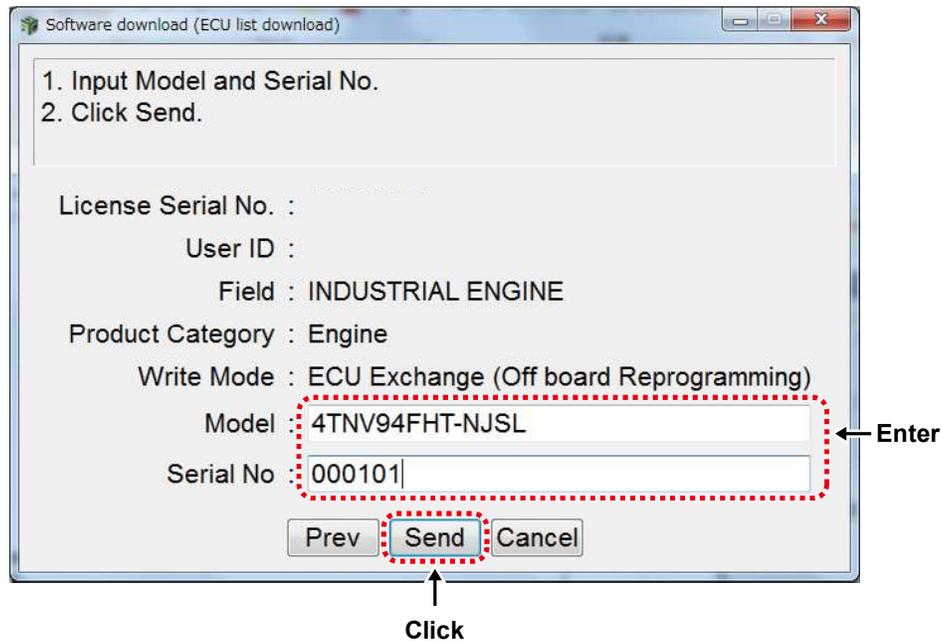
Note During training, please select "Training".
(To distinguish from actual operations)

12. ECU Replacement and Update the ECU Software

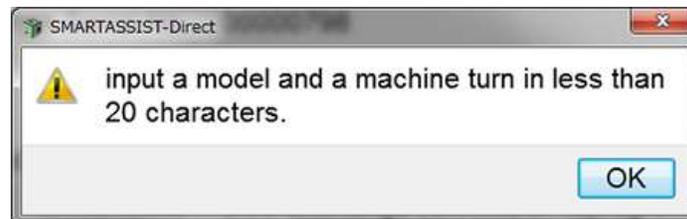
6 The Software Download Screen is displayed.

Enter the model and Serial No, and click "Send".

The following shows the engine type 4TNV94FHT as an example.

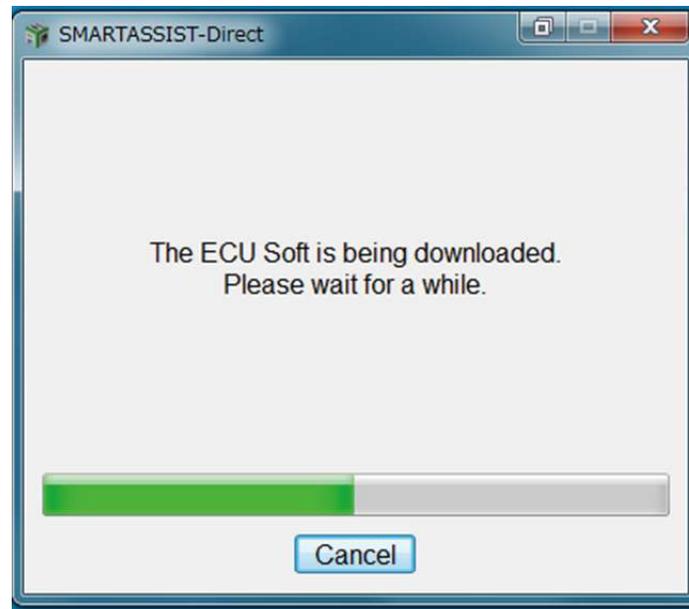


Remark If you do not enter either the model or machine number, a message (on the left) is displayed.

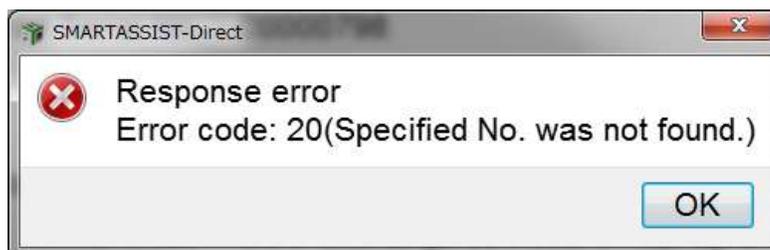
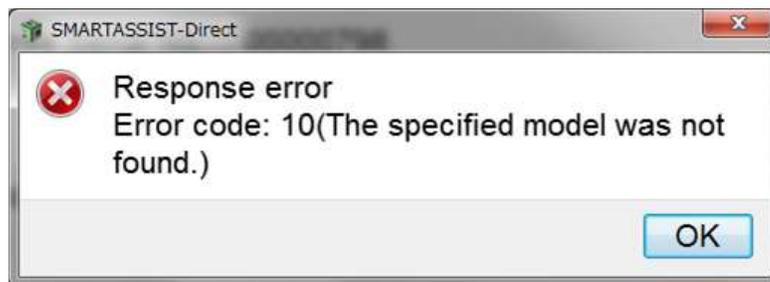


Note Make sure that the Internet connection is active.

7 The ECU software download process starts.



Remark ECU software is found on the center that corresponds to the entered model and Serial No, the below message is displayed. Click "OK", and enter the model and Serial No again.



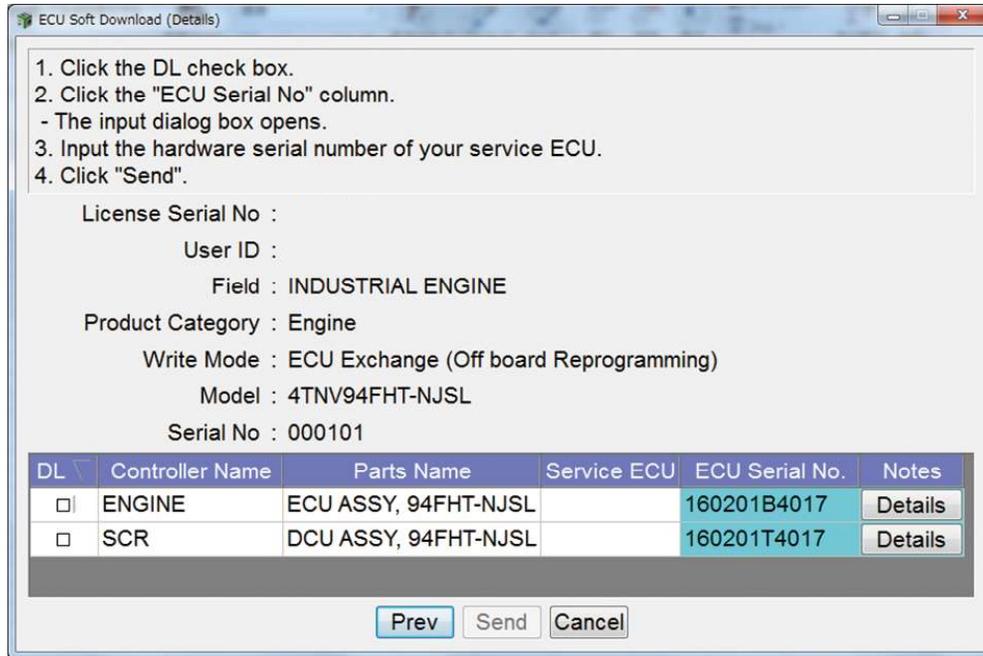
12. ECU Replacement and Update the ECU Software

8 A screen is displayed that lists the downloaded ECU software.

The following screen displays engine model 4TNV94FHT as an example which has two controllers; ECU (engine) and DCU (SCR for after-treatment).

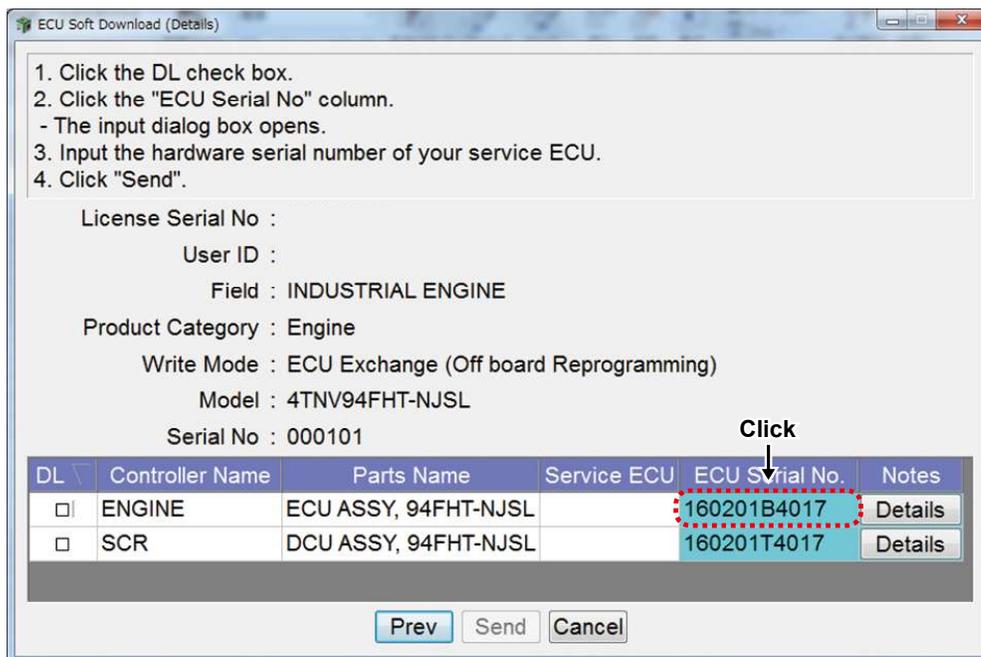
The displayed ECU Serial No. is the serial No. of the currently equipped ECU.

When there is only one controller, the one downloaded software is displayed.



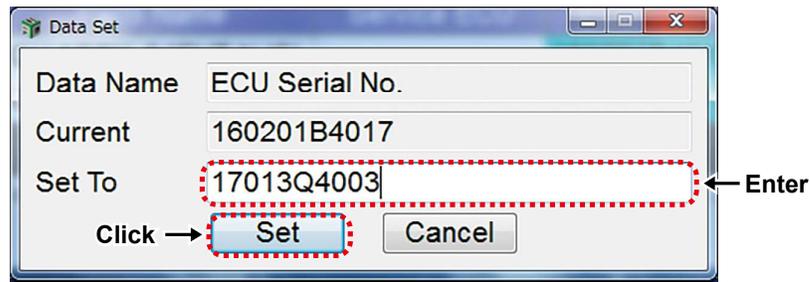
Remark When selecting "Software Update (Onboard Reprogramming)", it is not necessary to enter the "ECU serial No.". Therefore, the "ECU serial No." entry screen is not displayed.

9 Click "ECU Serial No." of the controller you want to exchange.

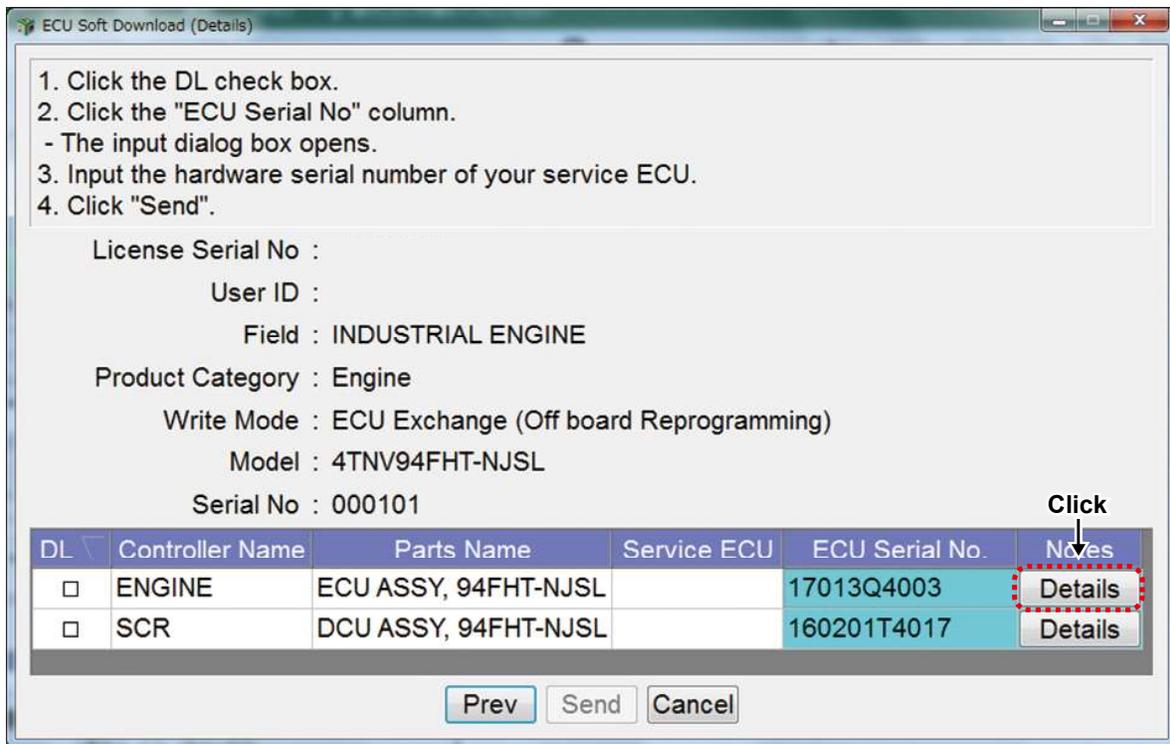


10 The Data Setting Screen is displayed.

Input the hardware serial number of your service ECU to set to then click "Set".

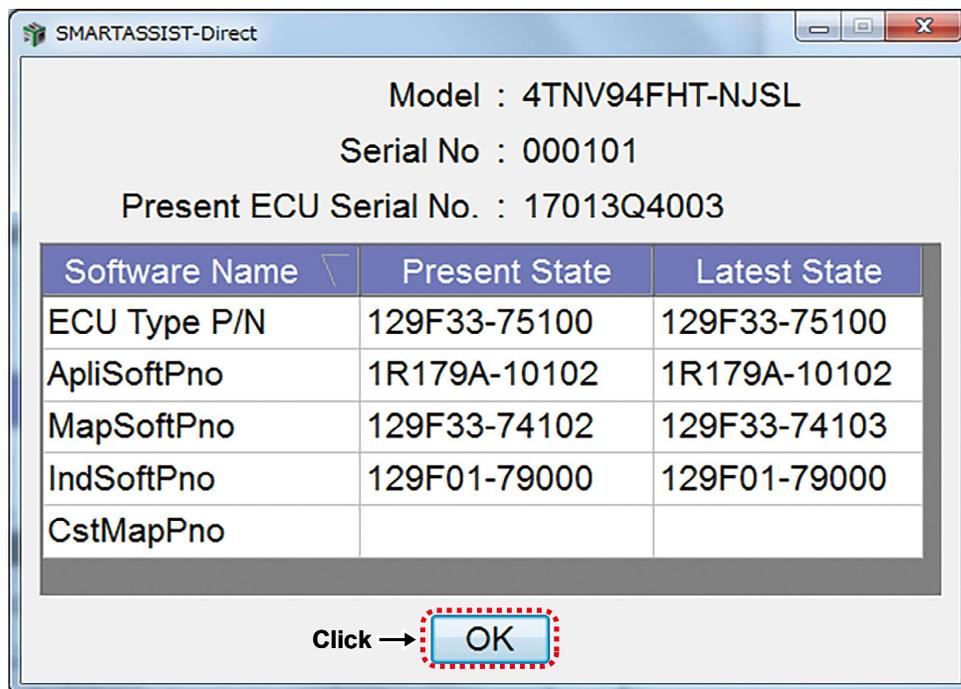


11 Click "Details" on the ECU Software List screen, and information regarding the software for download is displayed.

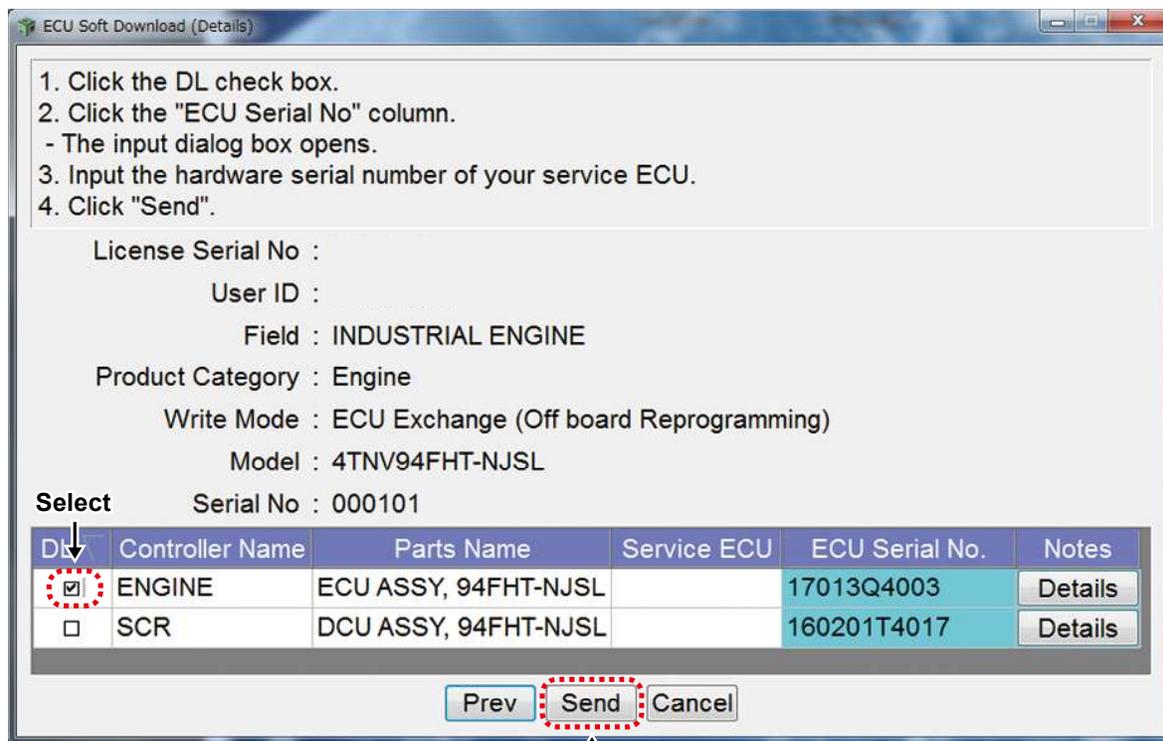


12. ECU Replacement and Update the ECU Software

12 Confirm the detailed information, and click "OK".



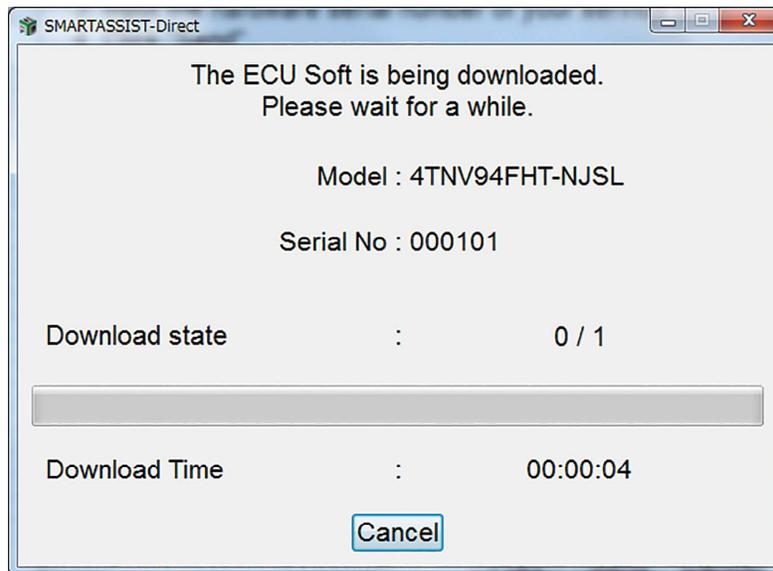
13 On the ECU Software List screen, select "DL" next to the ECU software that you wish to download. Click "Send", and the download process starts.



Remark If you click "Send" before the download has been selected, the below message is displayed.



14 The ECU software download process starts.



Remark If you click "Cancel" during download, the below message is displayed.



12. ECU Replacement and Update the ECU Software

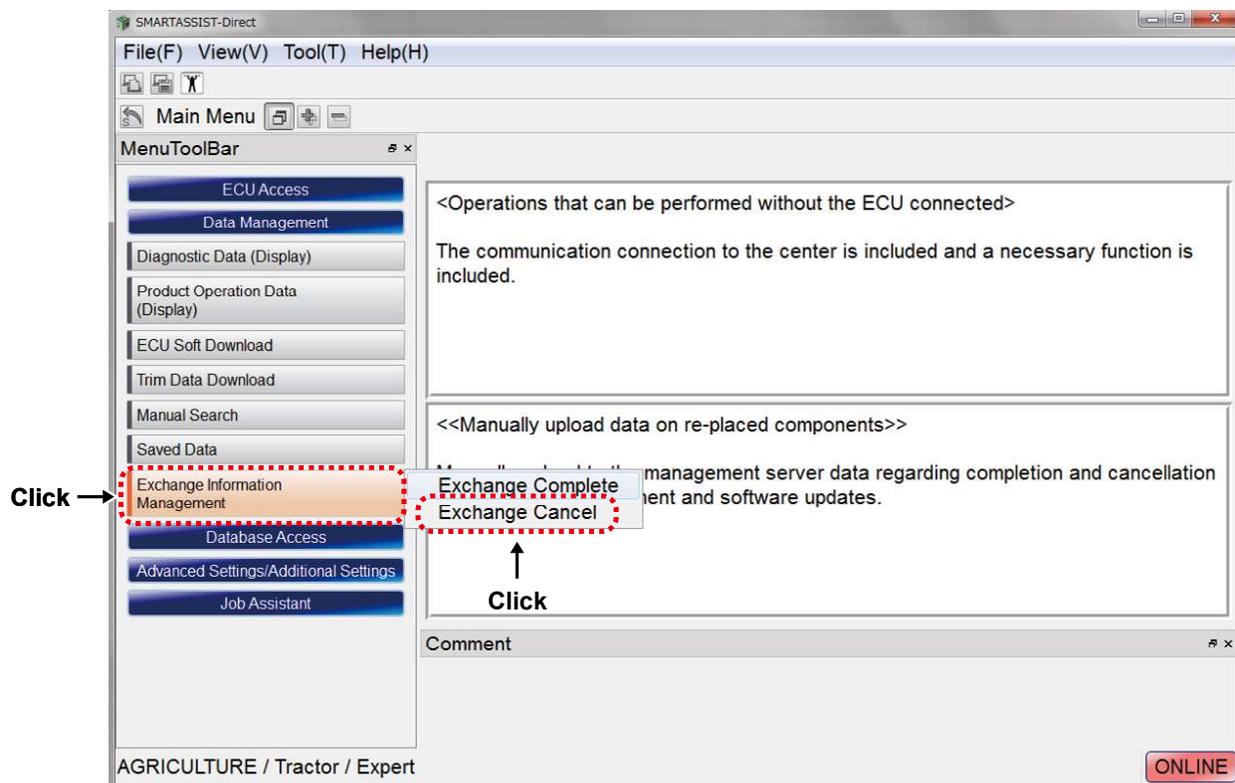
15 A message box notifies you when the download of the ECU software has finished.

Click "OK".

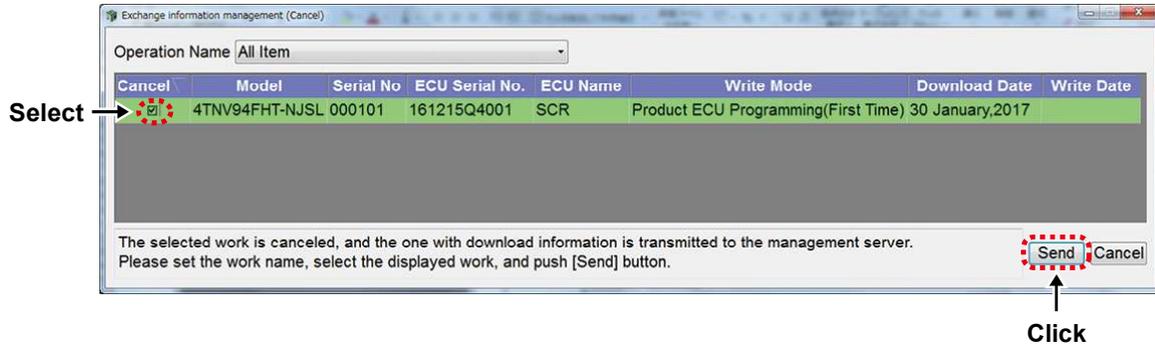


Remark The screen switches to the End of ECU Software Download Screen.

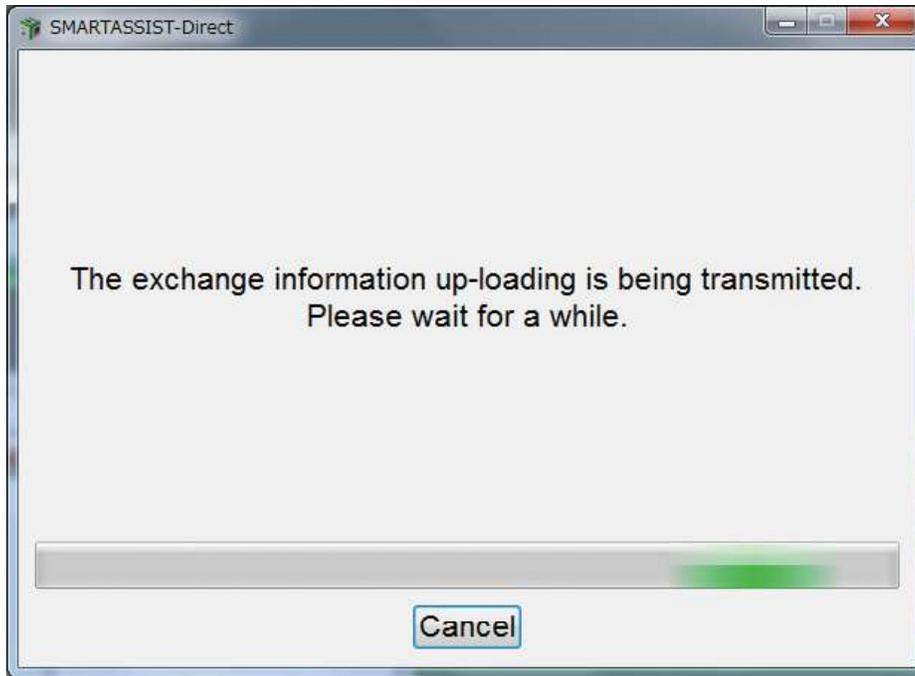
16 If you want to delete the downloaded ECU software, click "Exchange Information Management", and then "Exchange Cancel" from "Data Management" tab.



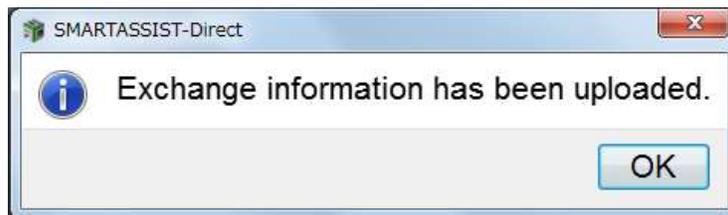
17 Check the operation you want to cancel, and click "Send".



18 The upload process is started.



19 A message box notifies you when the upload has finished.



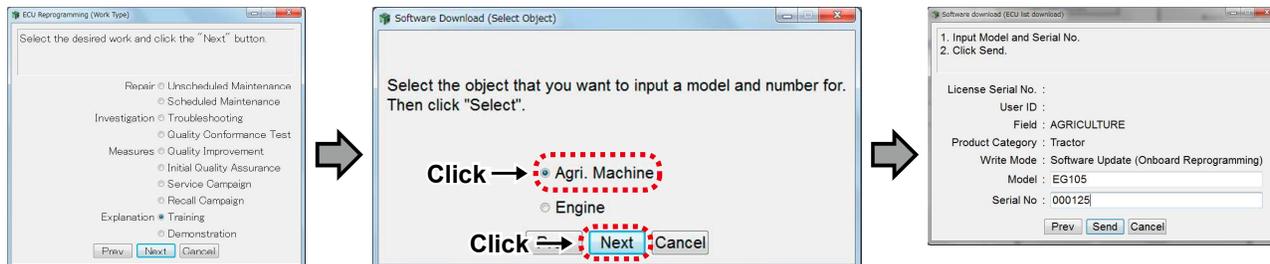
Remark This is the screen when ECU software download is canceled.

■ ECU Software Download Supplemental Information

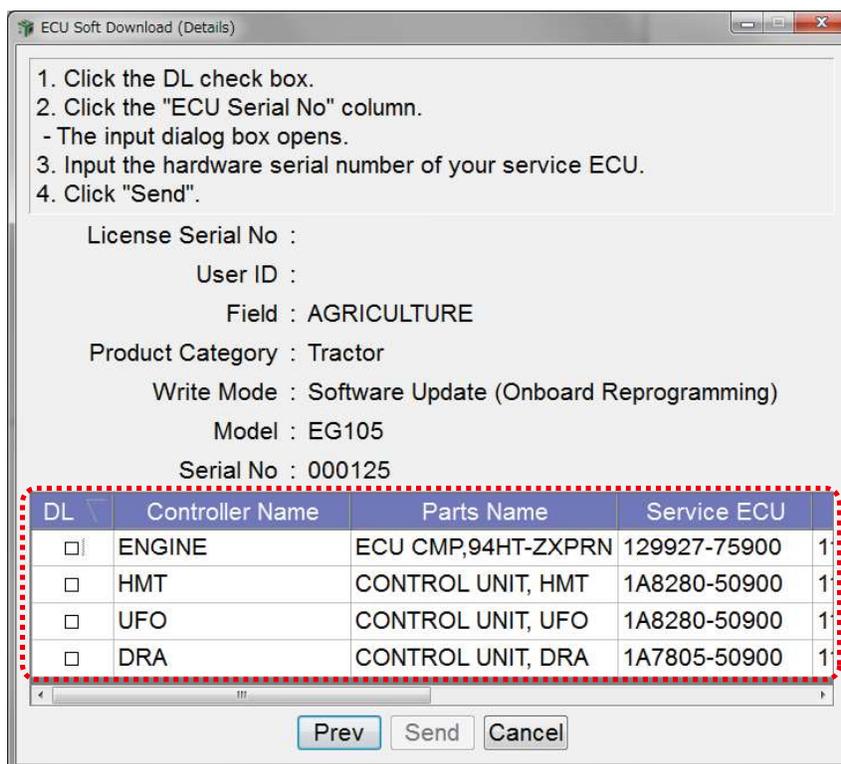
Supplement: When selecting "Agriculture" "Construction Machinery" from the start menu.

→ After the selection screen for the type of work for the ECU writing, the selection screen for "Machine" and "Engine" is displayed.

* Then, the process continues in the same way as from the selection "INDUSTRIAL ENGINE" from the Start Menu.



Supplement: This screen is displayed if more than one ECU software is available for download.



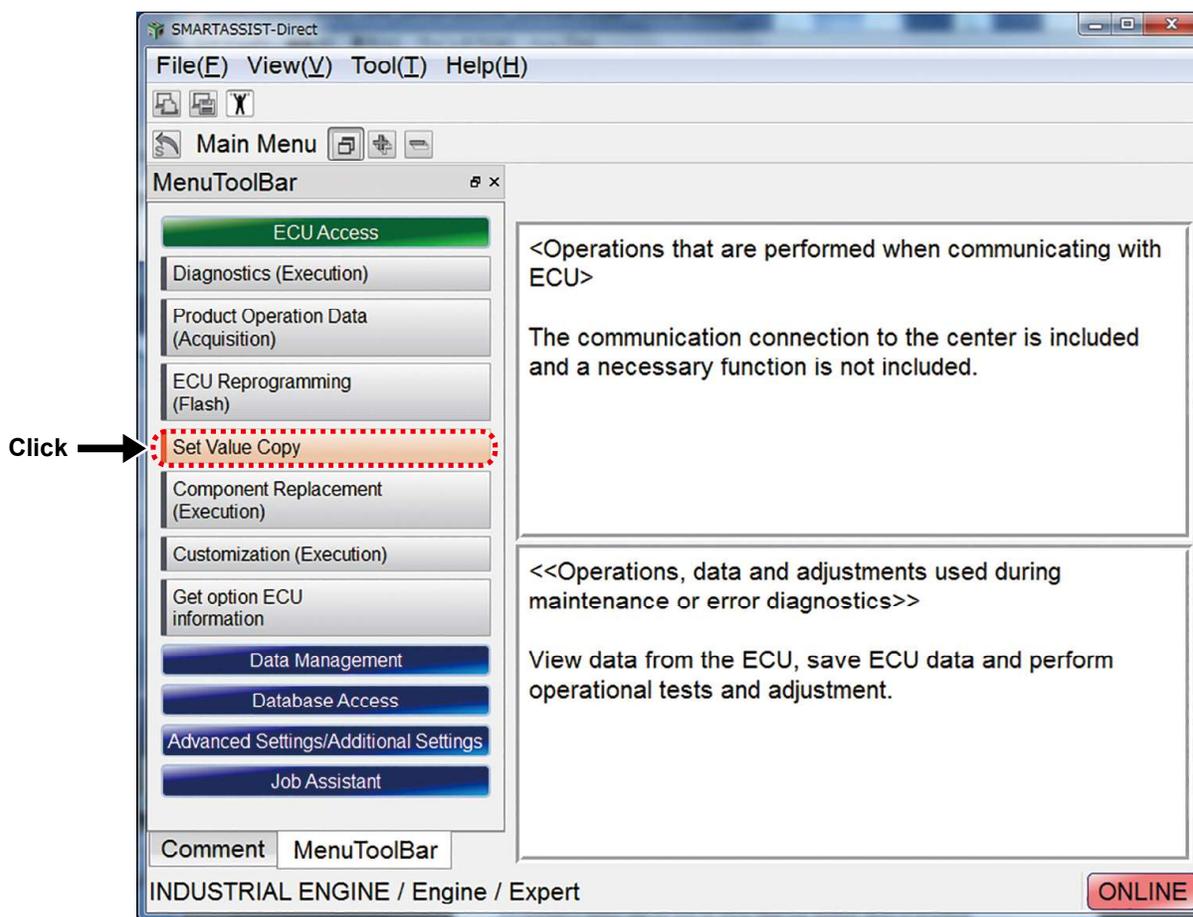
12.2 Reading and Saving the Setting Values (Correction Values) of the Old ECU

The data downloaded from the center does not include the setting values (correction values) of the historical data. Therefore, to enable continuance of the historical data upon replacing the ECU, the setting values (correction values) need to be copied from the previous ECU (old ECU).

The following indicates the procedure for reading and saving the original ECU setting values (correction values) for each product.

If there is difficulty in reading the setting values (correction values) from the original ECU, the historical data (total operating time and PM accumulated amount etc.) cannot continue. Regarding support related to PM deposition amount, refer to "13.4 Replacing Constituent Parts ■ Processing after ECU replacement (when you cannot carry-over from the old ECU) in the TNV Tier4 Service Manual.

- 1 Click "Set Value Copy" on the tab "ECU Access".



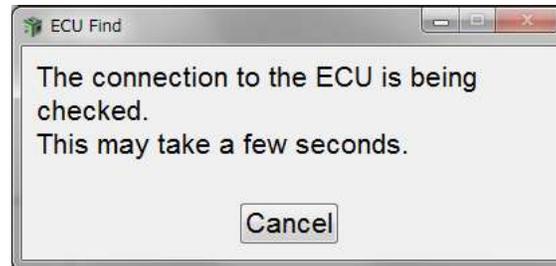
Copying the settings:

It is necessary to readout, save and write the setting values (e.g. correction values) off all products.

Note Make sure that the product or the ECU is connected.

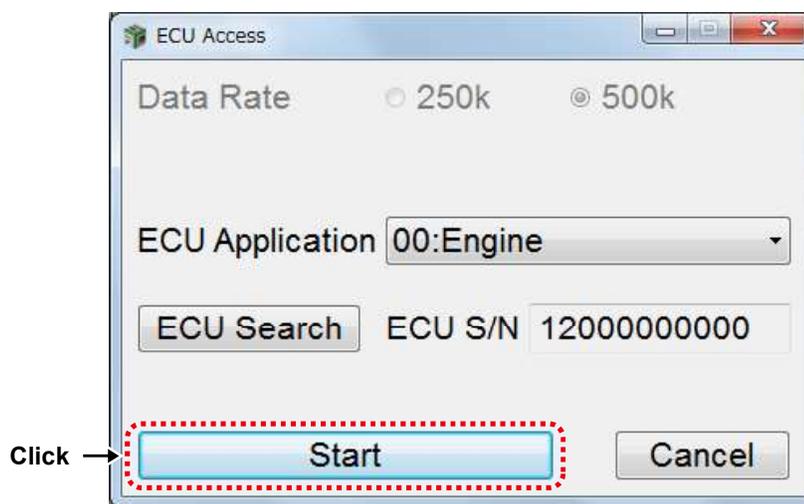
12. ECU Replacement and Update the ECU Software

2 The ECU Search in Progress Screen is displayed.

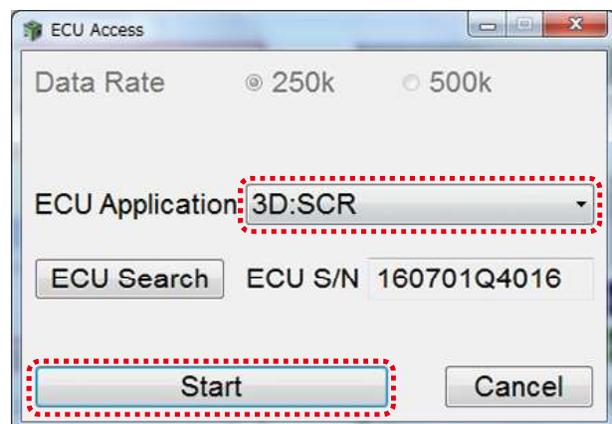
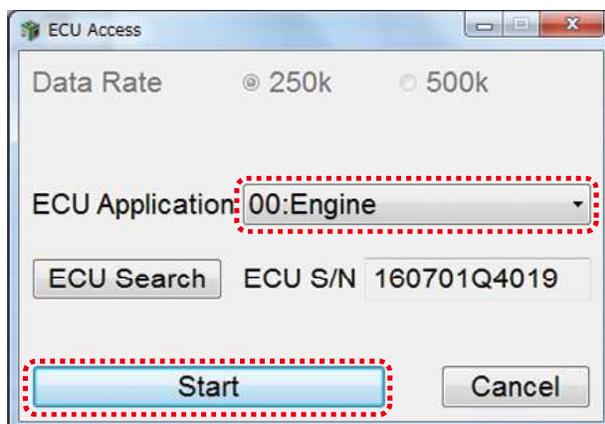


If there is difficulty in reading the setting values (correction values) from the original ECU, "Abnormal communication (Error code 1002)" is displayed.

3 The ECU Connection Screen is displayed. Click "Start".



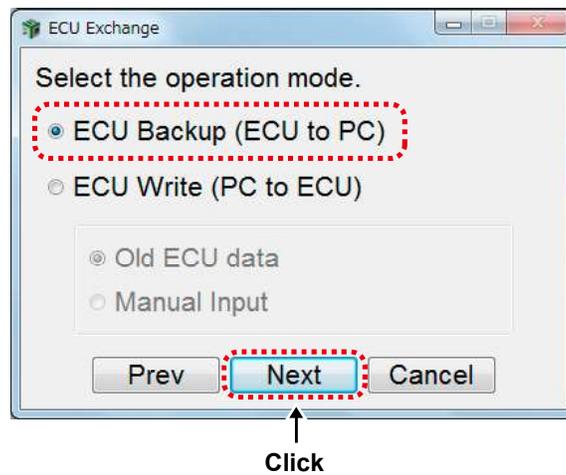
* Engine model 4TNV94FHT has two controllers which are engine ECU and ECU for SCR. Each controller has setting values (correction values) so if you want to exchange or overwrite engine ECU, select "Engine" from "ECU Application", and then click "Start". If you want to exchange or rewrite ECU for SCR, select "SCR" from "ECU address", and then click "Start".



- 4 The ECU Data Collection in Progress Screen is displayed.



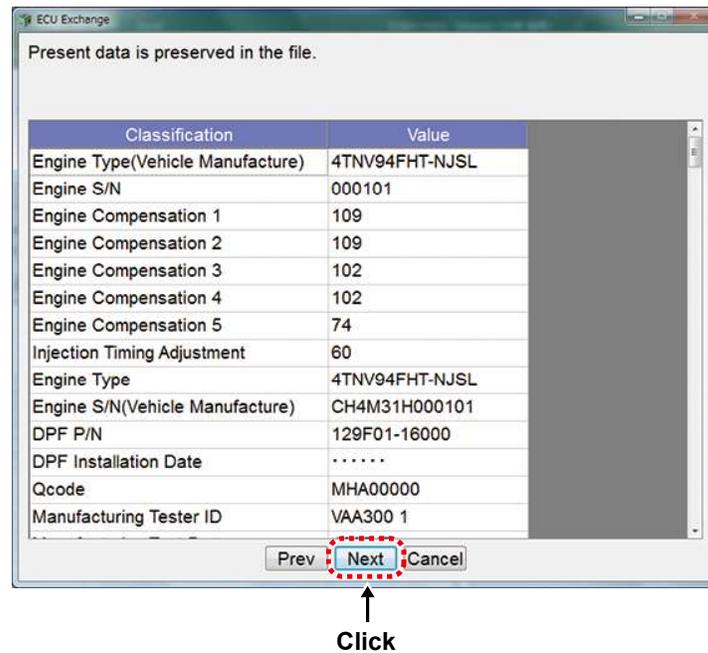
- 5 The ECU Exchange Screen is displayed.
Select "ECU Data Backup (ECU to PC)". Click "Next".



12. ECU Replacement and Update the ECU Software

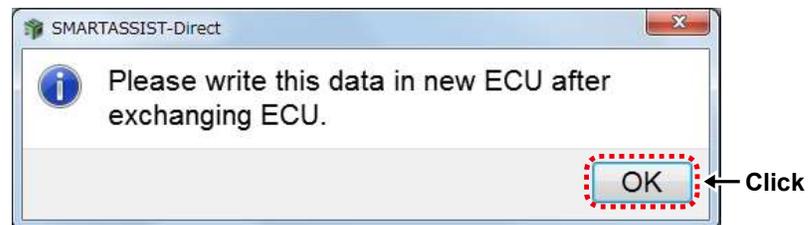
6 Screen of the ECU data to be saved is displayed.

Click "Next".



7 The process ends, and a message box with the procedures after ECU exchange is displayed.

Click "OK". The Main Menu Screen is displayed.



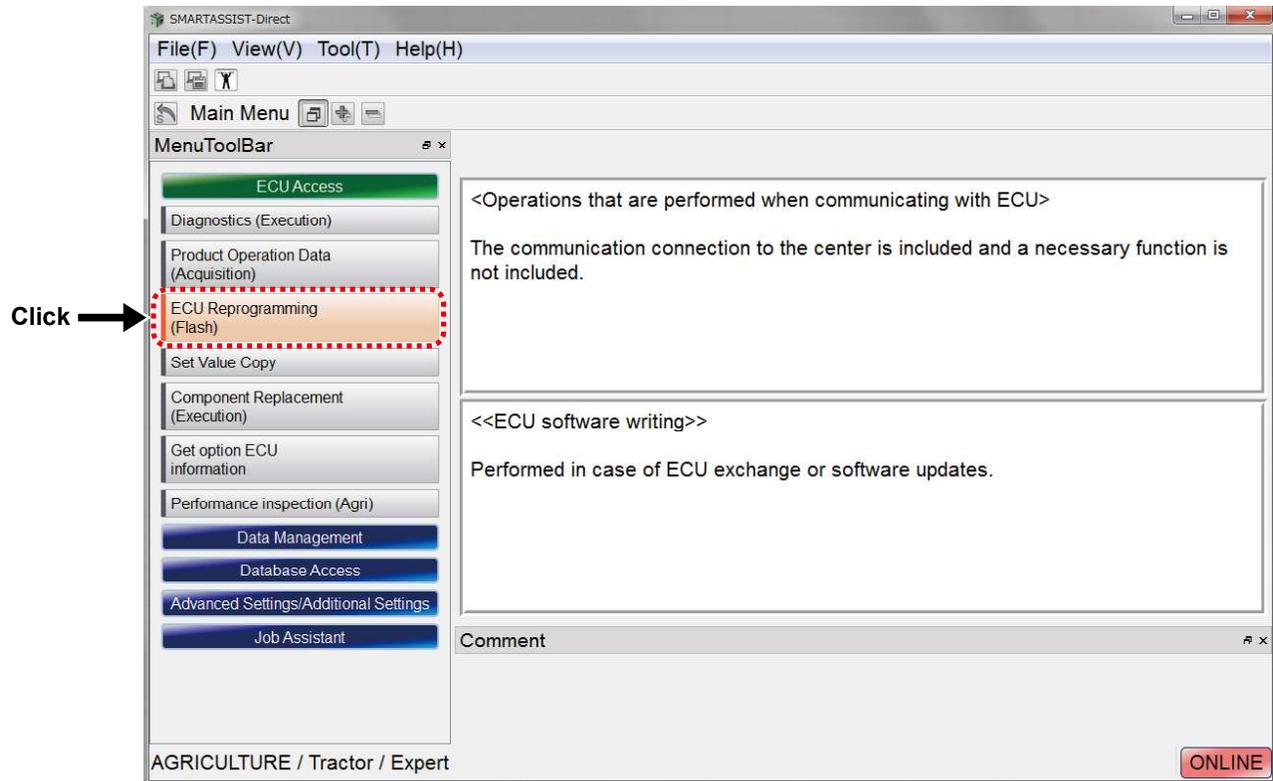
Remark The screen changes to the End of ECU Exchange (ECU→PC) Screen.

8 To delete (cancel) the setting values (correction values) of old ECU which are saved in your computer, by over-writing to new setting values, the old data is automatically deleted so you do not need to do any action.

12.3 ECU Software Reprogramming

The procedure for reprogramming the software downloaded from the center to the ECU is described below.

- 1 Connect the ECU to a PC and click "ECU Reprogramming (Flash)" from the ECU Access tab on the Main Menu. Make sure that the ECU is turned on (*1).



- *1 Turn on the key switch of the implement for "onboard reprogramming" to activate the ECU while turning on the switch of the power supply device connected to the ECU for "offboard reprogramming".

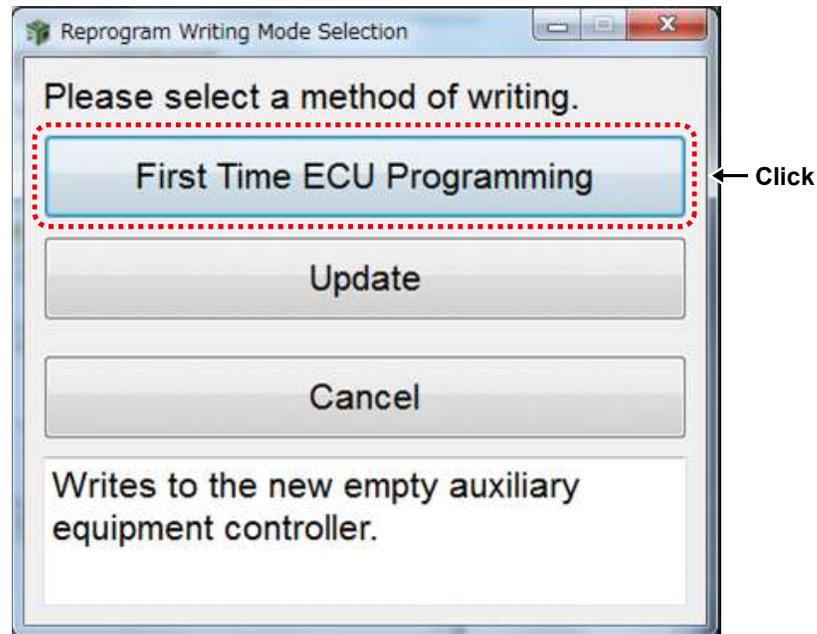
Note In the 4TNV94FHT engine, when replacing both the ECU and DCU by writing in to the actual machine, do not connect the service ECU and the service DCU at the same time. The reason is as follows. There are two communication speeds for this controller (250 kpbs and 500 kpbs) which can be switched by turning on and off the power depending on the communication speed on the driven machine when writing in. If you connect the ECU and DCU at the same time with different initial communication speeds of the service controller, because it does not match each other by turning on and off the power, a communication error will be detected. When replacing the ECU and DCU by writing in to the actual machine, replace them one at a time.

12. ECU Replacement and Update the ECU Software

2 The ECU Write Screen is displayed.

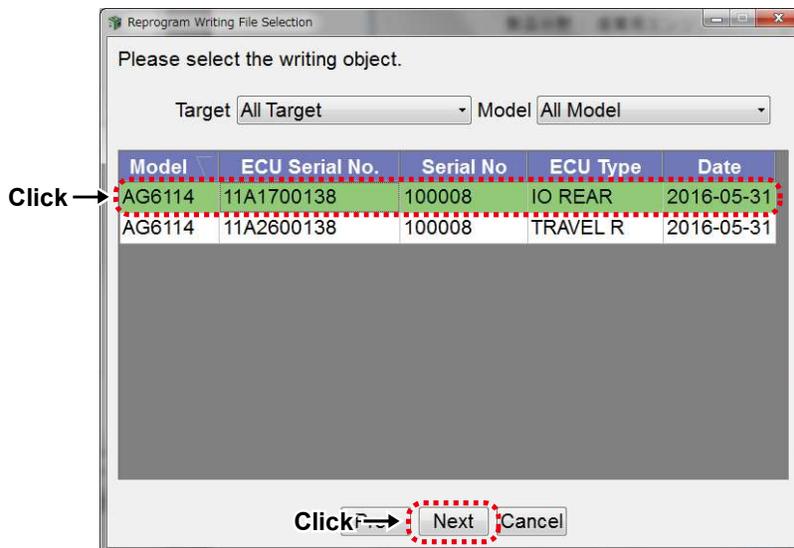
When writing to an empty ECU, select "First Time ECU Programming". When updating the controller, select "Update".

For example, click "First Time ECU Programming".

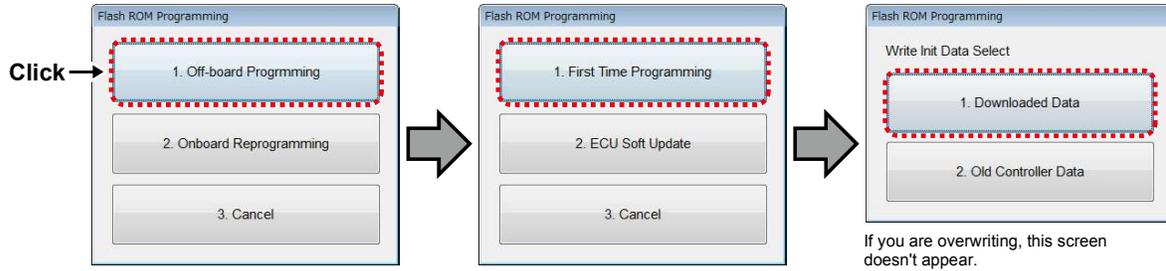


3 The selection screen for the write files after the download completed is displayed. Select the relevant file, and click "Next".

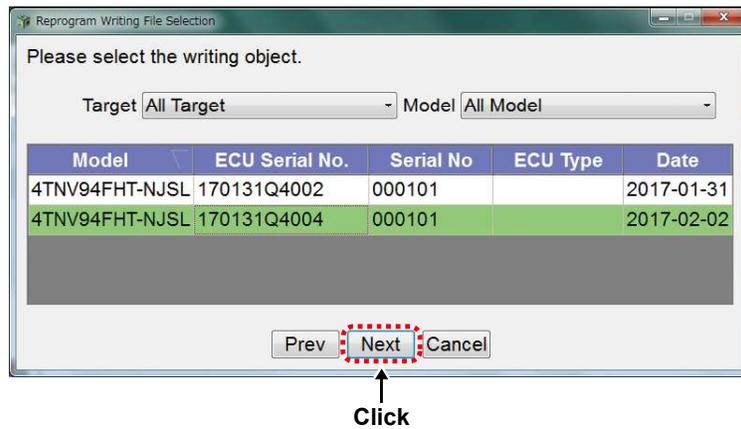
The following screen is an example of writing to ECU of the machine.



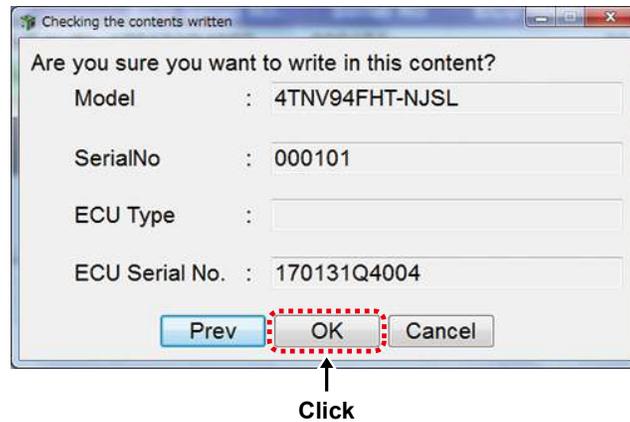
4 If you want to write machine ECU, the below screen appears.



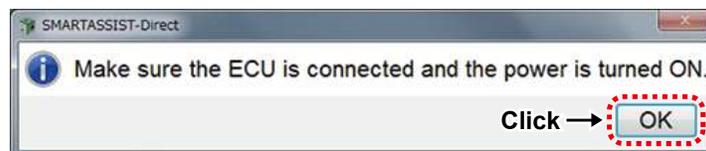
5 The following steps show the example when writing software to the engine ECU. Select the downloaded file from the writing object, then click "Next".



6 Click "OK", and the ECU software writing process starts. The following screen is an example of writing to ECU of the machine.

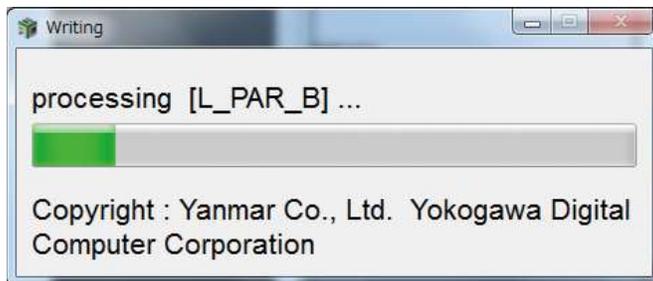


7 A screen is displayed that confirms that the ECU is turned on. Click "OK".



12. ECU Replacement and Update the ECU Software

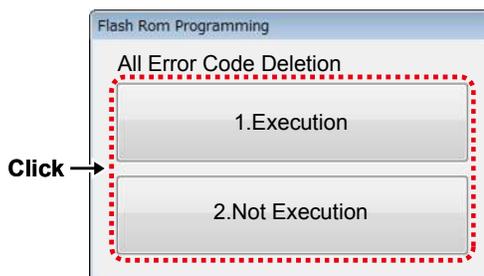
8 The ECU Software Reprogramming Process In Progress Screen is displayed.



* The information inside the box changes.

If there is a power failure or wiring disconnection during ECU writing, refer to section 15 on page 249 for the operating procedure.

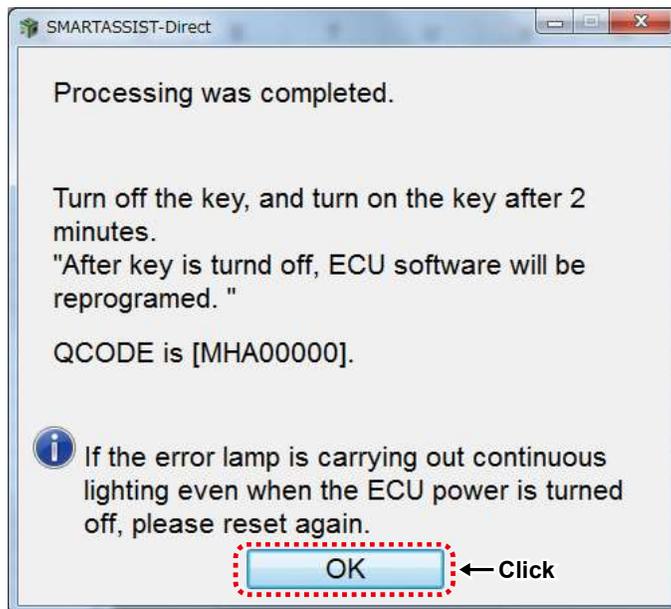
9 The ECU Software Programming Process In Progress Screen is displayed. (Not displayed in the case of engine ECU)



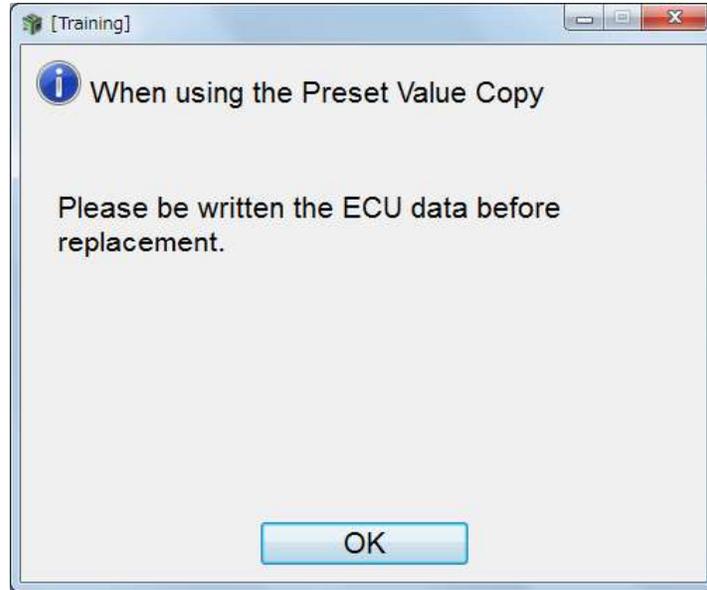
* Select depending on the situation.

10 After software reprogramming process is completed, the following screen is displayed with QCODE. Write down the QCODE to the label attached to the service ECU.

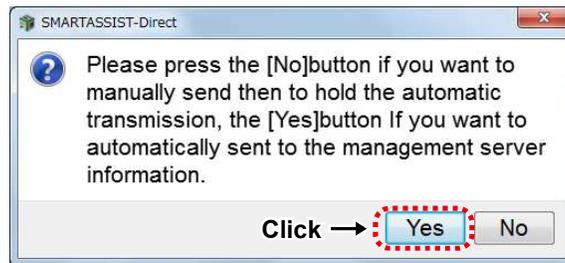
In the case of the ECU for SCR (=DCU), write down the old QCODE. When you finish writing down, click "OK".



Remark For new writing, the below message is displayed.



- 11** If you are over writing, the following window will show after it is complete.
Select how you want to send the information (Automatically or Manually).



- 12** If you continue writing to other controllers, select "Yes".



If you want to continue the writing, the screen switches to writing mode screen.
Click "No" to go back to the main menu.

12. ECU Replacement and Update the ECU Software

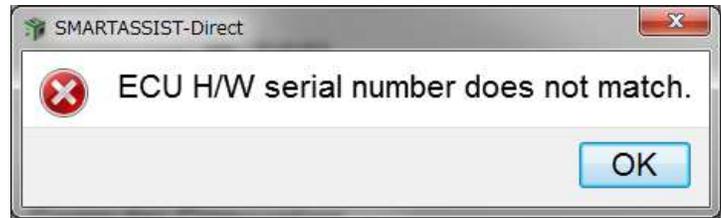
13 The procedure for how to handle when there is a power failure or communication failure due to wiring disconnection is described.

The following screen is displayed when there is a communication failure.

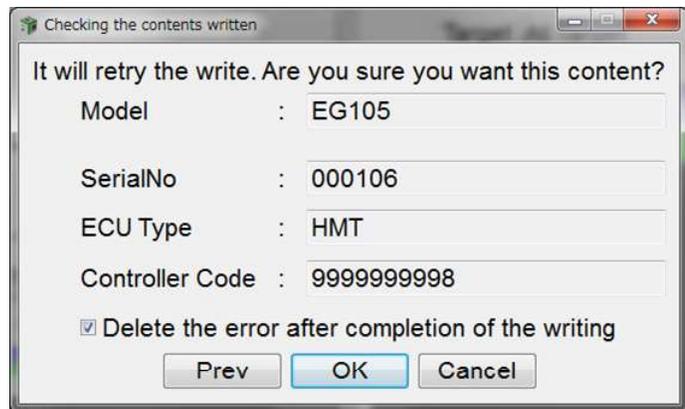
<Screen 1>



<Screen 2>

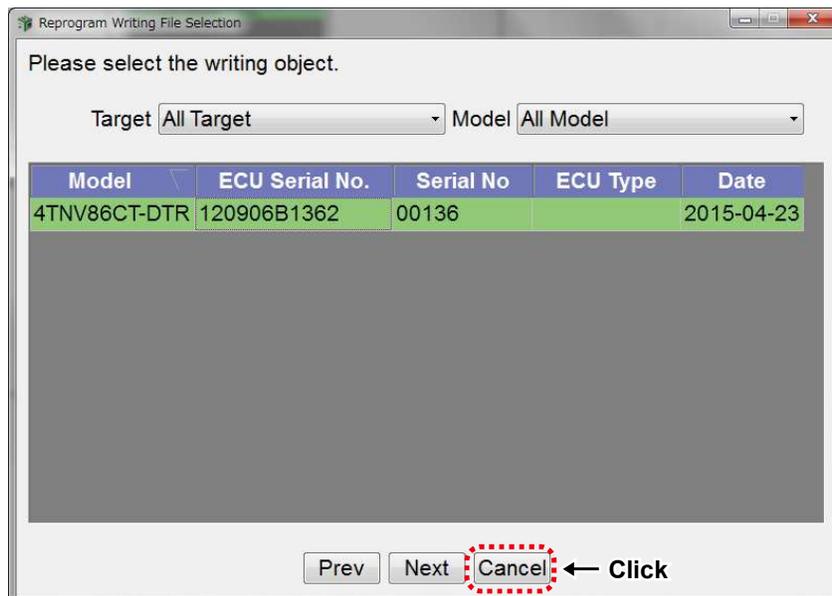


This will remain as abnormal data. After the communication failure is fixed, do an abnormal case writing. (To 249. 15)

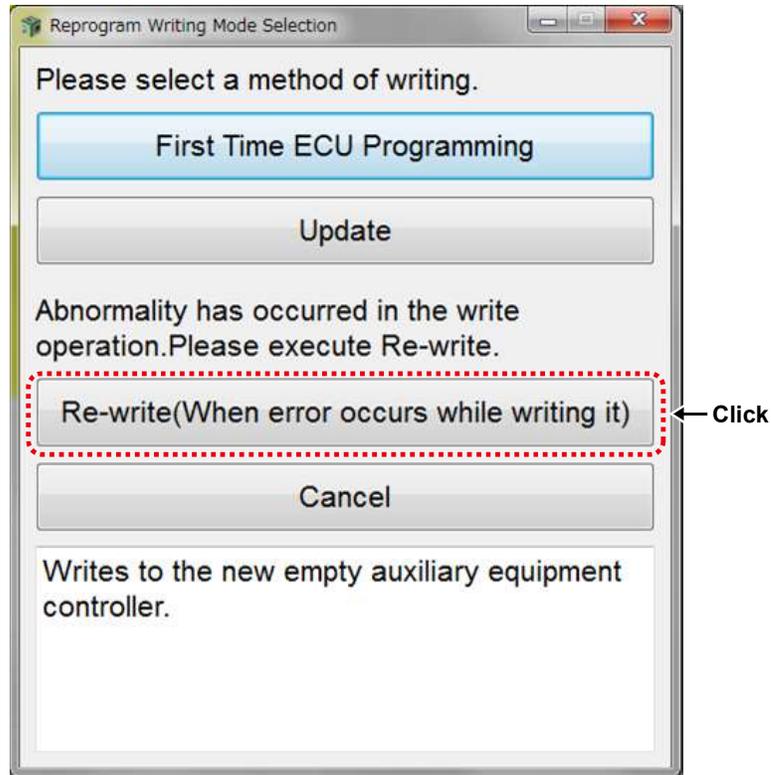


After fixing the communication error, click "OK" and write again.

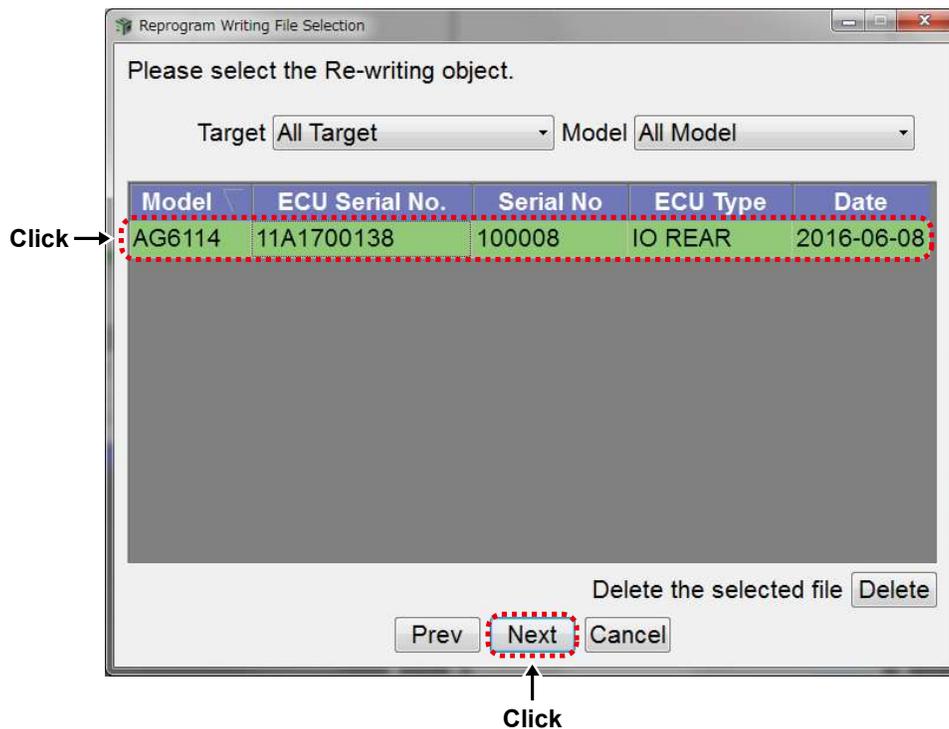
14 Repair the cause of the failure and click "OK", then the screen returns to the following screen. Click "Cancel".
If you click "Next" by accident, refer to section 20 on page 251.



15 If the abnormal data is still there, select "Re-write (When error occurs while writing it)"



16 The screen to select the downloaded file to be written is displayed again. Reset the ECU power supply. Choose the file you want to write and click "Next".

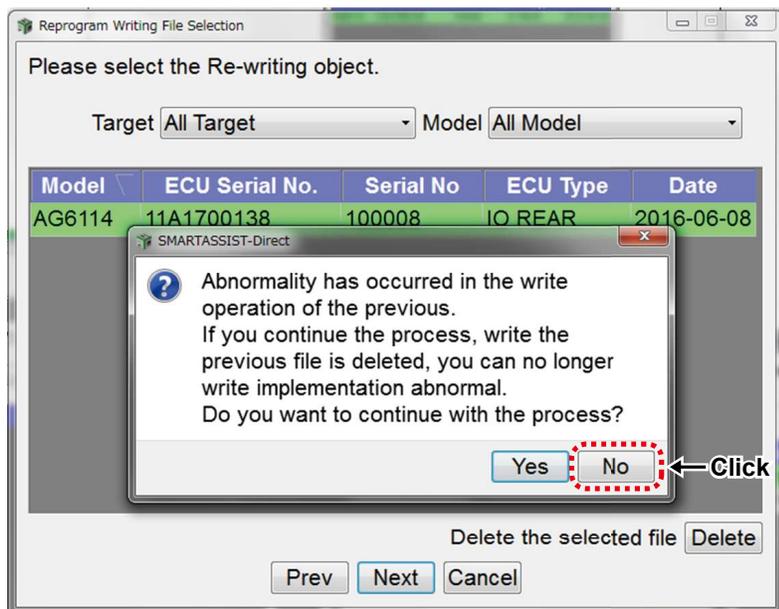


Remark When recovering from a communication failure, always turn off the power supply and turn it on again.

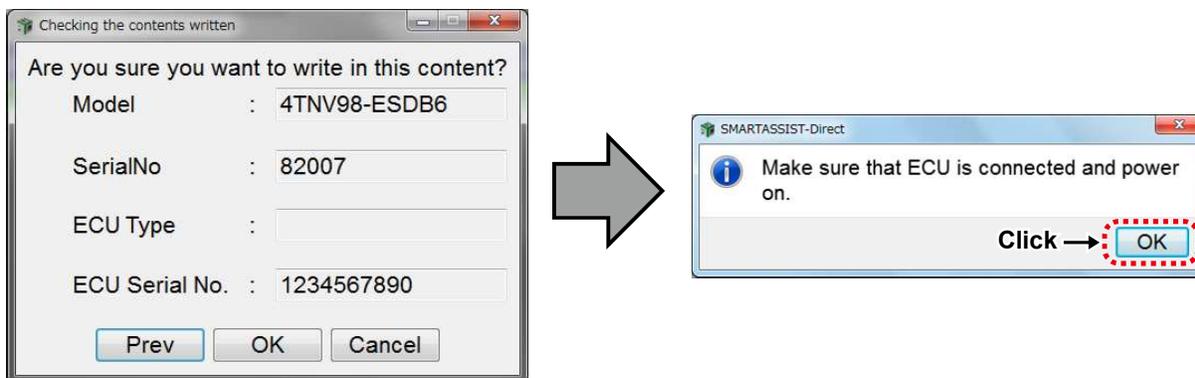
12. ECU Replacement and Update the ECU Software

- Do not click "Delete". Clicking "Delete" opens the below window.

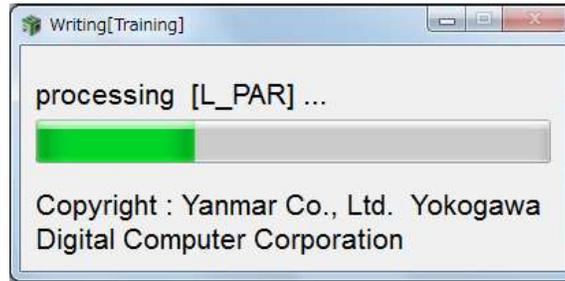
Be sure to click "No". If you click "Yes", be careful because "Writing During Abnormality" prevents you from writing and the ECU can no longer be used.



- 17** The ECU Software Reprogramming Process Start Screen is displayed. A screen is also displayed that confirms that the ECU is turned on. Click "OK".



18 The ECU Software Programming Process In Progress Screen is displayed. When it is complete, the Q Code Notification Screen is displayed the same as the notification in section 10 on page 246. The following procedures are the same as those described on page 246.

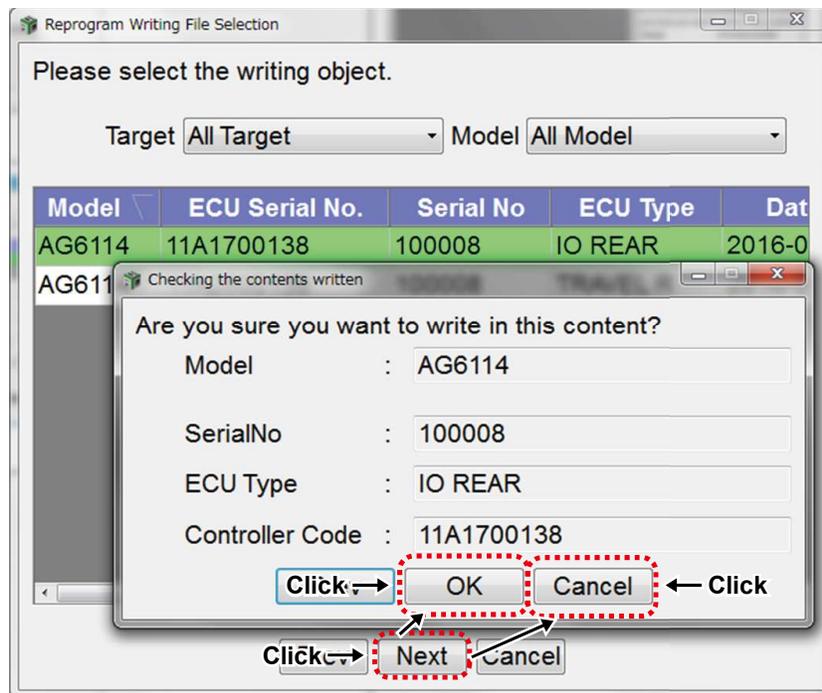


* The information inside the box changes.

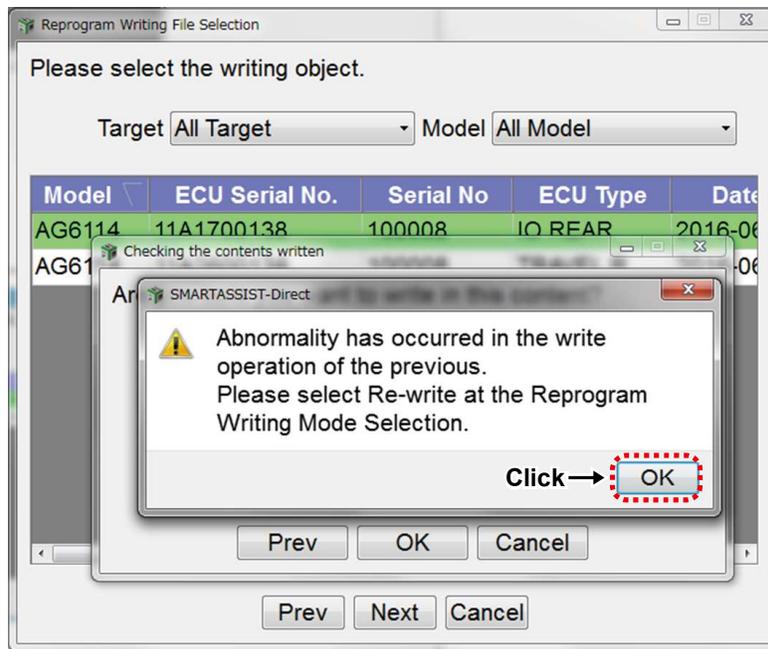
19 If the ECU power supply is not reset before software writing, the following screen is displayed. In this case, click "OK" and reset the ECU power supply. The screen returns to the screen indicated in section 17 on page 250.



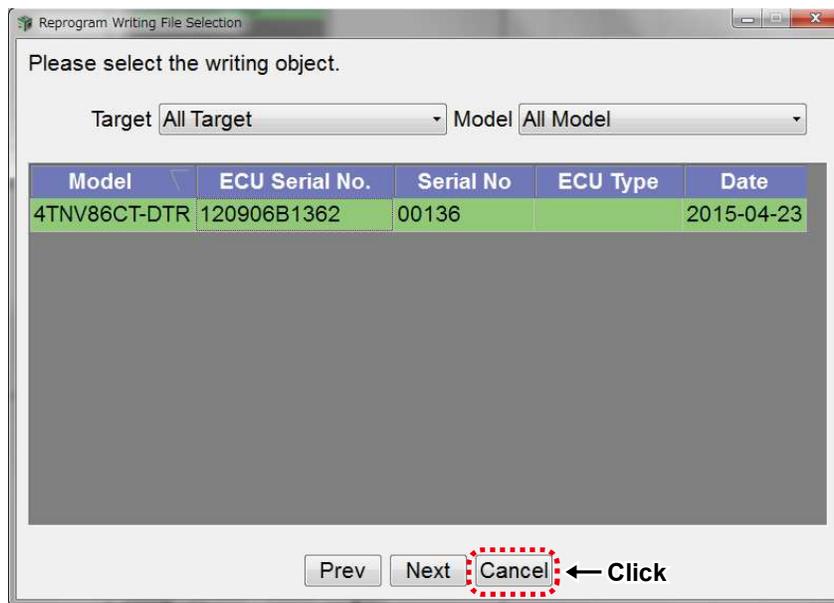
20 During the procedure for communication failure in section 14 on page 248, if you accidentally click "Next" and "OK", instead of "Cancel" as shown on the following screen, the screen shown in next page is displayed. When you click "Next" and "Cancel", then the screen will return to the screen shown in section 14 on page 248.



21 The following screen is displayed. Click "OK".



22 The screen returns to the same screen as shown in section 14 on page 248. Click "Cancel". The following procedures are the same as section 15 on page 249.

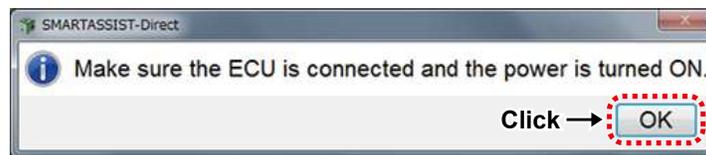
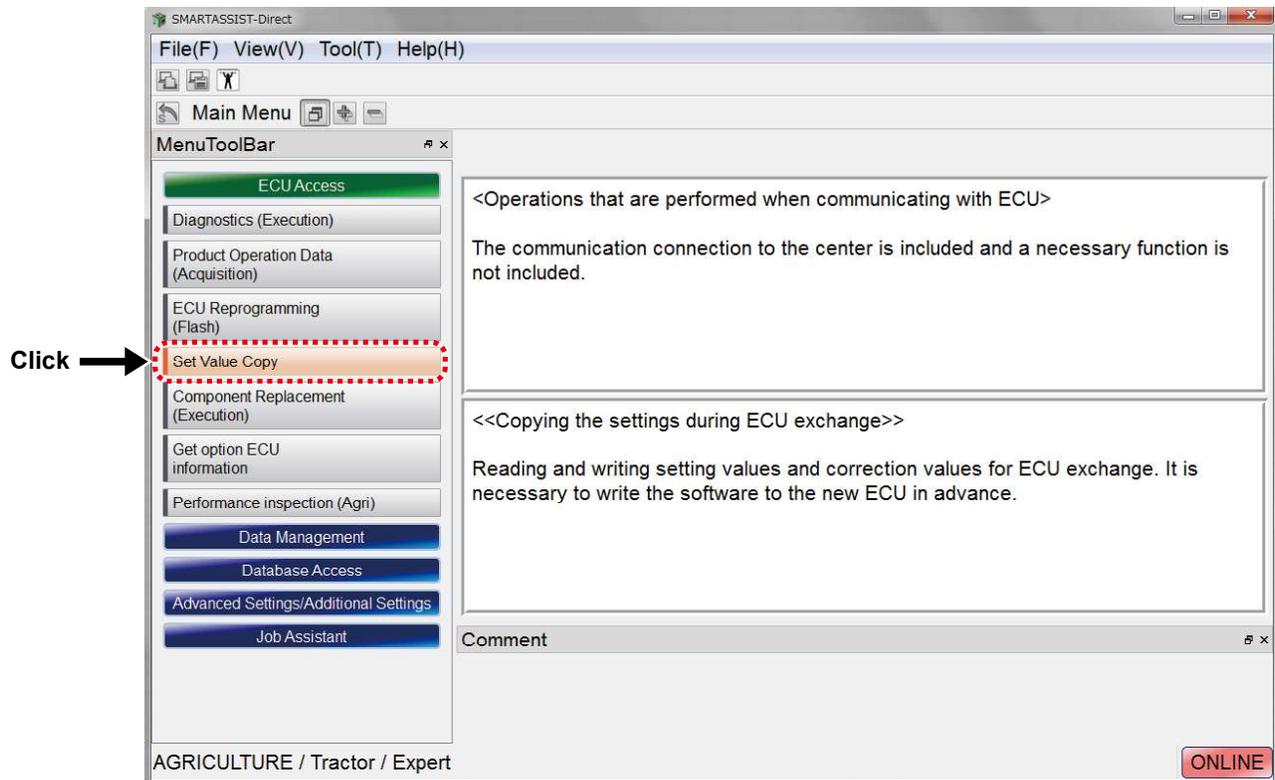


12.4 Copy the Setting Values (Correction Values) to the New ECU

After reprogramming the software to the Service ECU, it is necessary to copy the saved result of the setting values (correction values) read from the original ECU (old ECU) done in step 12.2. It is unnecessary to perform these procedures when unable to read in step 12.2.

The procedure for copying the setting values (correction value) of the original ECU saved in the PC to the new ECU is described.

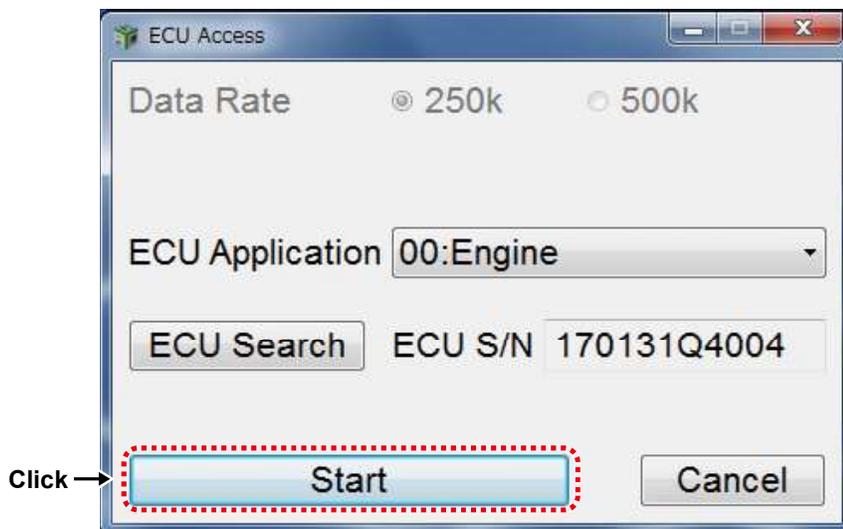
- 1 Click the "Set Value Copy" on the tab "ECU Access".



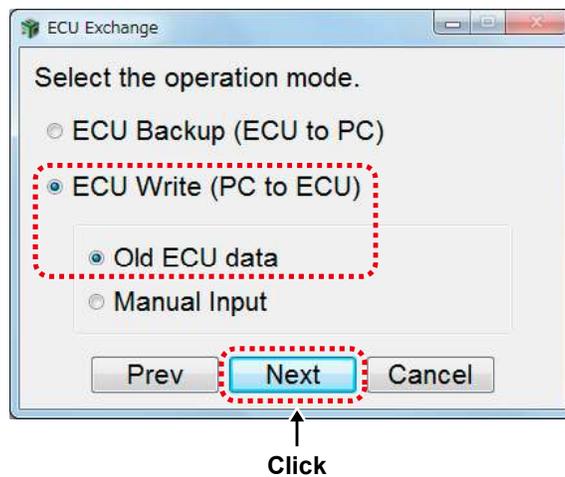
Note Make sure that the product or ECU is connected.

12. ECU Replacement and Update the ECU Software

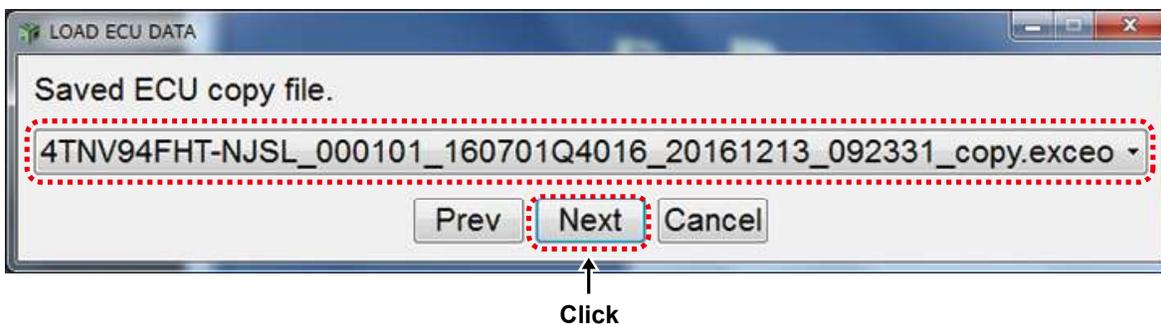
The ECU Connection Screen is displayed. Click "Start".



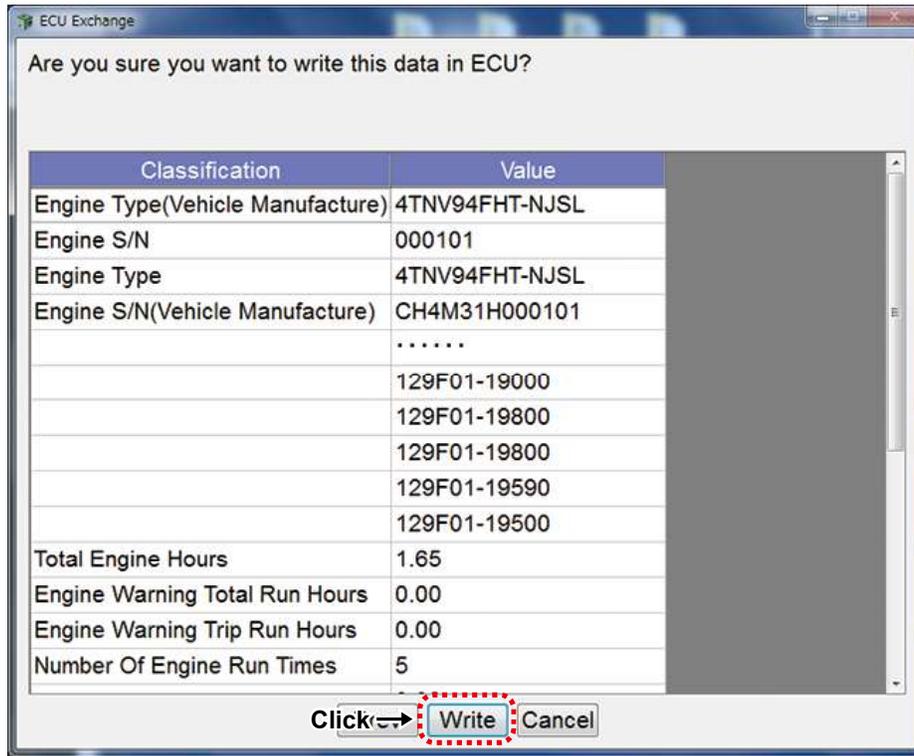
- 2 The ECU Exchange Screen is displayed.
Select "ECU Write (PC to ECU) Old ECU Data". Click "Next".



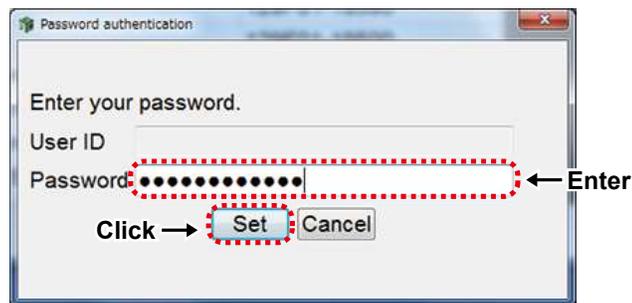
- 3 The selection screen for the ECU Data File is displayed.
Select the applicable file, and click "Next".



- 4 The ECU Exchange Output Check Screen is displayed.
Click "Write".

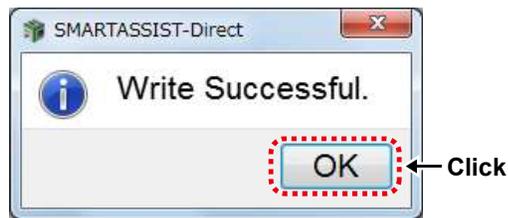


- 5 The Password Check Screen is displayed.
Enter the password, and click "Set".

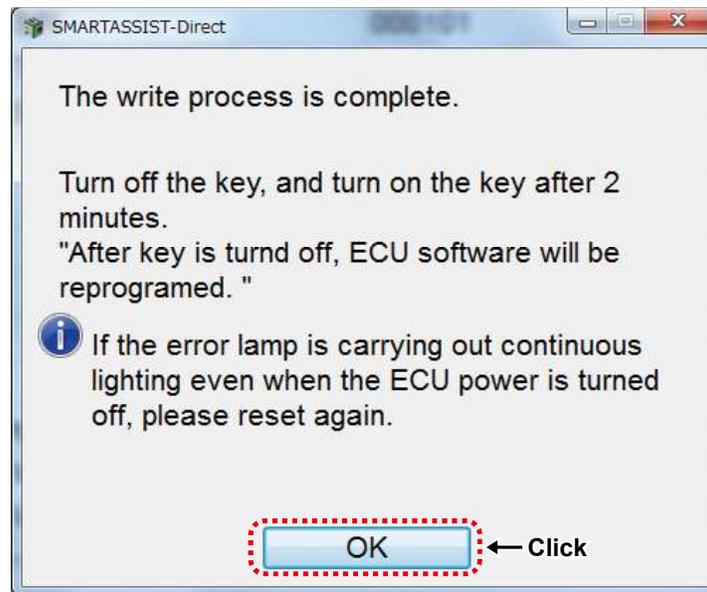


12. ECU Replacement and Update the ECU Software

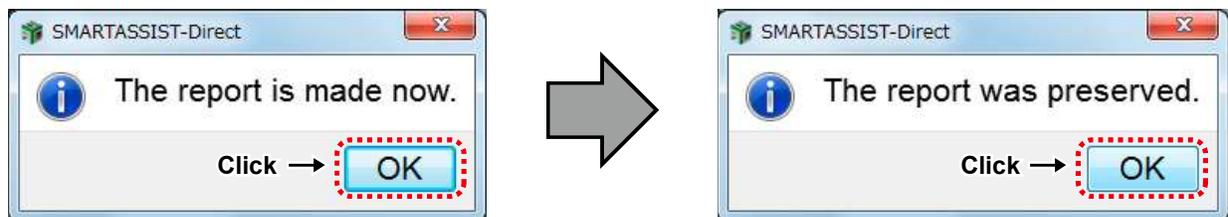
- 6 A message box notifies you when the writing process has finished.
Click "OK".



- 7 A screen with the necessary procedures after the ECU writing process is displayed.
Follow the on-screen instructions, and click "OK".



- 8 A message box notifies you that a report was created.
Click "OK".



Remark The screen changes to the End of ECU Exchange (PC→ECU) Screen.

12.5 Upload of ECU Replacement and Software update Information

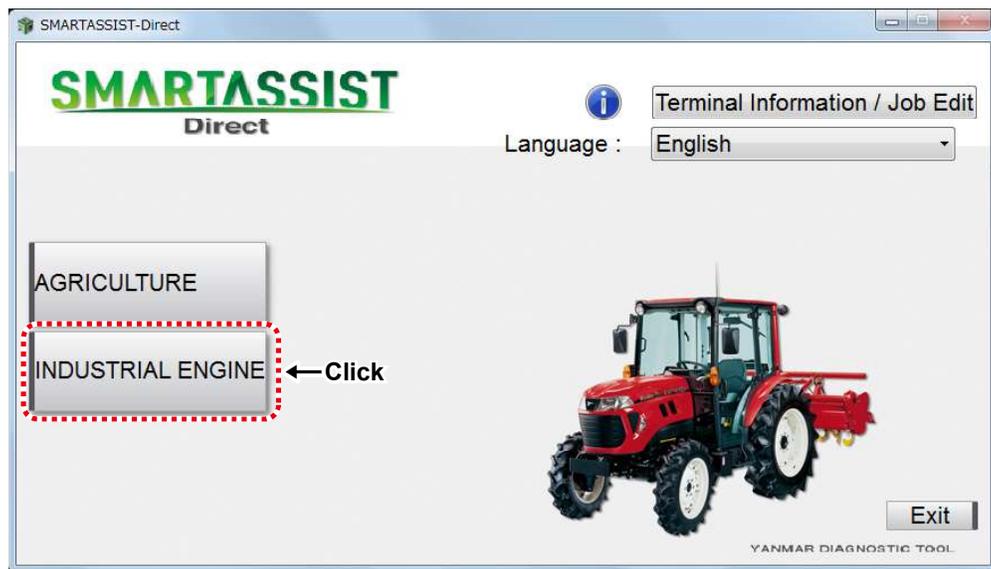
After writing the software to the ECU, access the center and upload the replacement data.

Software Update (Onboard reprogramming) are automatically uploaded, but ECU replacement (Onboard/Offboard reprogramming) is not automatically uploaded after overwriting. Therefore it is necessary to upload manually.

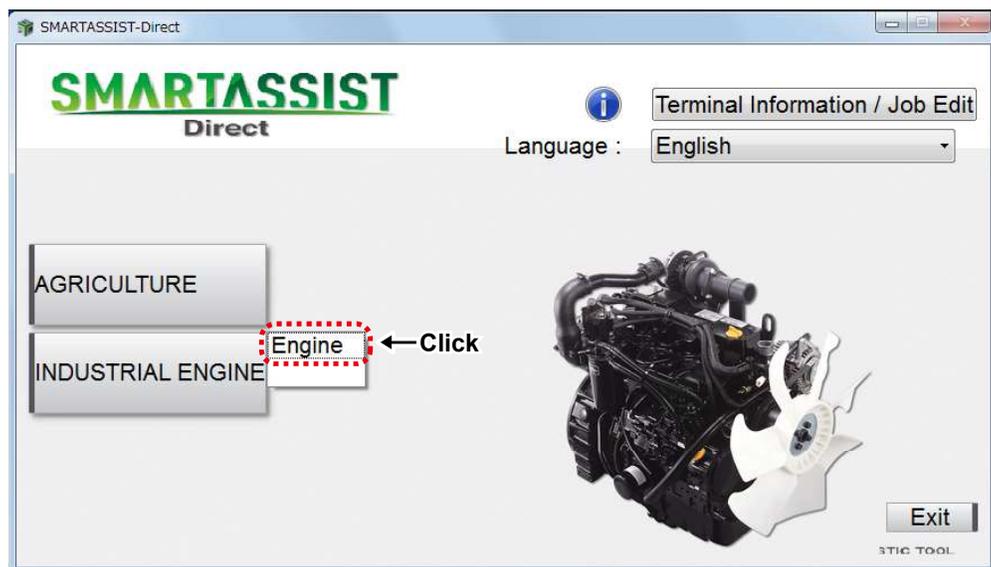
12.5.1 Automatic Upload Operation of ECU Software update Information

In case of Software Update (Onboard Reprogramming), the procedure for automatic upload is displayed.

- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

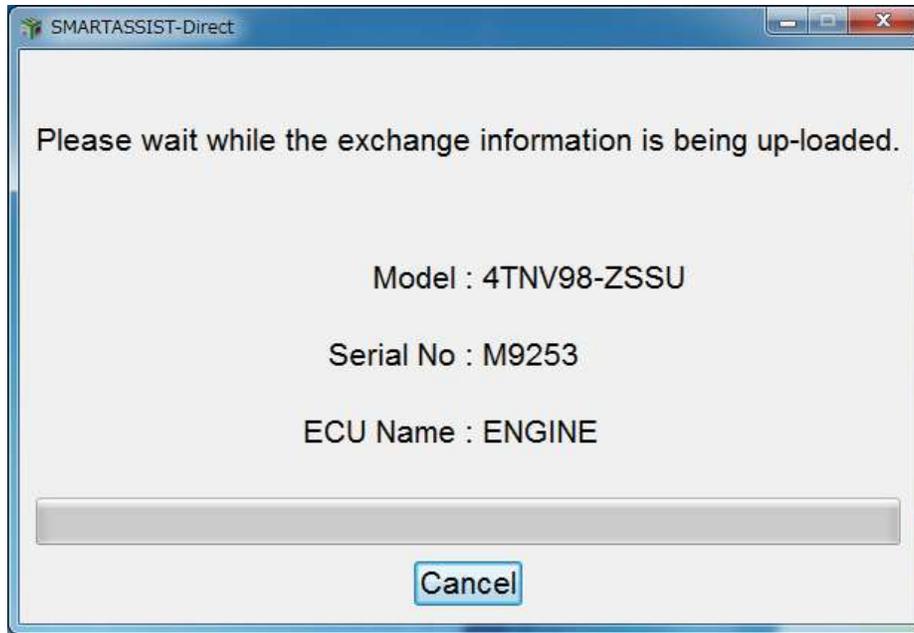


- 2 Select "Engine".

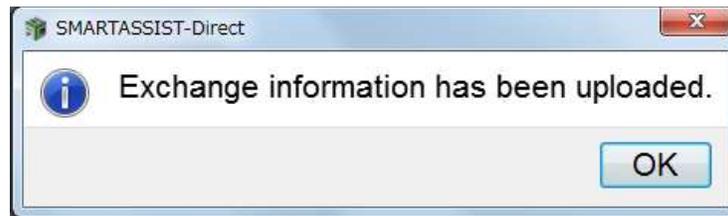


Note Make sure that the Internet connection is active.

- 3 The upload process is started.



- 4 A message box notifies you when the upload has finished.



Remark The screen switches to the End of ECU Software Upload Screen.

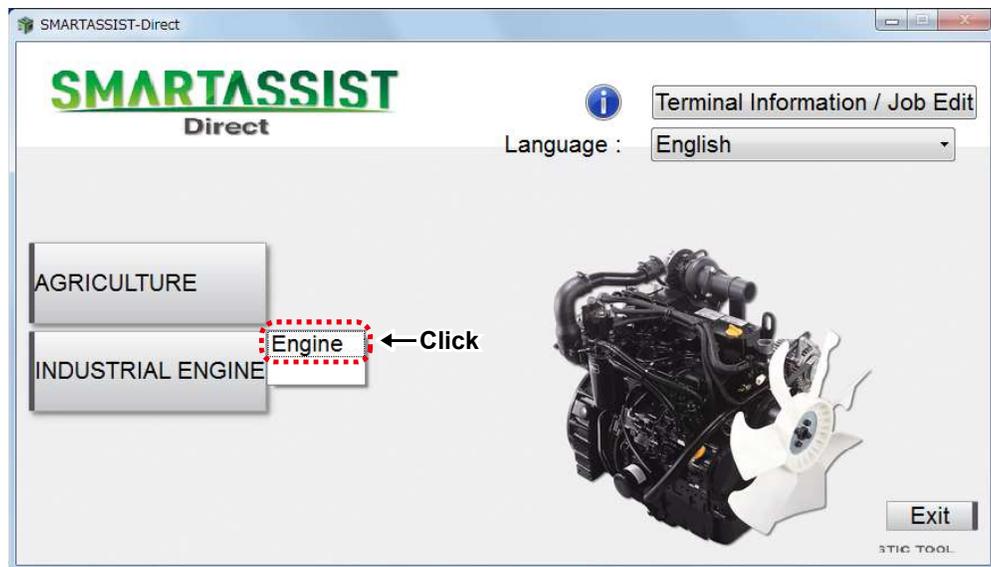
12.5.2 Manual Upload Operation of ECU Replacement Information

In case of replacing the ECU (Onboard/Off board Reprogramming), the procedure for manual upload is displayed. For details on how to cancel exchange, refer to [14.3 Replacement (or downloaded data) cancellation process].

- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

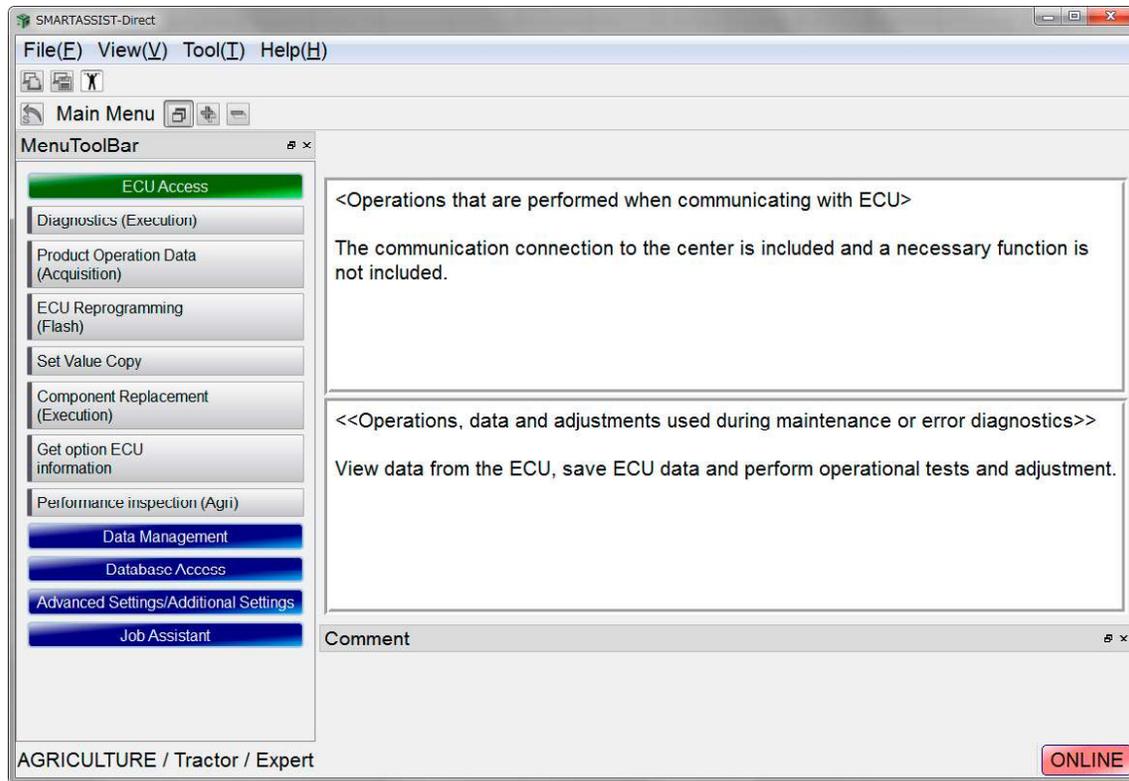


- 2 Select "Engine".

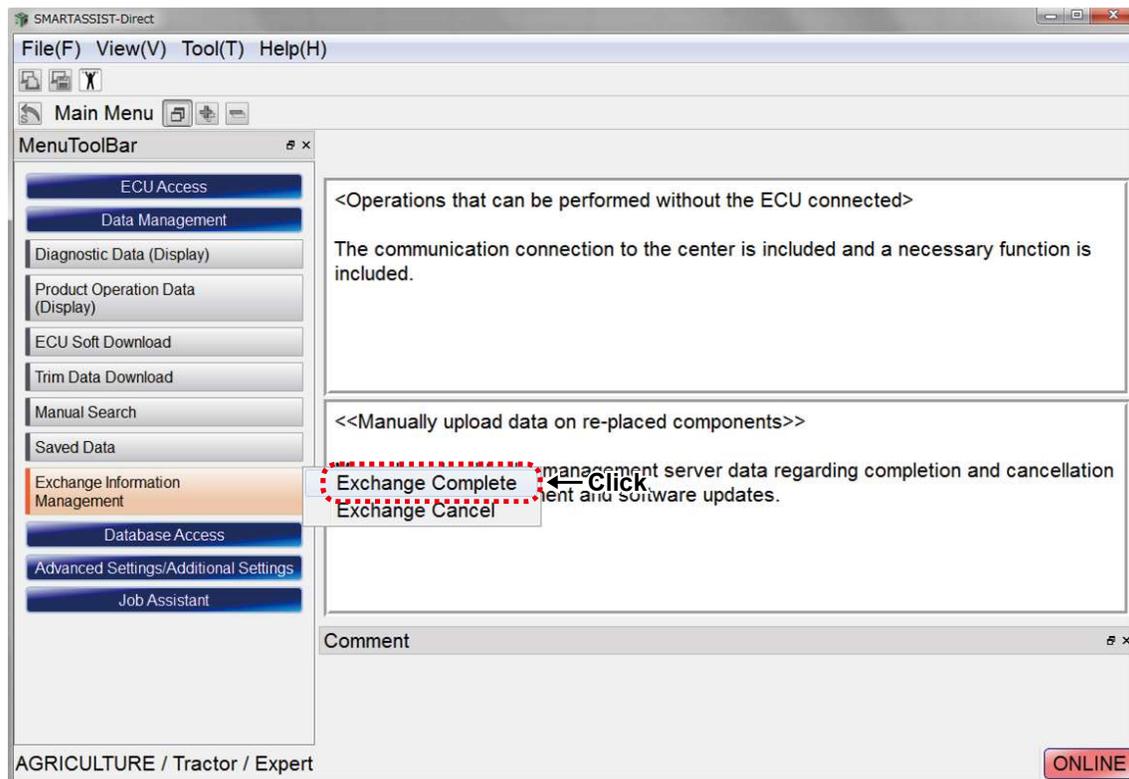


12. ECU Replacement and Update the ECU Software

3 The Main Menu Screen is displayed.

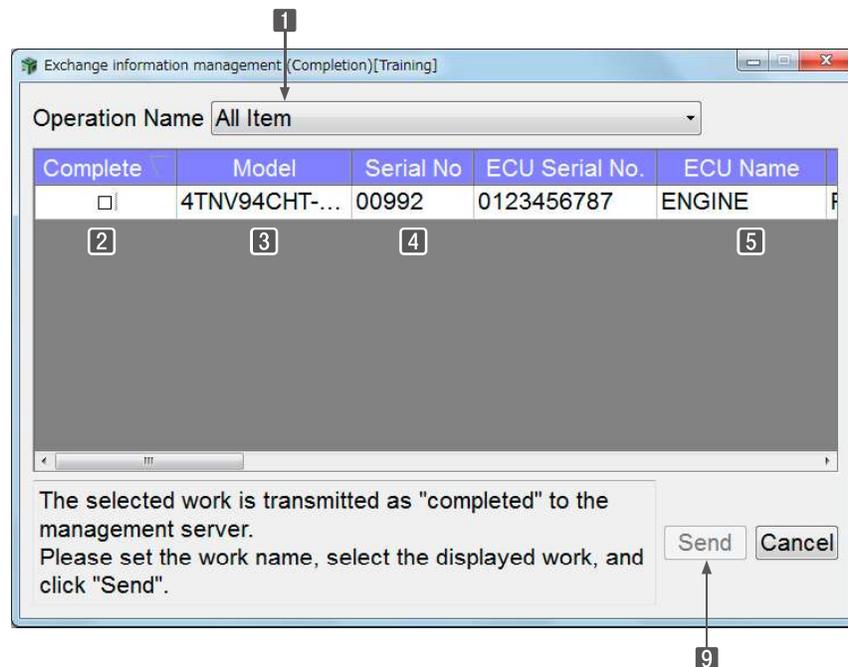


4 Click "Exchange Information Management" and "Exchange Complete" on the tab "Data Management".



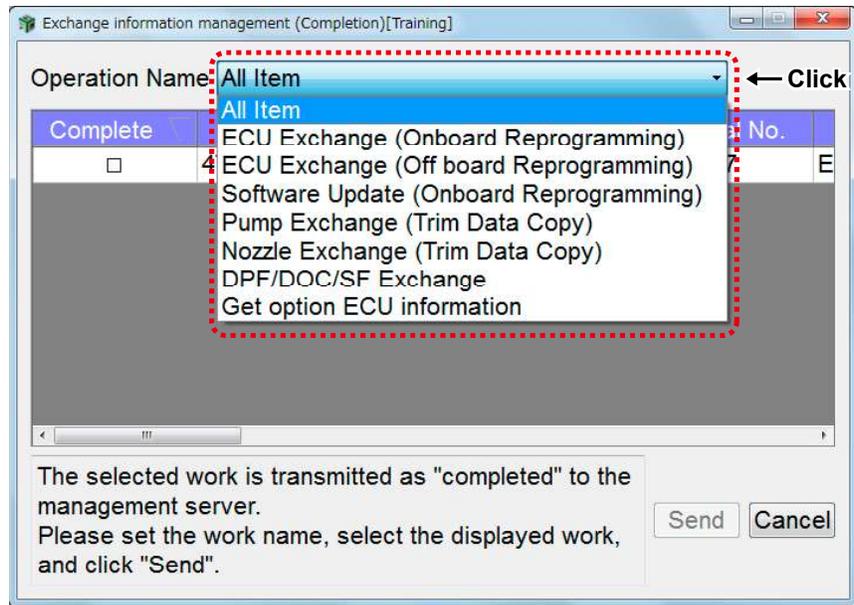
5 The Exchange Information Management (Completion) Screen is displayed.**1** Operation Name selection

Select "ECU Exchange (onboard reprogramming)", "ECU Exchange (offboard reprogramming)", "Software Update (onboard reprogramming)", "Replace Pump (copy correction values)", "Replace Nozzle (copy correction values) etc.

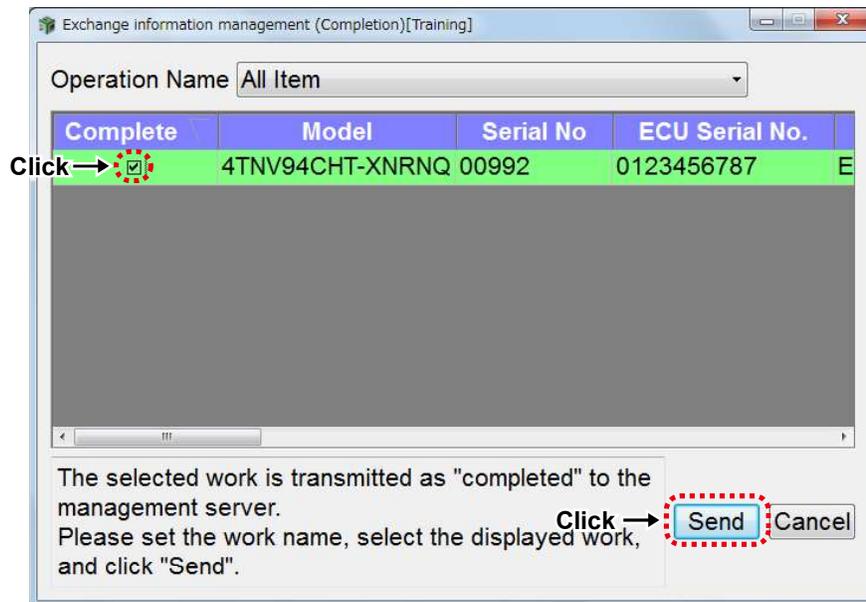
2 Checkbox when completing replacement**3** Model**4** Serial No**5** ECU Name**6** Write Mode**7** Download Data**8** Write Data**9** Send button

12. ECU Replacement and Update the ECU Software

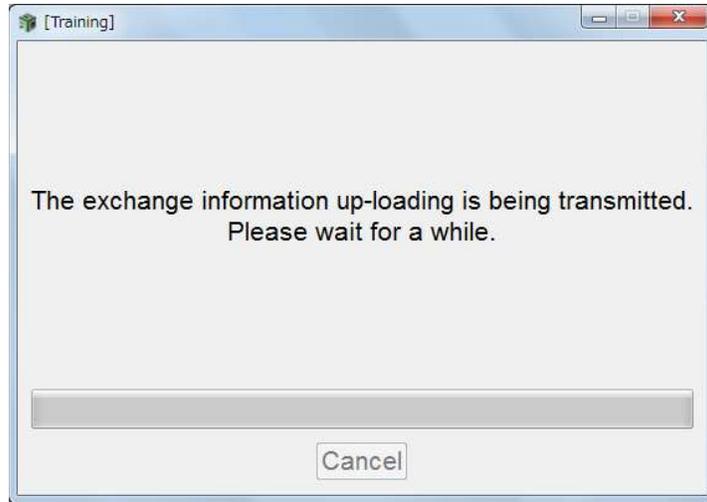
- 6 Click the "Task Name" tab and select the task name of the Replacement Completion you want.



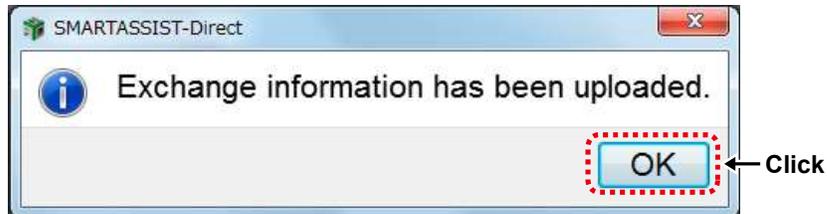
- 7 Select the task name of the Replacement Completion you want, then tick the check mark for "Completed" and when the ECU software corresponding to Replacement Completion appears, select the task name of the Replacement Completion you want and click "Send".



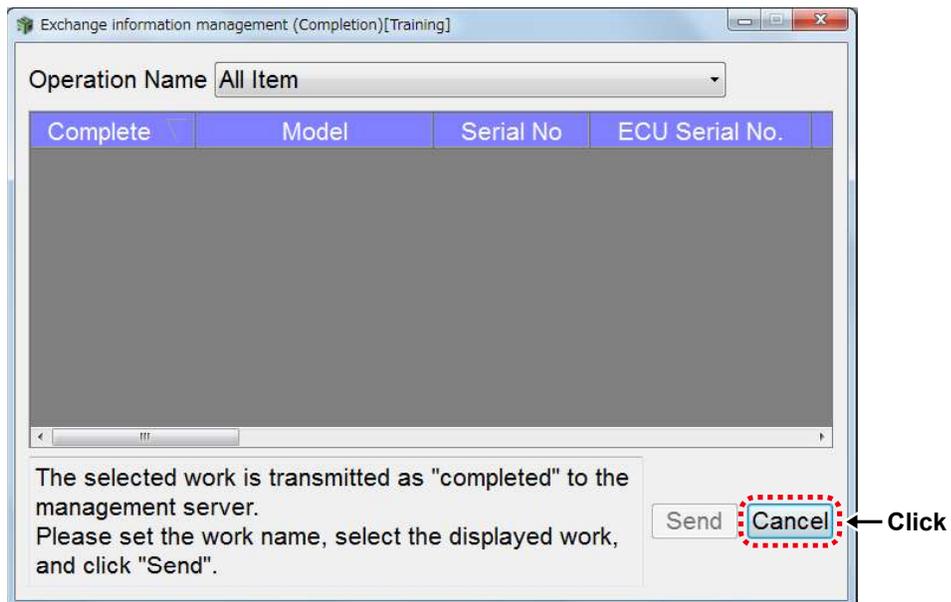
8 The Exchange Information Management (Cancel) process starts.



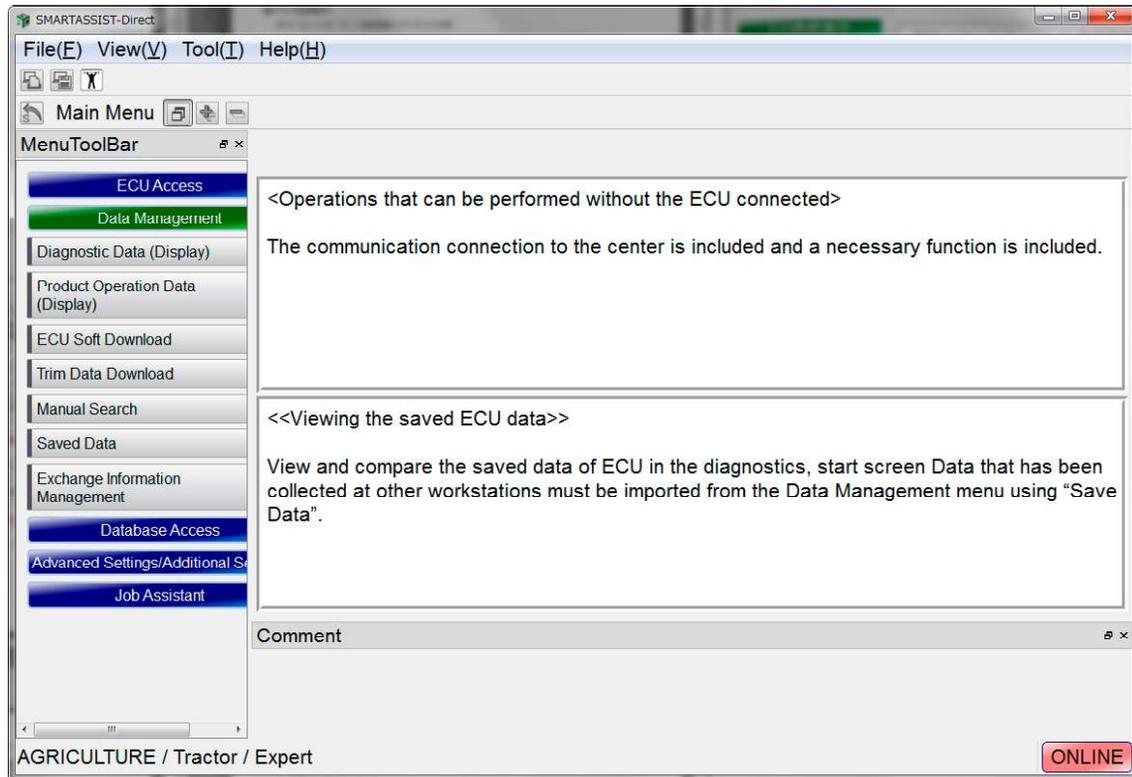
9 A message box notifies you when the Exchange Information Management (Cancel) process has finished. Click "OK".



10 Click "OK" on the Exchange Information Management (Cancel) Process Completion Message Box. The Exchange Information Management (Cancel) Screen is displayed. Click "Cancel" to return to the Main menu.



11 The Main Menu screen starts up, and the Exchange Information Management (Cancel) task is finished.



13. Part Exchange

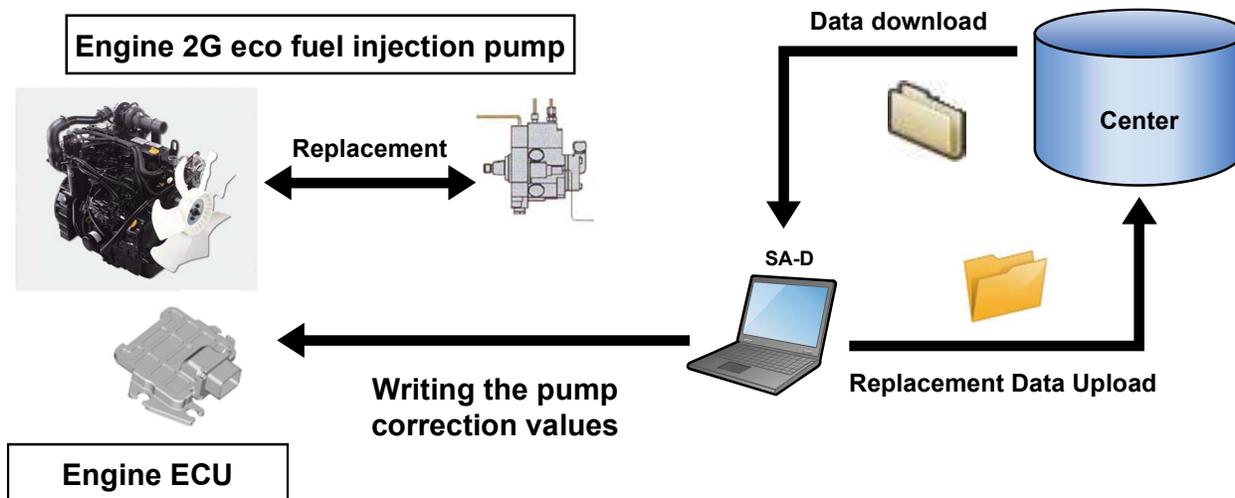
When replacing parts related to the exhaust emission for the engine models shown in the table below, it is necessary to write the correction values to the engine ECU using SA-D.

Engine model	Fuel injection system	Applicable Regulation	Parts requiring correction value writing during ECU exchange					
			2G eco pump	Denso injector	Bosch injector	DPF DOC/SF	Rail	SCR
3/4TNV**-Z, E, A, C	Yanmar 2G eco pump	Tier3	○	-	-	-	-	-
3TNV**F	Yanmar 2G eco pump	Tier4	○	-	-	-	-	-
4TNV94HT-Z	Denso CR	Tier3	-	○	-	-	-	-
4TNV94CHT	Denso CR	Tier4	-	○	-	○	-	-
4TNV94FHT	Denso CR	F-Tier4	-	○	-	○	-	○
3/4TNV**C/CT/CHT	Bosch CR	Tier4	-	-	○	○	○	-

For engine ECU exchange, refer to [12. ECU Replacement and Update the ECU Software].

13.1 2G Eco Pump Replacement Process

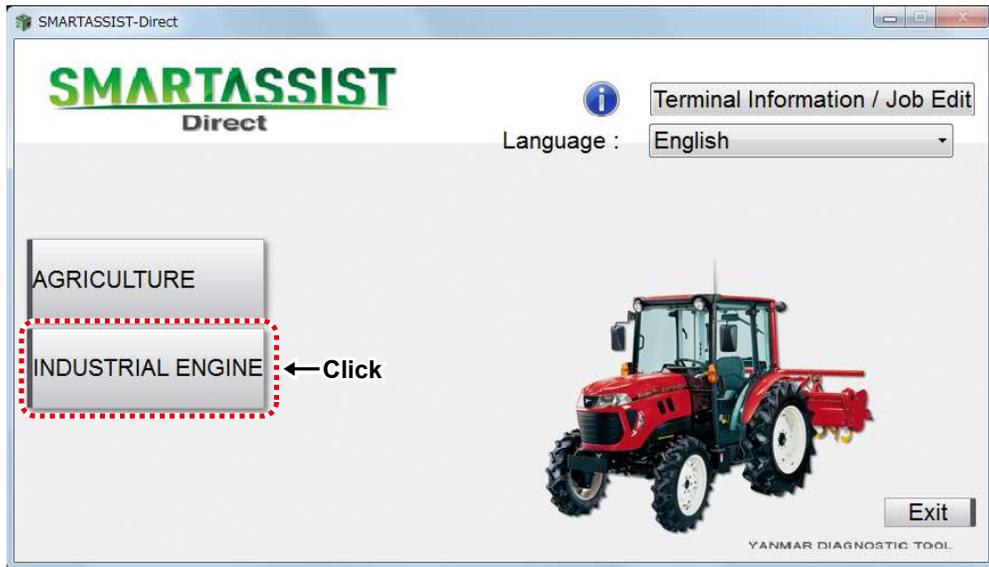
- When replacing the fuel injection pump for 3/4 TNV**-Z, E, A, C and 3TNV**F equipped with Yanmar 2G Eco pump, it is necessary to write the pump correction values to the engine ECU.
- The pump correction values are registered separately by engine model, machine number and ECU serial number. It is necessary to download the values from the center to your PC.



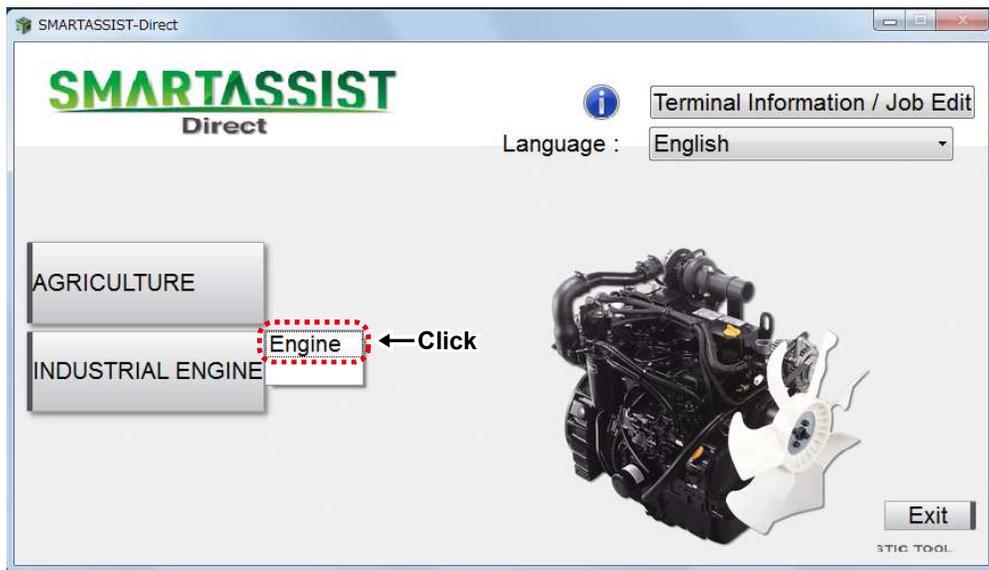
13.1.1 Pump Replacement (Download)

The procedure for downloading the pump correction values registered at the center to your PC is displayed.

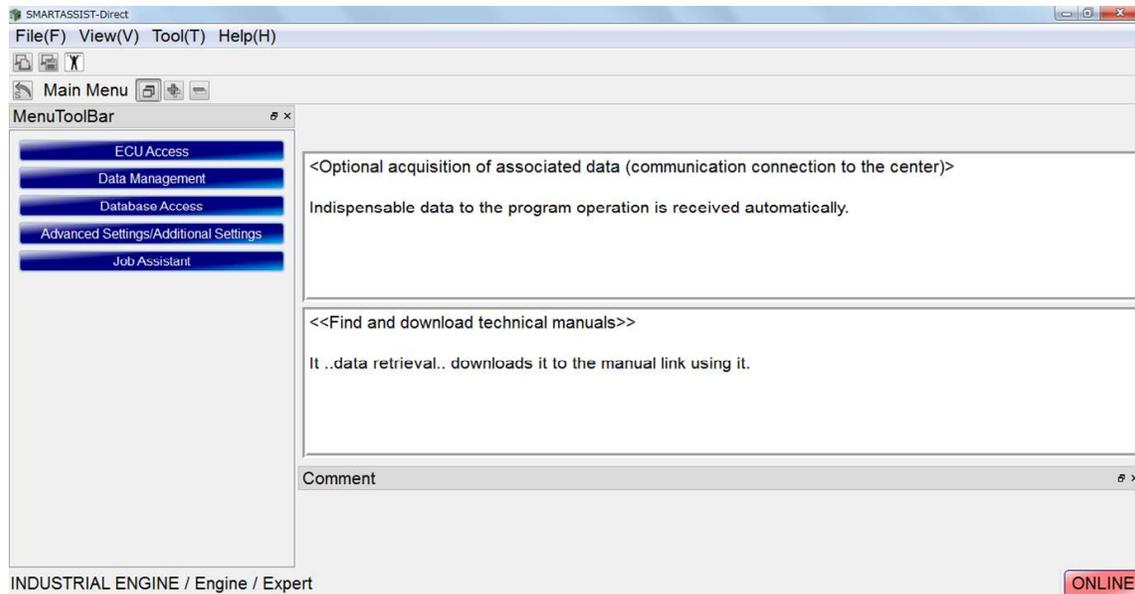
- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.



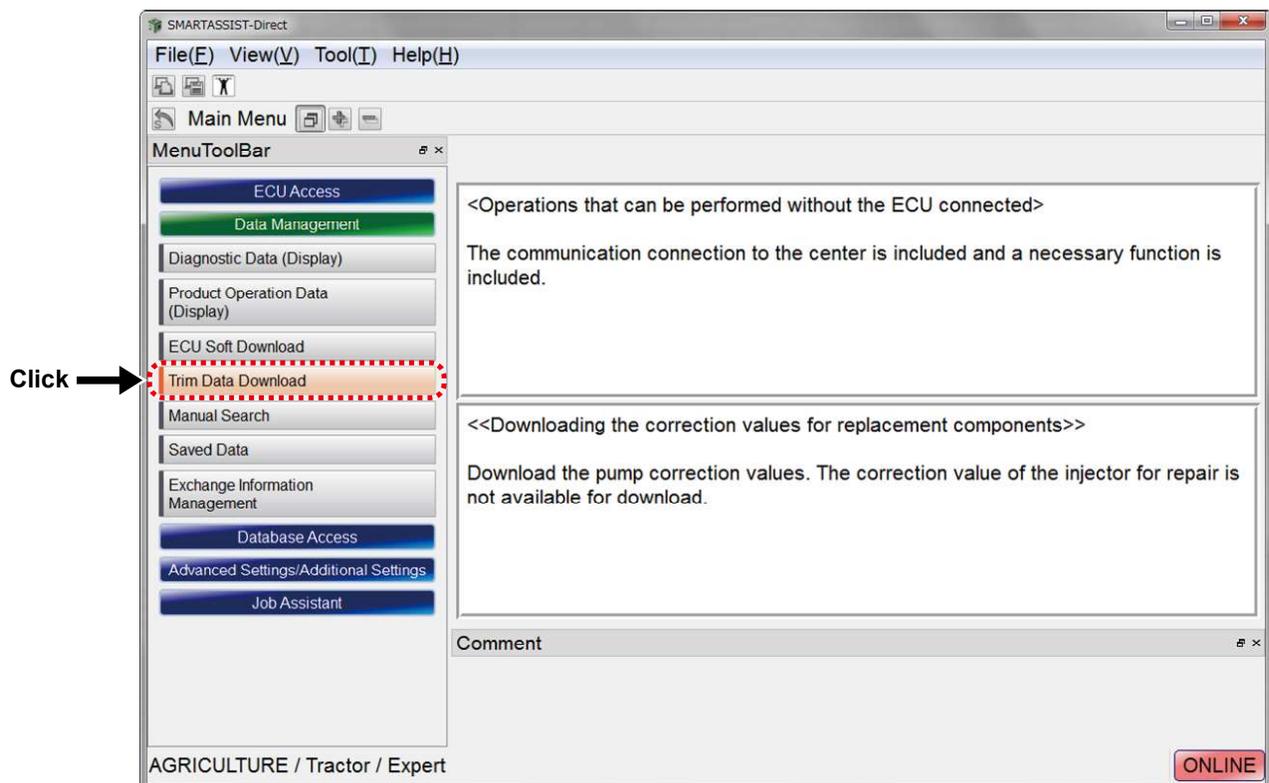
- 2 Select "Engine".



3 The Main Menu Screen is displayed.

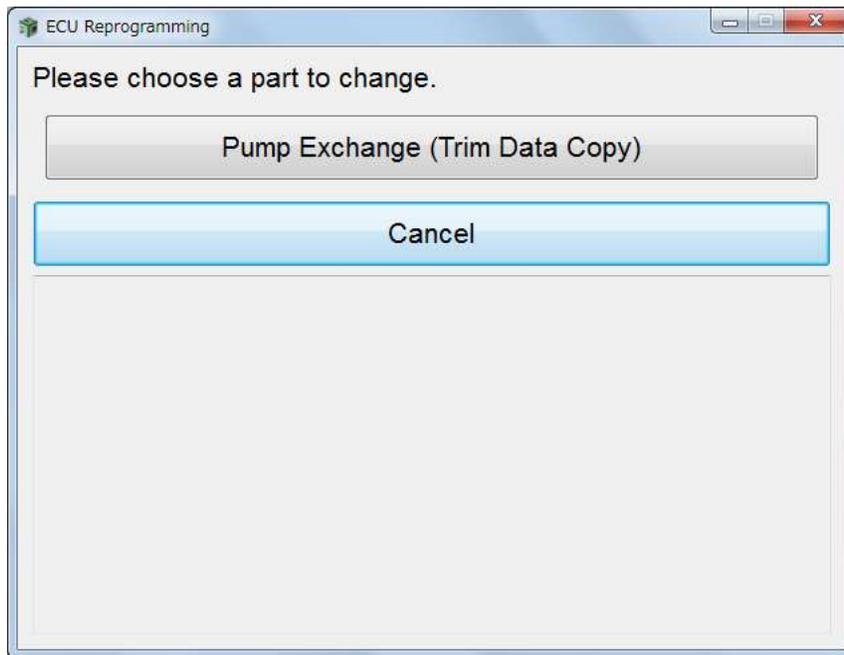


4 Click "Part replacement (download)" on the tab "Operations with ECU Disconnected".

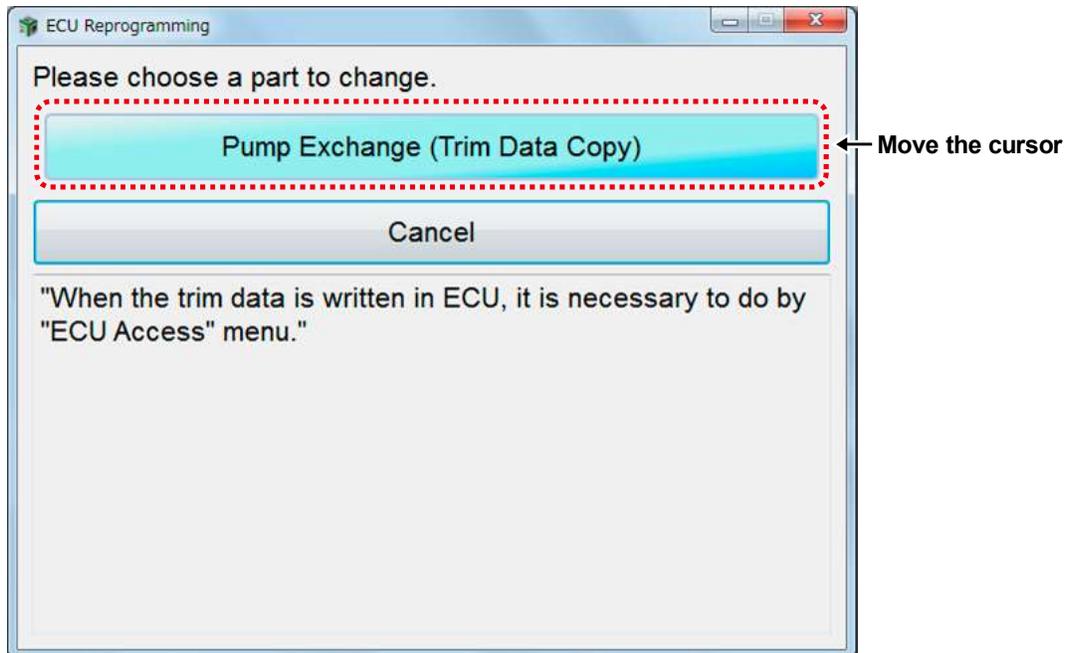


13. Part Exchange

- 5 The Parts Replacement/Adjustment Screen is displayed.
Move the cursor over "Pump Replacement (Trim Data Copy)".

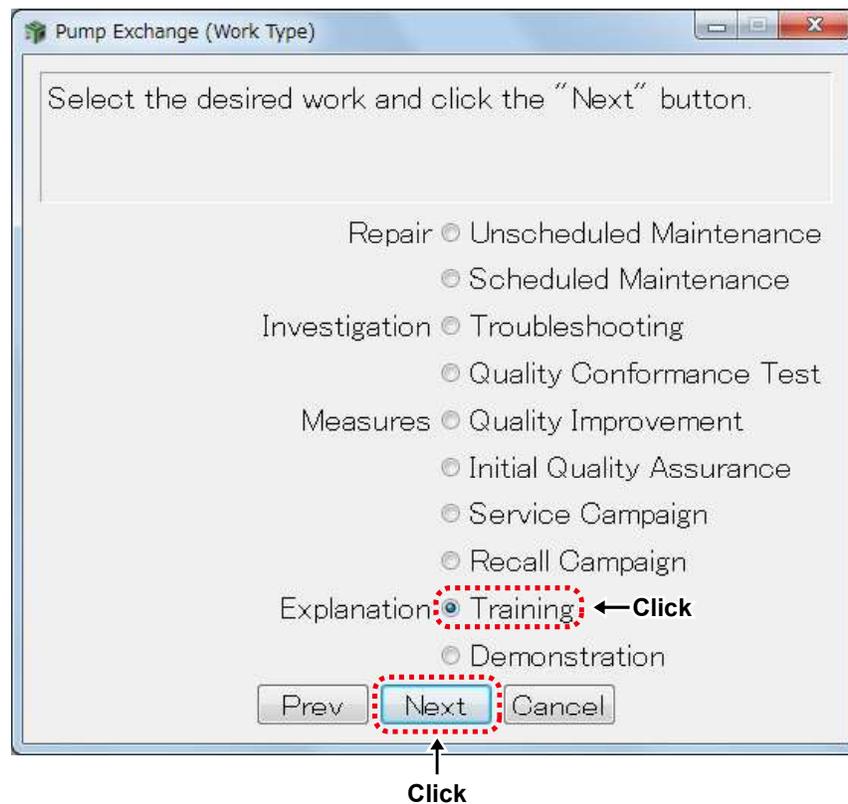


- 6 Move the cursor over "Pump Replacement (Trim Data Copy)". It will turn blue. Then click it.



7 The selection screen for the pump replacement type is displayed.

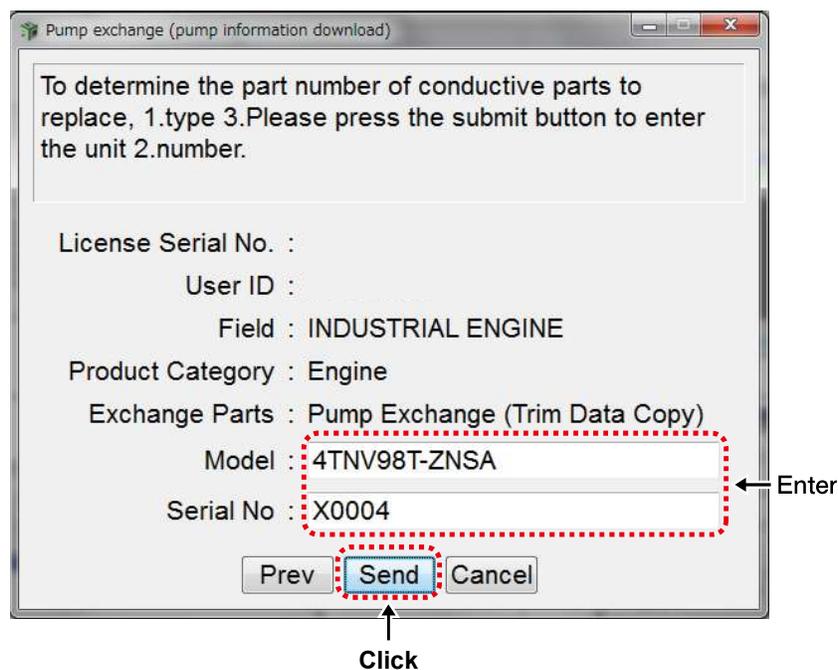
Click the type of work, and click "Next".



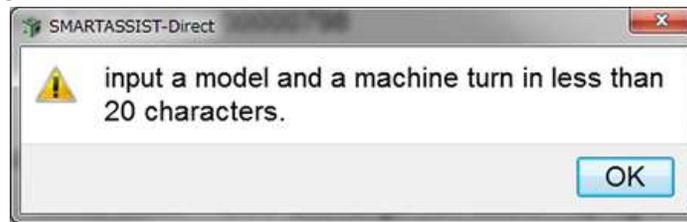
Remark During training, please select "Training". (Data gathering screen for market analysis)

8 The pump replacement (pump data download) screen is displayed.

Enter the model and Serial No, and click "Send".

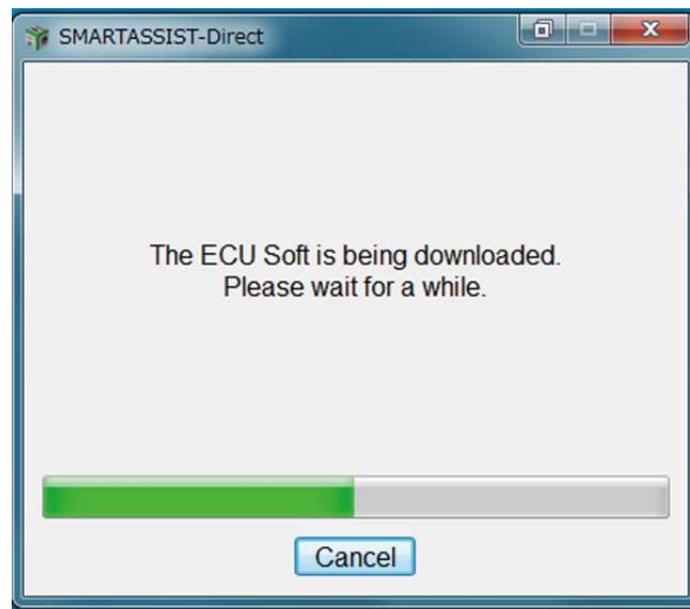


Remark If you do not enter either the model or machine number, a message (on the left) is displayed.

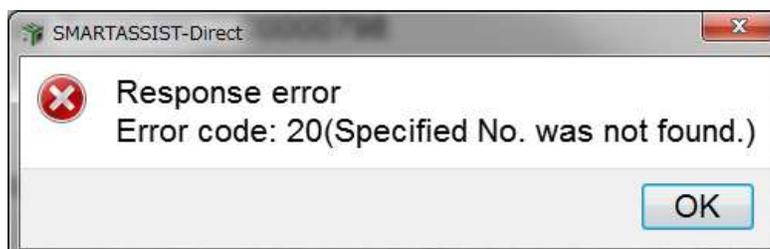
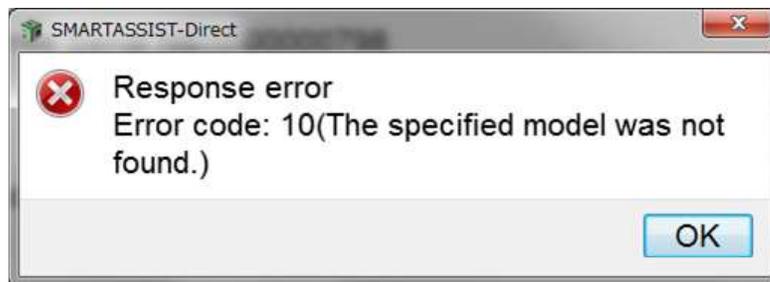


Note Make sure that the Internet connection is active.
Confirm that the replacement process for the ECU is complete before you write the correction values.

9 The pump replacement (correction value download) process starts.



Remark If no data is found on the center that corresponds to the entered model and Serial No, the below message is displayed. Click "OK", and enter the model and Serial No again.



- 10** A screen is displayed that lists the downloaded pump replacements (correction value download). Click the serial number box.

1. Click the desired check box.
 2. Insert the parts code and hardware serial number of your regular pump.
 3. Click "Send".
 Note: The last digit of the parts code can differ.

License Serial No :
 User ID :
 Field : INDUSTRIAL ENGINE
 Product Category : Engine
 Exchange Parts : Pump Exchange (Trim Data Copy)
 Model : 4TNV98T-ZNSA
 Serial No : X0004

DL	Parts Name	Pump No.	Pump Serial No.	Notes
<input type="checkbox"/>	Fuel injection pump	729928-51300		Details

Click ↑

Prev Send Cancel

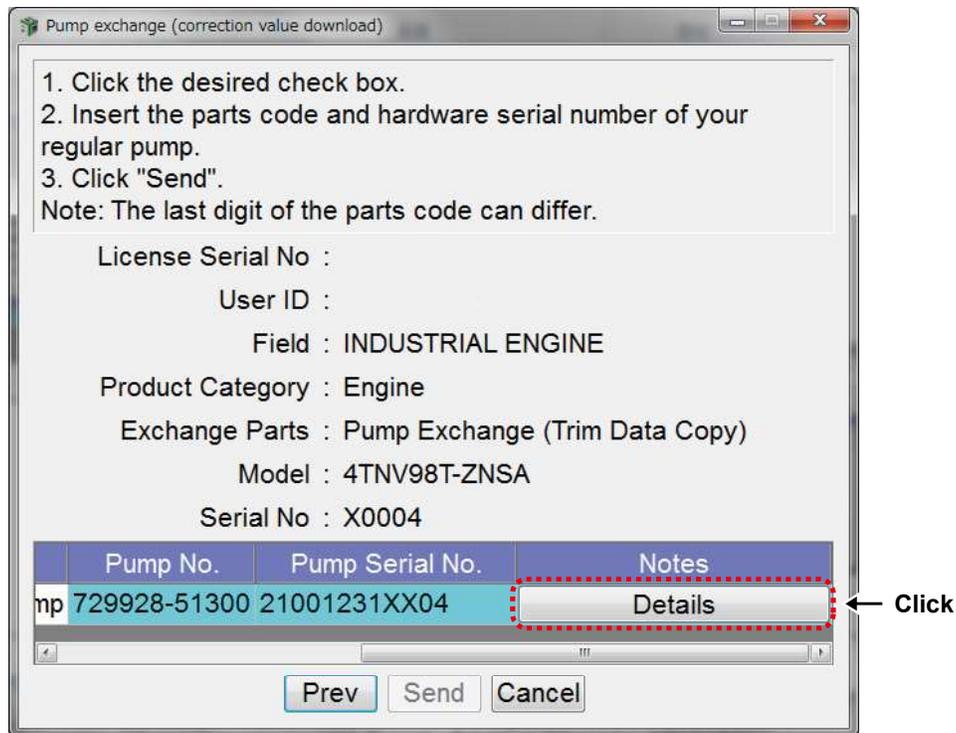
- 11** The Data Setting Screen is displayed.
 Enter the serial number of the fuel injection pump, and click "Set".

Data Name
 Current
 Set To

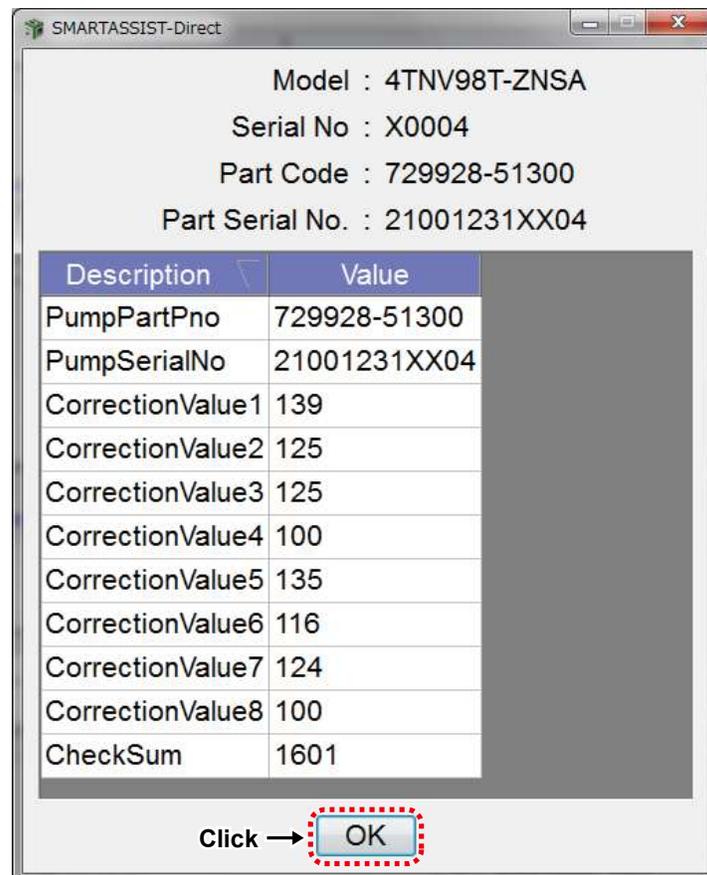
Click → Set Cancel ↑
 Enter

13. Part Exchange

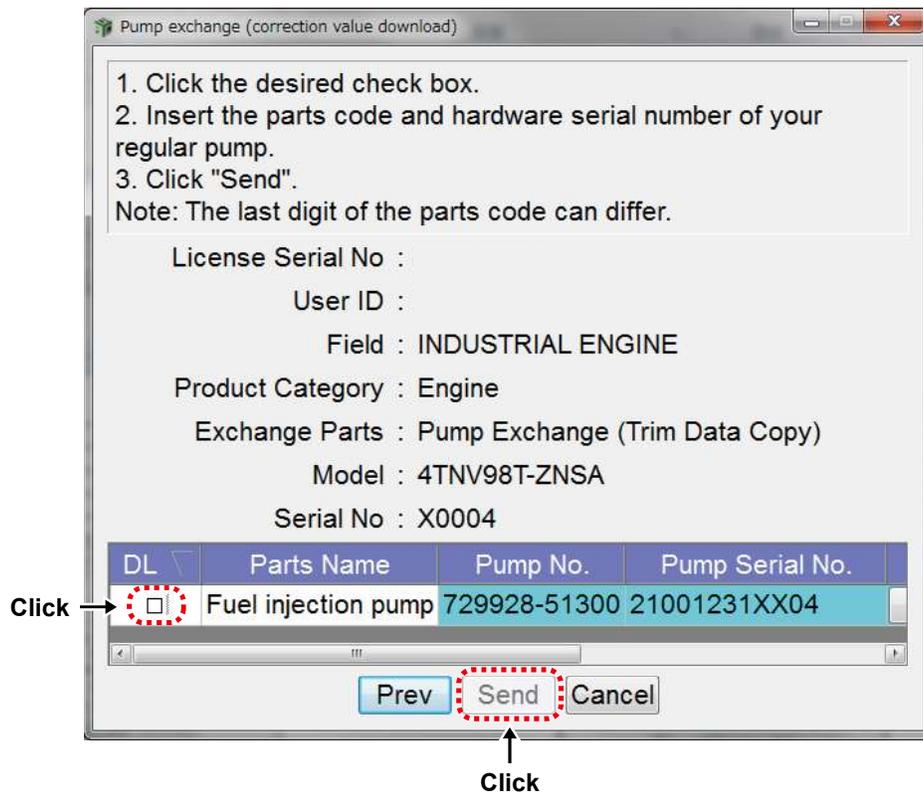
12 Click "Details" on the pump replacement (correction value download) screen.



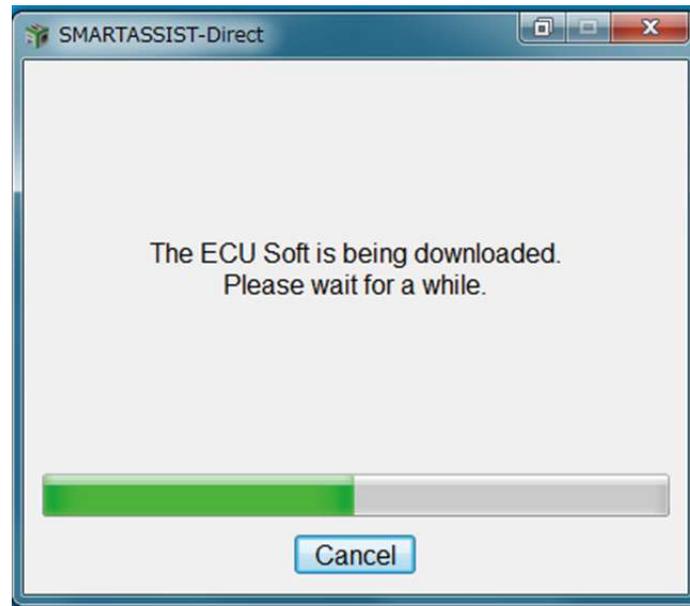
13 The pump replacement information for download is displayed.



- 14** On the Pump Replacement (Correction Value Download) List screen, select "DL" next to the part name that you wish to download data for. Click "Send", and the download process starts.

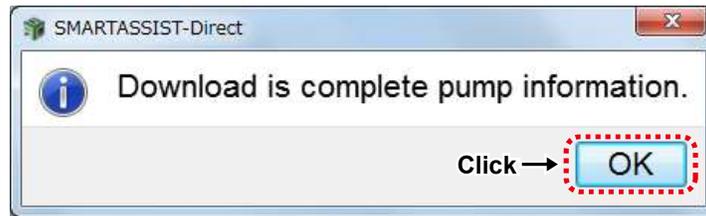


- 15** The pump replacement (correction value download) process starts.



13. Part Exchange

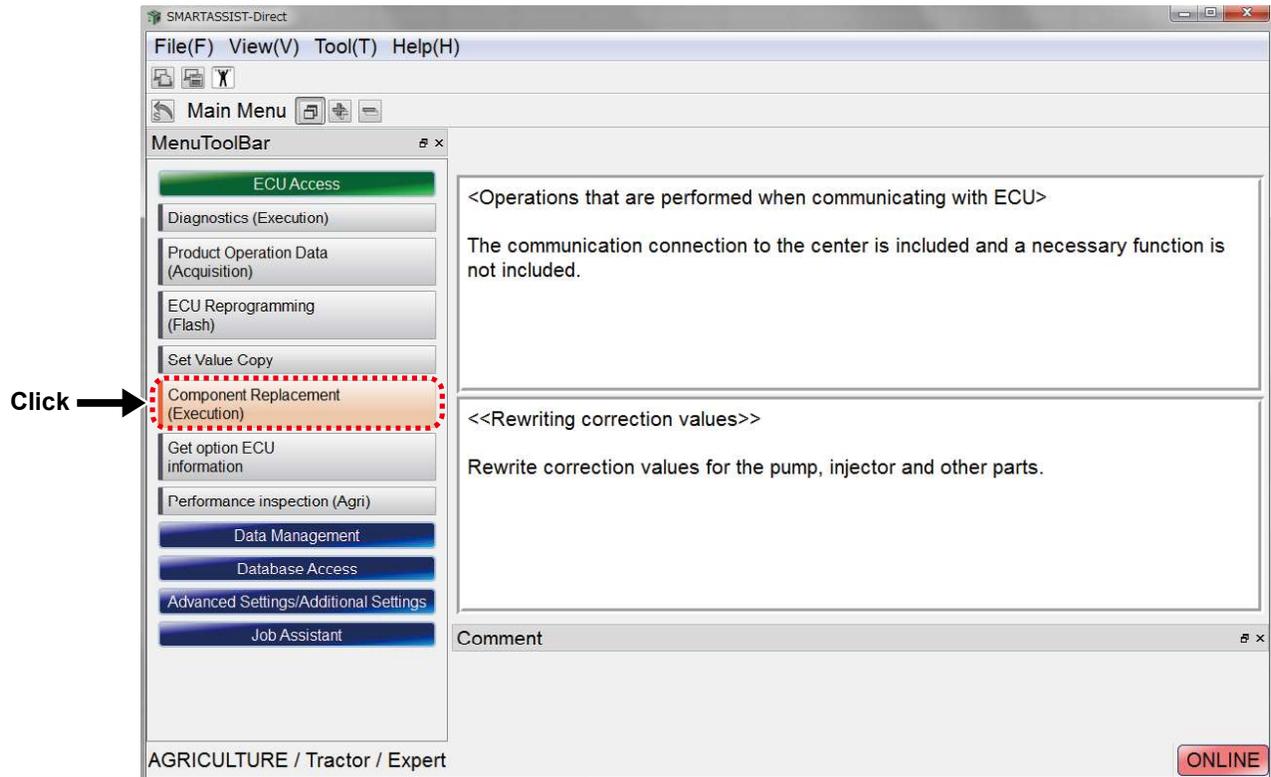
- 16** A message box notifies you when the pump replacement (correction value download) process has finished.
Click "OK".



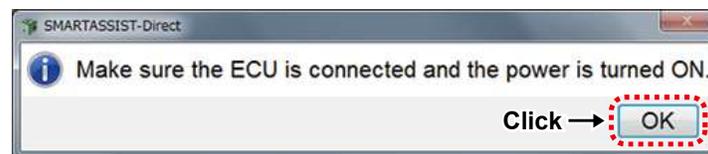
13.1.2 Pump Replacement (Execution)

Displays the pump correction values downloaded to your PC for writing to the ECU.

- 1 Click "FIE Replacement (Execution)" on the tab "ECU Access".



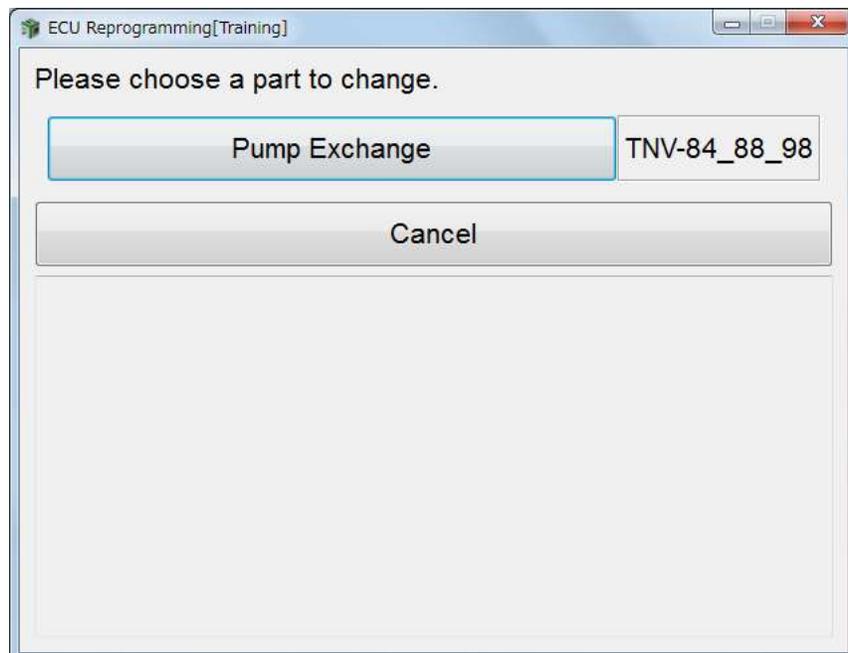
- 2 After displaying the ECU Search In Progress Screen, the ECU Access Screen is displayed. Click "OK".



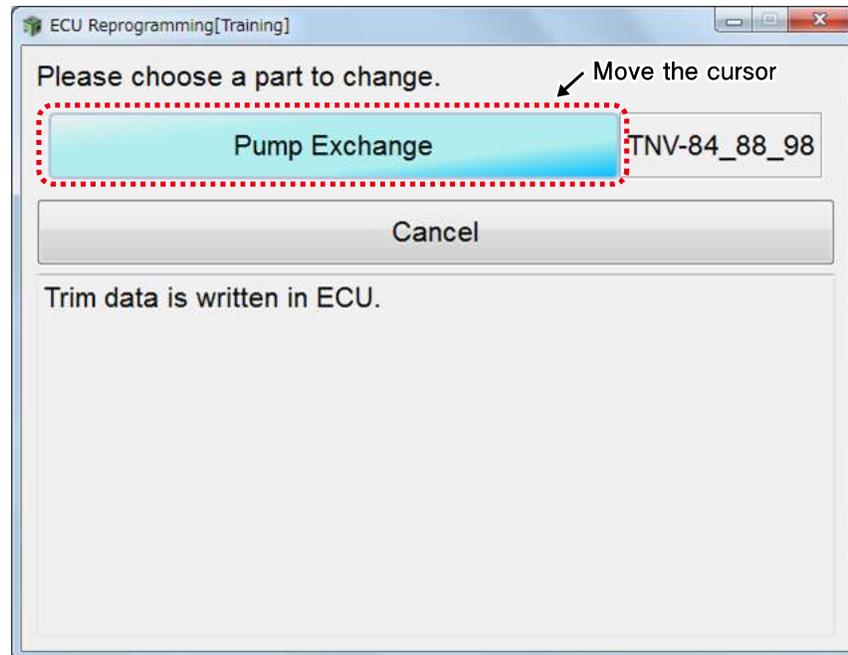
- 3 The Standby Information Screen is displayed.



- 4 The ECU Write Screen is displayed.
Move the cursor over "Pump Replacement (Trim data write)".

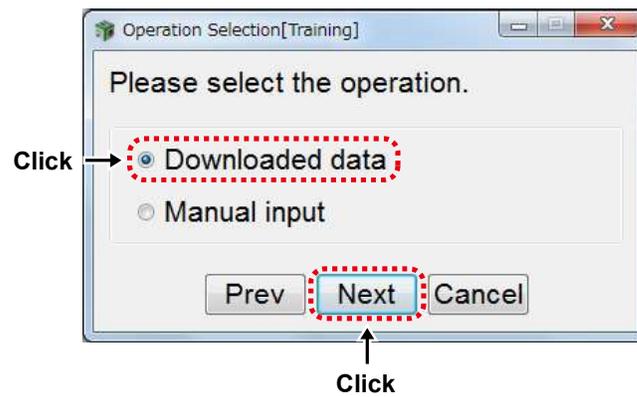


- 5 Move the cursor over "Pump Replacement (Trim data write)". It will turn blue. Then click it.



- 6 The Operation Selection Screen is displayed.
Select "Download data". Click "Next".

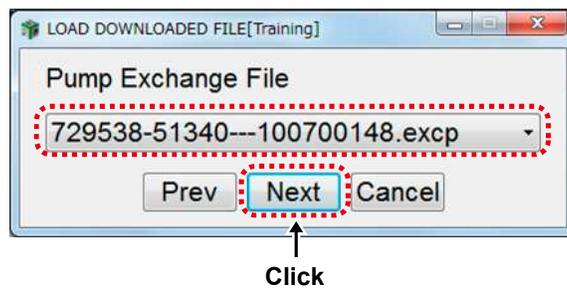
Remark In case of the manual input data, start work from (10).



13. Part Exchange

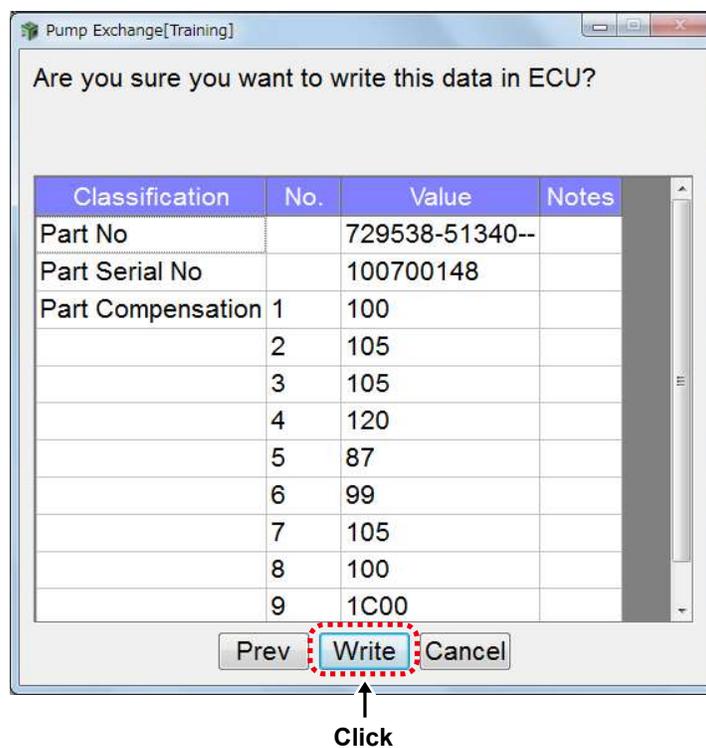
7 The Download File Reading Screen is displayed.

Select the applicable file, and click "Next".



8 The selection screen for the pump replacement Trim data write file is displayed.

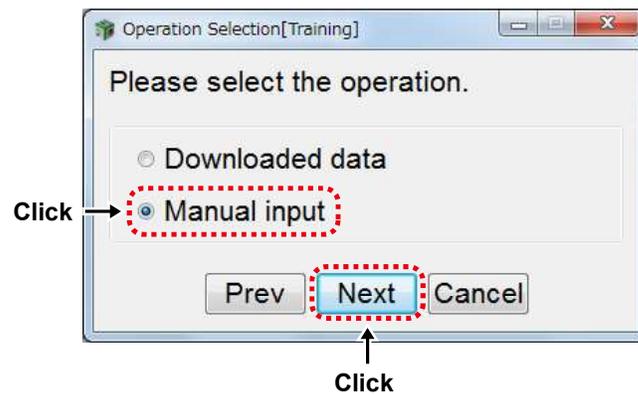
Confirm the contents, and click "Write".



Remark For processing afterwards, start work from (14).

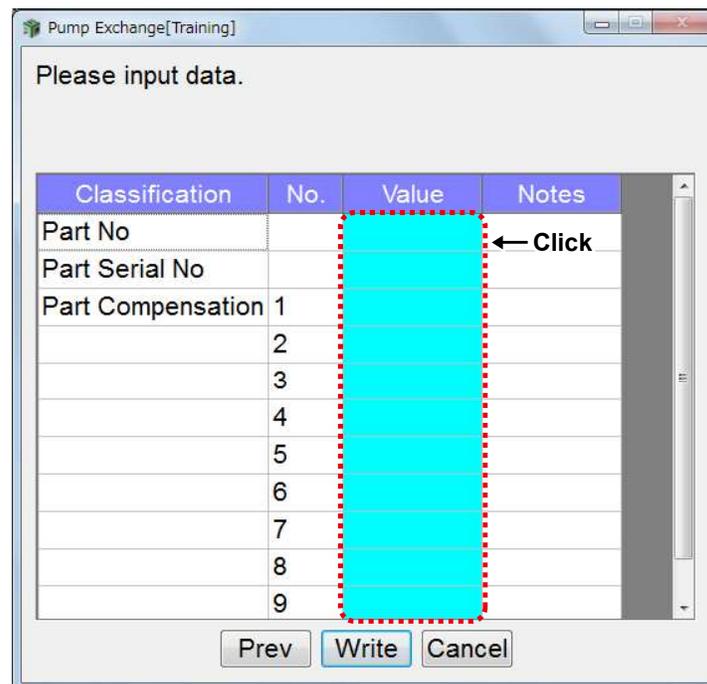
9 The Operation Selection Screen is displayed.

Select "Manual input". Click "Next".



10 The selection screen for the pump replacement Trim data write file is displayed.

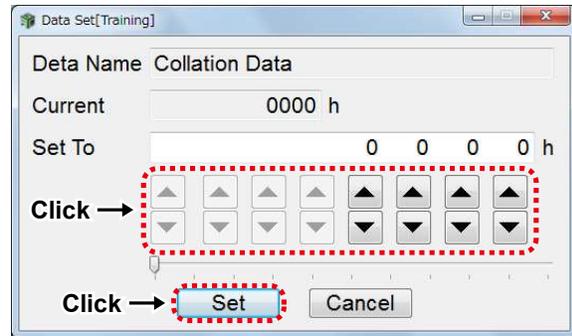
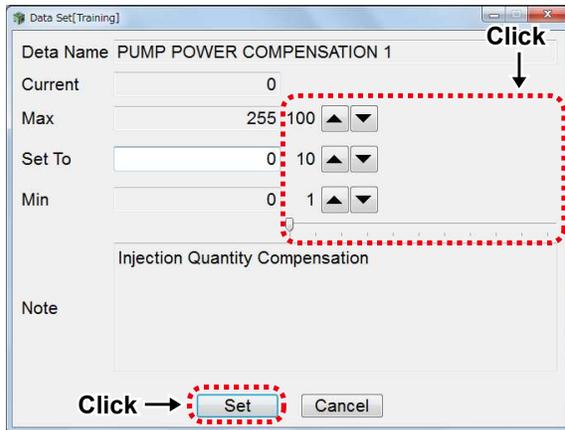
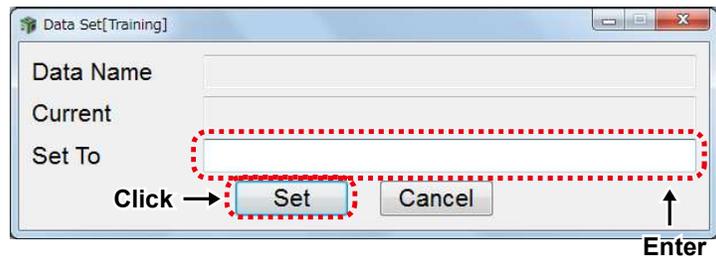
Click the value box. The entry screen is displayed and you can manually enter the correction values.



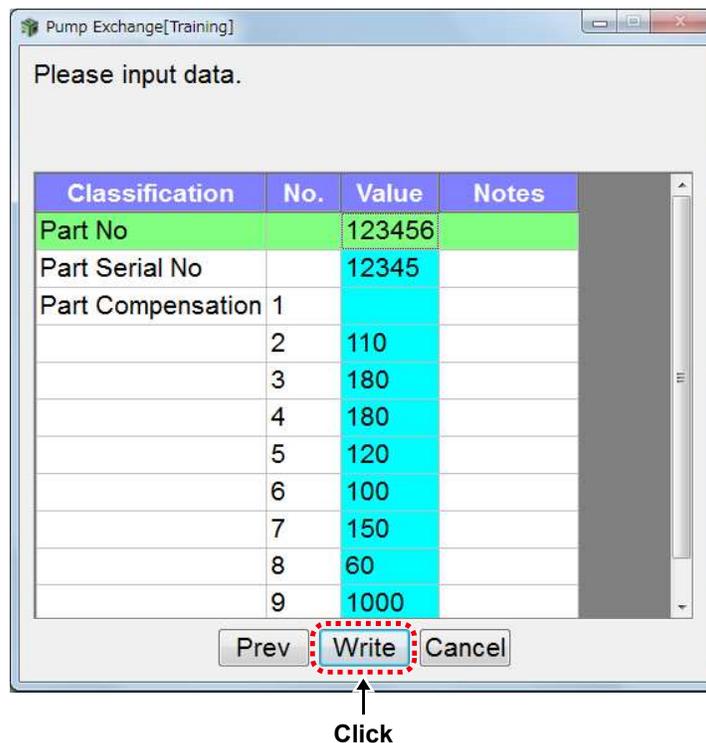
13. Part Exchange

11 The Data Setting Screen is displayed.

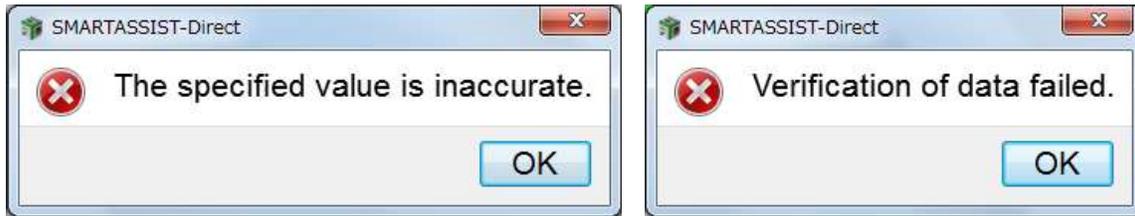
Manually enter the correction values.



12 When you finished manual entry of the pump replacement correction values, check them and then click "Write".

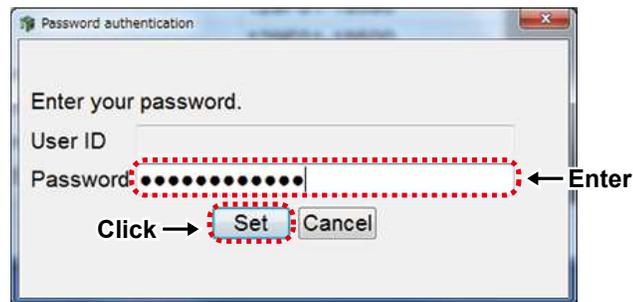


Remark If a value has not been entered or if the check data is incorrect, the below error screen is displayed.



13 The Password Check Screen is displayed.

Enter the password, and click "Set".



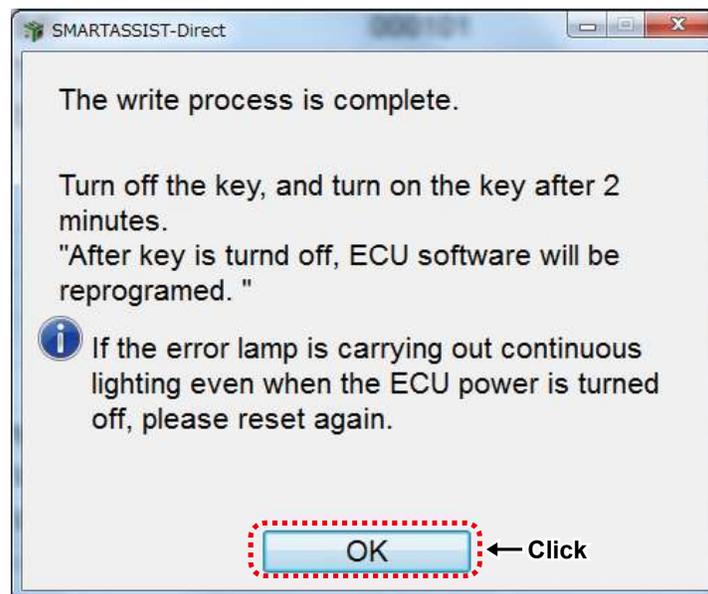
14 A message box notifies you when the writing process has finished.

Click "OK".

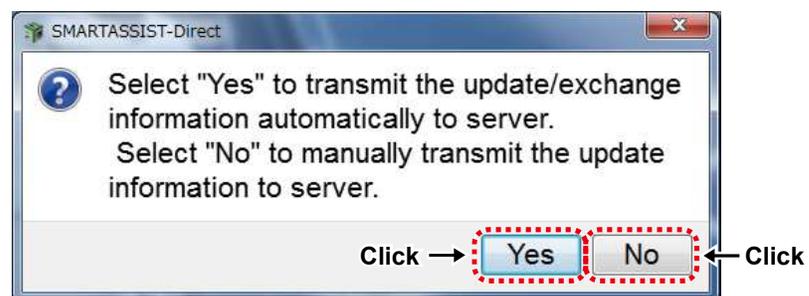


15 A screen with the necessary procedures after the ECU writing process is displayed.

When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

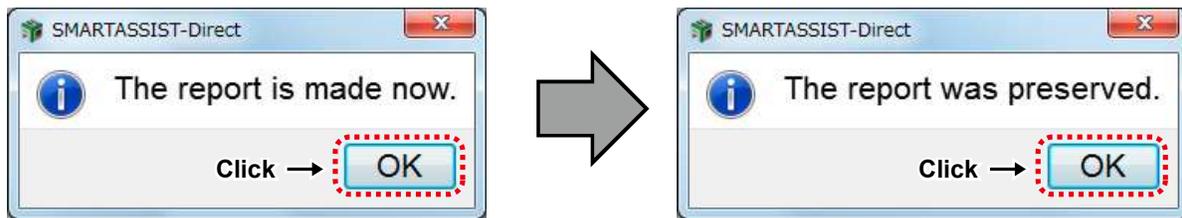


16 Confirm the content and click "Yes" to automatically send the replacement completion data to the management server. Click "No" to send it manually at a later time. Click "OK". When you click "No", refer to chapter 14.

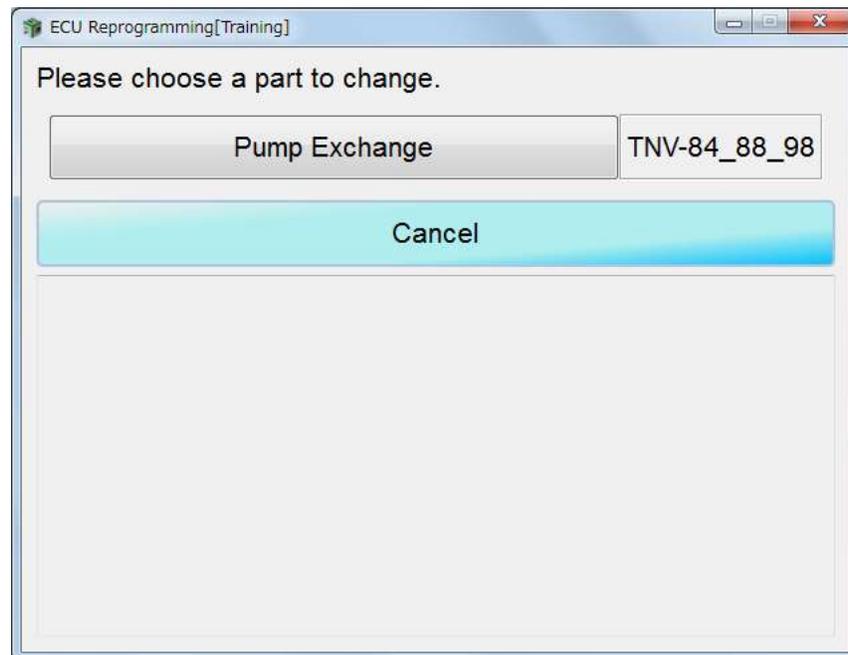


17 A message box noting you that a report was created will appear.

Click "OK".

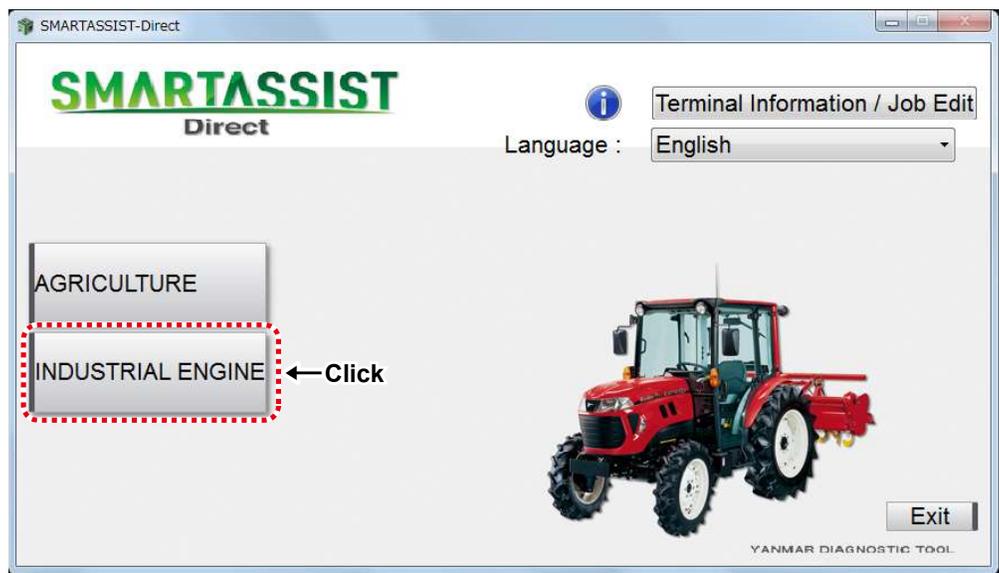


18 Click "OK" on the message box for the report creation notification to return to the below page. Click "Cancel" to return to the main menu.



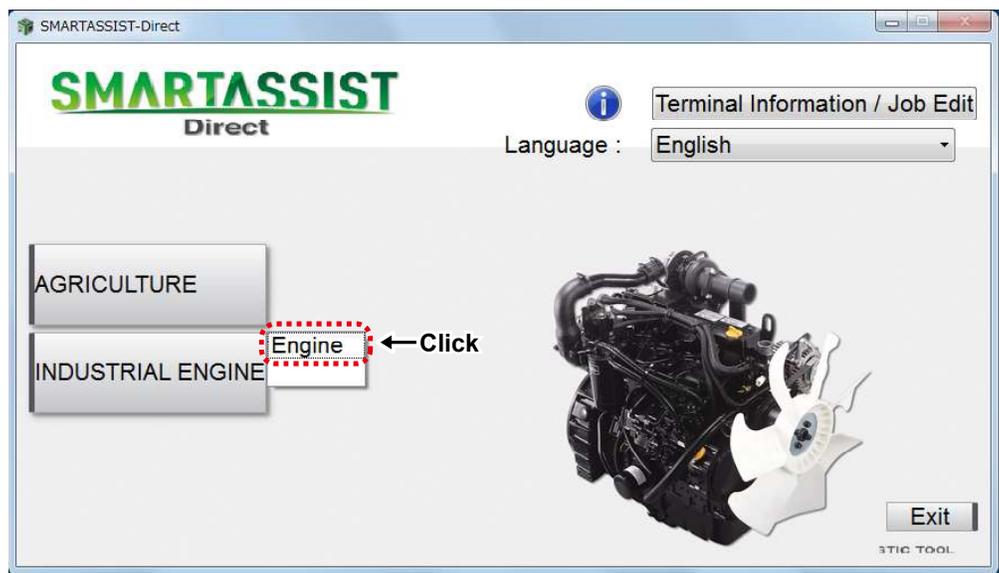
13.1.3 Automatic Upload Operation when Pump replacement (execution) completed

1 Select "Industrial Engine" from the Start Menu.



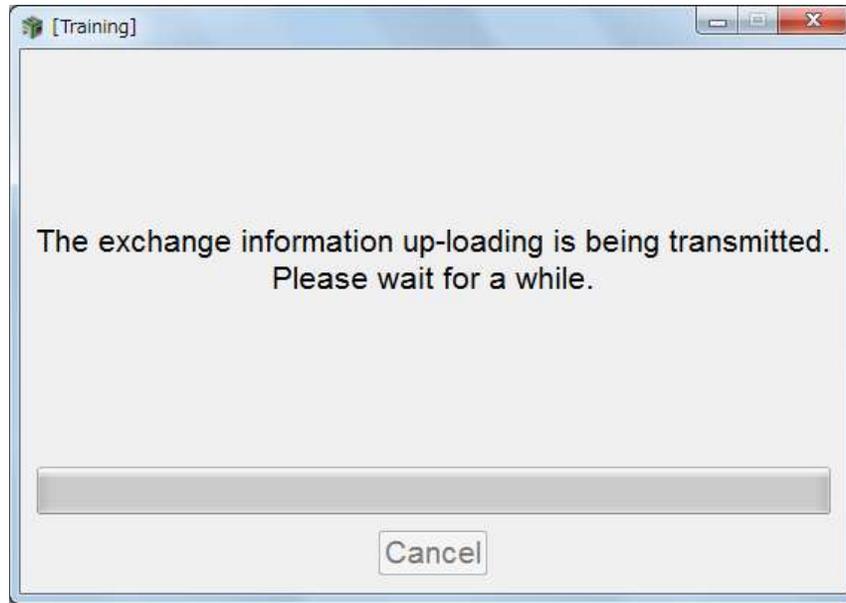
Note Make sure that the Internet connection is active.

2 Select "Engine".

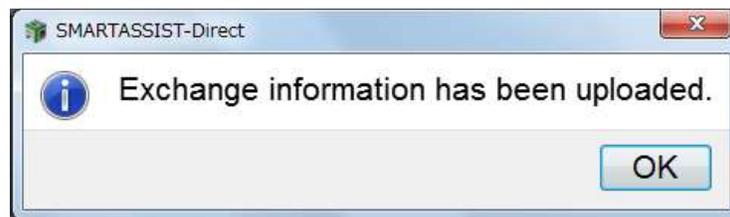


Note Make sure that the Internet connection is active.

- 3 The Replacement Data Upload Screen is displayed, and the upload process starts.



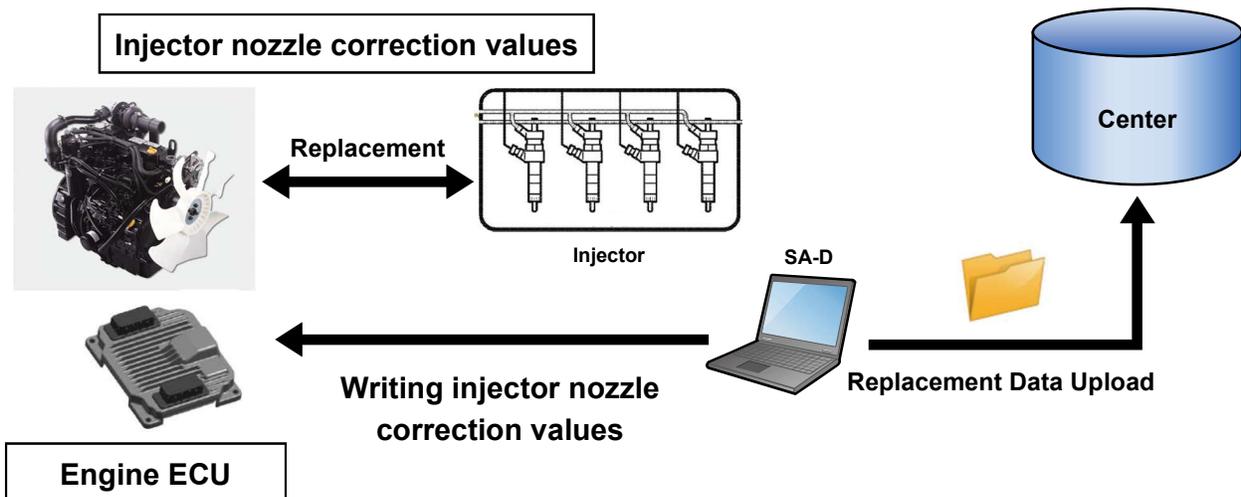
- 4 A message box notifies you when the upload has finished.



13.2 Parts Exchange Process for CR OEM Engine manufactured by Denso

13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT

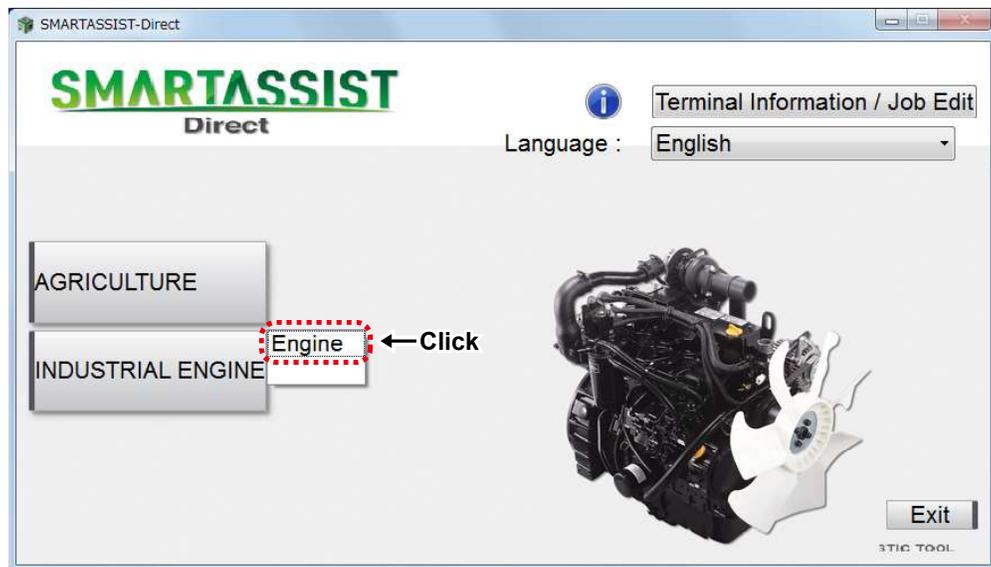
- When exchanging the common rail (CR) injector nozzle manufactured by Denso and equipped in 4TVN94HT-Z*(Tier 3 compliant) and 4TNV94CHT-* (Tier 4 compliant) and 4TNV94FHT-* (Final Tier4 compliant) engines, it is necessary to write the correction values of the injector nozzle to the engine ECU.
- Correction values of the injector nozzles are registered separately by the engine ECU. It is necessary to set the correction value when replacing the ECU or the injector nozzle.



- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

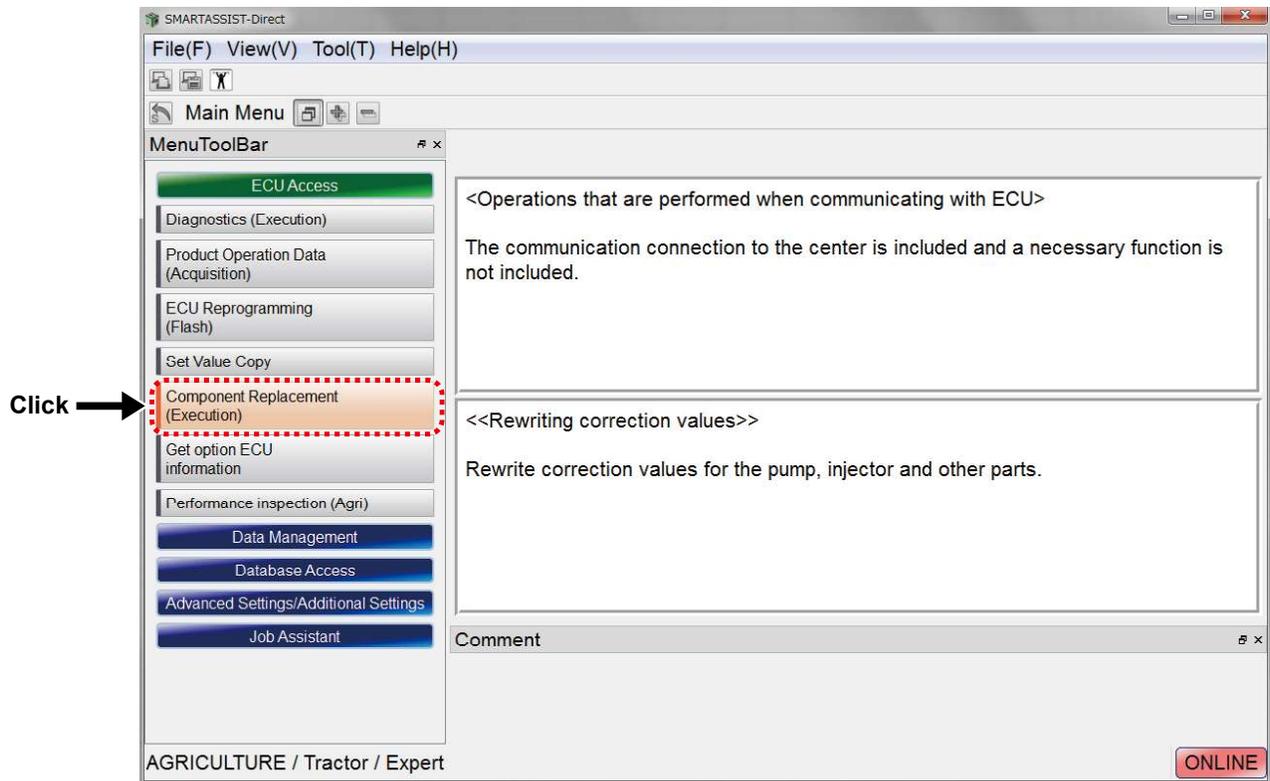


- 2 Select "Engine".

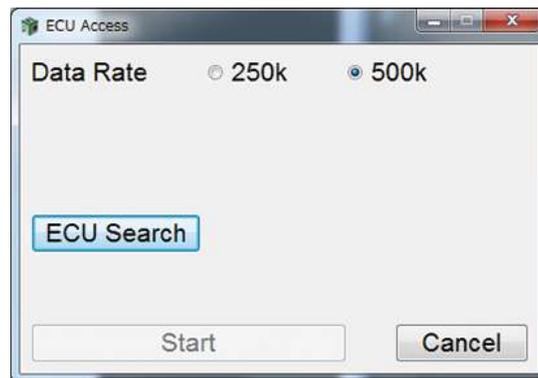
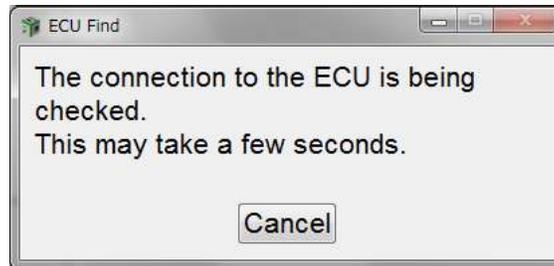


13. Part Exchange

- 3 The Main Menu Screen is displayed. Click "Component Replacement (Execution)" on the tab "ECU Access".



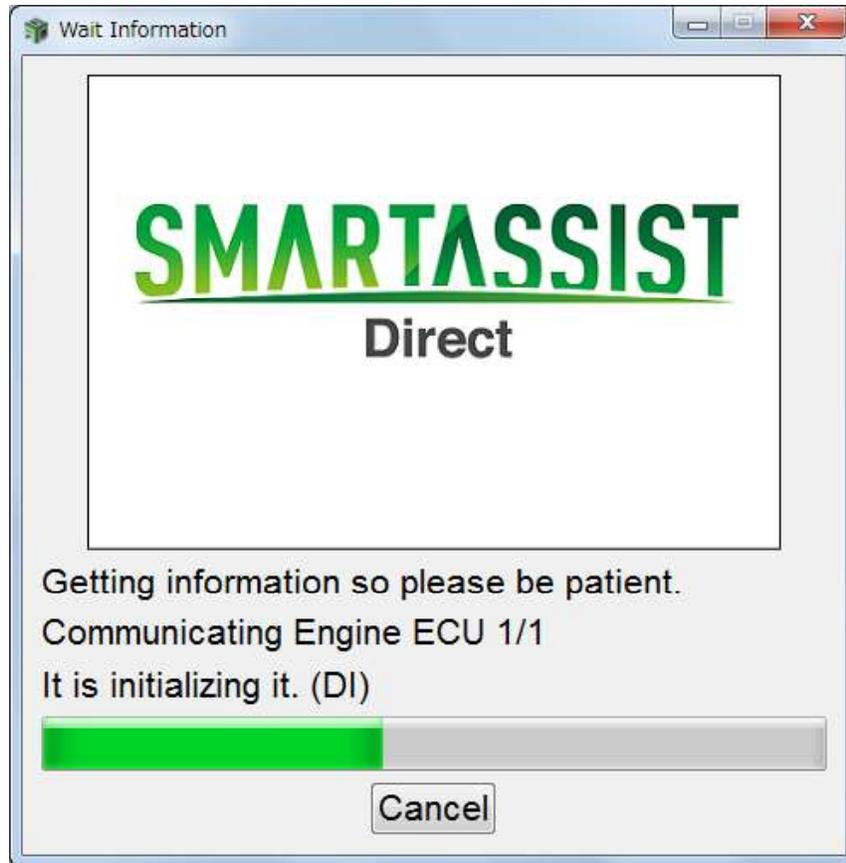
- 4 After displaying the ECU Search In Progress Screen, the ECU Access.



- 5 Confirm that the ECU type is "00: engine", and click "Select".



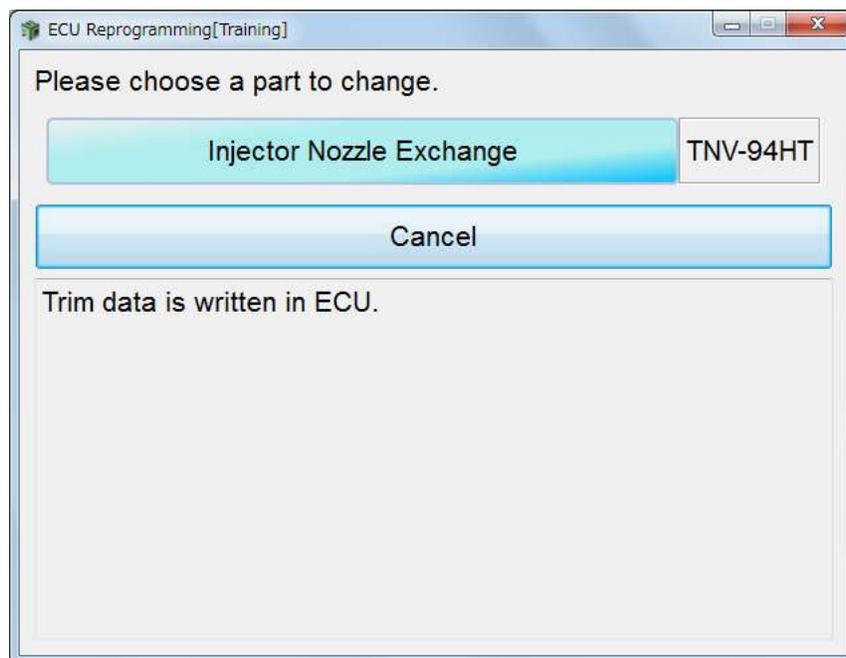
6 The Standby Information Screen is displayed.



7 The ECU Write screen is displayed. (It depends on the engine model)

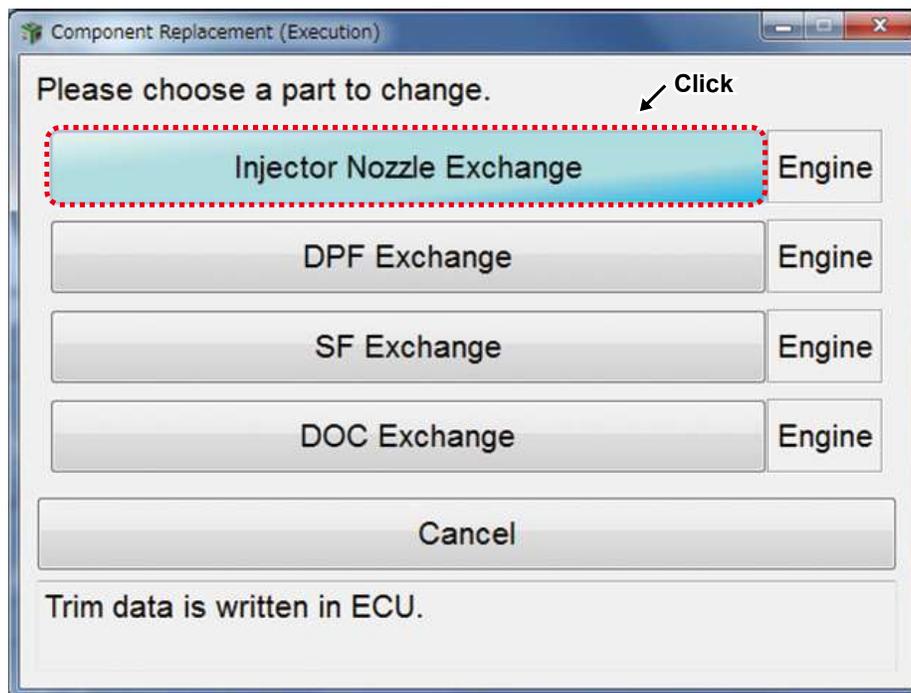
Click "Injector Nozzle Exchange (Writing Correction Value)".

The following write screen is for 4TNV94HT-Z.



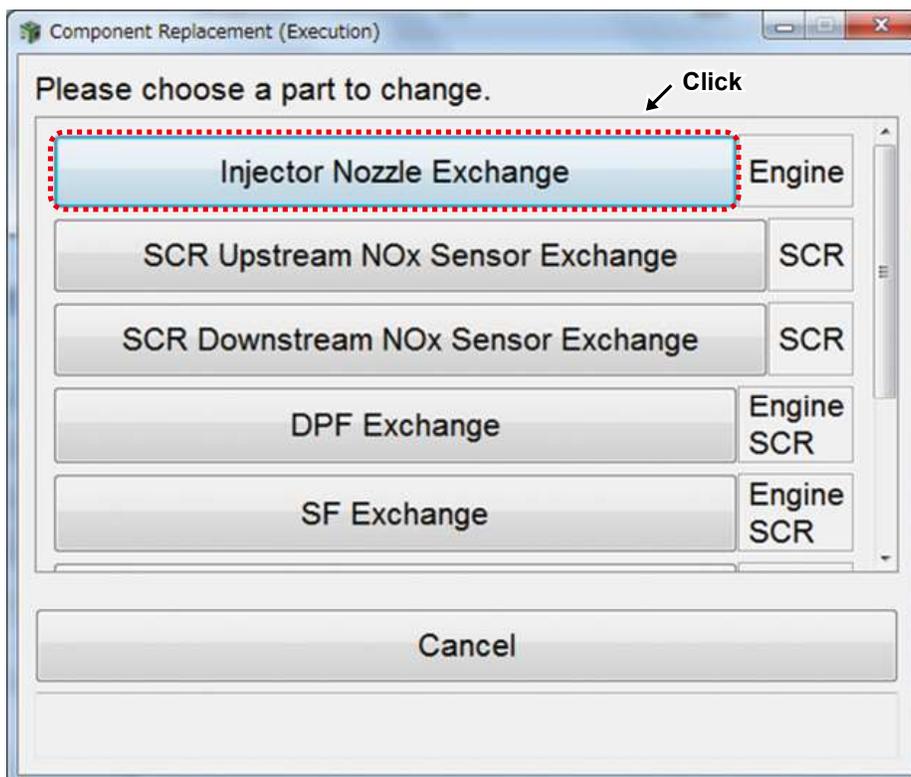
The following write screen is for 4TNV94CHT.

Click "Injector Nozzle Exchange (Writing Correction Value)".



The following write screen is for 4TNV94FHT.

Click "Injector Nozzle Exchange (Writing Correction Value)".



13. Part Exchange

- 8 The Selection Screen for Injector Replacement Correction Value Data Entry is displayed. The following write screen is for 4TNV94FHT. Check if there is a cylinder that requires correction.

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Injector Model Code	Injector Correction Value
1	43	05E50C120703000A0F000000
2	43	15E80D00EAFEF9F2E6000000
3	43	0AE102F9E1EBEAE2D8000000
4	43	1AEF0B06F9FCF8F8F9000000

Position of flywheel: Left side Right side

Injector Pattern: No.1 cylinder, No.2 cylinder, No.3 cylinder, No.4 cylinder

flyWheel

DataInput Complete

Note The displayed data are the correction values written to the currently connected ECU.

- 9 If you expand the width of the cells on the selection screen for the injector replacement correction data entry, you can confirm the values in the below table.

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Injector Model Code	Mod	Injector Correction Value	Injector BCC Data
1	43	43	05E50C120703000A0F000000	BC
2	43	43	15E80D00EAFEF9F2E6000000	4A
3	43	43	0AE102F9E1EBEAE2D8000000	89
4	43	43	1AEF0B06F9FCF8F8F9000000	47

Position of flywheel: Left side Right side

Injector Pattern: No.1 cylinder, No.2 cylinder, No.3 cylinder, No.4 cylinder

flyWheel

DataInput Complete

- 10** Confirm "Injector Pattern" and click "OK". Set the position of the flywheel, and confirm the position of the cylinders.

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Injector Model Code	Injector Correction Value
1	43	05E50C120703000A0F000000
2	43	15E80D00EAF9F9F2E6000000
3	43	0AE102F9E1EBEAE2D8000000
4	43	1AEF0B06F9FCF8F8F9000000

Injector Pattern

Position of flywheel
 Left side Right side

flyWheel
 No.1 cylinder No.2 cylinder No.3 cylinder No.4 cylinder

DataInput Complete

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Injector Model Code	Injector Correction Value
1	43	05E50C120703000A0F000000
2	43	15E80D00EAF9F9F2E6000000
3	43	0AE102F9E1EBEAE2D8000000
4	43	1AEF0B06F9FCF8F8F9000000

Injector Pattern

Position of flywheel
 Left side Right side

flyWheel
 No.4 cylinder No.3 cylinder No.2 cylinder No.1 cylinder

DataInput Complete

Note This screen lets you understand the cylinder numbers easily.

- 11** When entering data manually, select "Manual Entry", select the cylinder that you wish to update, and click "Data Input".

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Injector Model Code	Injector Correction Value	Injector BCC Data
1	43	05E50C120703000A0F000000	BC
2	43	15E80D00EAF9F9F2E6000000	4A
3	43	0AE102F9E1EBEAE2D8000000	89
4	43	1AEF0B06F9FCF8F8F9000000	47

Injector Pattern

Position of flywheel
 Left side Right side

flyWheel
 No.1 cylinder No.2 cylinder No.3 cylinder No.4 cylinder

Click → DataInput Complete

13. Part Exchange

12 Manually enter the injector compensation value written at the top of the new injector.

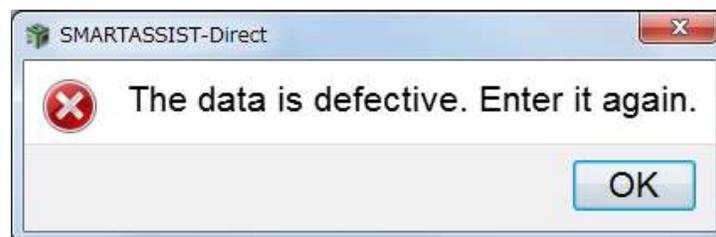
After entering, click "Write" to perform writing.



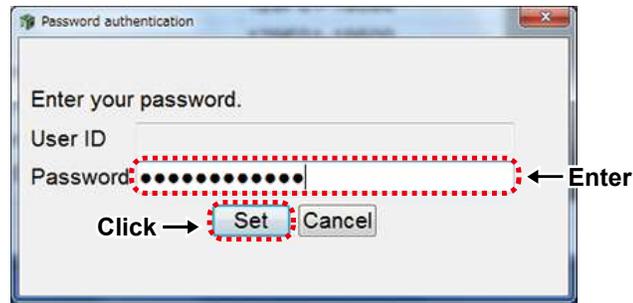
The screenshot shows the 'INJECTOR DataInput' software window. The title bar reads 'INJECTOR DataInput'. The main content area is titled 'Cylinder No. 1' and 'Injector compensation value'. A red dotted box highlights the input fields for manual entry. An arrow labeled 'Manual entry' points to the right side of this box. At the bottom, a 'Write' button is highlighted with a red dotted box, and an arrow labeled 'Click' points to it. A 'Prev' button is also visible.

4	3	0	5	E	5	0	C
1	2	0	7	0	3	0	0
0	A	0	F	0	0	0	0
0	0	0	0	B	C		

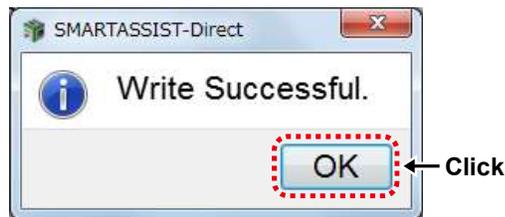
Remark If correction data values are not yet entered or entered incorrectly, the below error screen is displayed.



13 The Password Request Screen is displayed. Enter the password, and click "Set".



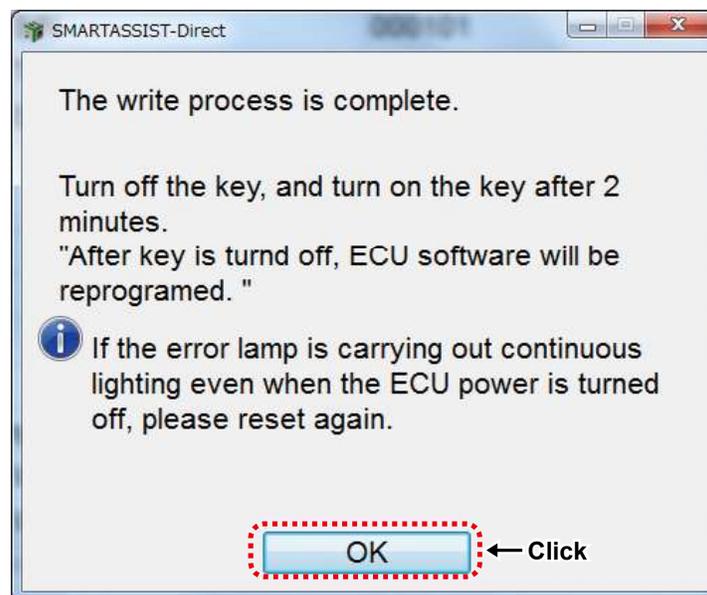
14 When the writing of correction values is complete, the below screen is displayed.



15 After ECU writing is completed, the procedure required next is displayed.

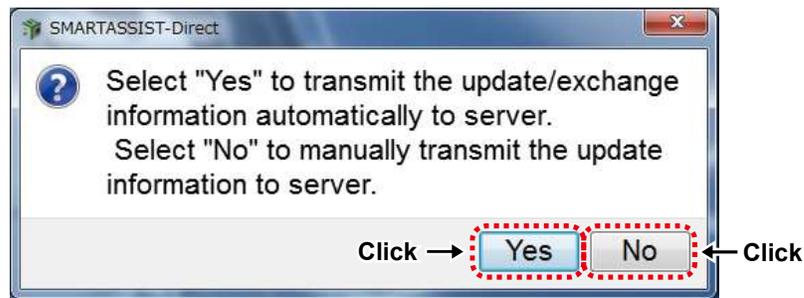
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 10 seconds.

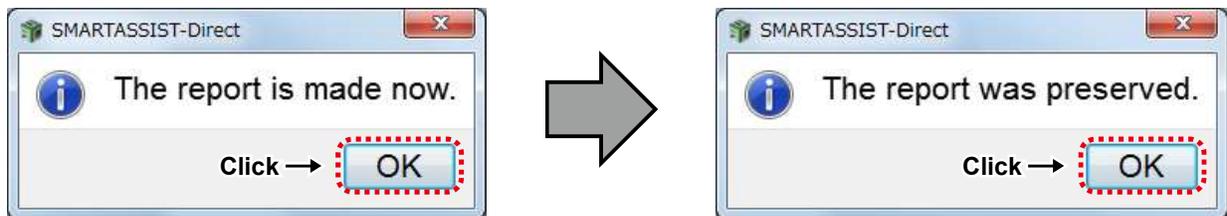


13. Part Exchange

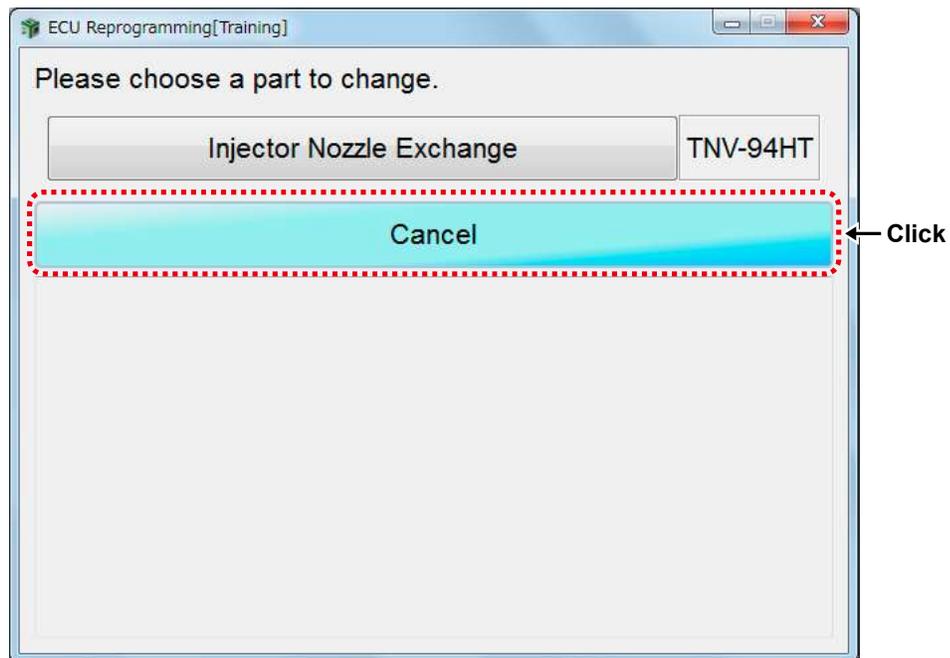
16 Confirm the content and click "Yes" to automatically send the replacement completion data to the management server. Click "No" to send it manually at a later time. When you click "No", refer to chapter 14.



17 A message box noting you that a report was created will appear. Click "OK".

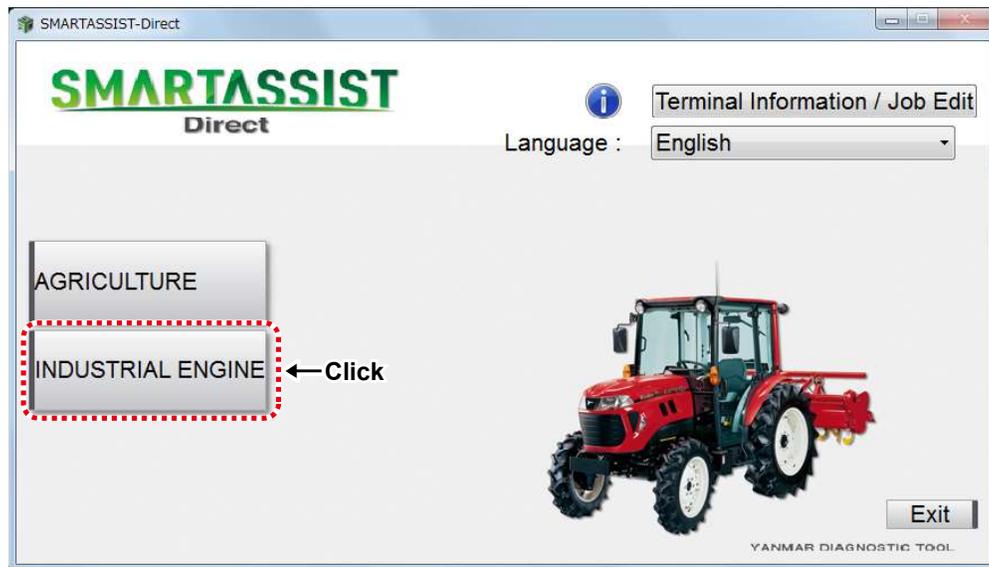


18 Click "OK" on the message box for the report creation notification to return to the below page. Click "Cancel" to return to the main menu.

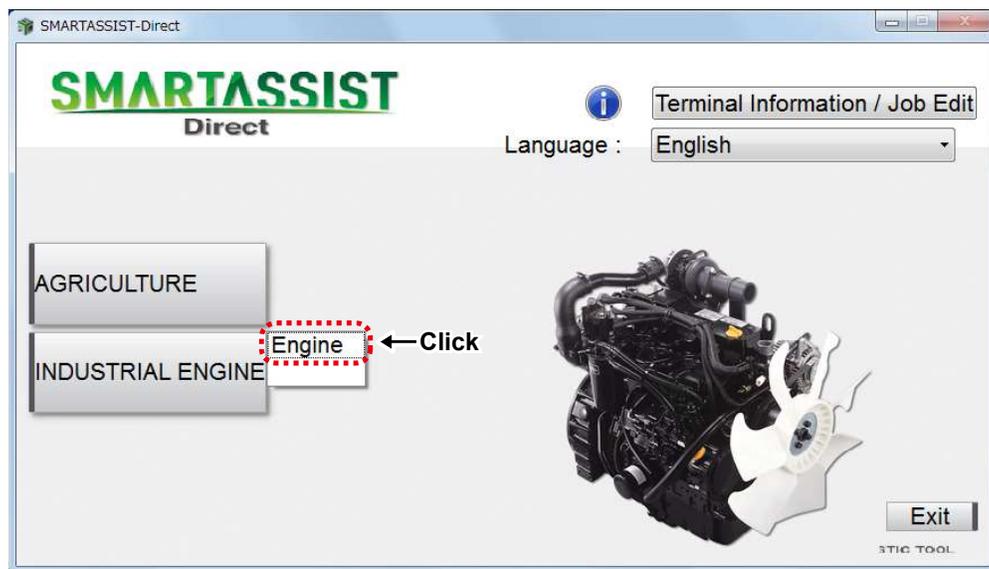


13.2.2 Automatic Upload Operation when Injector (DENSO) Replacement (Execution) completed

- 1 Select "Industrial Engine" from the Start Menu.



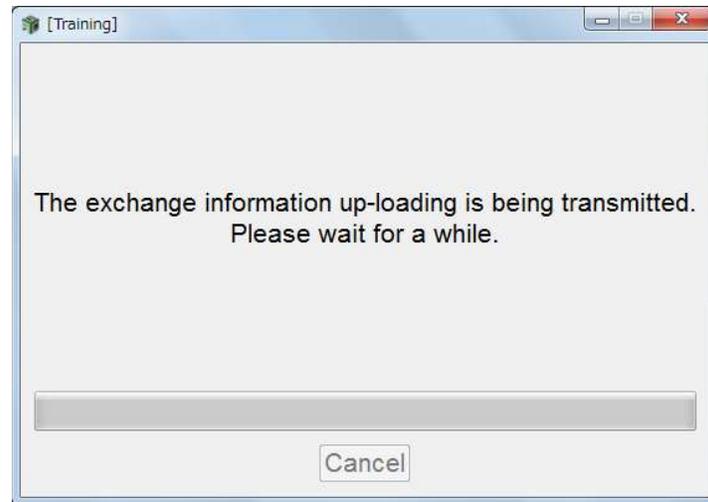
- 2 Select "Small Land Engine".



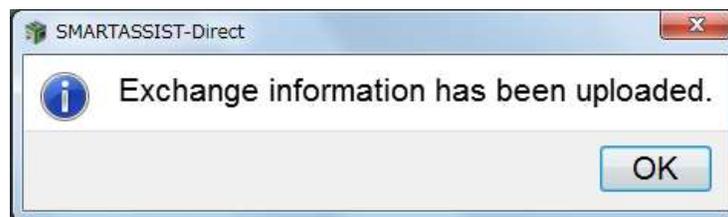
Note Make sure that the Internet connection is active.

13. Part Exchange

- 3 The Replacement Data Upload Screen is displayed, and the upload process starts.



- 4 A message box notifies you when the upload has finished.



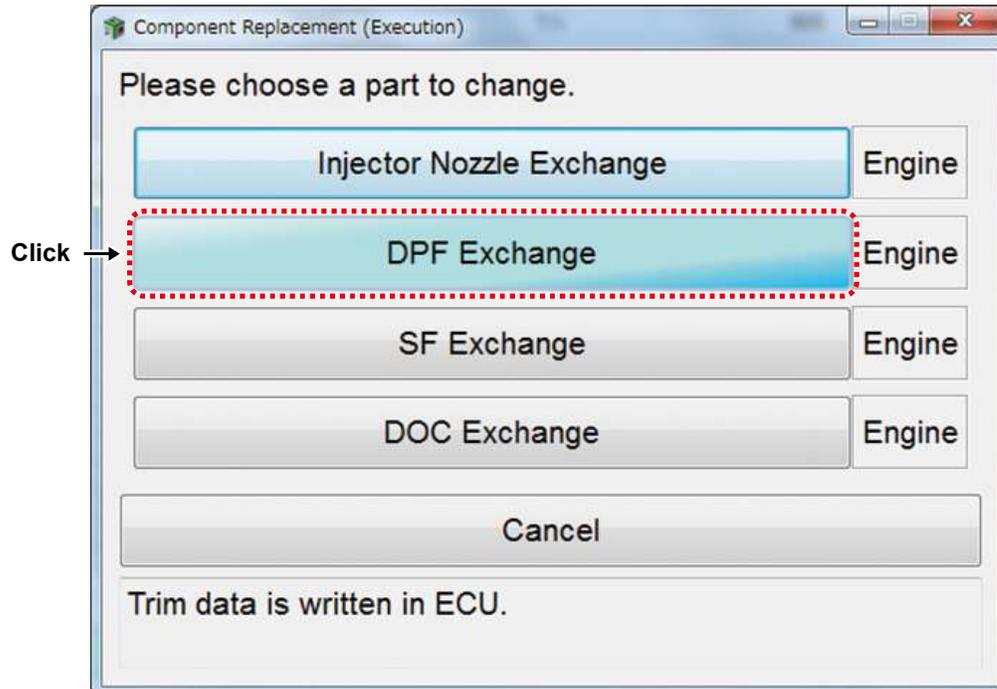
Note If you select the data manually, then refer to chapter 14 the following procedure.

13.2.3 Exchange 4TNV94CHT DPF/SF/DOC

■DPF Exchange Process

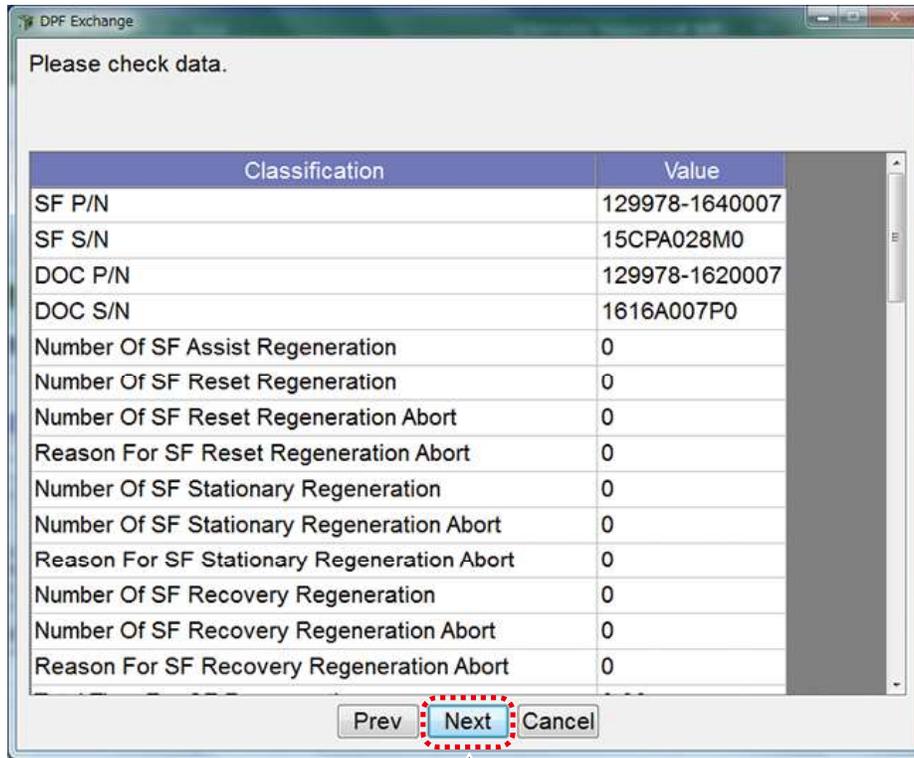
The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "DPF Exchange".

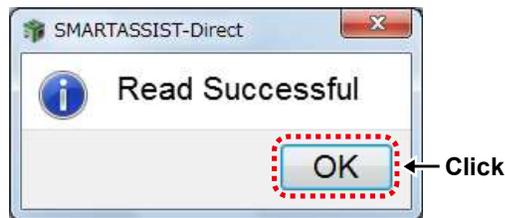


13. Part Exchange

When the screen below is displayed, click "OK".



Click



Click

Select "New" or "Reuse" for SF status.

Click the value cell and enter the part number and serial number of the SF.

Classification	Value
SF P/N	
SF S/N	
DOC P/N	
DOC S/N	
Number Of SF Assist Regeneration	0
Number Of SF Reset Regeneration	0
Number Of SF Reset Regeneration Abort	0
Reason For SF Reset Regeneration Abort	0
Number Of SF Stationary Regeneration	0
Number Of SF Stationary Regeneration Abort	0
Reason For SF Stationary Regeneration Abort	0

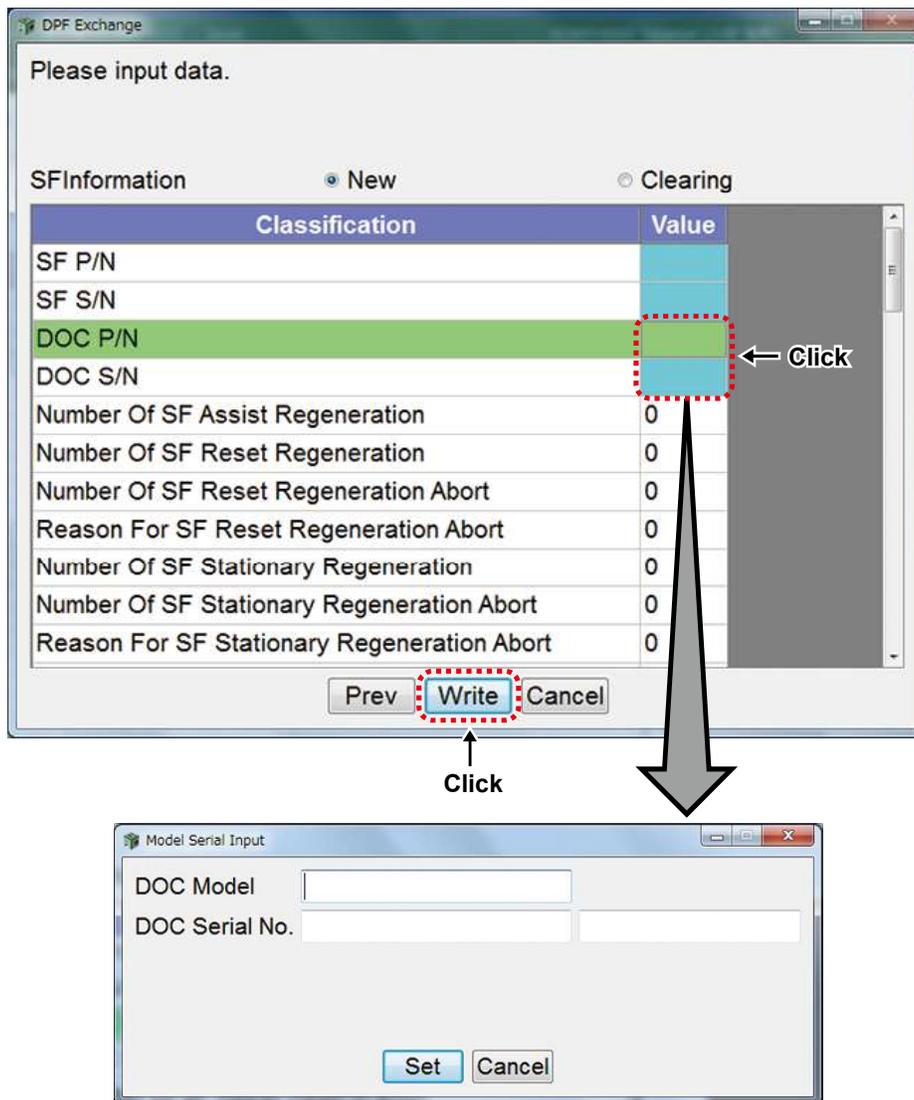
SF Model

SF Serial No.

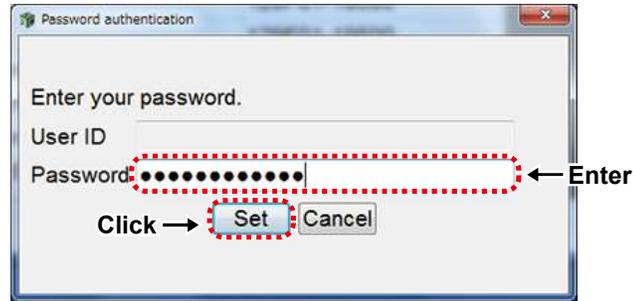
13. Part Exchange

Click the value cell and enter the part number and serial number of the DOC.

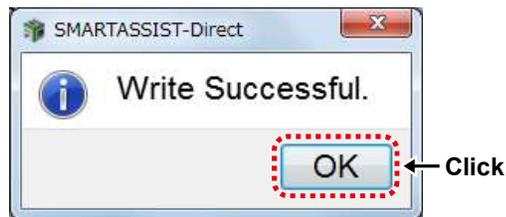
Click "Write" to write the data to the ECU.



The Password Request Screen is displayed. Enter the password, and click "Set".



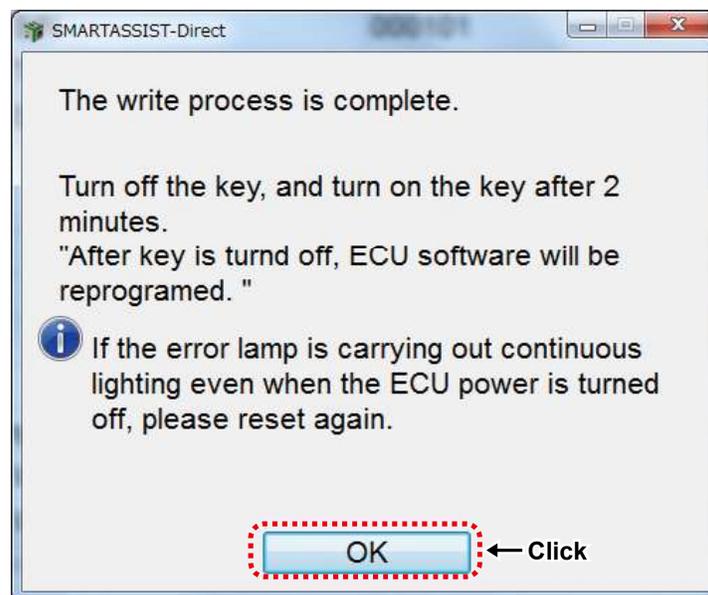
When the writing of correction values is complete, the below screen is displayed.



After ECU writing is completed, the procedure required next is displayed.

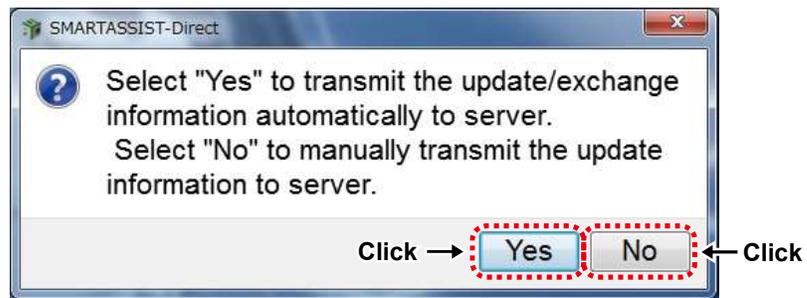
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.

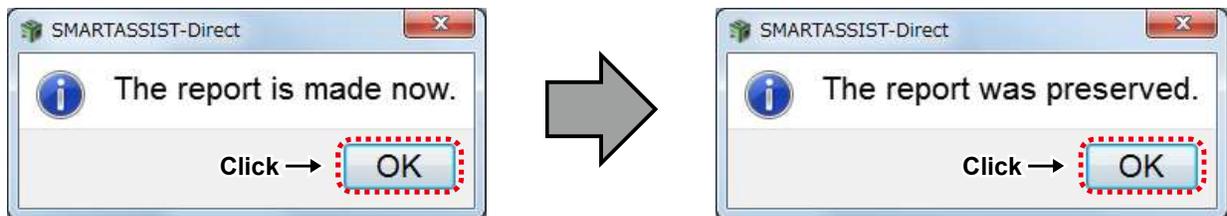


13. Part Exchange

Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.
Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".
Exchange process is complete.



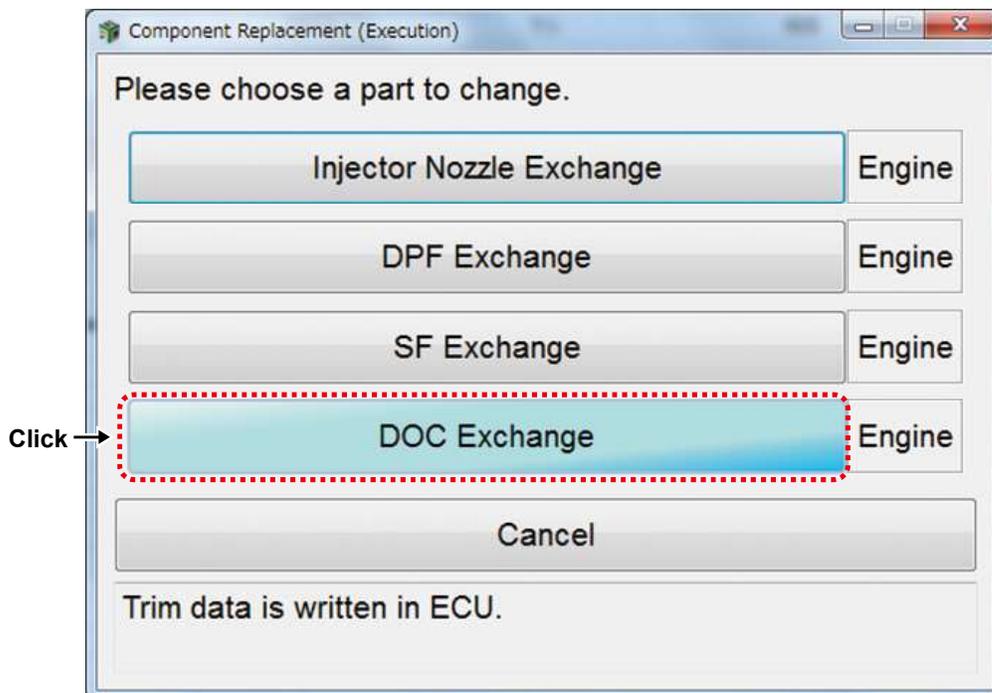
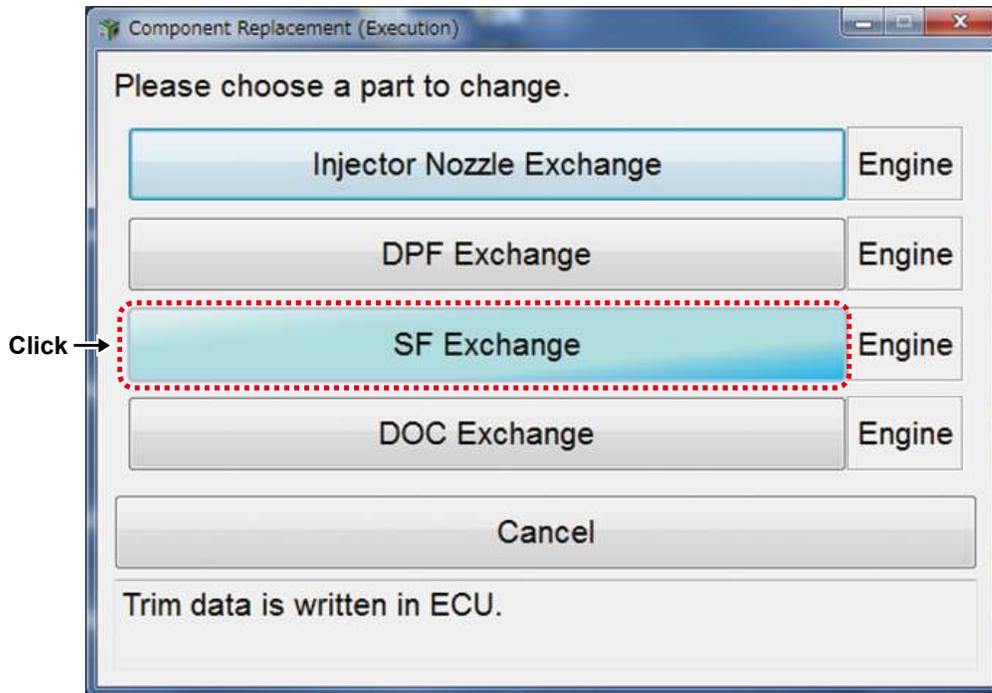
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

■SF/DOC Exchange

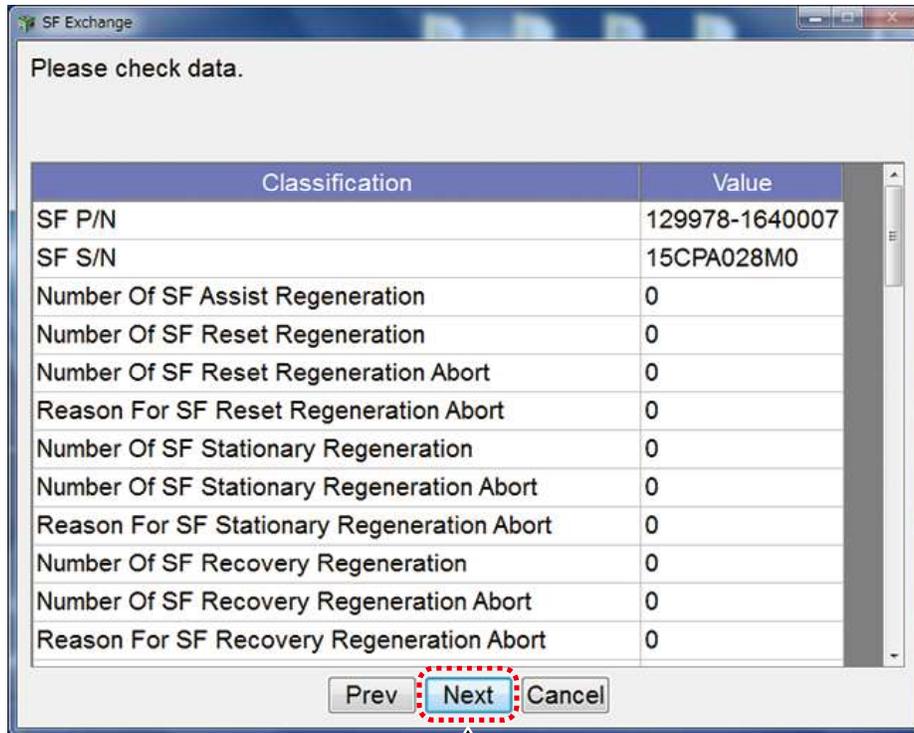
The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "SF Exchange" or "DOC Exchange".

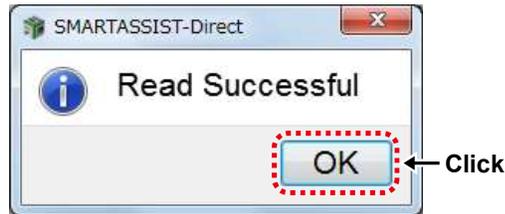


13. Part Exchange

For "SF Exchange", present SF information (before exchange) is displayed and the data is read by PC.



Click

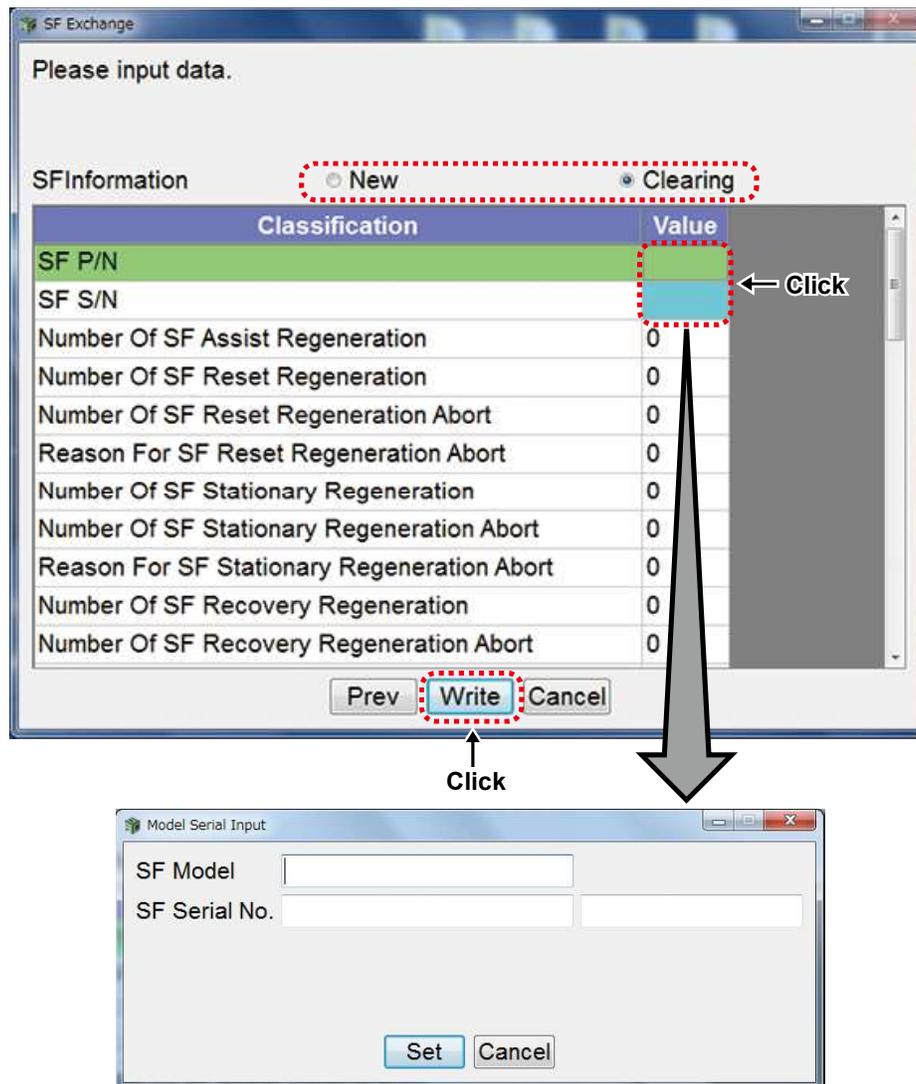


Click

Select "New" or "Reuse" for SF status.

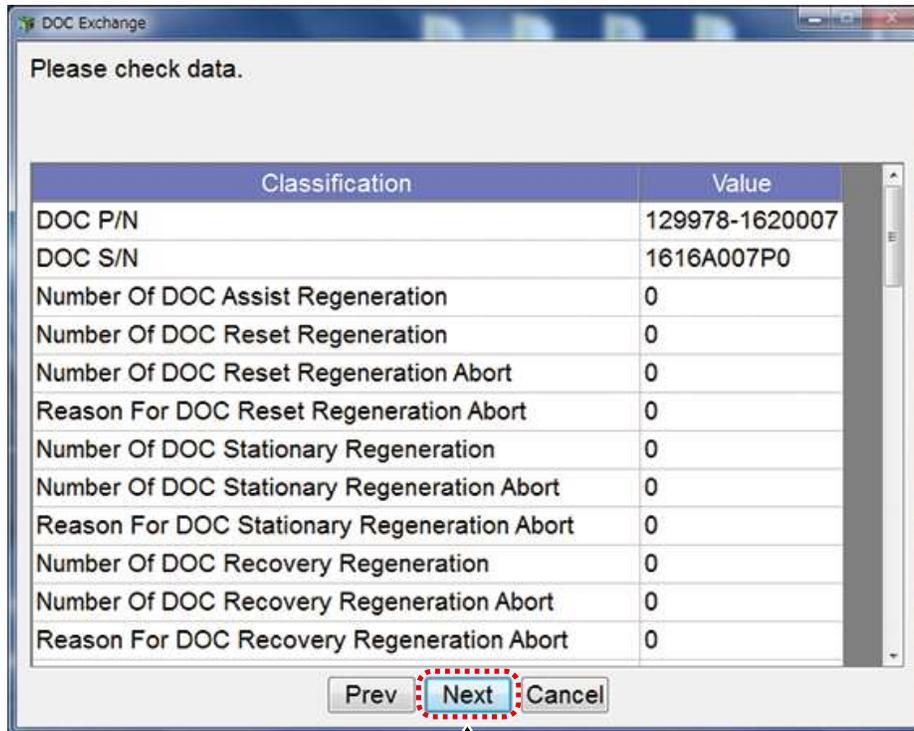
Click the value cell and enter the part number and serial number of the SF.

Click "Write" to write the data to the ECU.

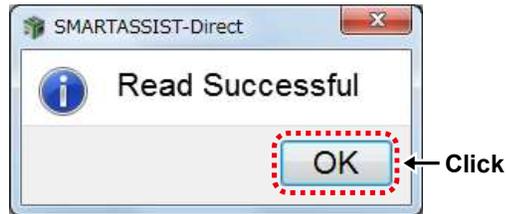


13. Part Exchange

For "DOC Exchange", present DOC information (before exchange) is displayed and the data is read by PC.



Click



Click

Click the value cell and enter the part number and serial number of the DOC.

The image shows two screenshots of a software interface. The top screenshot is titled "DOC Exchange" and displays a table with the following data:

Classification	Value
DOC P/N	
DOC S/N	
Number Of DOC Assist Regeneration	0
Number Of DOC Reset Regeneration	0
Number Of DOC Reset Regeneration Abort	0
Reason For DOC Reset Regeneration Abort	0
Number Of DOC Stationary Regeneration	0
Number Of DOC Stationary Regeneration Abort	0
Reason For DOC Stationary Regeneration Abort	0
Number Of DOC Recovery Regeneration	0
Number Of DOC Recovery Regeneration Abort	0
Reason For DOC Recovery Regeneration Abort	0

Below the table are three buttons: "Prev", "Write", and "Cancel". The "Write" button is highlighted with a red dashed box and labeled "Click". A large grey arrow points from the "Write" button to the second screenshot.

The second screenshot is titled "Model Serial Input" and contains two input fields:

DOC Model:

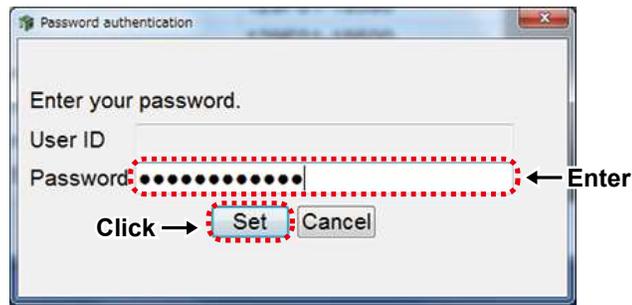
DOC Serial No.:

Below the input fields are two buttons: "Set" and "Cancel".

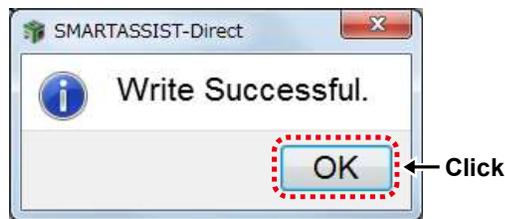
13. Part Exchange

Enter the data in SF exchange or DOC exchange then click "Write" to write the data to the ECU.

The Password Request Screen is displayed. Enter the password, and click "Set".



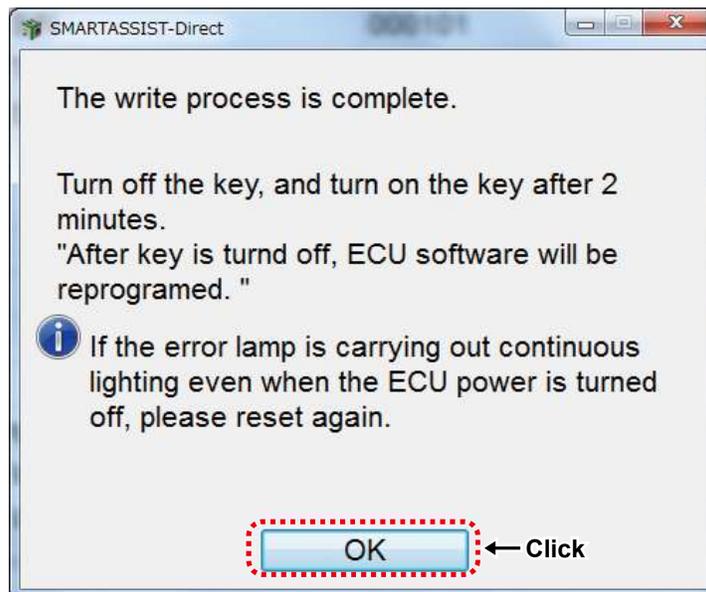
When the writing of correction values is complete, the below screen is displayed.



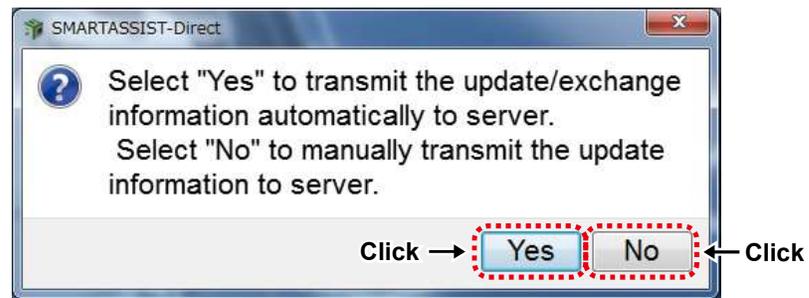
After ECU writing is completed, the procedure required next is displayed.

When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

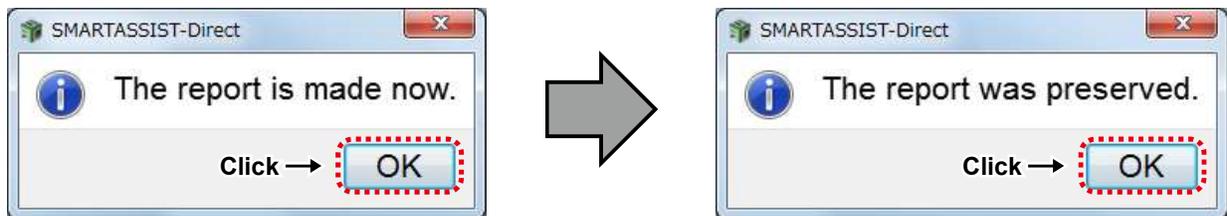
Turn the ECU power source ON after holding the power OFF for 30 seconds.



Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.
Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".
Exchange process is complete.



When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

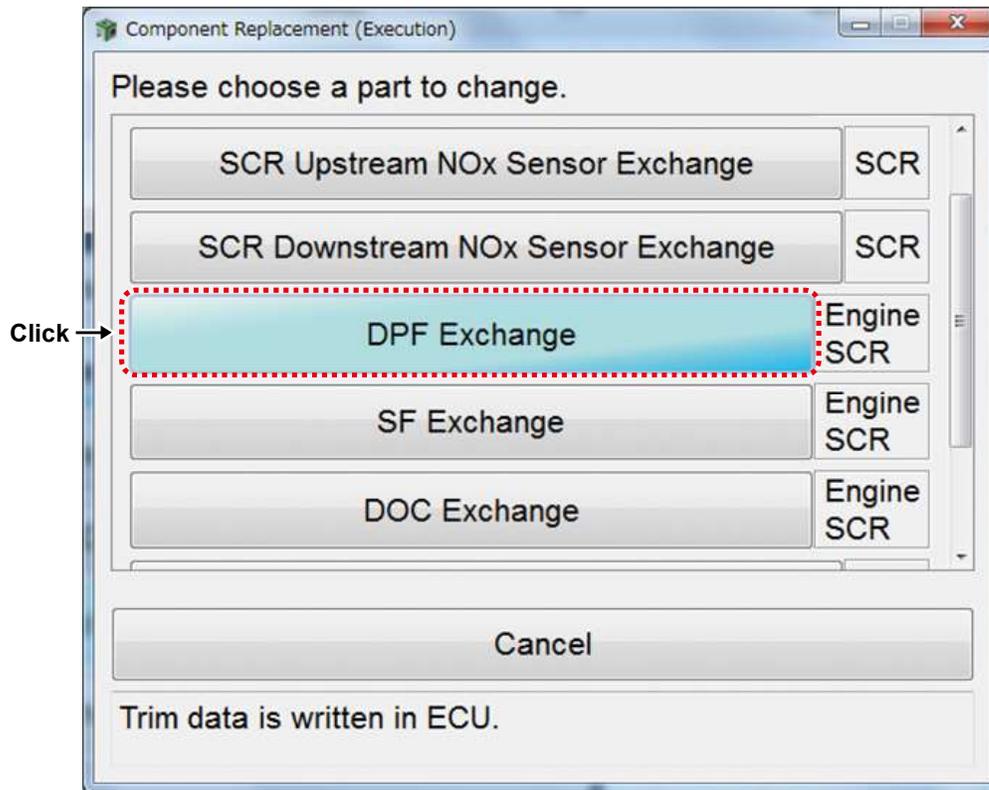
If you select the data manually, then refer to chapter 14 for the following procedure.

13.2.4 Exchange 4TNV94FHT DPF/SF/DOC/SCR/NOx Sensor or other parts

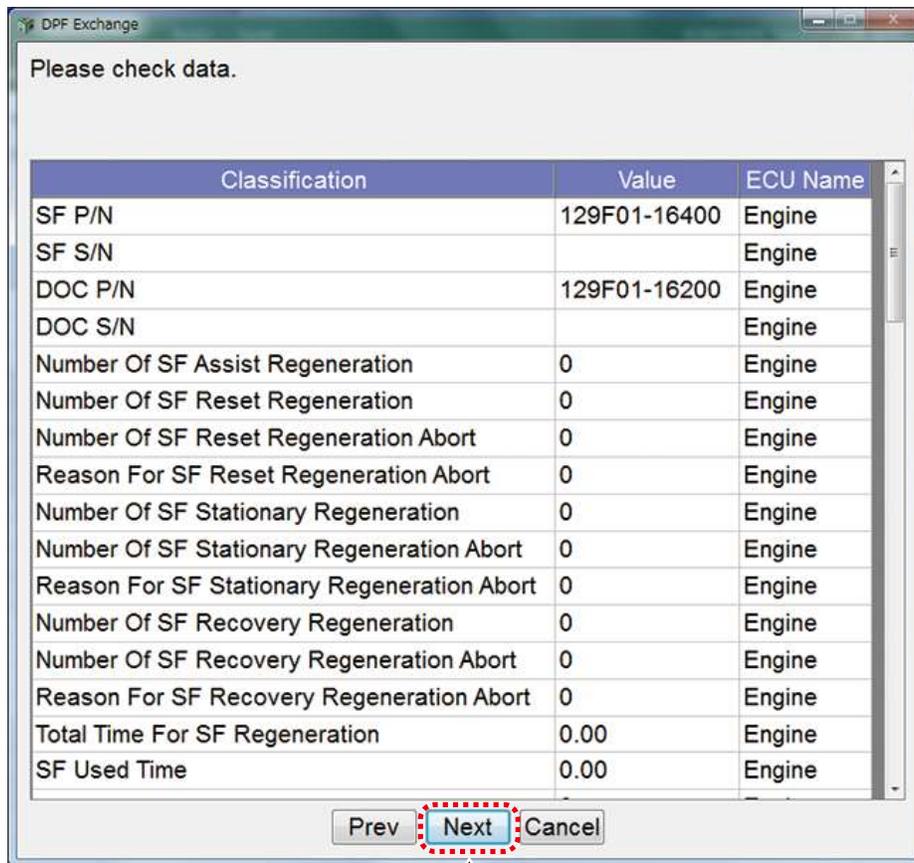
■DPF Exchange Process

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "DPF Exchange".



Present DPF information (before exchange) is displayed and the data is read by PC.



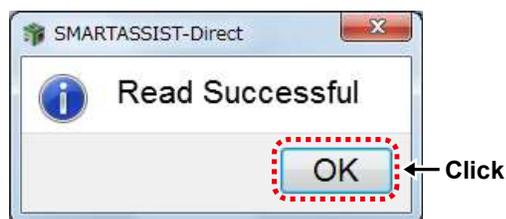
DPF Exchange

Please check data.

Classification	Value	ECU Name
SF P/N	129F01-16400	Engine
SF S/N		Engine
DOC P/N	129F01-16200	Engine
DOC S/N		Engine
Number Of SF Assist Regeneration	0	Engine
Number Of SF Reset Regeneration	0	Engine
Number Of SF Reset Regeneration Abort	0	Engine
Reason For SF Reset Regeneration Abort	0	Engine
Number Of SF Stationary Regeneration	0	Engine
Number Of SF Stationary Regeneration Abort	0	Engine
Reason For SF Stationary Regeneration Abort	0	Engine
Number Of SF Recovery Regeneration	0	Engine
Number Of SF Recovery Regeneration Abort	0	Engine
Reason For SF Recovery Regeneration Abort	0	Engine
Total Time For SF Regeneration	0.00	Engine
SF Used Time	0.00	Engine

Prev Next Cancel

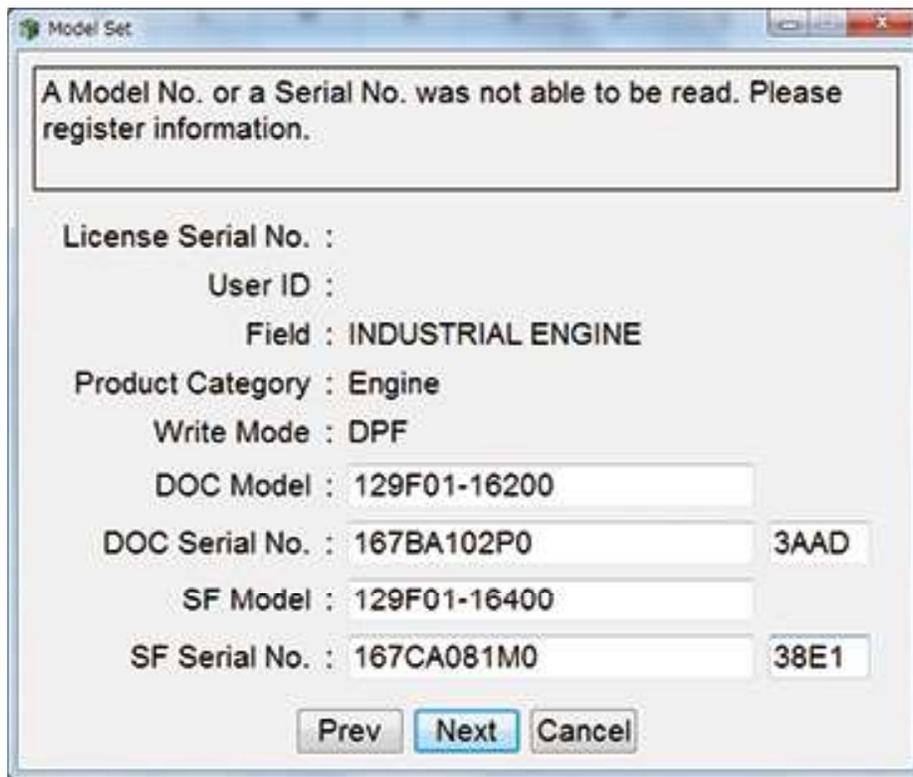
Click



Click

13. Part Exchange

If model No. or serial No. of SF or DOC was not able to read, the following screen is displayed. Enter the numbers and then click "Next".



The screenshot shows a window titled "Model Set" with a message box at the top: "A Model No. or a Serial No. was not able to be read. Please register information." Below the message, the following information is displayed:

- License Serial No. :
- User ID :
- Field : INDUSTRIAL ENGINE
- Product Category : Engine
- Write Mode : DPF
- DOC Model : 129F01-16200
- DOC Serial No. : 167BA102P0 3AAD
- SF Model : 129F01-16400
- SF Serial No. : 167CA081M0 38E1

At the bottom of the dialog, there are three buttons: "Prev", "Next", and "Cancel". The "Next" button is highlighted in blue.

Select "New" or "Reuse" for SF status.

Click the value cell and enter the part number and serial number of the SF.

DPF Exchange

Please input data.

SFInformation New Clearing

Classification	Value	ECU Name
SF P/N		Engine
SF S/N		Engine
DOC P/N		Engine
DOC S/N		Engine
Number Of SF Assist Regeneration	0	Engine
Number Of SF Reset Regeneration	0	Engine
Number Of SF Reset Regeneration Abort	0	Engine
Reason For SF Reset Regeneration Abort	0	Engine
Number Of SF Stationary Regeneration	0	Engine
Number Of SF Stationary Regeneration Abort	0	Engine
Reason For SF Stationary Regeneration Abort	0	Engine
Number Of SF Recovery Regeneration	0	Engine
Number Of SF Recovery Regeneration Abort	0	Engine
Reason For SF Recovery Regeneration Abort	0	Engine
Total Time For SF Regeneration	0.0	Engine
SF Used Time	0.0	Engine
	0	Engine

Prev Write Cancel



Model Serial Input

SF Model

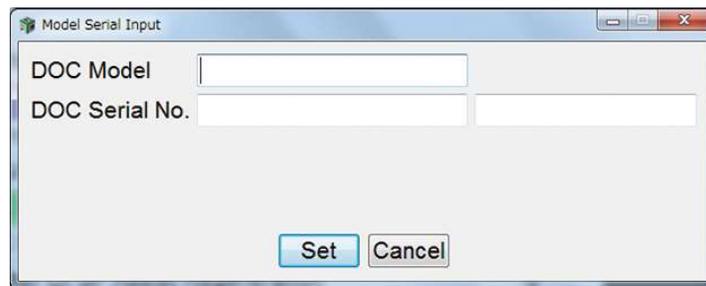
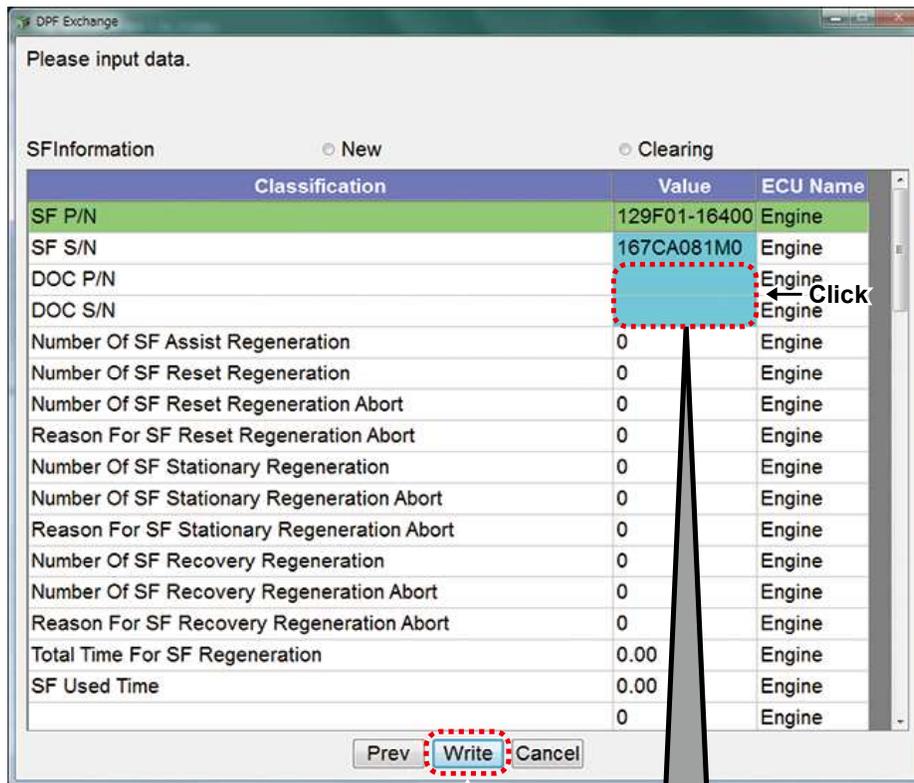
SF Serial No.

Set Cancel

13. Part Exchange

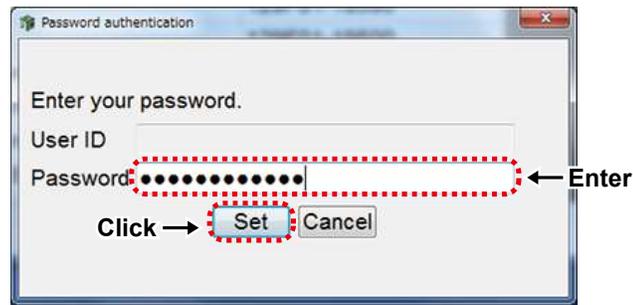
Click the value cell and enter the part number and serial number of the DOC.

Click "Write" to write the data to the ECU.

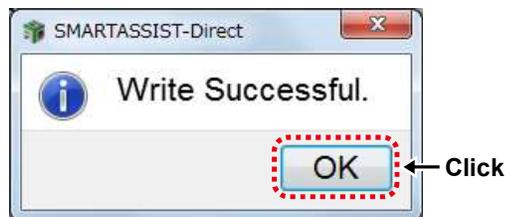


Enter the data in DPF exchange, and then click "Write" to write the data to the ECU.

The Password Request Screen is displayed. Enter the password, and click "Set".



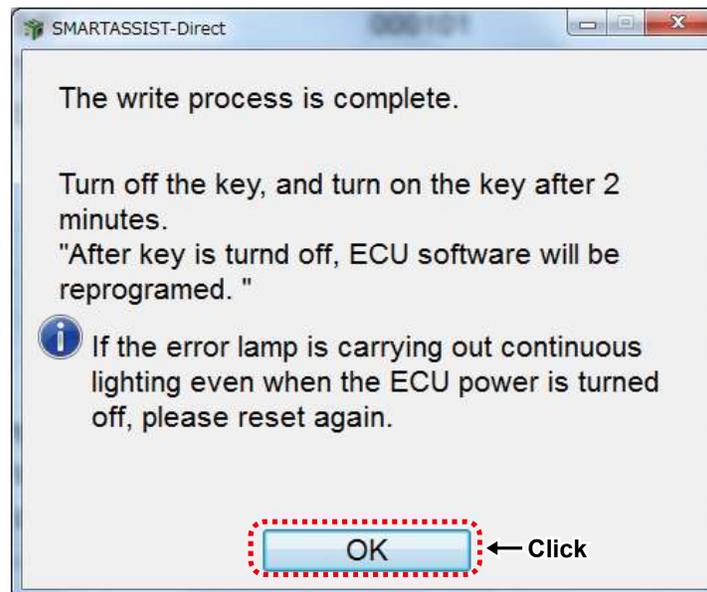
When the writing of correction values is complete, the below screen is displayed.



After ECU writing is completed, the procedure required next is displayed.

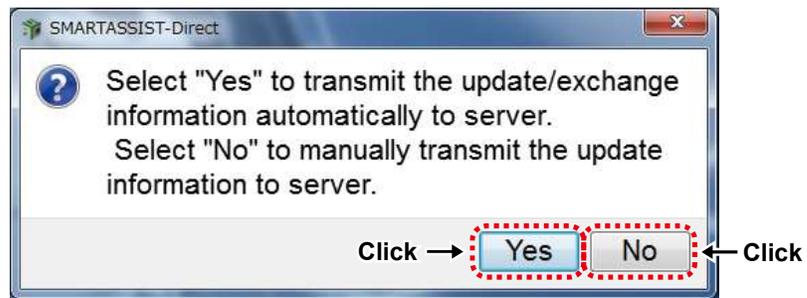
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.

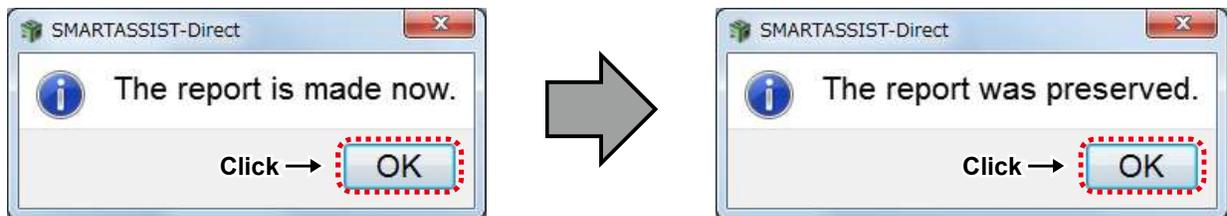


13. Part Exchange

Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.
Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".
Exchange process is complete.



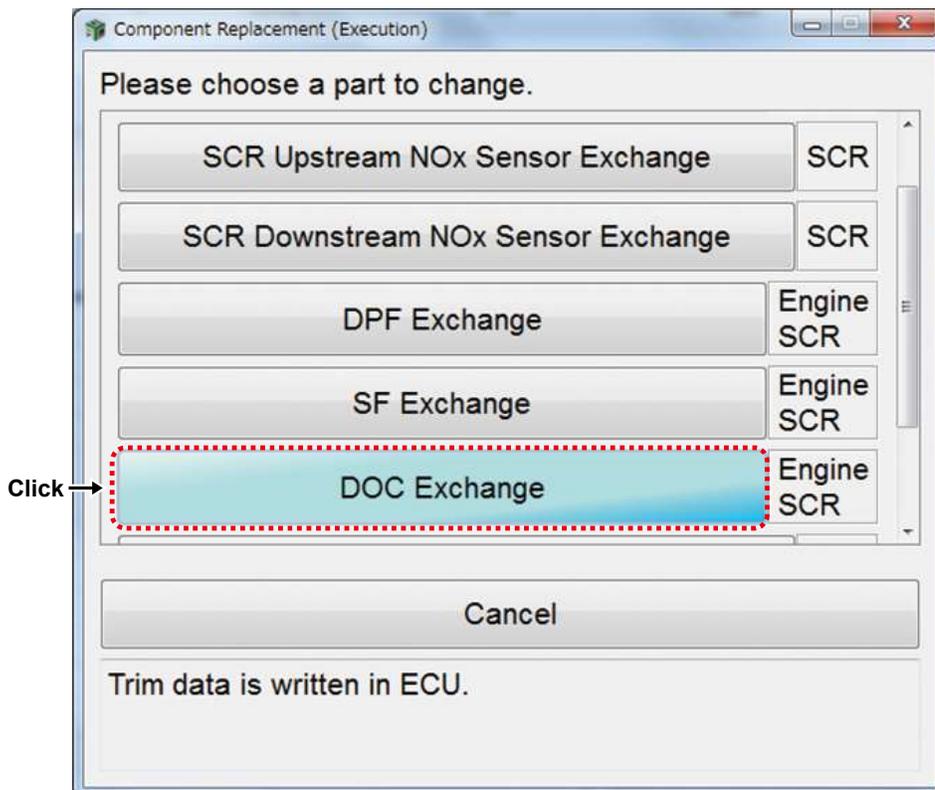
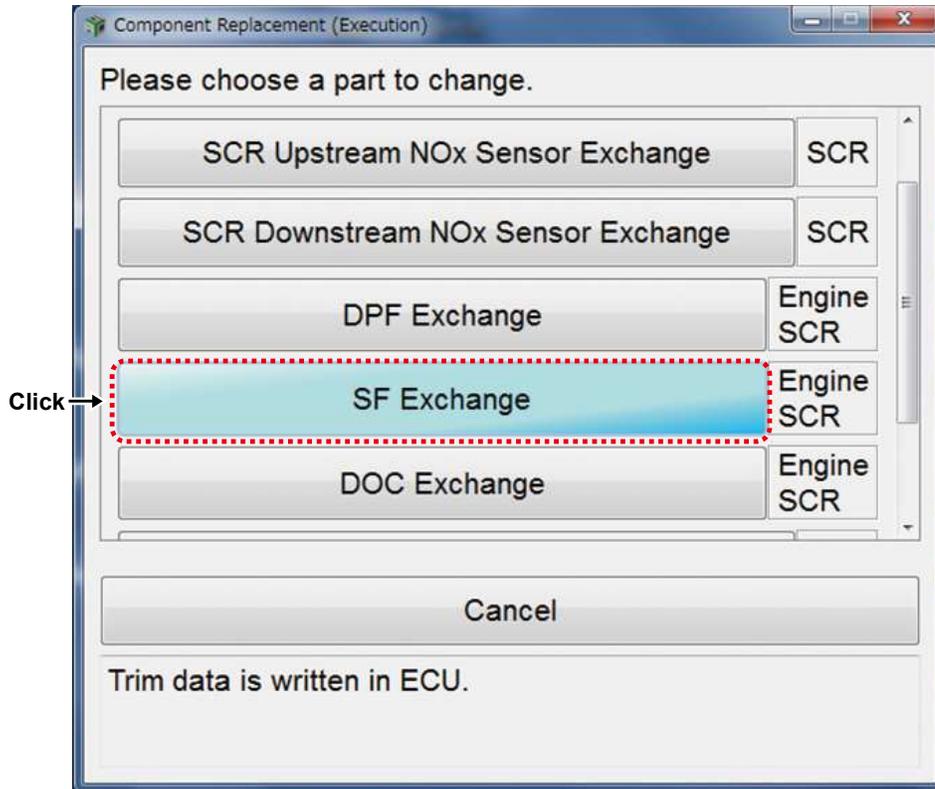
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

■SF/DOC Exchange

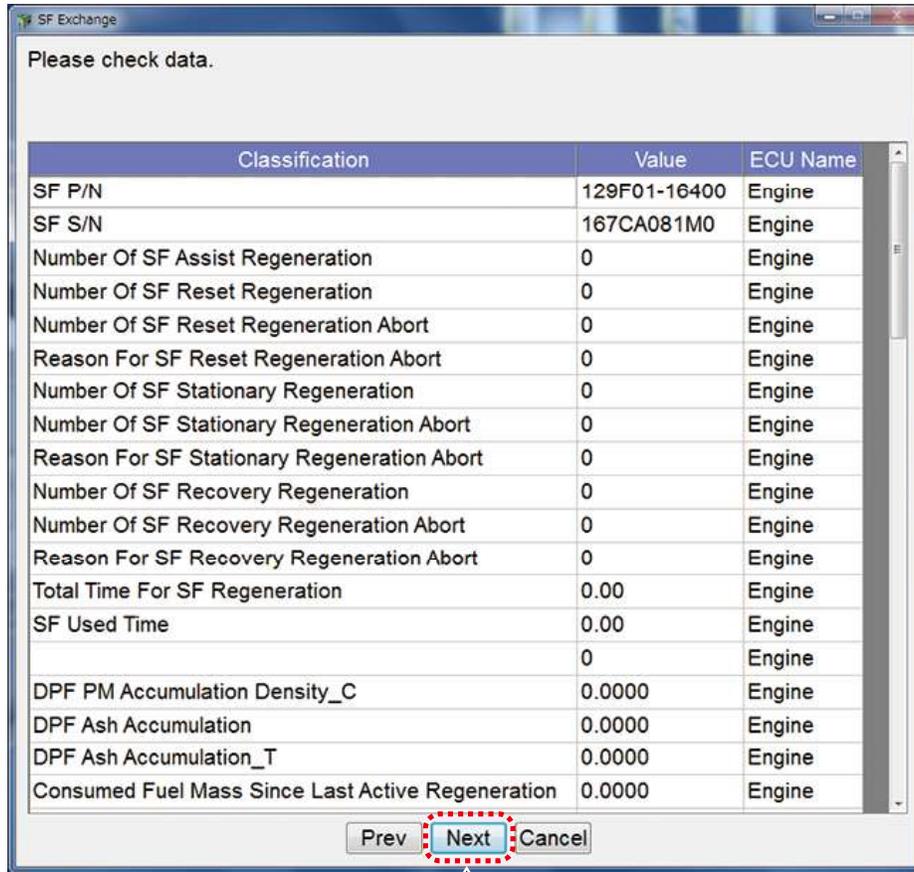
The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "SF Exchange" or "DOC Exchange".



13. Part Exchange

For "SF Exchange", present SF information (before exchange) is displayed and the data is read by PC.

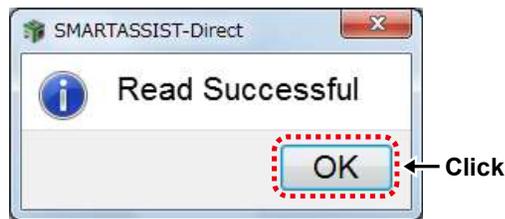


Please check data.

Classification	Value	ECU Name
SF P/N	129F01-16400	Engine
SF S/N	167CA081M0	Engine
Number Of SF Assist Regeneration	0	Engine
Number Of SF Reset Regeneration	0	Engine
Number Of SF Reset Regeneration Abort	0	Engine
Reason For SF Reset Regeneration Abort	0	Engine
Number Of SF Stationary Regeneration	0	Engine
Number Of SF Stationary Regeneration Abort	0	Engine
Reason For SF Stationary Regeneration Abort	0	Engine
Number Of SF Recovery Regeneration	0	Engine
Number Of SF Recovery Regeneration Abort	0	Engine
Reason For SF Recovery Regeneration Abort	0	Engine
Total Time For SF Regeneration	0.00	Engine
SF Used Time	0.00	Engine
	0	Engine
DPF PM Accumulation Density_C	0.0000	Engine
DPF Ash Accumulation	0.0000	Engine
DPF Ash Accumulation_T	0.0000	Engine
Consumed Fuel Mass Since Last Active Regeneration	0.0000	Engine

Prev Next Cancel

Click

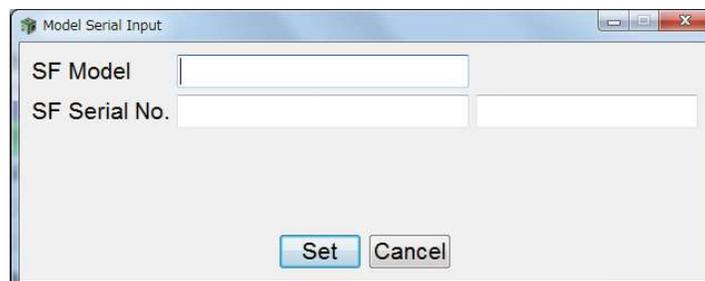
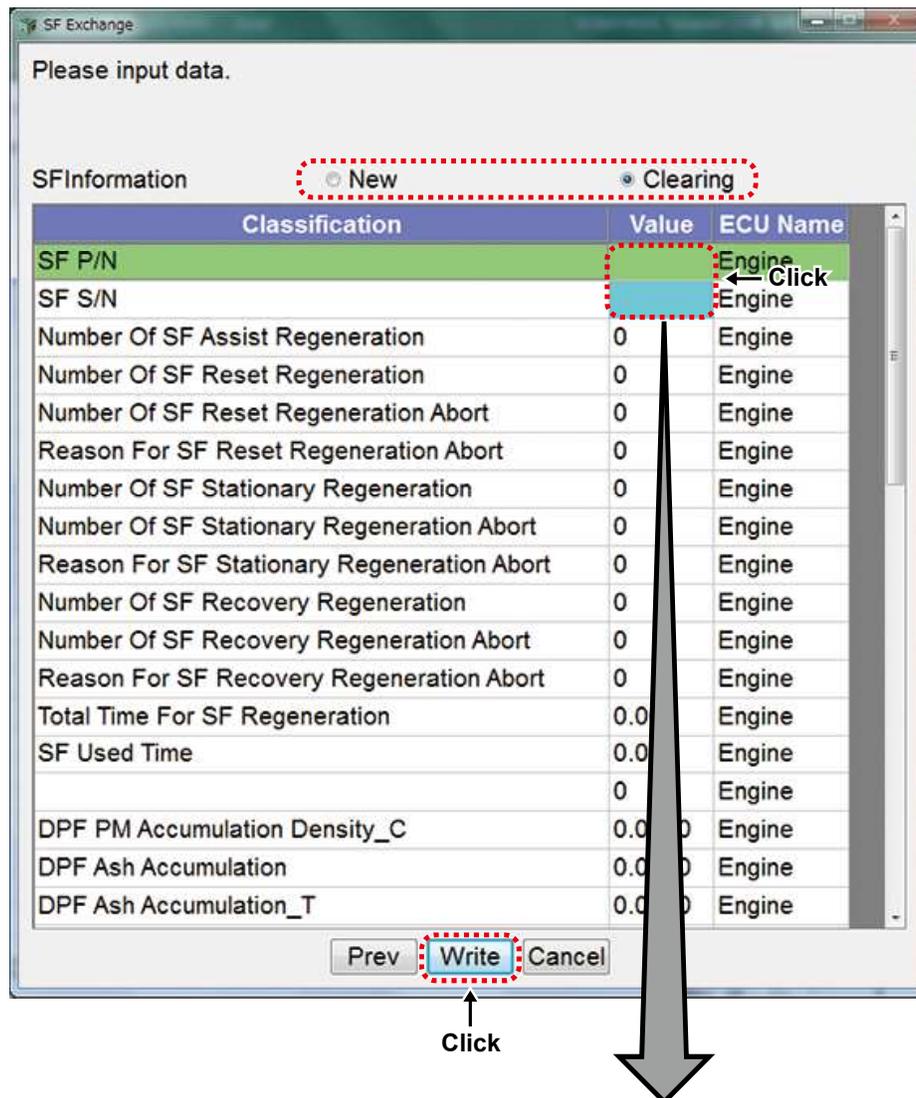


Click

Select "New" or "Reuse" for SF status.

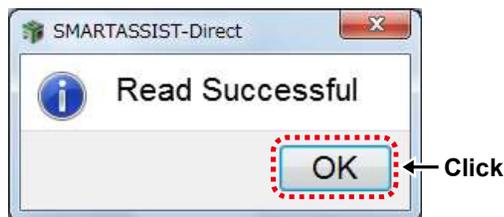
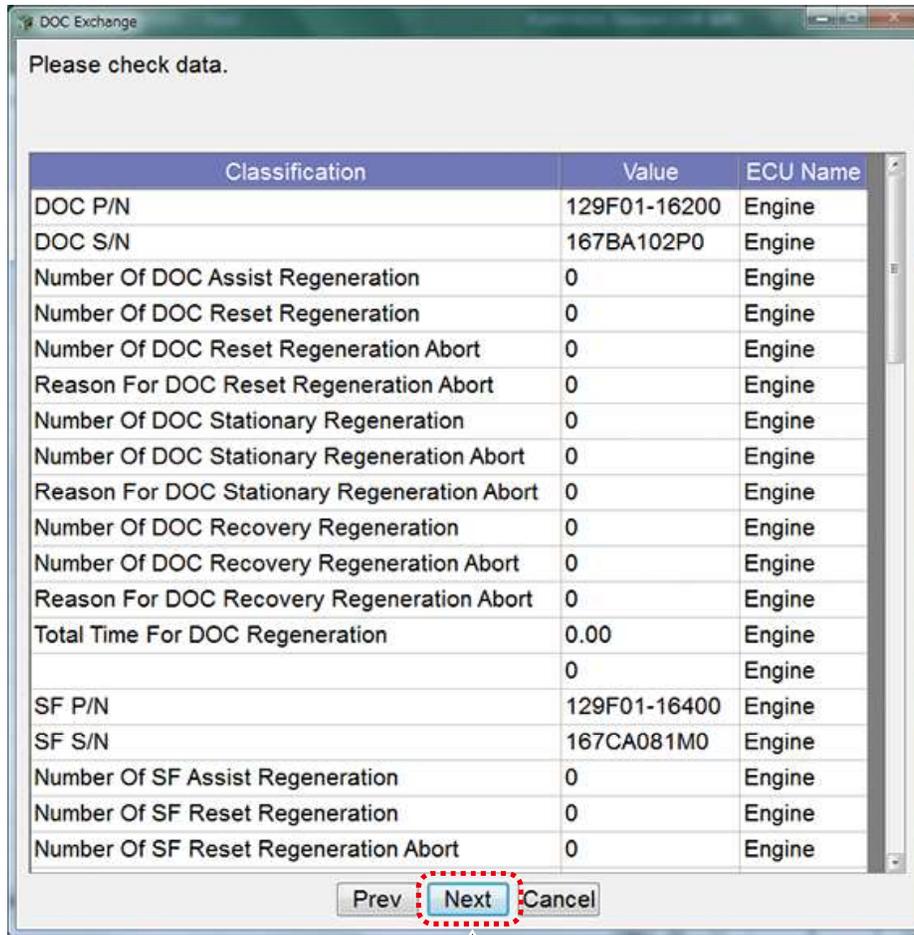
Click the value cell and enter the part number and serial number of the SF.

Click "Write" to write the data to the ECU.

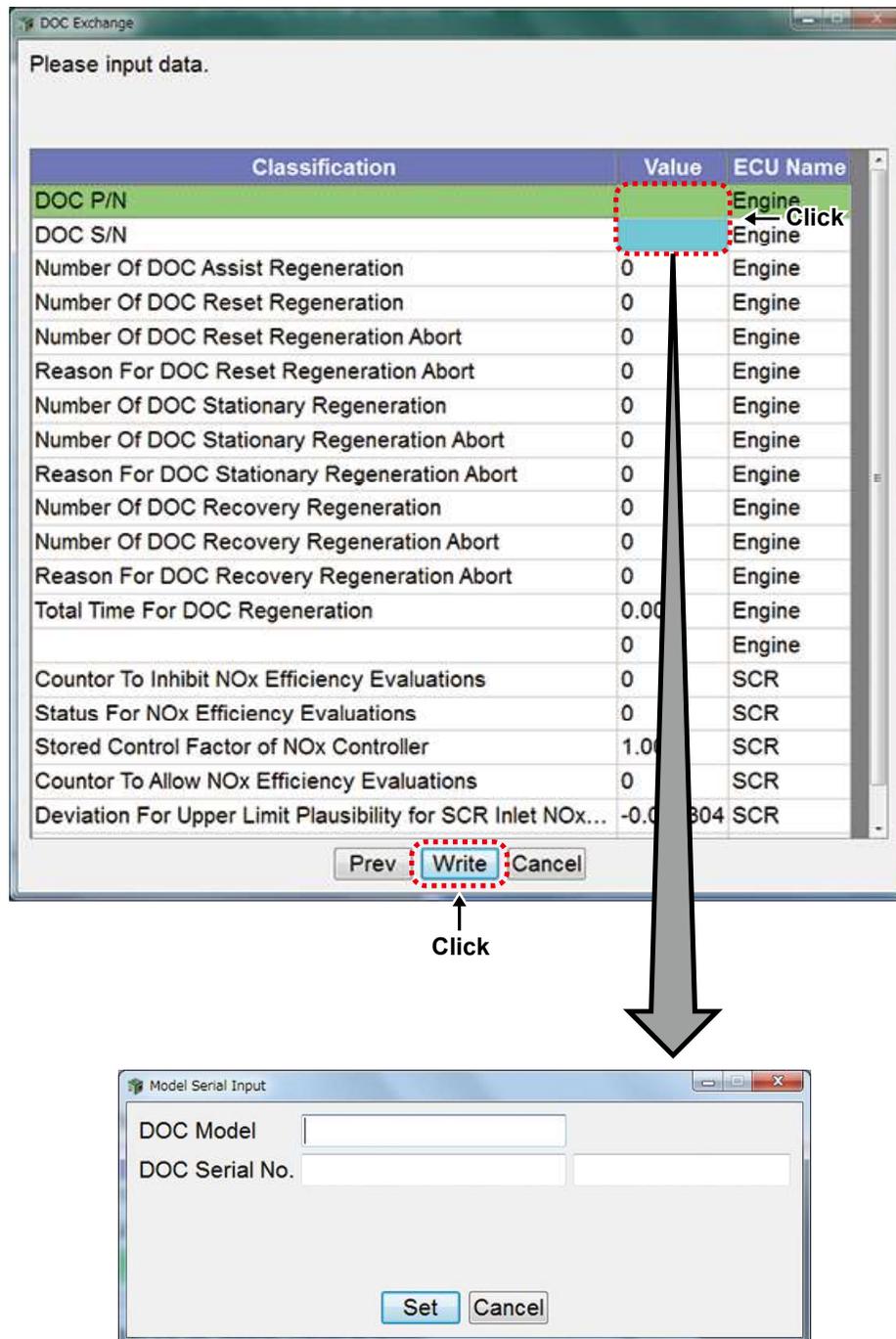


13. Part Exchange

For "DOC Exchange", present DOC information (before exchange) is displayed and the data is read by PC.



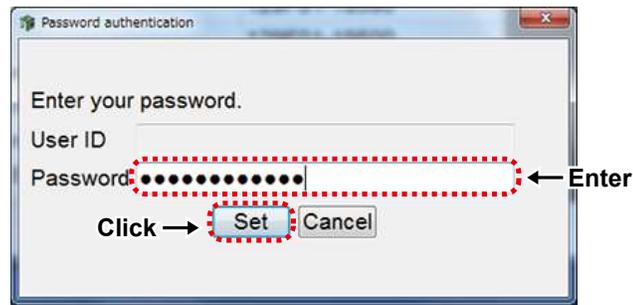
Click the value cell and enter the part number and serial number of the DOC.



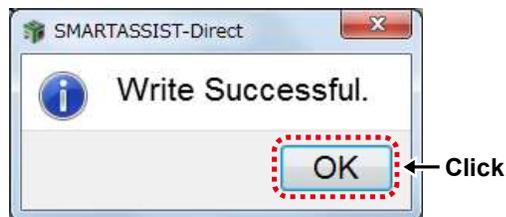
13. Part Exchange

Enter the data in SF exchange or DOC exchange then click "Write" to write the data to the ECU.

The Password Request Screen is displayed. Enter the password, and click "Set".



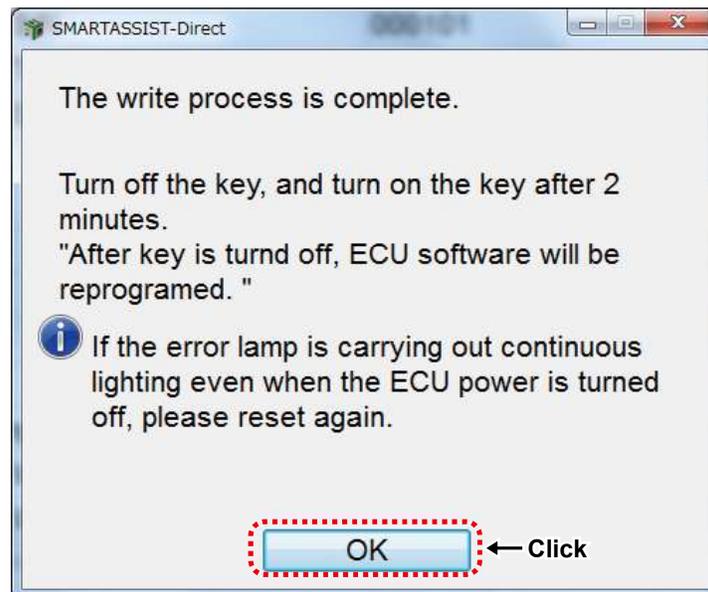
When the writing of correction values is complete, the below screen is displayed.



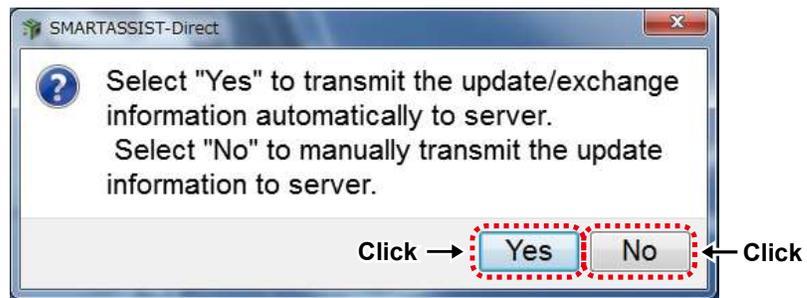
After ECU writing is completed, the procedure required next is displayed.

When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

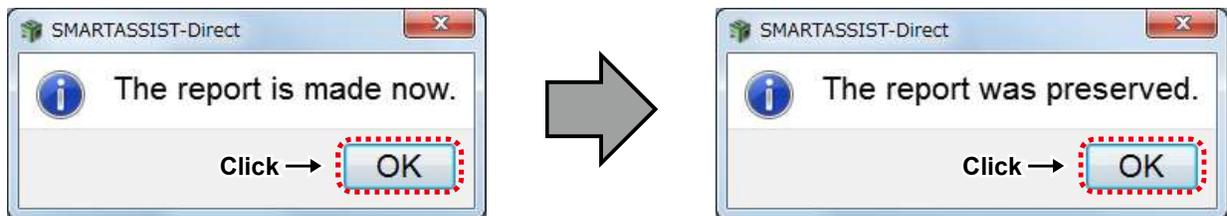
Turn the ECU power source ON after holding the power OFF for 30 seconds.



Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.
Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".
Exchange process is complete.



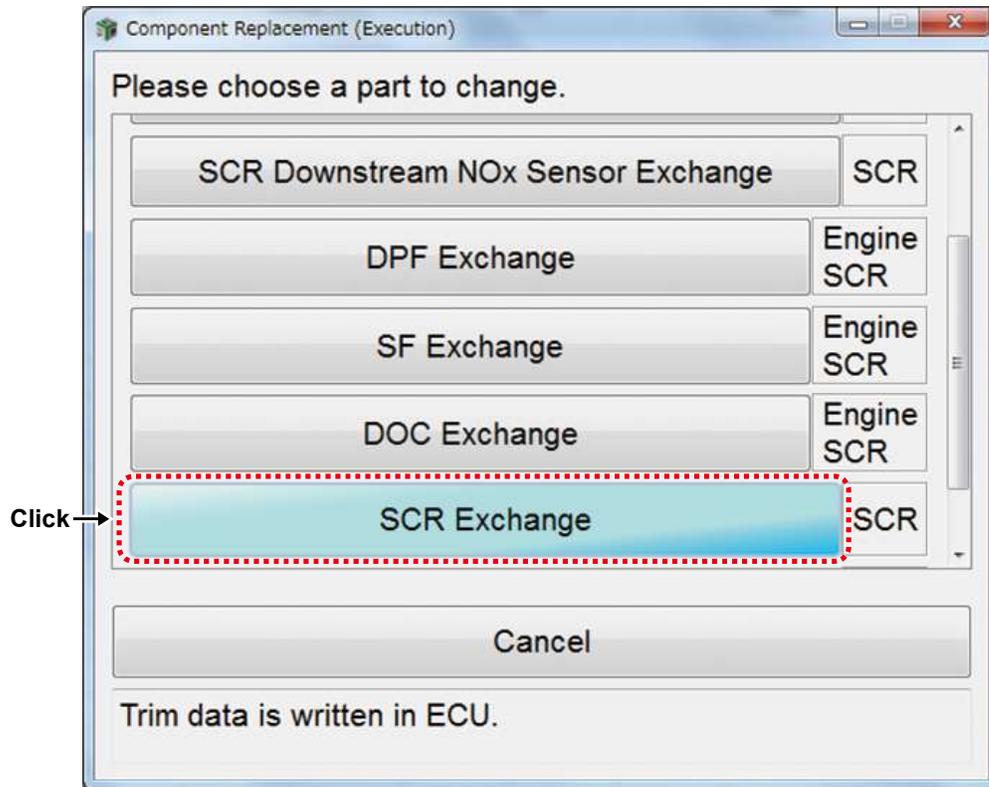
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

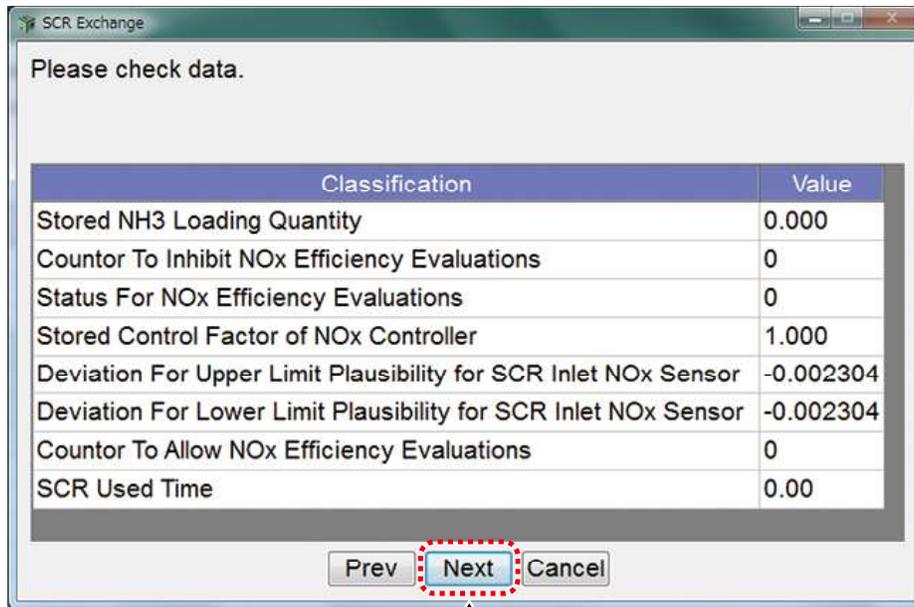
■ Exchange SCR

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

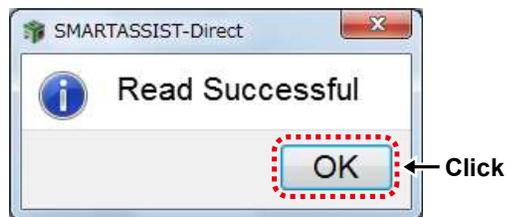
Click "SCR Exchange".



Present SCR information (before exchange) is displayed and the data is read by PC.



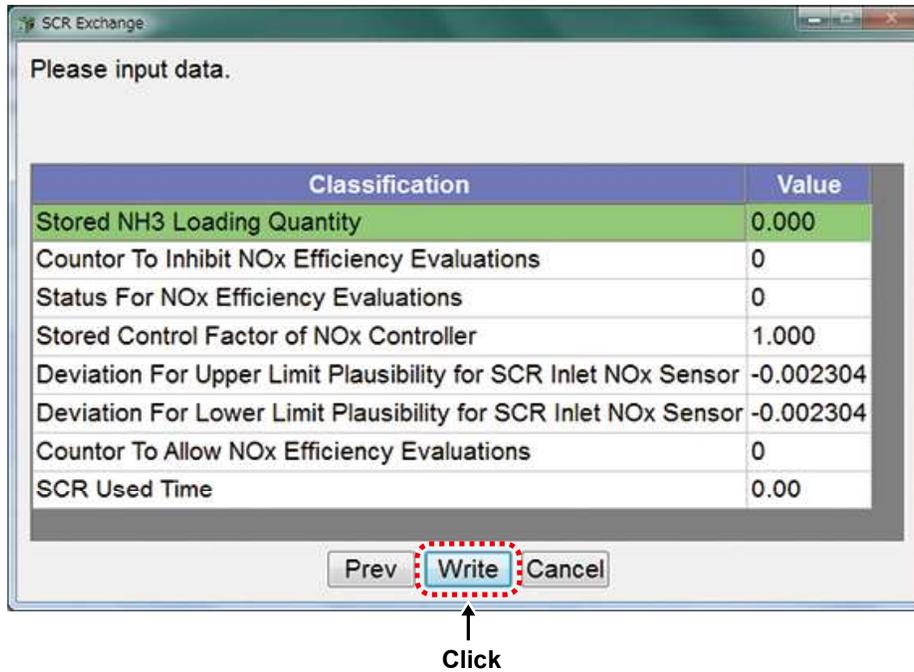
Click



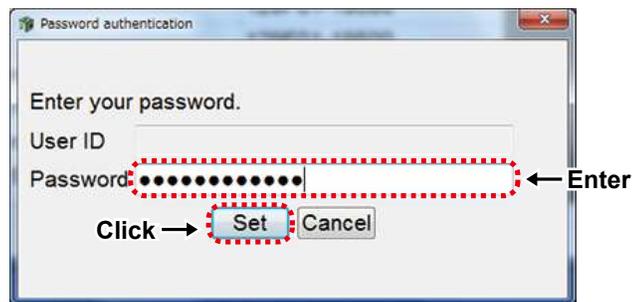
Click

13. Part Exchange

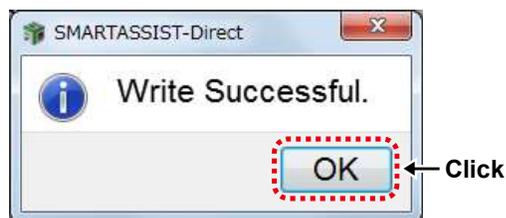
Click the cell of SCR that you want to exchange from Classification. Enter the data, and then click [Write].



The Password Request Screen is displayed. Enter the password, and click "Set".



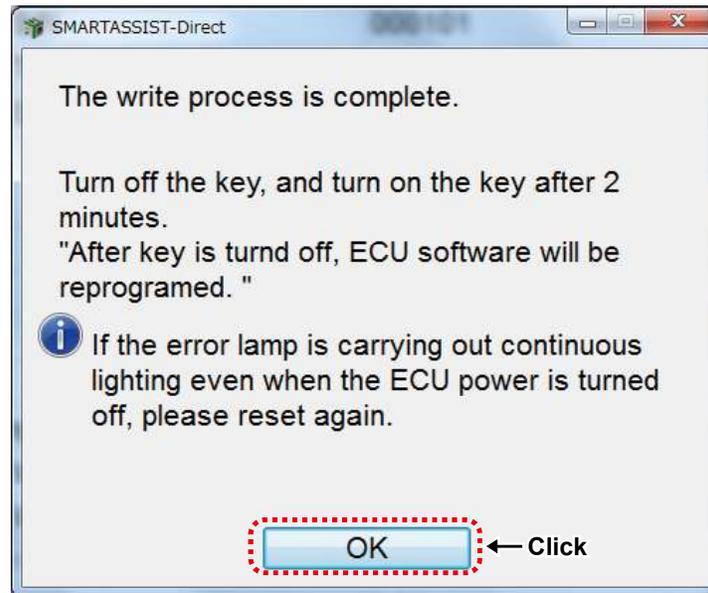
When the writing of correction values is complete, the below screen is displayed.



After ECU writing is completed, the procedure required next is displayed.

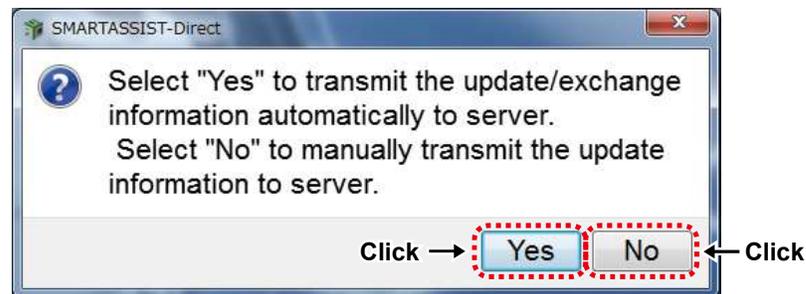
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.



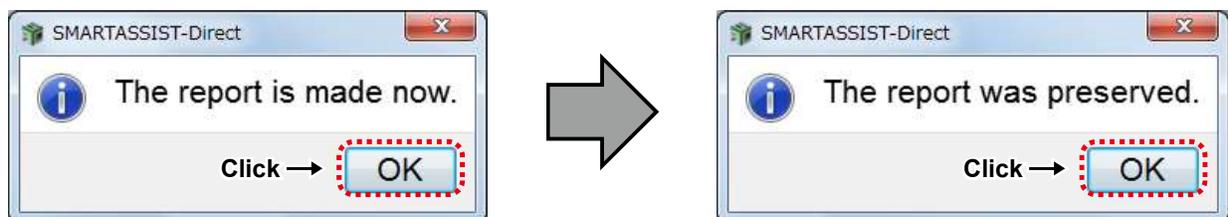
Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.

Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".

Exchange process is complete.



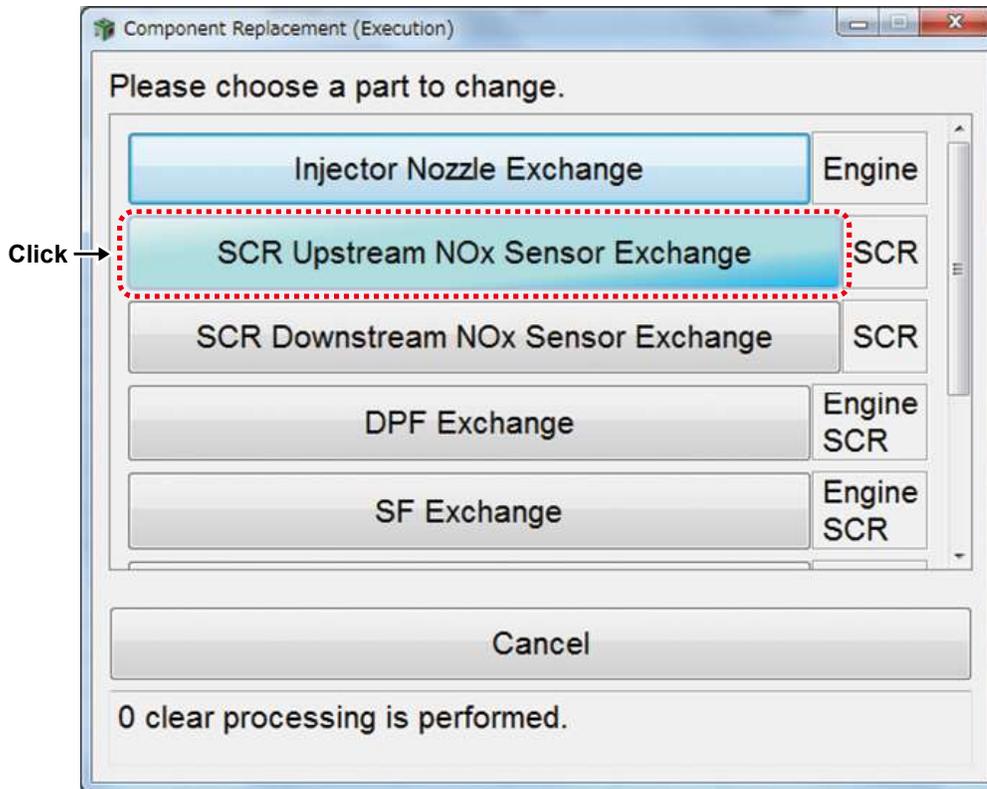
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

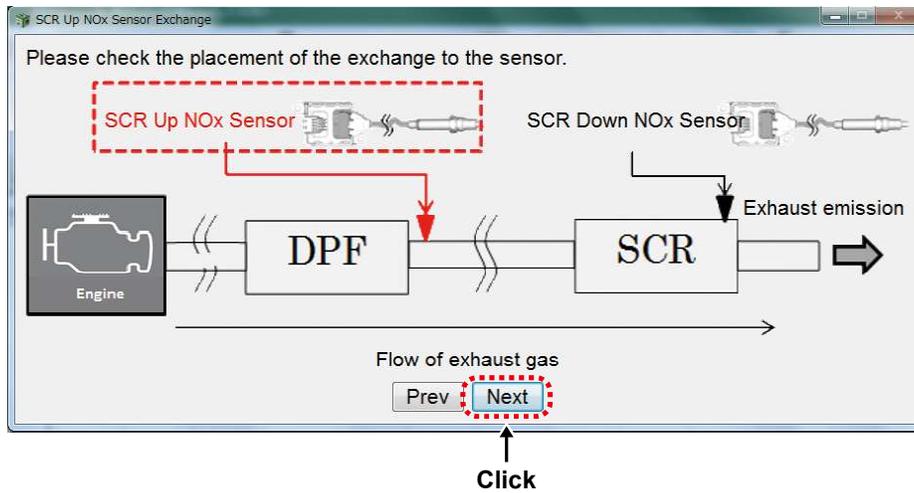
If you select the data manually, then refer to chapter 14 for the following procedure.

■SCR NOx Sensor Exchange

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click SCR Upstream NOx Sensor Exchange or SCR Downstream NOx Sensor Exchange.





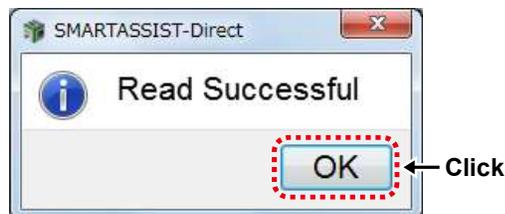
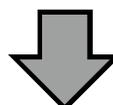
Present NOx Sensor information (before exchange) is displayed and the data is read by PC.

Please check data.

Classification	Value
Counter To Inhibit NOx Efficiency Evaluations	0
Status For NOx Efficiency Evaluations	0
Stored Control Factor of NOx Controller	1.000
Counter To Allow NOx Efficiency Evaluations	0
Deviation For Upper Limit Plausibility for SCR Inlet NOx Sensor	-0.002304
Deviation For Lower Limit Plausibility for SCR Inlet NOx Sensor	-0.002304
SCR NOx sensor1 Used Time	7.55

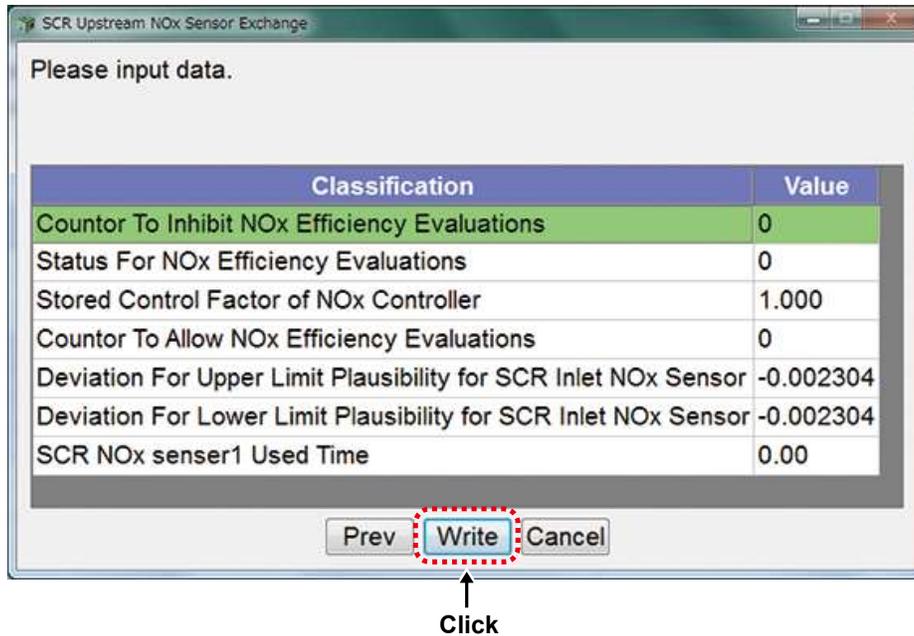
Prev Next Cancel

Click

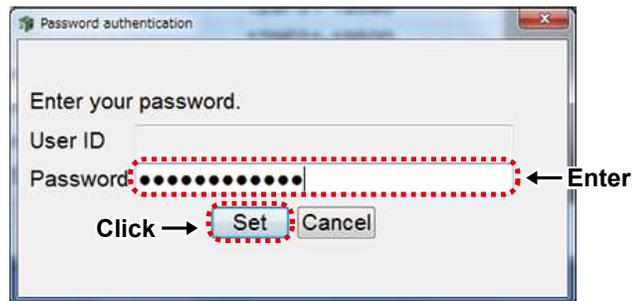


13. Part Exchange

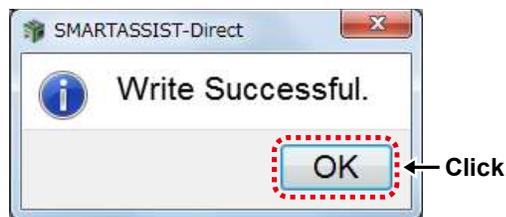
Click the cell of NOx sensor that you want to exchange from Classification. Enter the data, and then click [Write].



Enter the password, and click "Set".



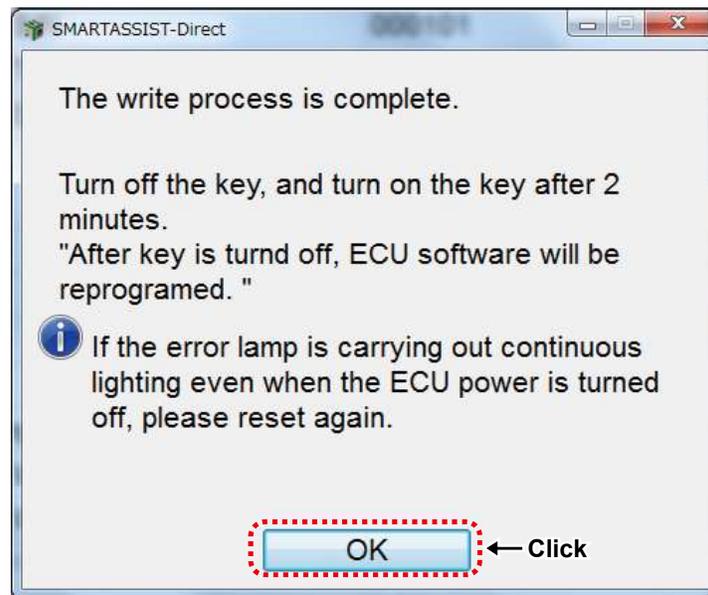
When the writing of correction values is complete, the below screen is displayed.



After ECU writing is completed, the procedure required next is displayed.

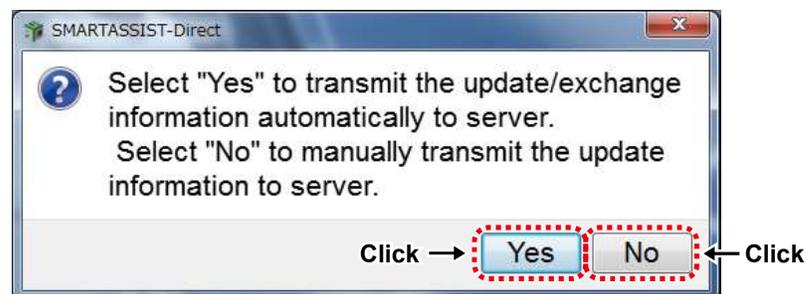
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.



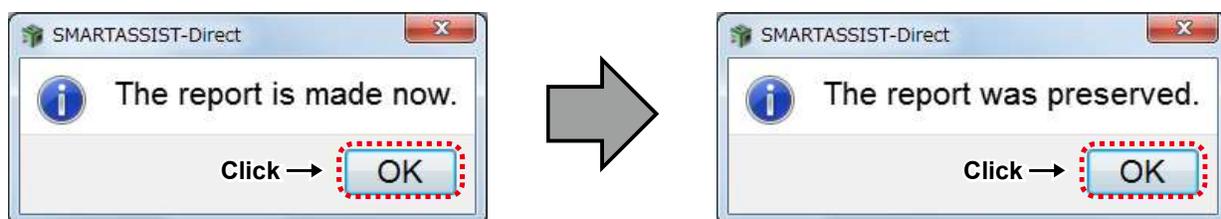
Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.

Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".

Exchange process is complete.



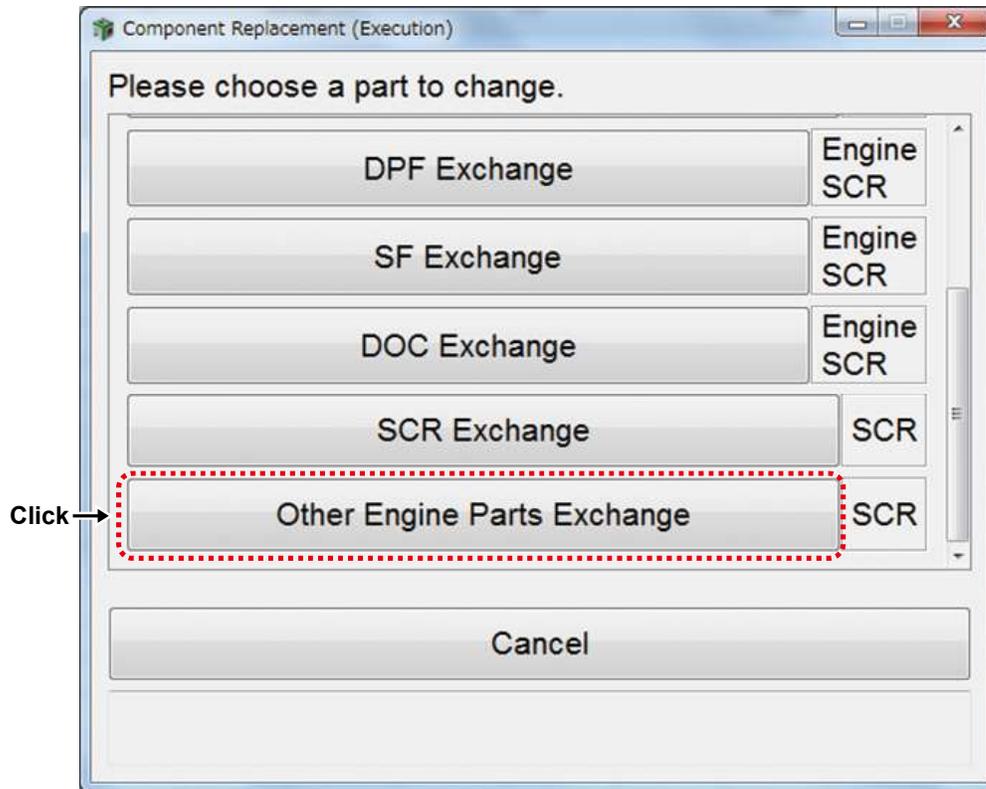
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

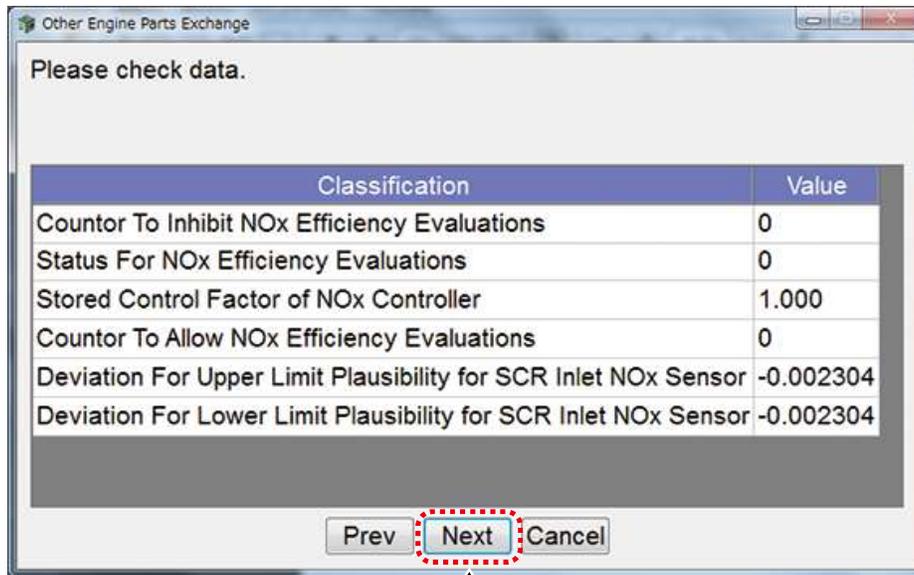
■Other Engine Parts Exchange Process

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

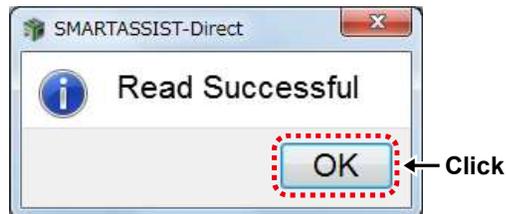
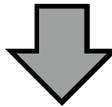
Click "Other Engine Parts Exchange".



Present information of other engine parts (before exchange) is displayed and the data is read by PC.



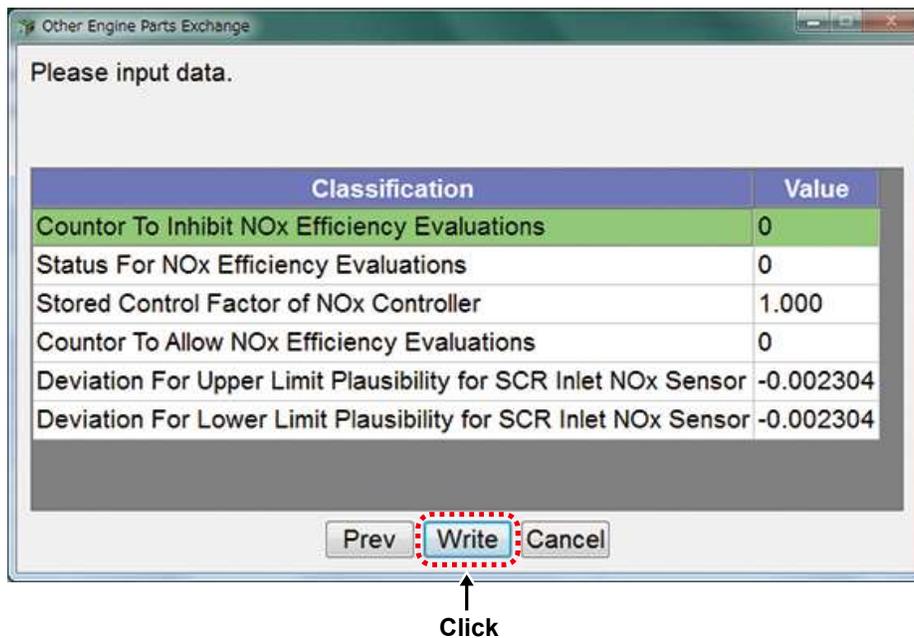
Click



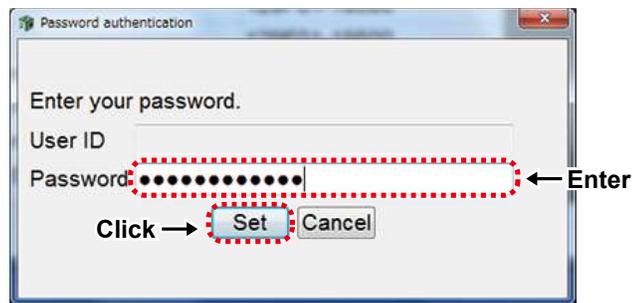
Click

13. Part Exchange

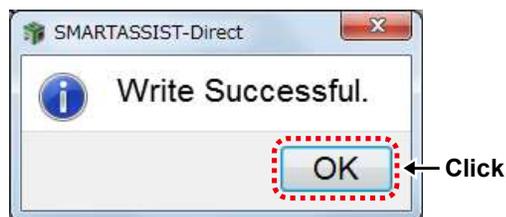
Click the cell of other engine parts that you want to exchange from Classification, enter the data, and then click [Write].



Enter the password, and click "Set".



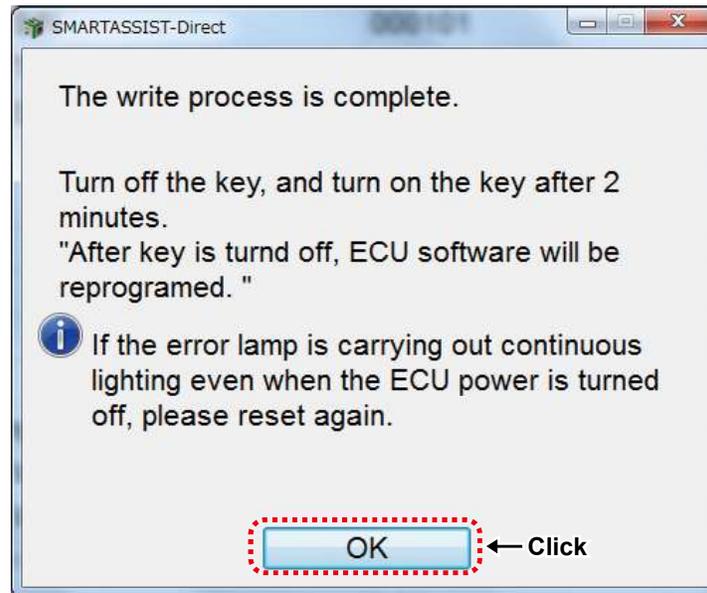
When the writing of correction values is complete, the below screen is displayed.



After ECU writing is completed, the procedure required next is displayed.

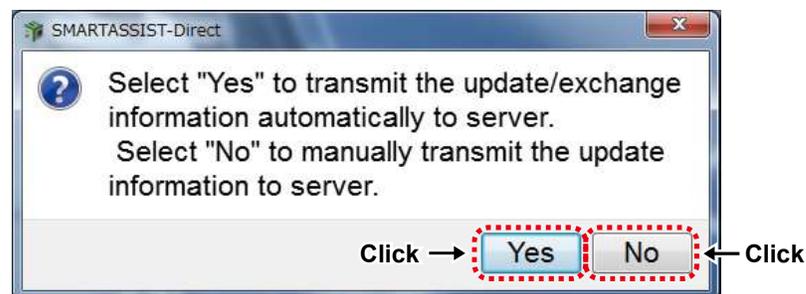
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.



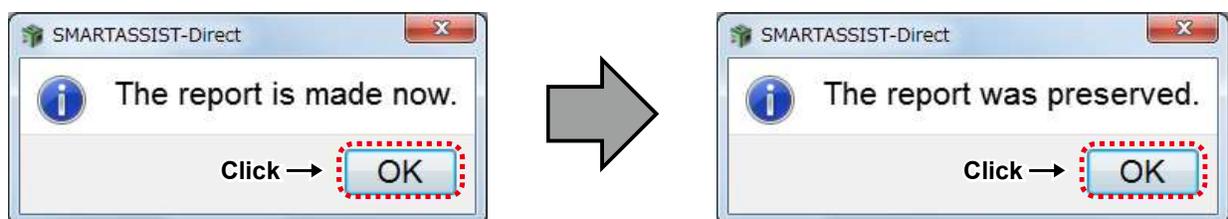
Confirm the content and click "Yes" to automatically send the replacement completion data to the management server.

Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".

Exchange process is complete.



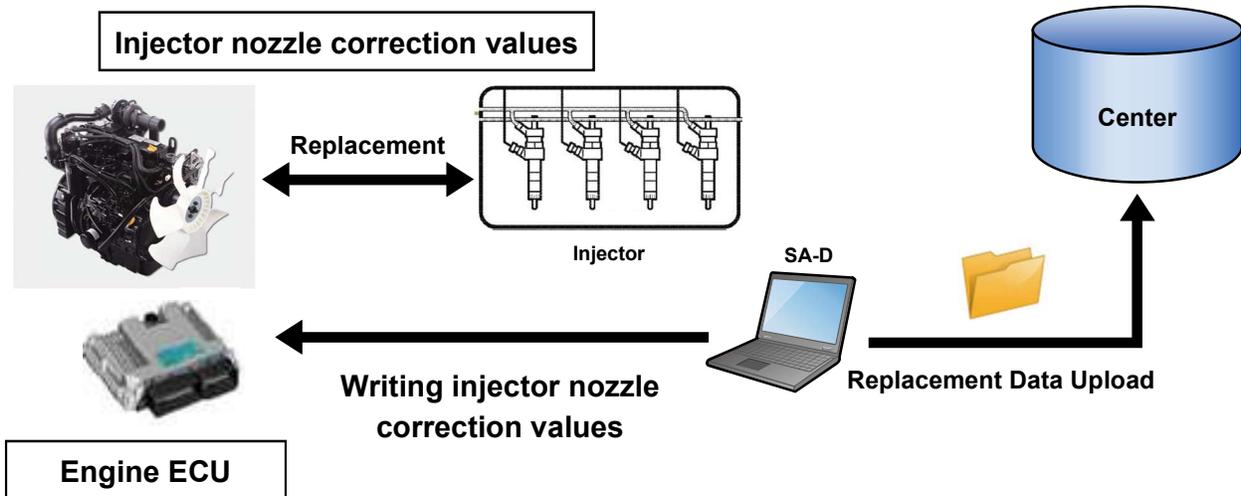
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

13.3 Parts Exchange Process for CR OEM Engine Manufactured by Bosch

13.3.1 Injector Exchange for 3/4 TNV**C (T/HT) Engines

- When exchanging the common rail (CR) injector nozzle manufactured by Bosch and equipped in 3/4TNV**C(H) (Tier 4 compliant) engines, it is necessary to write the correction values of the injector nozzle to the engine ECU.
- Correction values of the injector nozzles are registered separately by the engine ECU. It is necessary to set the corrector value when replacing the ECU or the injector nozzle.



- 1 Select "Industrial Engine" from the Start Menu.



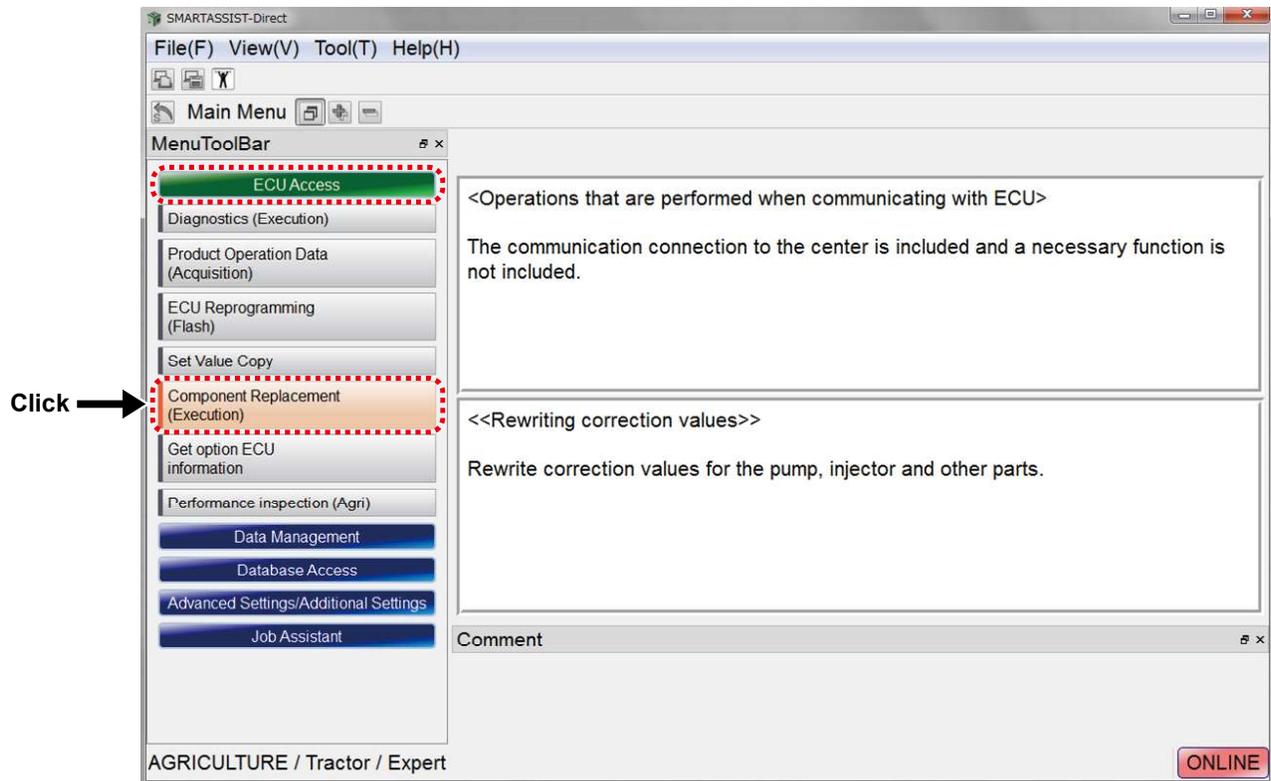
- 2 Select "Small Land Engine".



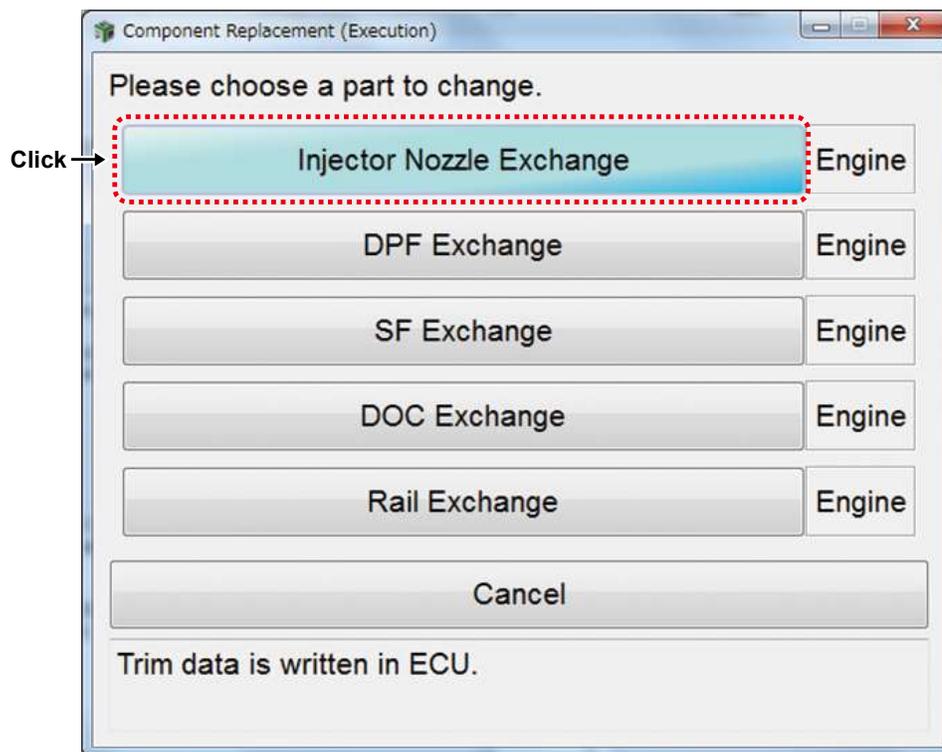
Note Make sure that the Internet connection is active.

13. Part Exchange

- 3 The main menu screen is displayed. Click "Component Replacement (Execution)" on the "ECU Access" tab.



- 4 Click "Injector Nozzle Exchange (Trim data Write)".



- 5 Information on the alphanumeric code of the injector is displayed.

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Alphanum Code		
1	AA8WCECC		
2	ASSCBSZC		
3	A1IEEW5C		
4	78RF6NXC		

Injector Pattern

Position of flywheel

Left side Right side

No.1 cylinder No.2 cylinder No.3 cylinder No.4 cylinder

flyWheel

DataInput Complete

- 6 Set the position of the flywheel, and confirm the position of the cylinders.

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Alphanum Code		
1	AA8WCECC		
2	ASSCBSZC		
3	A1IEEW5C		
4	78RF6NXC		

Injector Pattern

Position of flywheel

Left side Right side

No.1 cylinder No.2 cylinder No.3 cylinder No.4 cylinder

flyWheel

DataInput Complete

INJECTOR Exchange

Input the compensation data.

Cylinder No.	Alphanum Code		
1	AA8WCECC		
2	ASSCBSZC		
3	A1IEEW5C		
4	78RF6NXC		

Injector Pattern

Position of flywheel

Left side Right side

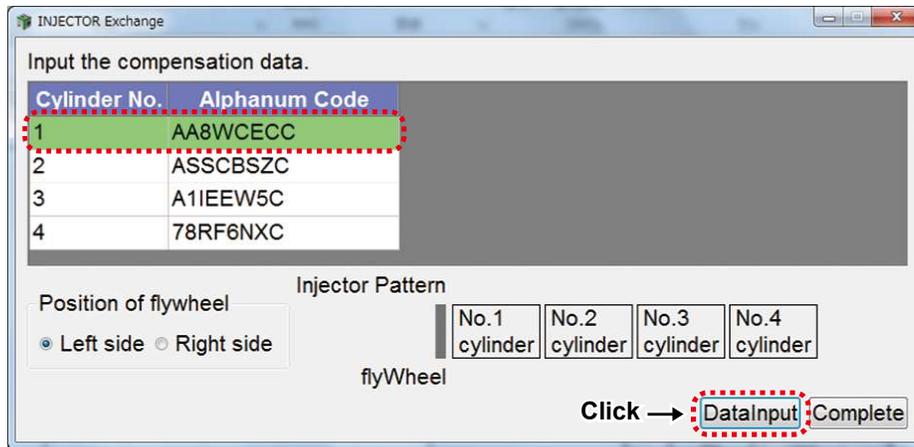
No.4 cylinder No.3 cylinder No.2 cylinder No.1 cylinder

flyWheel

DataInput Complete

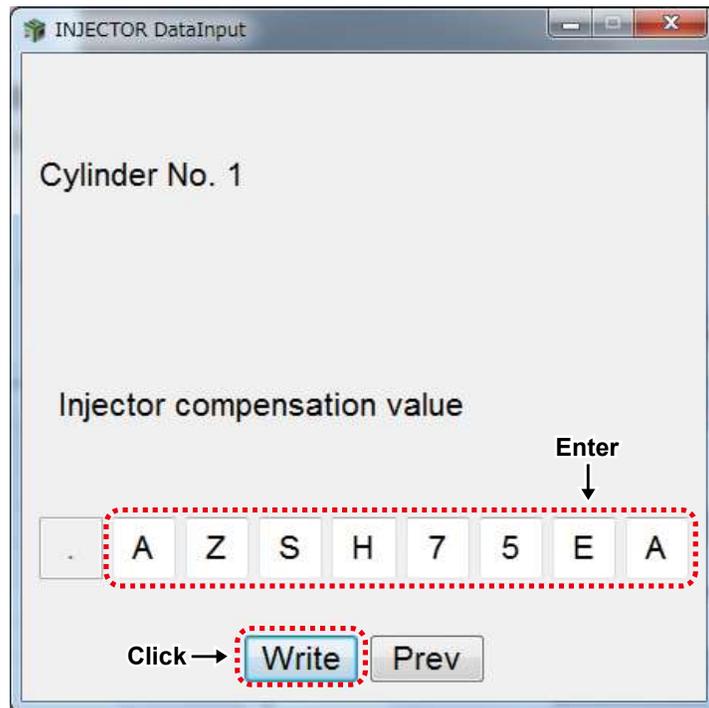
13. Part Exchange

7 Select the cylinder number of the injector to be exchanged, and then click "Data Input".

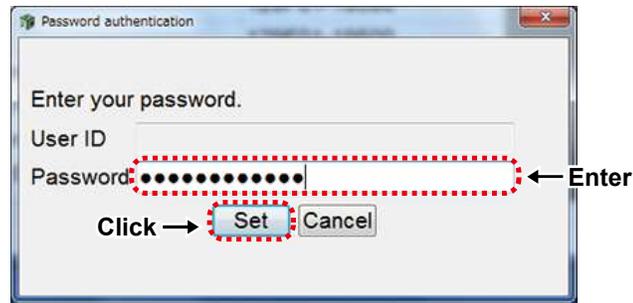


8 Enter the 8-digit alphanumeric code indicated on the top of the injector.

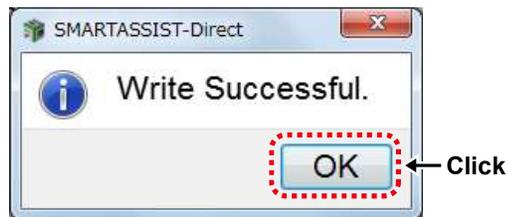
Click "Write" to start writing the data.



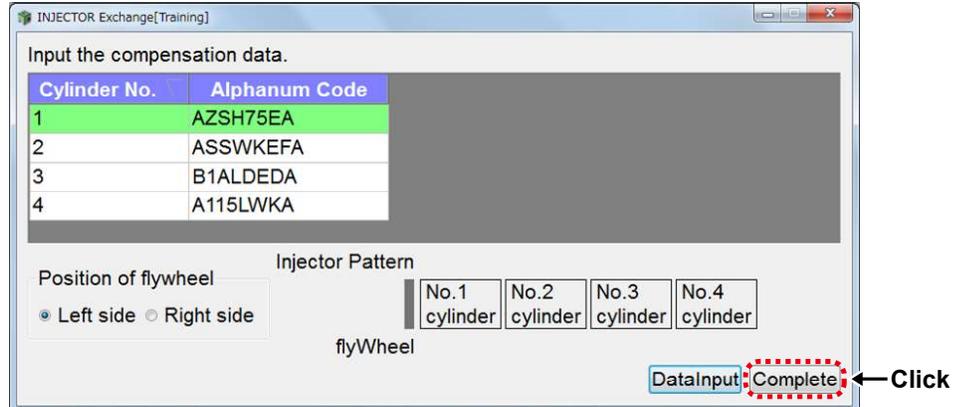
- 9 The password request page is displayed. Enter the password, and click "Set".



- 10 When writing is complete, the below message appears.



- 11 The rewritten alphanumeric code is displayed.
Click "Complete" to finish the exchange process.

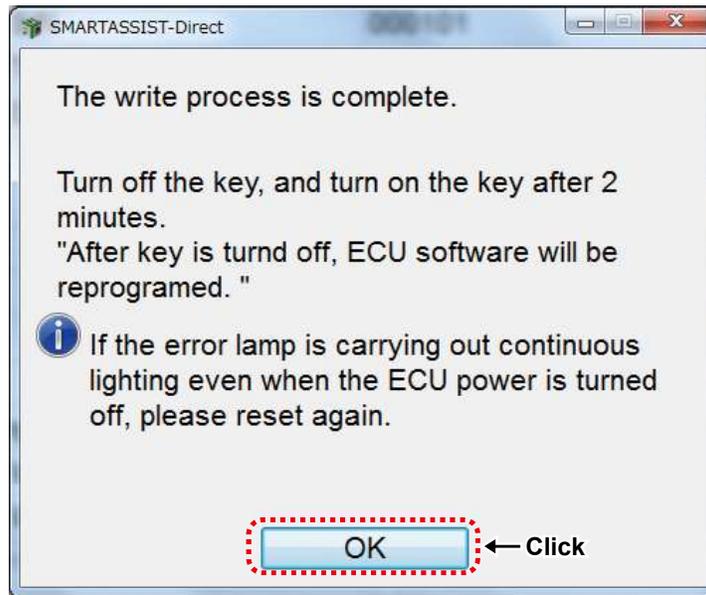


13. Part Exchange

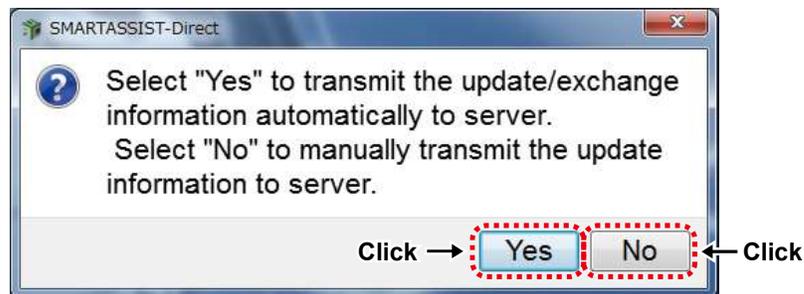
12 A screen with the necessary procedures after the ECU writing process is displayed.

When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.

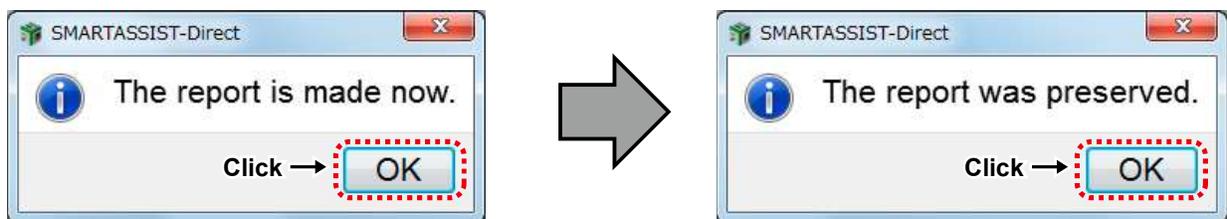


13 Confirm the content and click "Yes" to automatically send the replacement completion data to the management server. Click "No" to send it manually at a later time. When you click "No", refer to chapter 14.

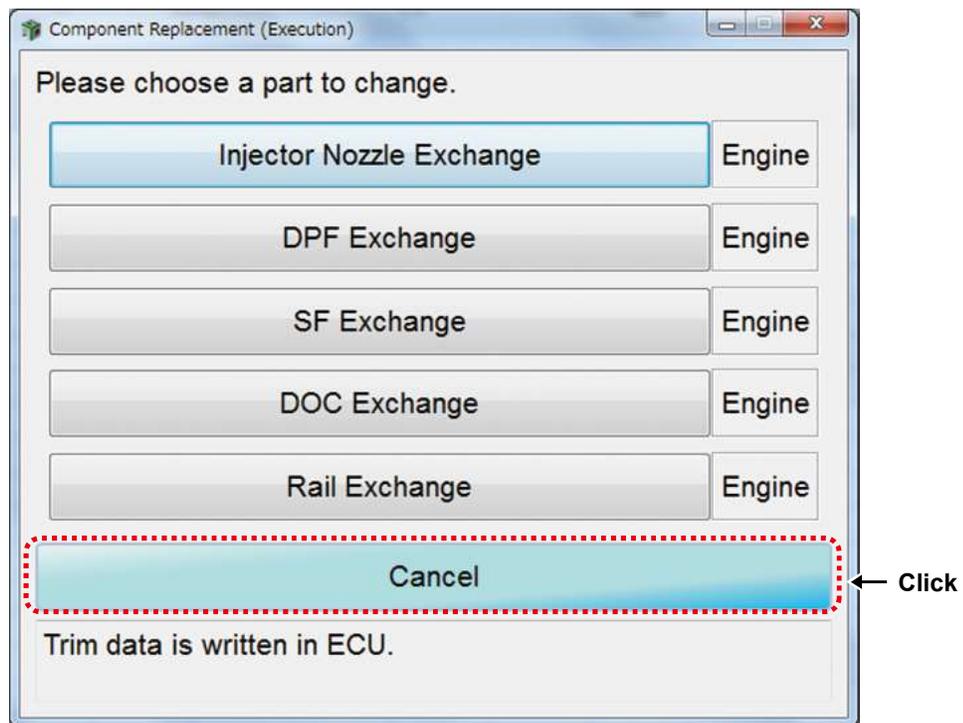


14 A message box noting you that a report was created will appear.

Click "OK".

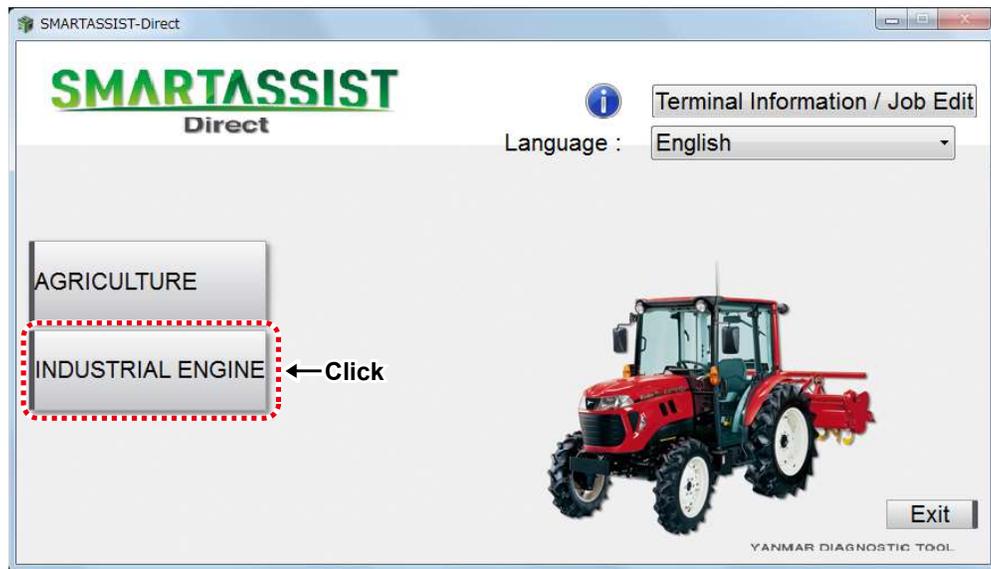


- 15** Click "OK" on the message box for the report creation notification to return to the below page. Click "Cancel" to return to the main menu.



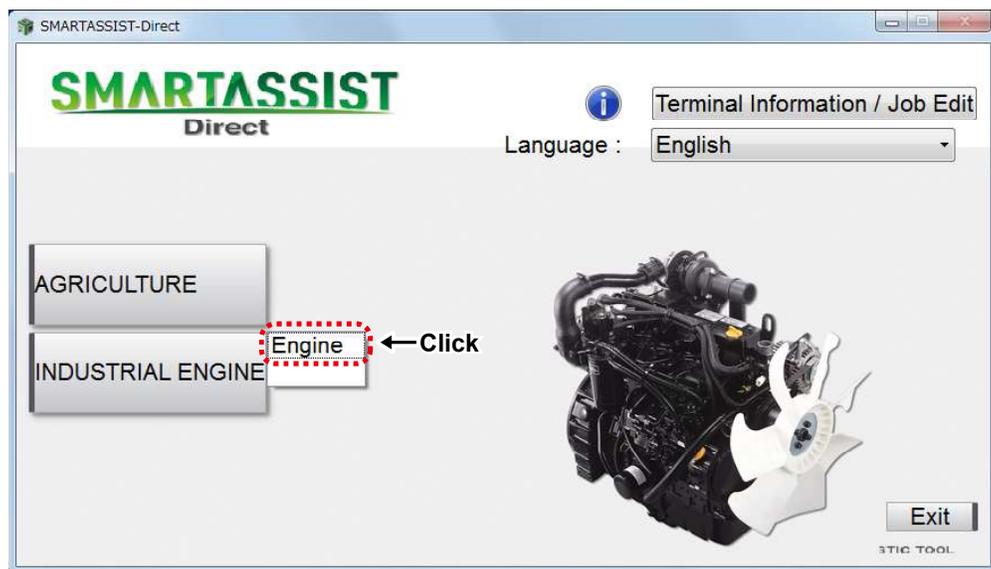
13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed

- 1 Select "Industrial Engine" from the Start Menu.



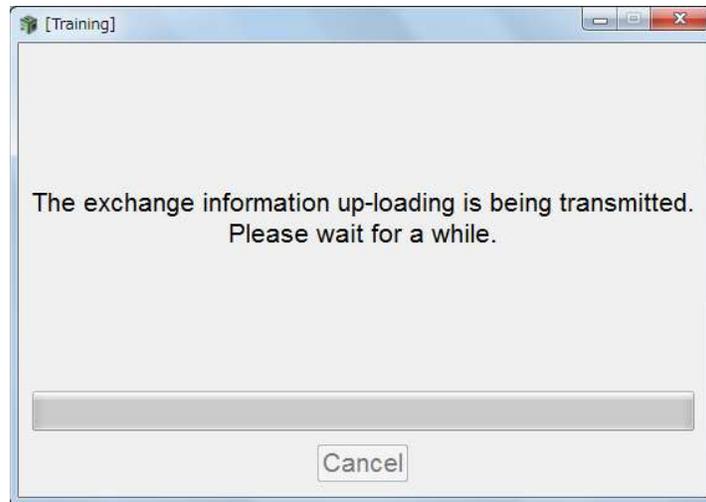
Note Make sure that the Internet connection is active.

- 2 Select "Small Land Engine".

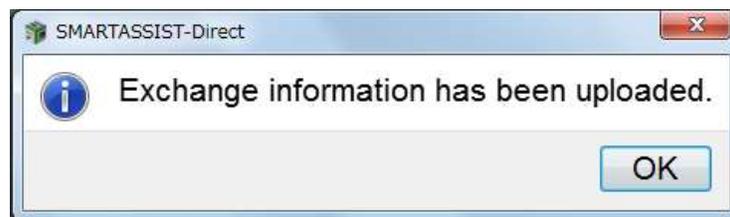


Note Make sure that the Internet connection is active.

- 3 "Exchange Info Upload" screen is displayed, and the upload starts.



- 4 A message box notifies you when the upload is complete.

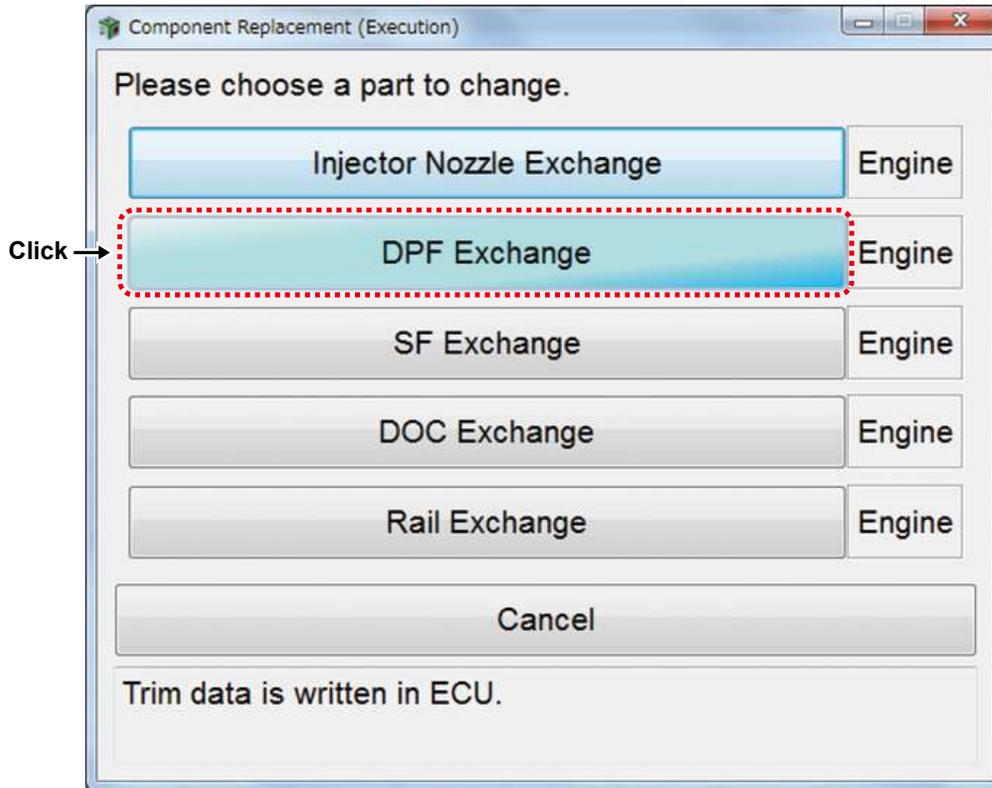


13.3.3 Exchange DPF/SF/DOC

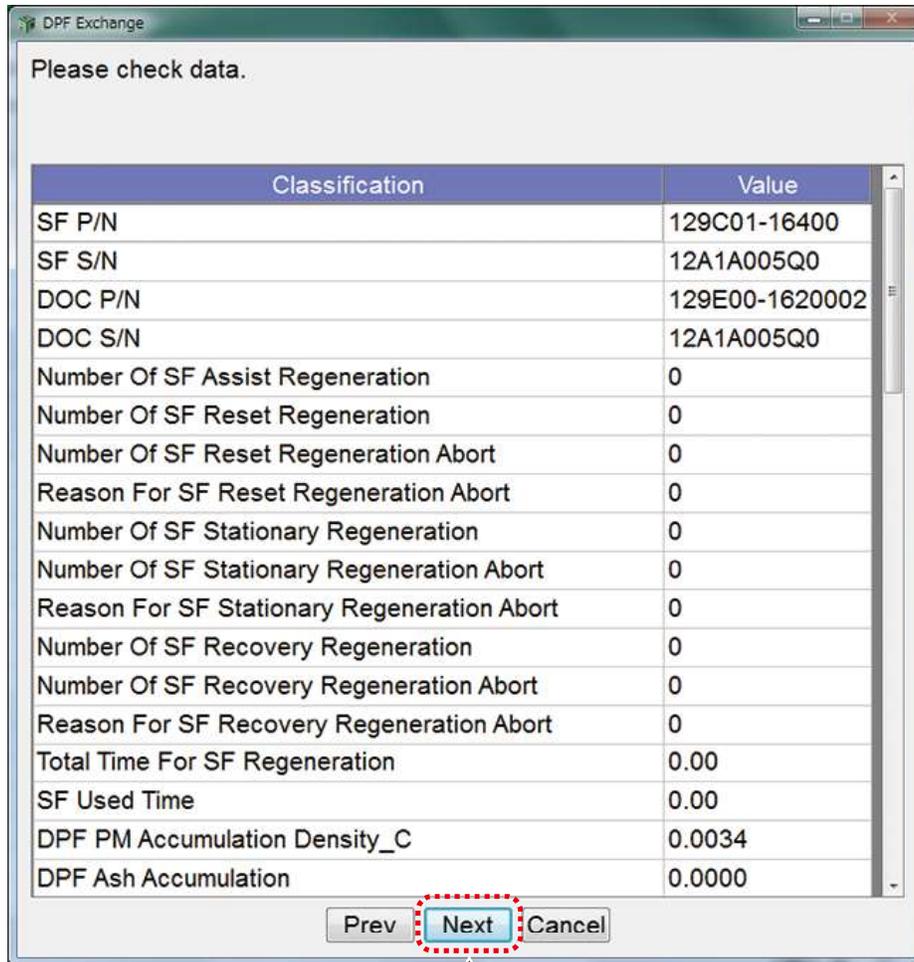
■DPF Exchange Process

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "DPF Exchange".



Present DPF information (before exchange) is displayed and the data is read by PC.



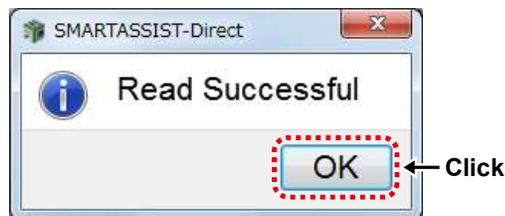
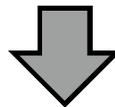
DPF Exchange

Please check data.

Classification	Value
SF P/N	129C01-16400
SF S/N	12A1A005Q0
DOC P/N	129E00-1620002
DOC S/N	12A1A005Q0
Number Of SF Assist Regeneration	0
Number Of SF Reset Regeneration	0
Number Of SF Reset Regeneration Abort	0
Reason For SF Reset Regeneration Abort	0
Number Of SF Stationary Regeneration	0
Number Of SF Stationary Regeneration Abort	0
Reason For SF Stationary Regeneration Abort	0
Number Of SF Recovery Regeneration	0
Number Of SF Recovery Regeneration Abort	0
Reason For SF Recovery Regeneration Abort	0
Total Time For SF Regeneration	0.00
SF Used Time	0.00
DPF PM Accumulation Density_C	0.0034
DPF Ash Accumulation	0.0000

Prev Next Cancel

Click



Click

13. Part Exchange

Select "New" or "Reuse" for SF status.

Click the value cell and enter the part number and serial number of the SF.

DPF Exchange

Please input data.

SFInformation New Clearing

Classification	Value
SF P/N	
SF S/N	
DOC P/N	
DOC S/N	
Number Of SF Assist Regeneration	0
Number Of SF Reset Regeneration	0
Number Of SF Reset Regeneration Abort	0
Reason For SF Reset Regeneration Abort	0
Number Of SF Stationary Regeneration	0
Number Of SF Stationary Regeneration Abort	0
Reason For SF Stationary Regeneration Abort	0
Number Of SF Recovery Regeneration	0
Number Of SF Recovery Regeneration Abort	0
Reason For SF Recovery Regeneration Abort	0
Total Time For SF Regeneration	0.
SF Used Time	0.
DPF PM Accumulation Density_C	0 00

Prev Write Cancel

Model Serial Input

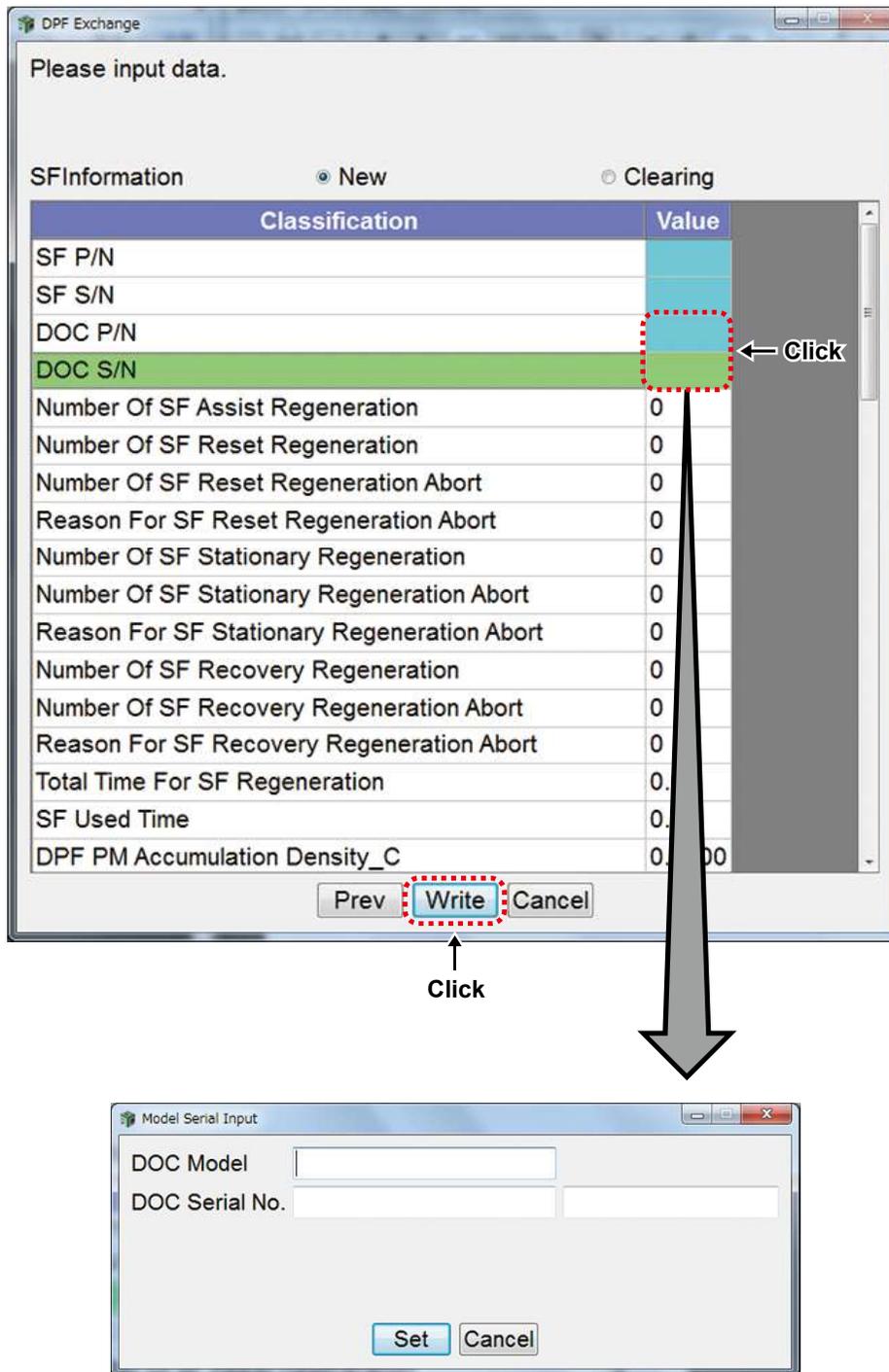
SF Model

SF Serial No.

Set Cancel

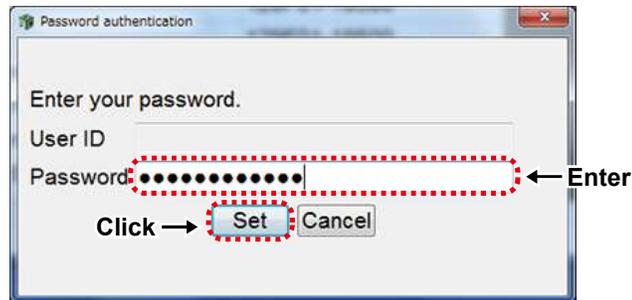
Click the value cell and enter the part number and serial number of the DOC.

Click "Write" to write the data to the ECU.

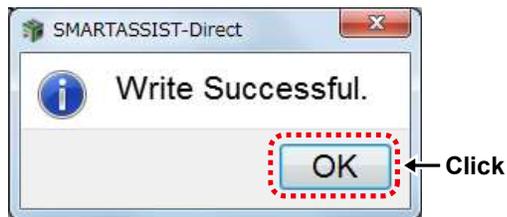


13. Part Exchange

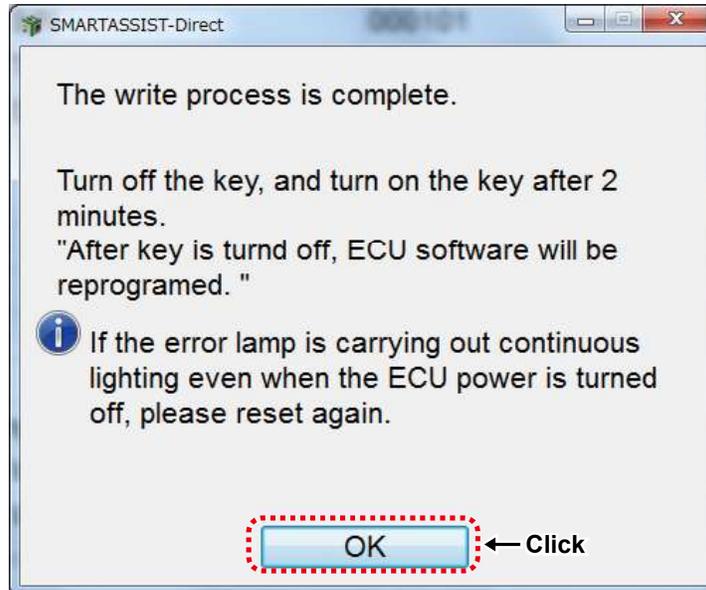
The password request page is displayed. Enter the password, and click "Set".



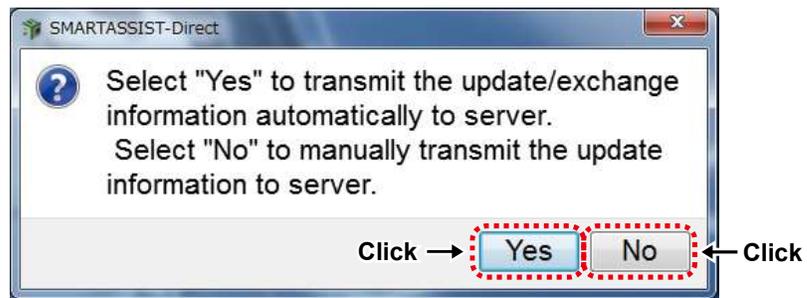
When writing is complete, the below message appears.



When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions. Turn the ECU power source ON after holding the power OFF for 30 seconds.

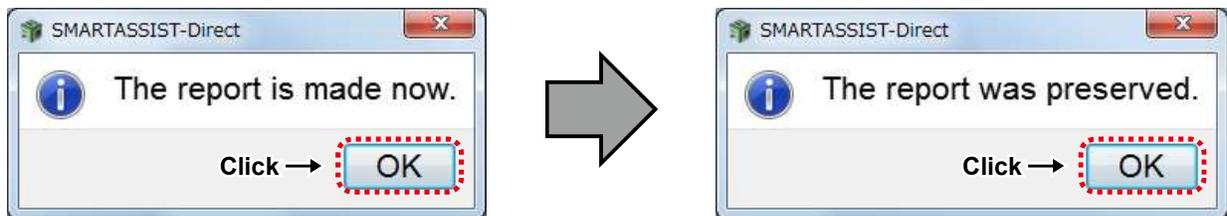


Confirm the content and click "Yes" to automatically send the replacement completion data to the management server. Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".

Exchange process is complete.



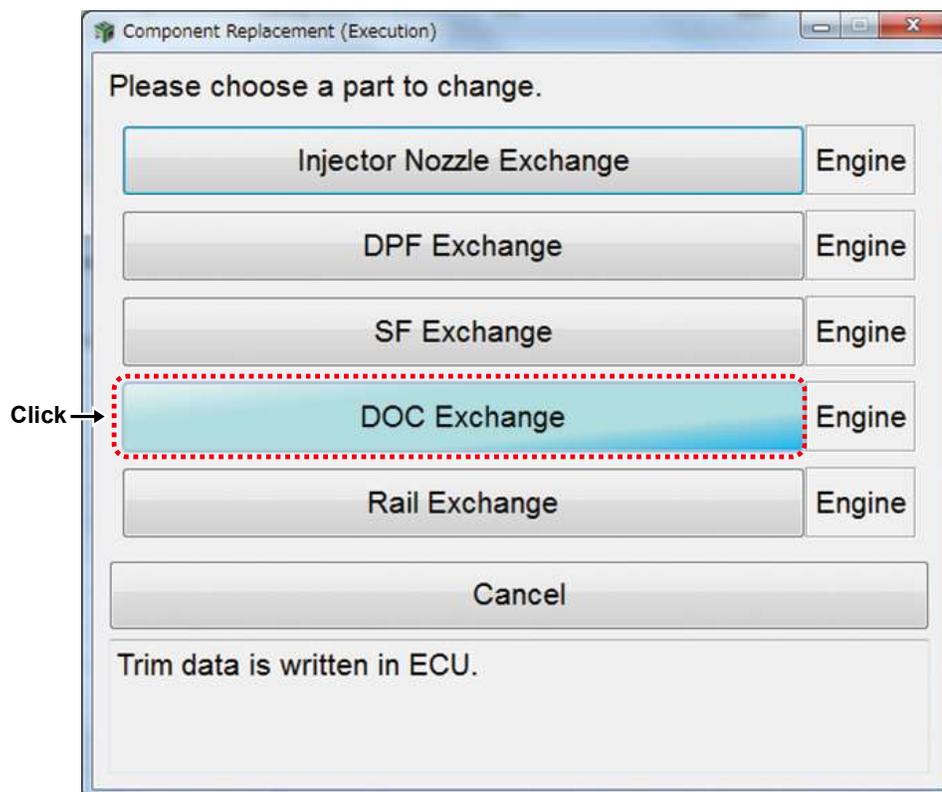
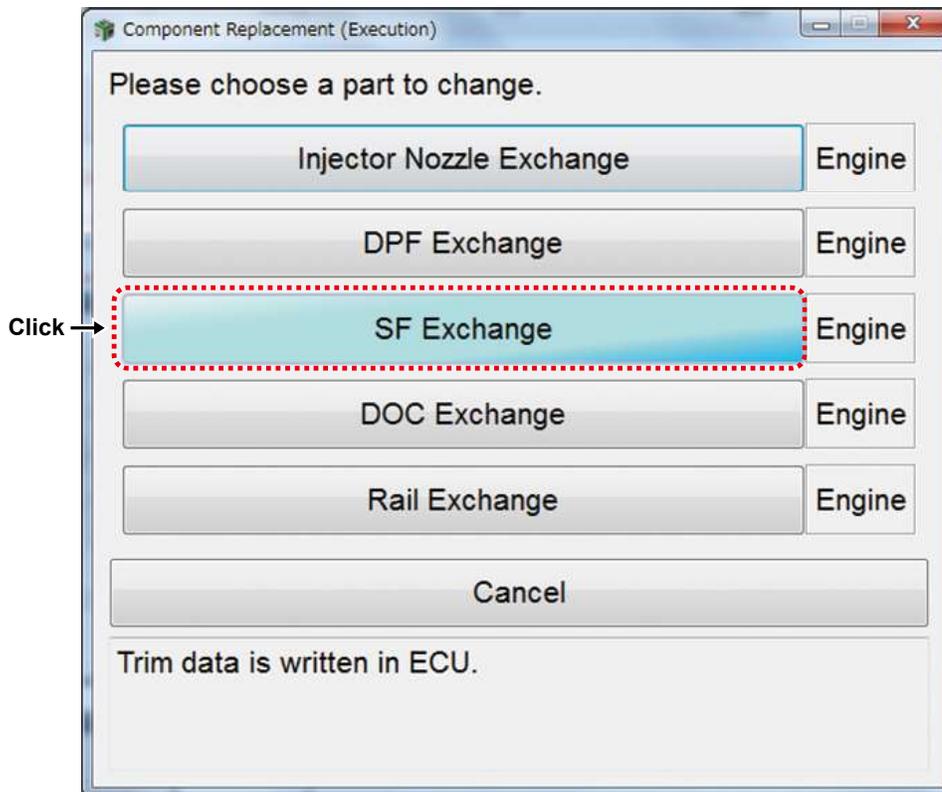
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

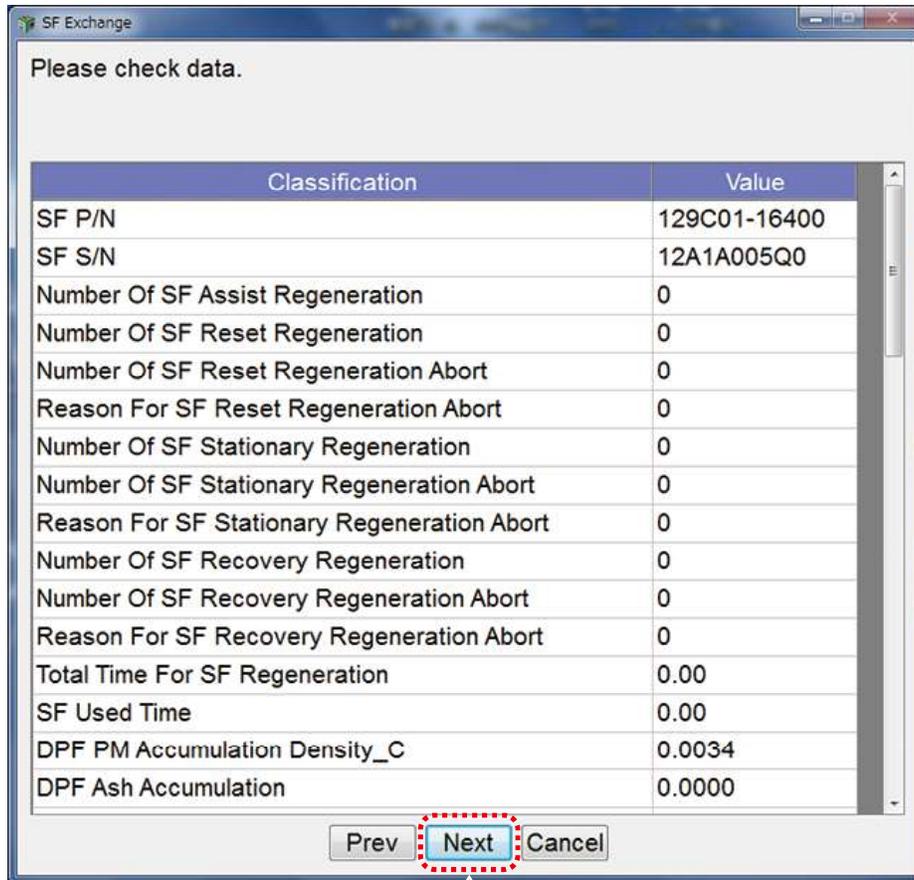
■SF/DOC Exchange

The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

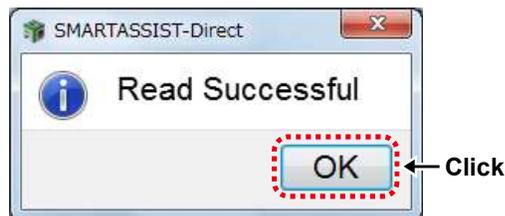
Click "SF Exchange" or "DOC Exchange".



For "SF Exchange", present SF information (before exchange) is displayed and the data is read by PC.



Click

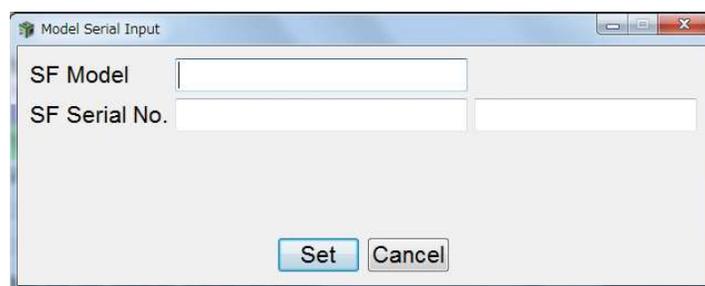
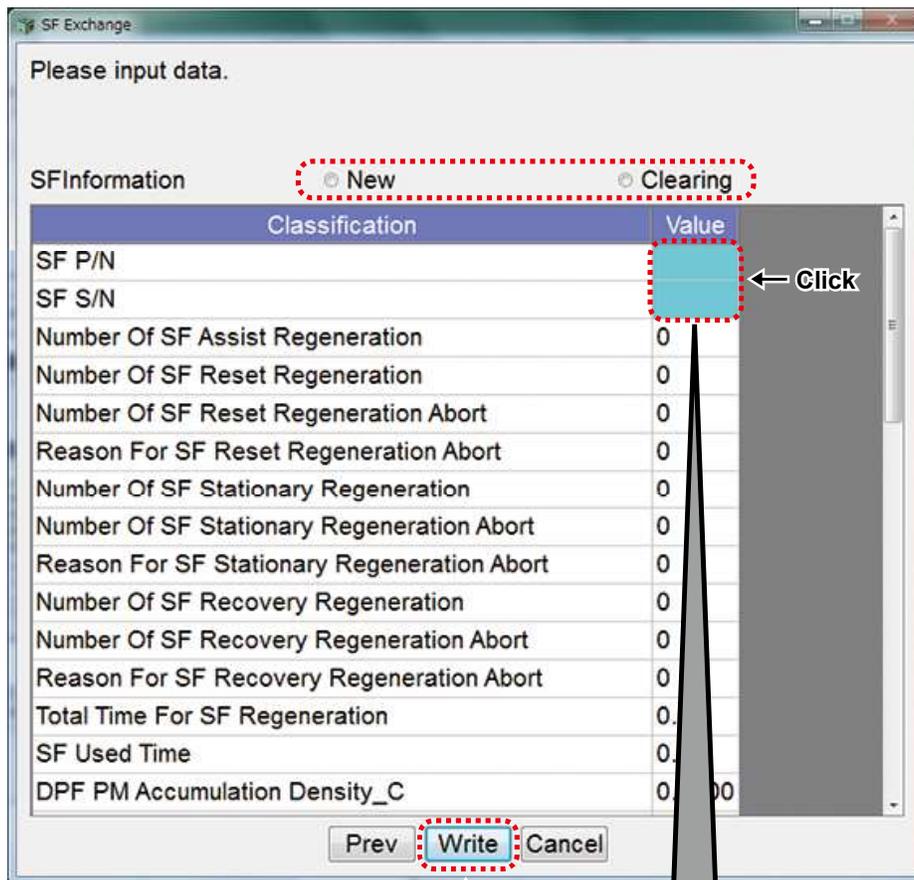


13. Part Exchange

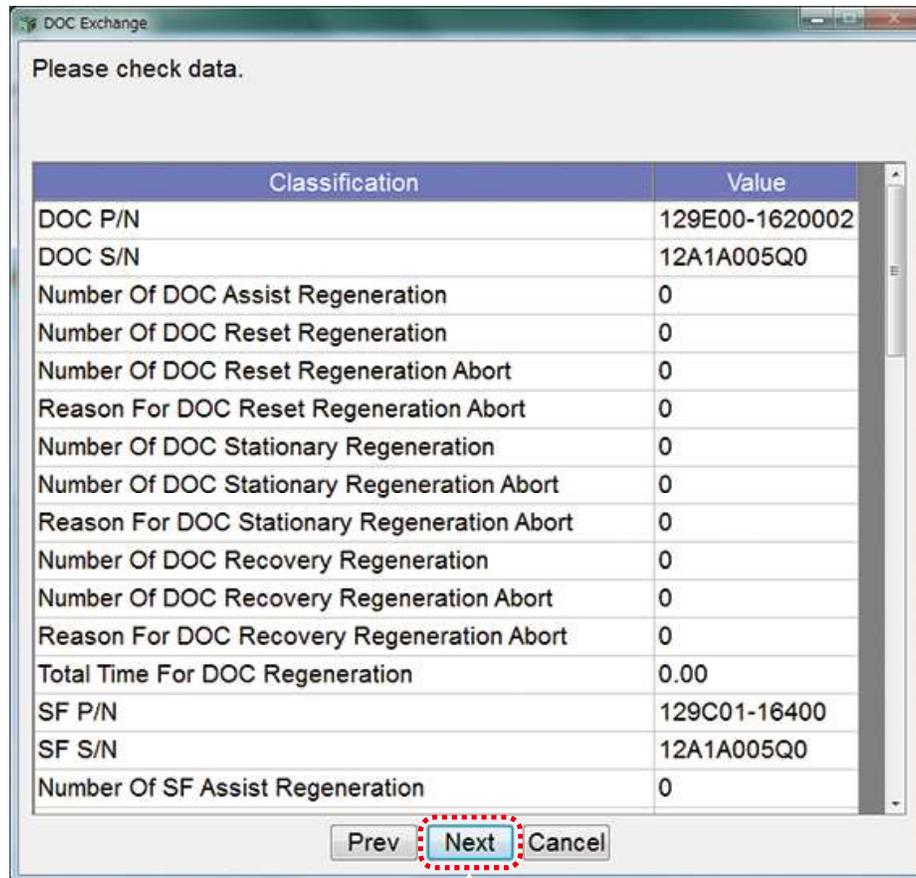
Select "New" or "Reuse" for SF status.

Click the value cell and enter the part number and serial number of the SF.

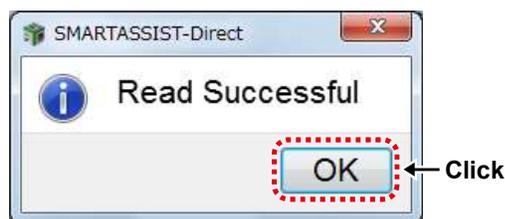
Click "Write" to write the inputted data to the ECU.



For "DOC Exchange", present DOC information (before exchange) is displayed and the data is read by PC.

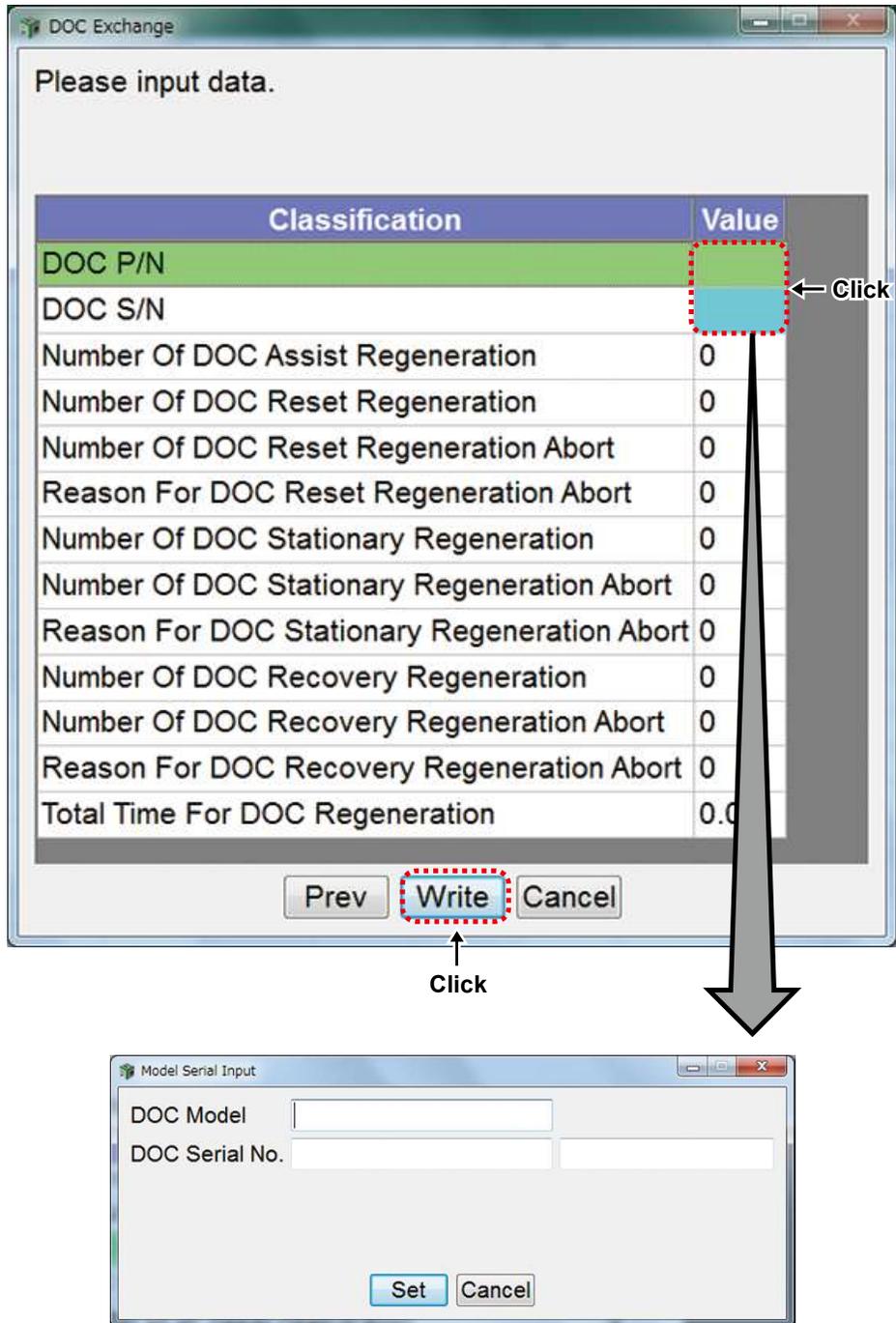


Click



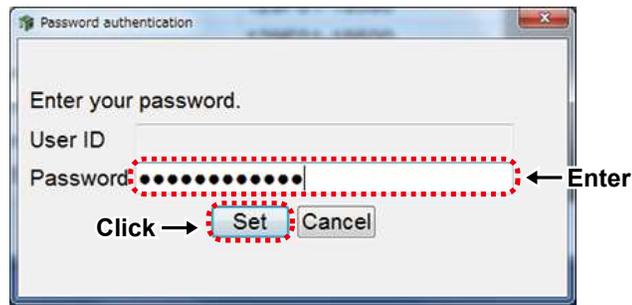
13. Part Exchange

Click the value cell and enter the part number and serial number of the DOC.

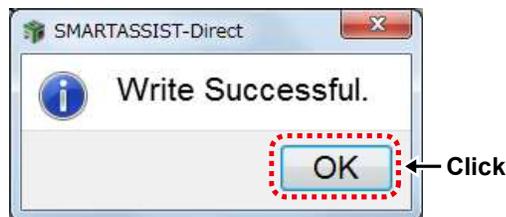


Enter the data in SF exchange or DOC exchange then click "Write" to write the data to the ECU.

The password request page is displayed. Enter the password, and click "Set".

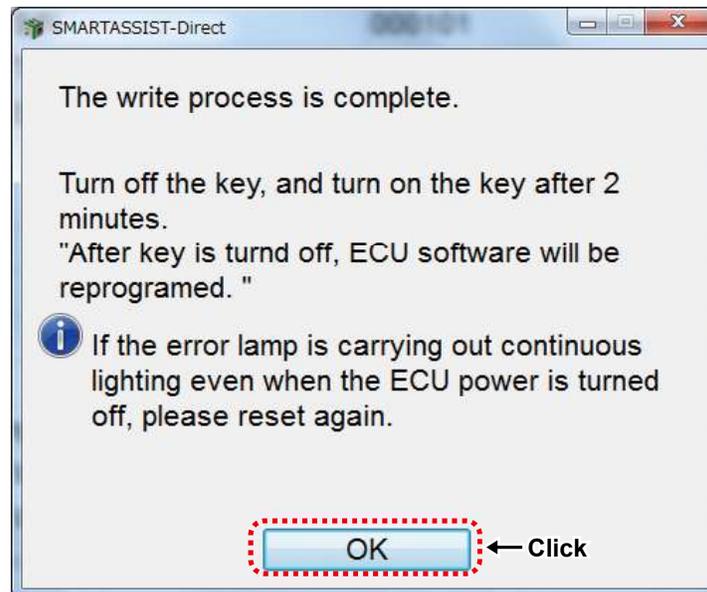


When writing is complete, the below message appears.



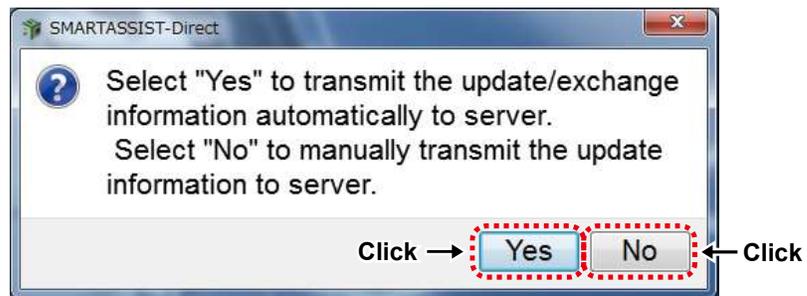
When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions.

Turn the ECU power source ON after holding the power OFF for 30 seconds.



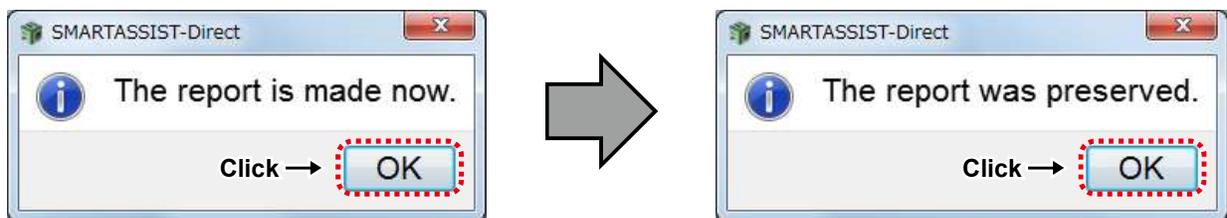
13. Part Exchange

Confirm the content and click "Yes" to automatically send the replacement completion data to the management server. Click "No" to send it manually at a later time.



When the screen below is displayed, click "OK".

Exchange process is complete.



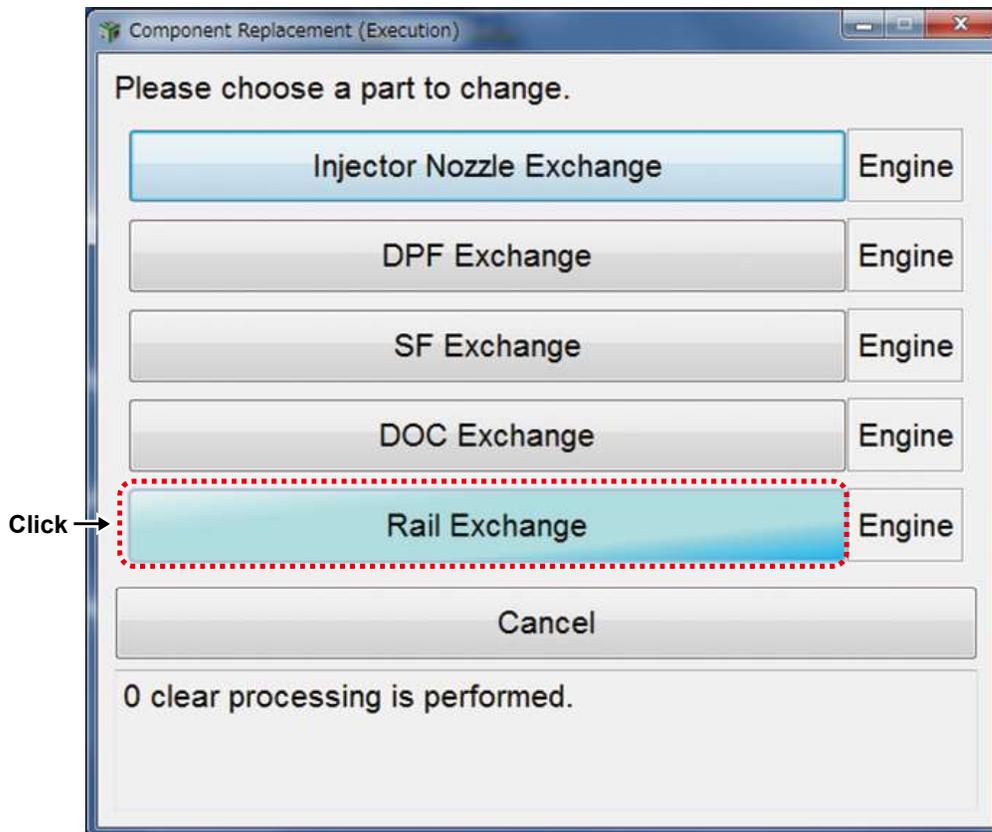
When you select "automatic sending", then follow the same instruction as [13.3.2 Automatic Upload Operation when Injector (Bosch) Replacement (Execution) completed].

If you select the data manually, then refer to chapter 14 for the following procedure.

13.3.4 Rail Exchange Process

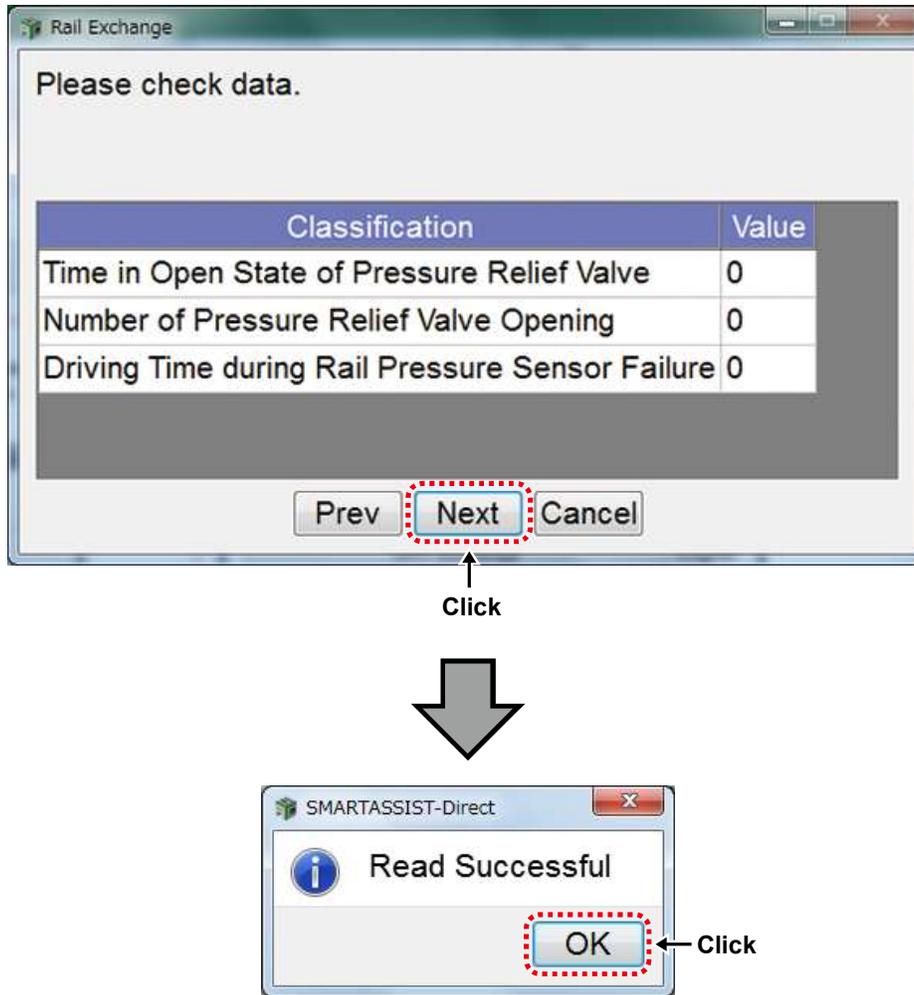
The procedure, "Start Menu (Industrial Engine → Small Land Engine)" → "Main Menu ("ECU Access" → "FIE Replacement (Execution)", is the same as [13.2.1 Injector Exchange Process for 4TNV94HT-Z/4TNV94CHT/4TNV94FHT].

Click "Rail Exchange".



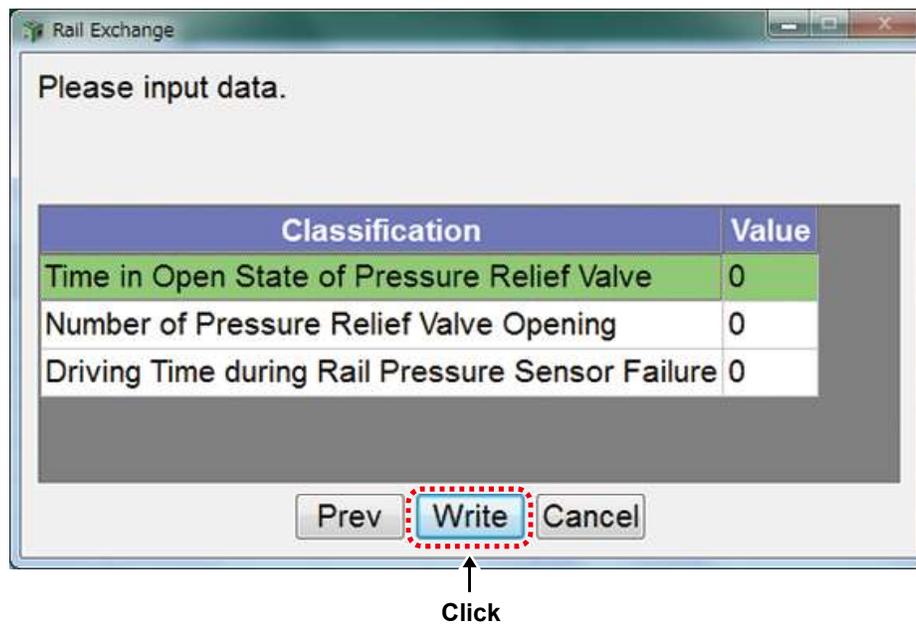
13. Part Exchange

Present rail information (before exchange) is displayed and the data is read by PC.

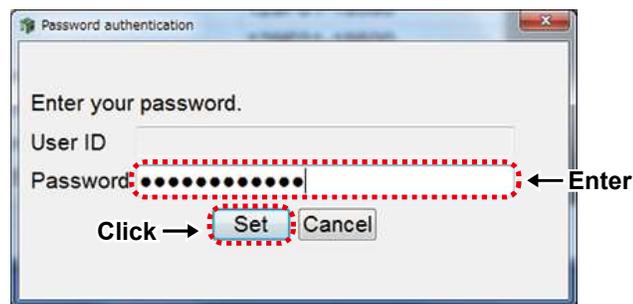


Click "Write".

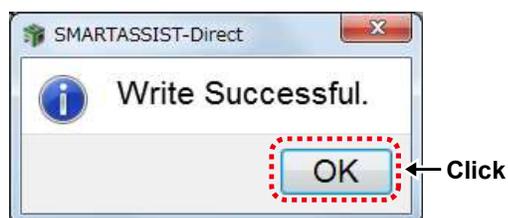
(No data entry is required.)



The password request page is displayed. Enter the password, and click "Set".

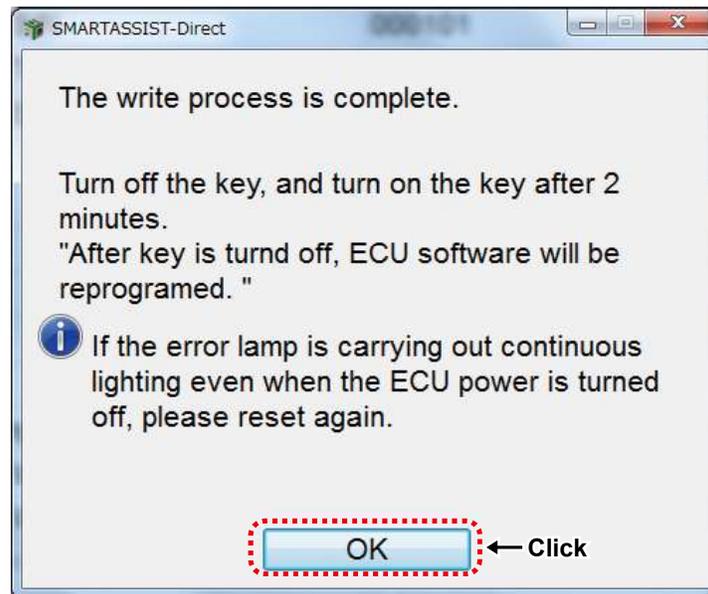


When writing is complete, the below message appears.

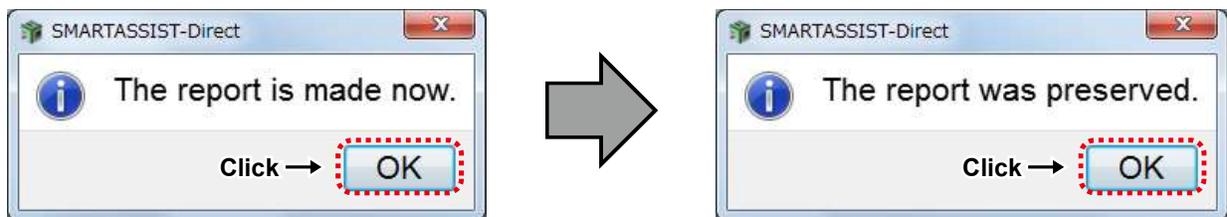


13. Part Exchange

When the confirmation screen is displayed, click "OK". Turn ON/OFF the ECU by following the on-screen instructions. Turn the ECU power source ON after holding the power OFF for 30 seconds.



When the screen below is displayed, click "OK".
Exchange process is complete.



13.4 Reference material "Parts replacement process"

■Supply Pump Replacement Process for 4TNV94HT-Z and 4TNV94CHT (Denso) Engines

When replacing the supply pump for the 4TNV94HT-Z and 4TNV94CHT engines (DENSO CR), it is necessary to perform pump learning after replacement. Because there is no supply pump replacement item found in the main menu for part replacements, after replacing the pump, connect to the SA-D and select Fuel Pump Learning using the forced operation diagnosis test from the top bar of the menu, and conduct according to the notes.

For details, refer to "[6.5.9 Reference material: Active Control (Engine TNV series for Tier3/Tier4)] [■ Fuel Pump Learning]".

■4TNV94HT-Z Engine (DENSO) ECU for CR - Replacement Process

Also, when replacing the management ECU or ECU for CR for the 4TNV94HT-Z engine type or when replacing the management ECU or ECU for CR at the same time, it is necessary to initialize the ECU for CR in order to transfer and receive the data from the management ECU to the ECU for CR. Connect to the SA-D and select the configuration settings from the settings on the menu top bar, and then check the initialized data of the ECU data for CR.

SMARTASSIST-Direct

File(F) View(V) Operation(O) Tool(T) Help(H)

Diagnosics TRAINING Active Code

MenuToolBar

- ECU Information
- Diagnostic Codes
- Freeze Frame Data
- Diagnostic Tests
- Data Logging
- Historical Data
- ECU Structures
- System Settings
- Configuration
- Calibration
- Tuning
- Initial Settings

System Settings - Configuration

Description	Value	Notes
HOLD SPEED2	1500	
SLOW DOWN SPEED	1500	
SLOW DOWN RATE1	85	
SLOW DOWN RATE2	70	
AUTO DECELERATION WAI...	4	
DROOP CONTROL SELECT	1	0:ISOCHRONOUS, 1:CHANGE POSSIBILITY, 2:DROOP
ENGINE STOP DELAY TIME	30	
ECU Data Format for CR	0	
Fail-safe Action Delay Time A	30	
Fail-safe Action Delay Time B	180	

Comment

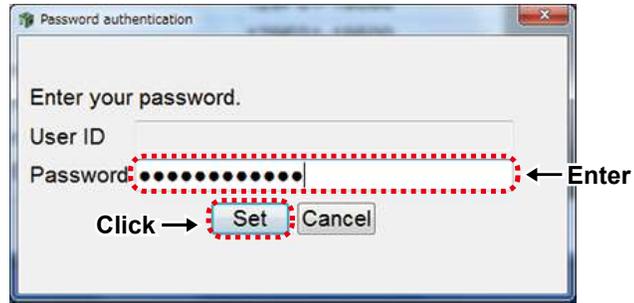
Notes :

Baudrate : 500k Type:4TNV94HT-ZXXX / SNo:123456

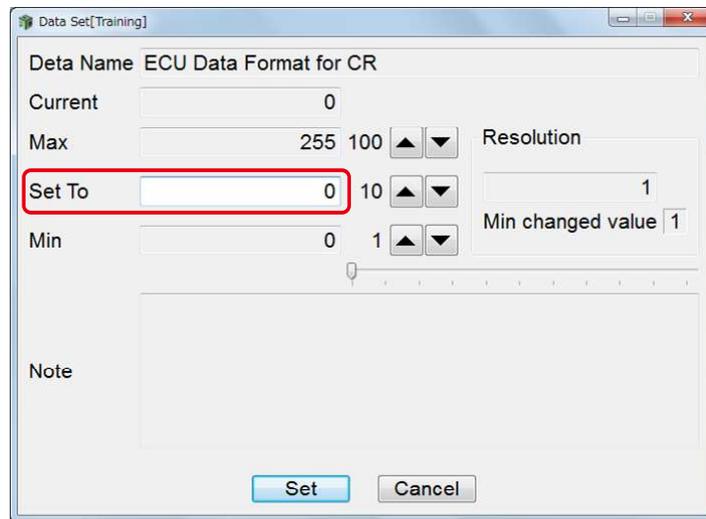
ONLINE

13. Part Exchange

The password request page is displayed. Enter the password, and click "Set".

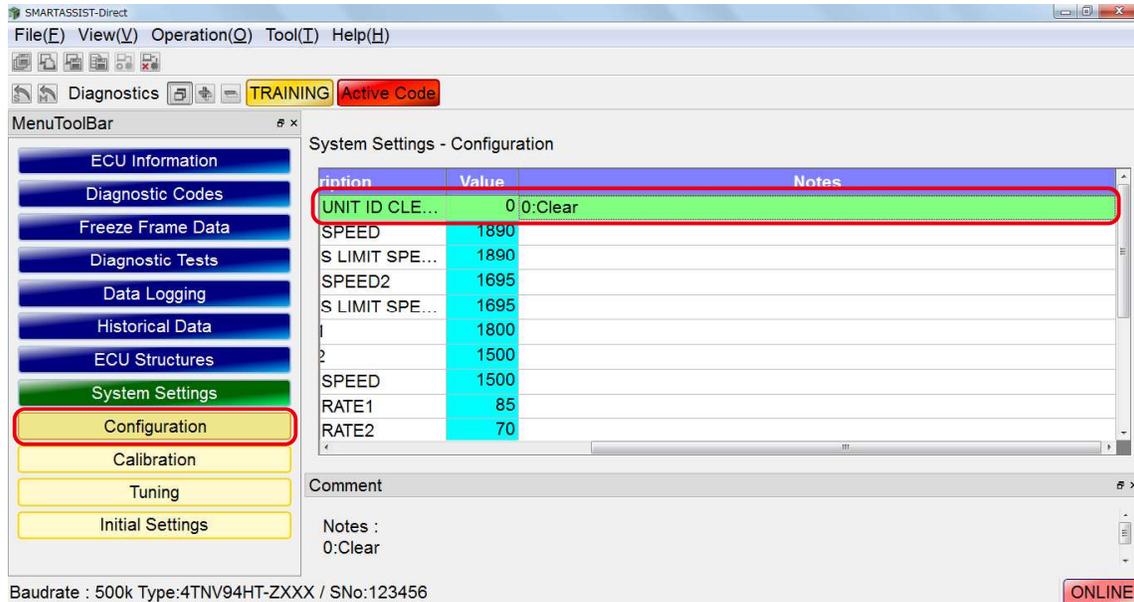


When replacing the ECU for CR, because the data is zero "0", select Initialize ECU data for CR and input the number one "1" in the settings on the screen.

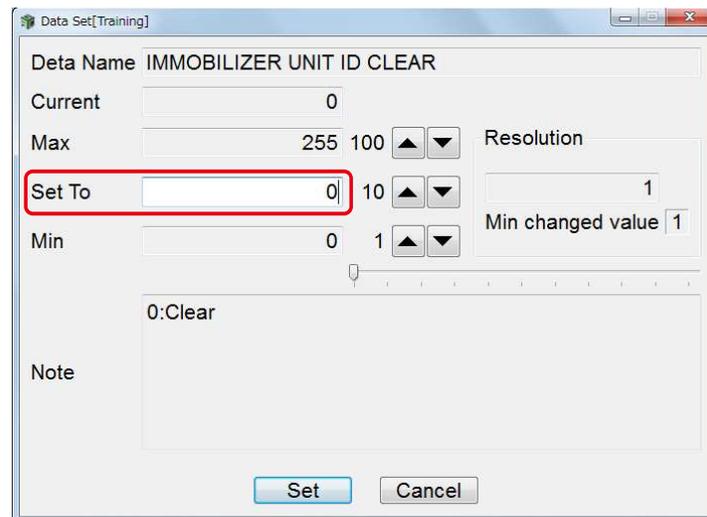


■ Immobilizer (Option) Failure or Replacement Process

When the engine cannot be started due to a failure of the immobilizer (optional function) and or when replacing the immobilizer, connect to the SA-D, and select the configuration settings from the menu top bar settings, and then check the immobilizer UNIT-ID clear data.



If there is a value other than zero "0", select immobilizer UNIT-ID clear from that screen and input zero "0" in the settings.



14. Exchange Information Management Function

14.1 Manual Upload Operation of Exchange Information

As explained in Chapter 12 and Chapter 13, when reprogramming the ECU software*1, copying the settings (correction value), replacing the pump (copying the setting), or replacing the injector nozzle, DPF, rail (writing the correction values), a maintenance report is created and this data is upload automatically or manually to the center. However, the data is not sent automatically when reprogramming the software during ECU replacement. Therefore it is necessary to upload the data to the Center manually. Also, if despite having downloaded the software and data, and it was not replaced, it is necessary to perform the process of cancellation of the replacement. These task implementation items and operation categories have been summarized in a table as indicated below. As indicated in the table below, in the case a manual operation process or replacement operation process (or downloaded data) was canceled, it will become necessary to perform a manual upload operation, for which procedures are provided in this chapter.

*1: There are two types of ECU software available for 4TNV94FHT engines, engine ECU and SCR ECU (=DCU: Dosing Control Unit).

Note If the process is not completed automatically, it is necessary to upload a replacement completion or a replacement cancellation process manually to the center. If the data is not uploaded, the process will not complete and as such, the ECU software and pump correction values cannot be downloaded. In addition, if the data is not uploaded within 30 days of completing the process, a warning screen will be displayed, prompting the user to execute the process.

○: Selectable -: Not Set

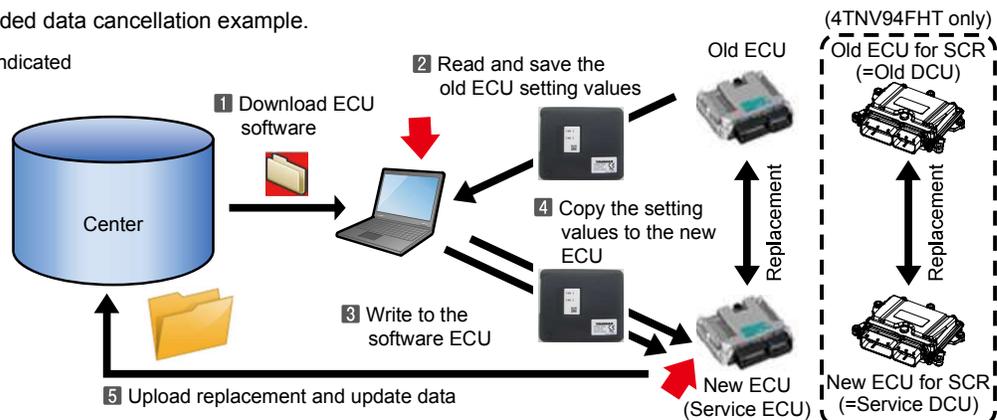
Control Menu	Upload		Replacement (or downloaded data) cancellation	Notes
	Automatic Completion	Manual Completion		
ECU Reprogramming (Flash)				
ECU Exchange (Onboard Reprogramming)	-	○	○	
ECU Exchange (Off board Reprogramming)	-	○	○	
Software Update (Onboard Reprogramming)	○	○	○	
Settings Copy	○	○	-	
Parts Replacement (Execution)				
Pump Exchange (Copying Correction Value)	○	○	○	
Injector Nozzle Exchange (Writing Correction Value)	○	○	-	
Rail Replacement (Writing Correction Value)	○	○	-	
DPF Replacement (Writing Correction Value)	○	○	-	
SF Replacement (Writing Correction Value)	○	○	-	
DOC Replacement (Writing Correction Value)	-	-	-	

● The writing of injector nozzle, DPF, SF, DOC, rail correction values is not the writing of downloaded data, and thus there is no cancellation operation.

● Replacement or downloaded data cancellation example.

Regarding the service flow indicated in the diagram on the right,

- 1) Downloaded the software from the Center, however, it did not write to the Service ECU
- 2) Created a new ECU, however, did not perform replacement of the ECU etc.

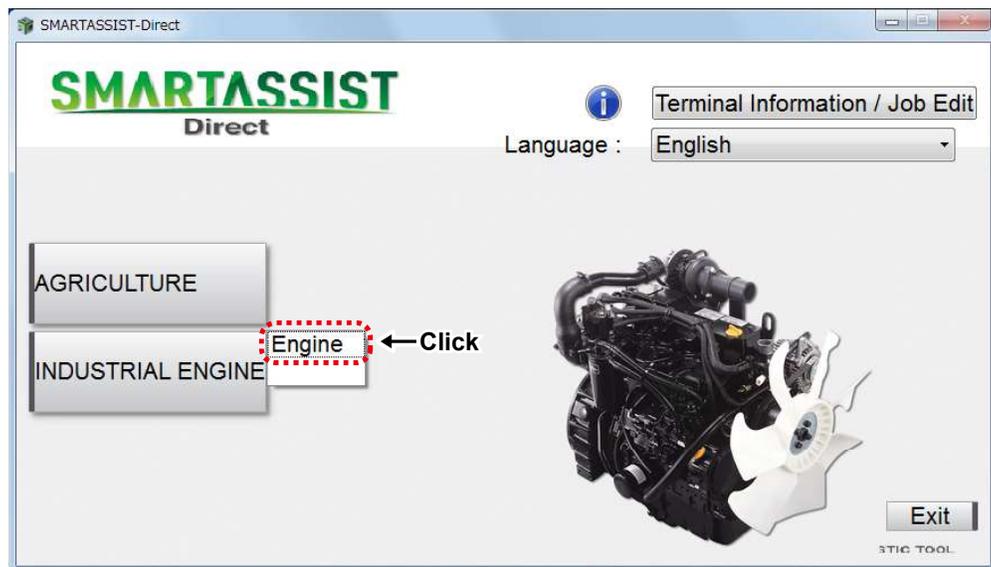


14.2 Manual Exchange Completion Process

- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

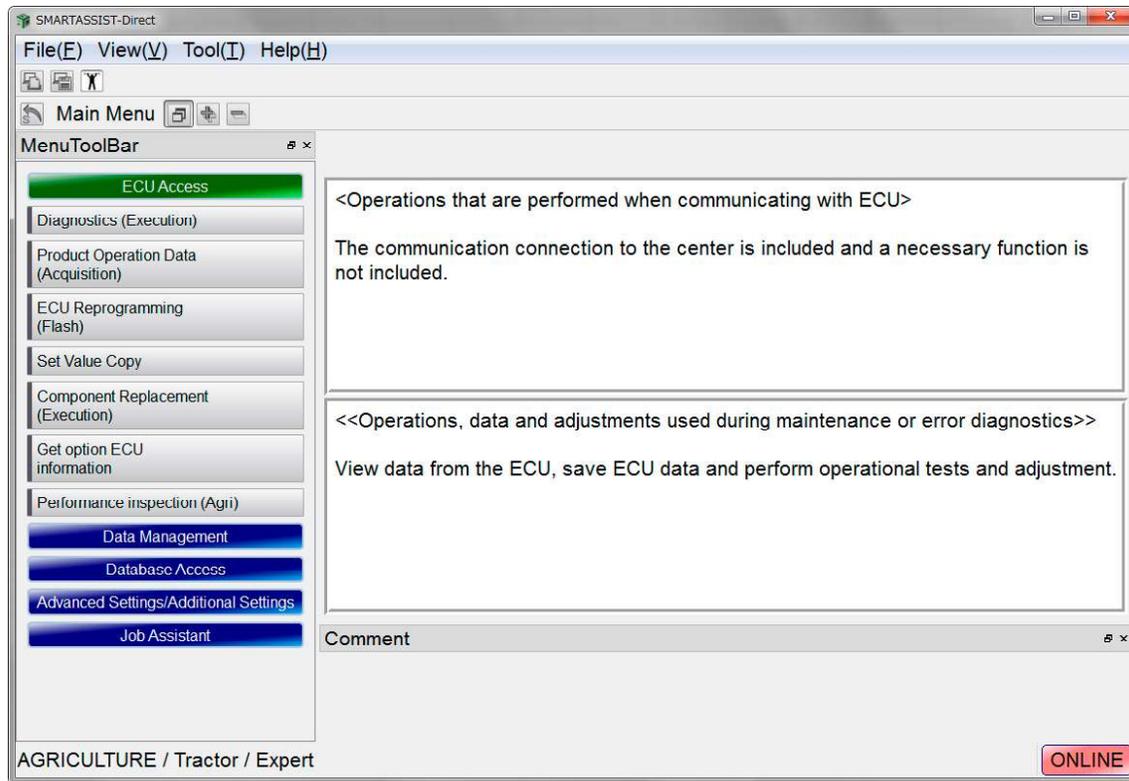


- 2 Select "Engine".

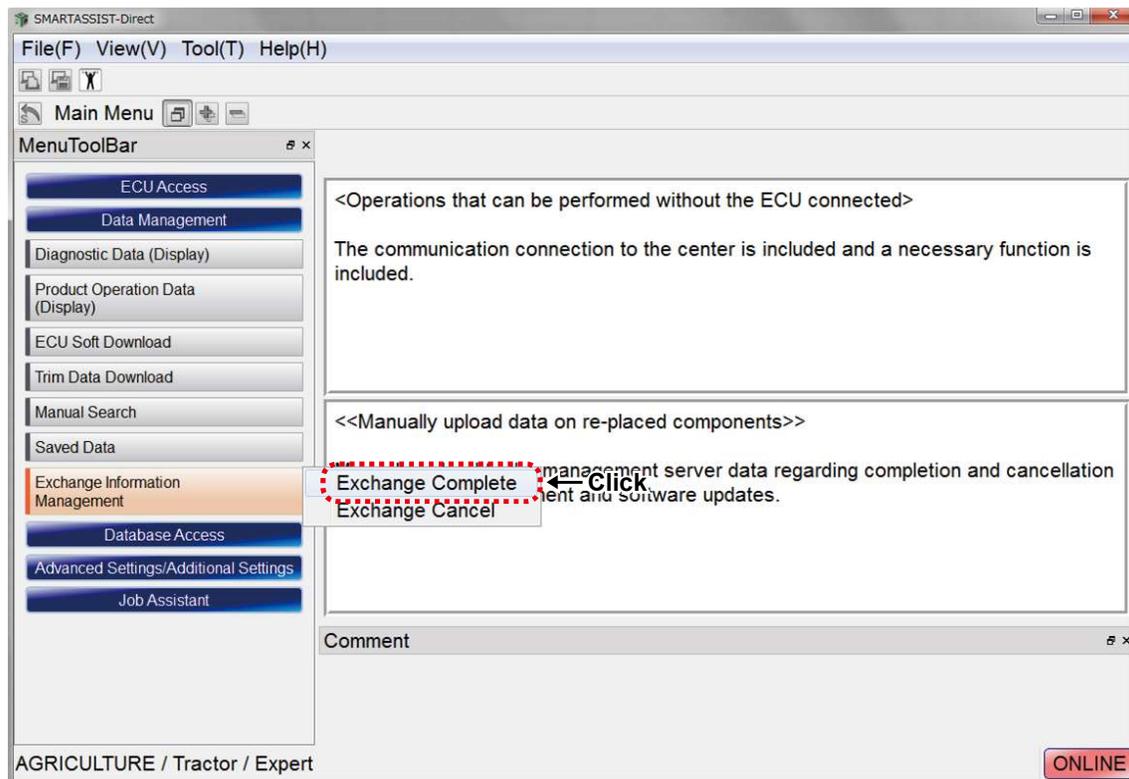


14. Exchange Information Management Function

3 The Main Menu Screen is displayed.



4 Click "Exchange Information Management" and "Exchange Complete" on the tab "Data Management".



5 The Exchange Information Management (Completion) Screen is displayed.

1 Operation Name selection

Select "ECU Exchange (onboard reprogramming)" "ECU Exchange (offboard reprogramming)" "Software Update (onboard reprogramming)", "Replace Pump (copy correction values)", "Replace Nozzle (copy correction values) etc.

2 Checkbox when completing replacement

3 Model

4 Serial No

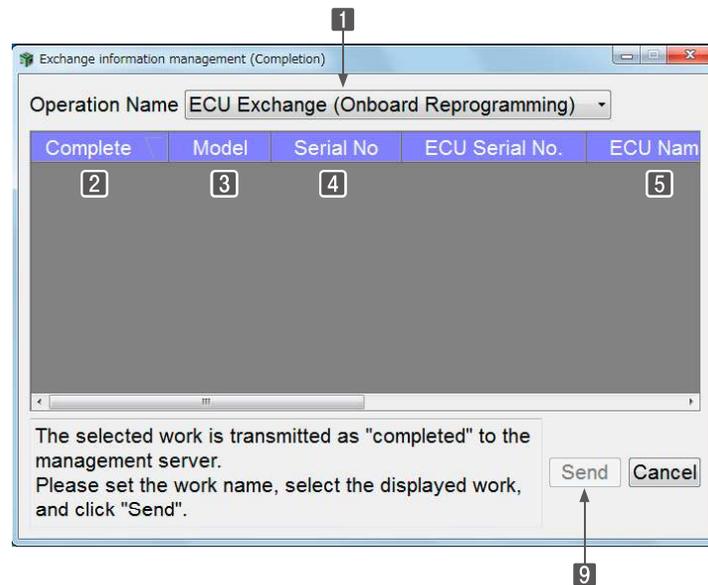
5 ECU Name

6 Write Mode

7 Download Data

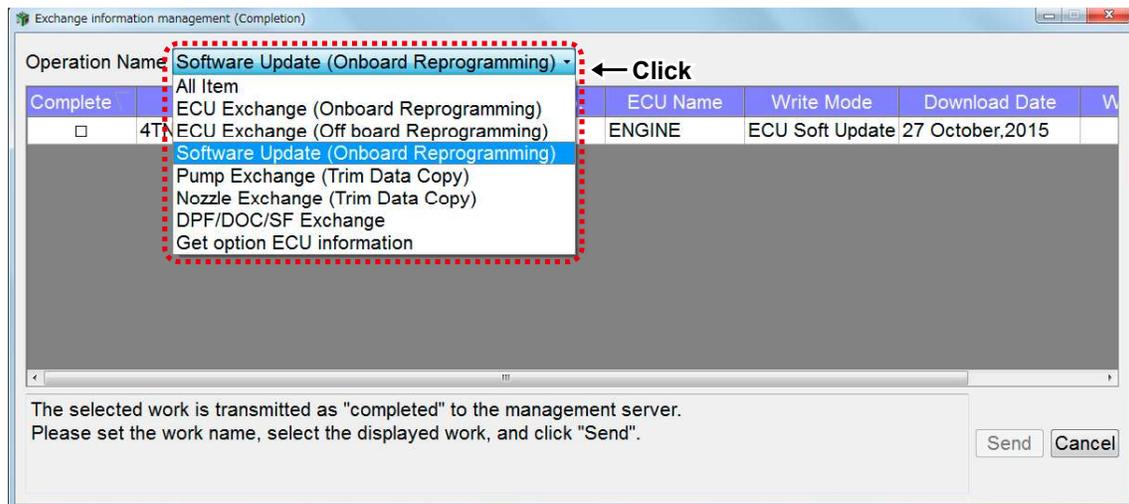
8 Write Data

9 Send button

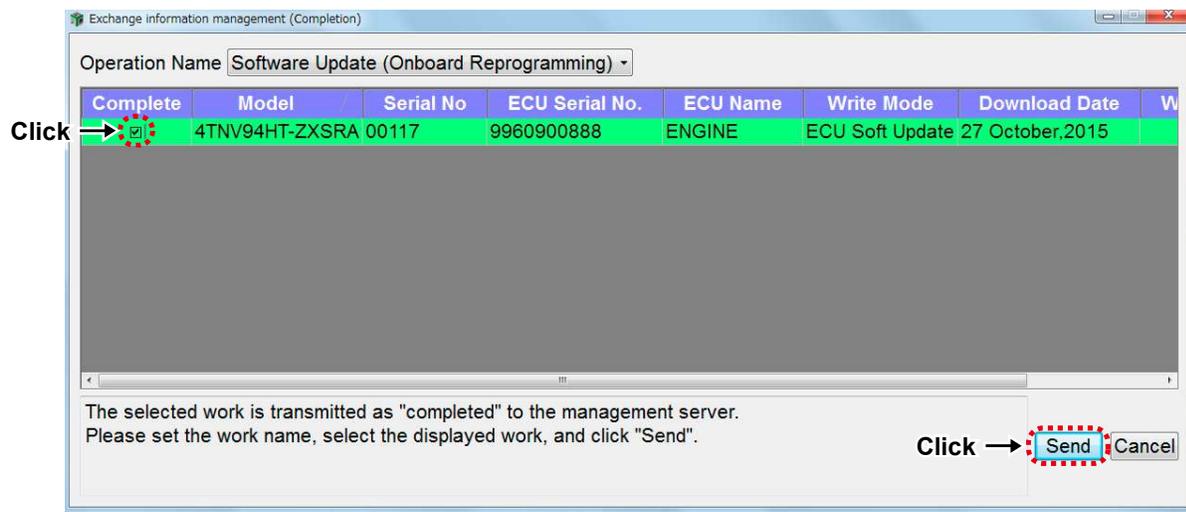


14. Exchange Information Management Function

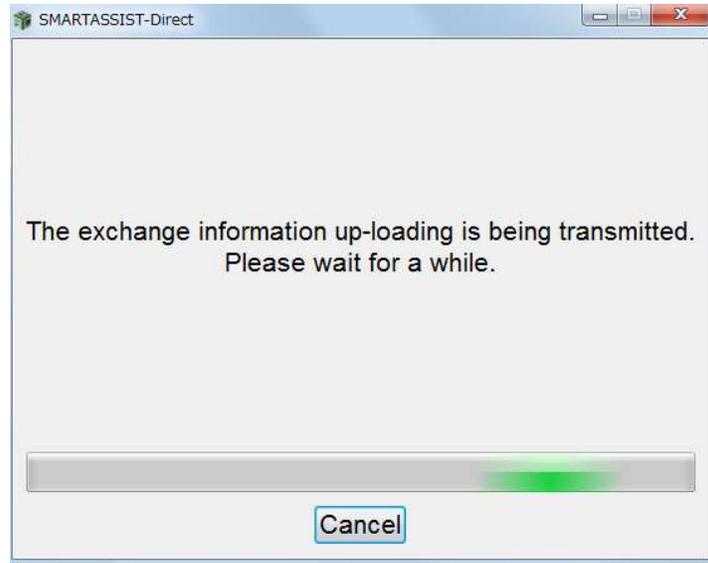
- 6 The Exchange Information Management (Completion) Screen is displayed.
Click the tab "Operation Name", and select the task that you wish to cancel.



- 7 Select the task that you wish to complete. When the ECU software to be canceled is displayed, select and click "Send" and click the task that you wish to complete.



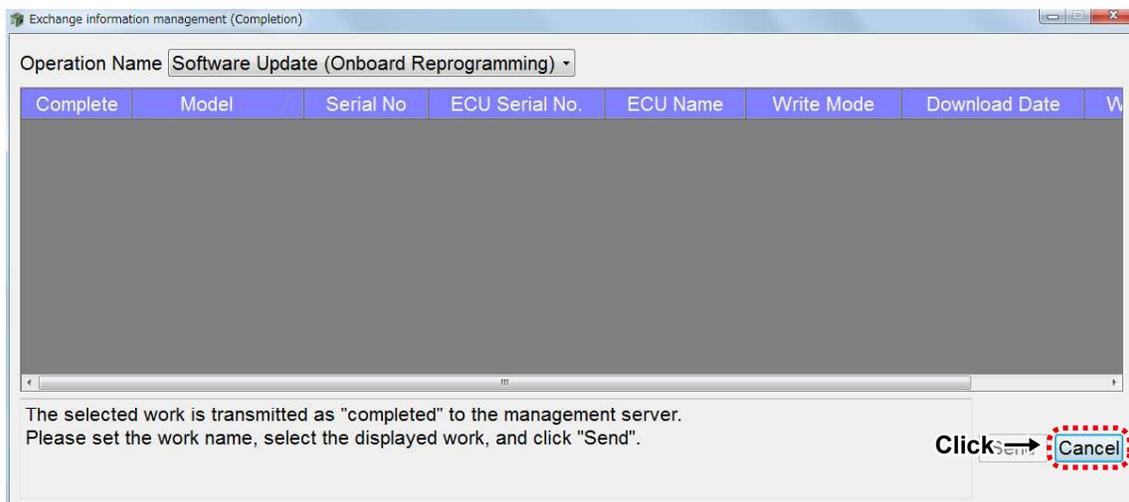
8 The Exchange Information Management (Completion) process starts.



9 A message box notifies you when the Exchange Information Management (Completion) process has finished. Click "OK".

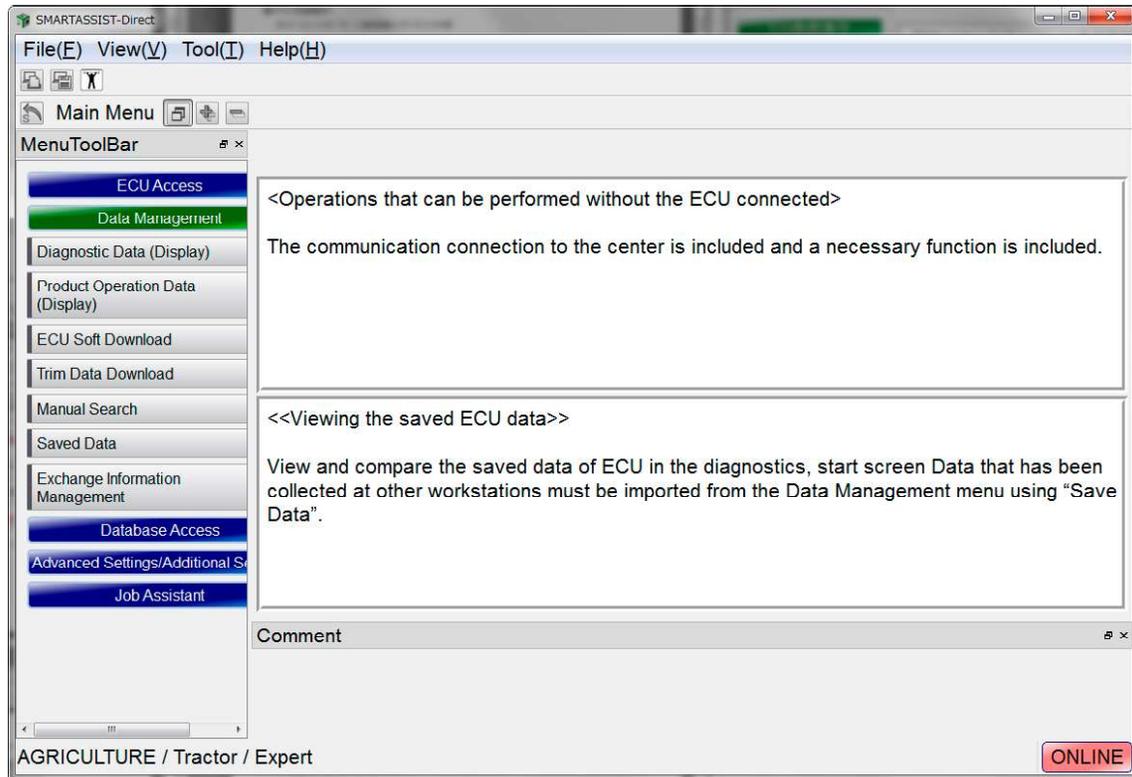


10 Click "OK" on the Exchange Information Management (Completion) Process Completion Message Box. The Exchange Information Management (Completion) Screen displays. Click "Cancel" to return to the main menu.



14. Exchange Information Management Function

11 The Main Menu screen starts up, and the Exchange Information Management (Completion) task is finished.



14.3 Replacement (or downloaded data) cancellation process

If despite having downloaded the software and data, and it was not replaced, it is necessary to perform the process of cancellation of the replacement. The following indicates this procedure.

- 1 Select "INDUSTRIAL ENGINE" from the Start Menu.

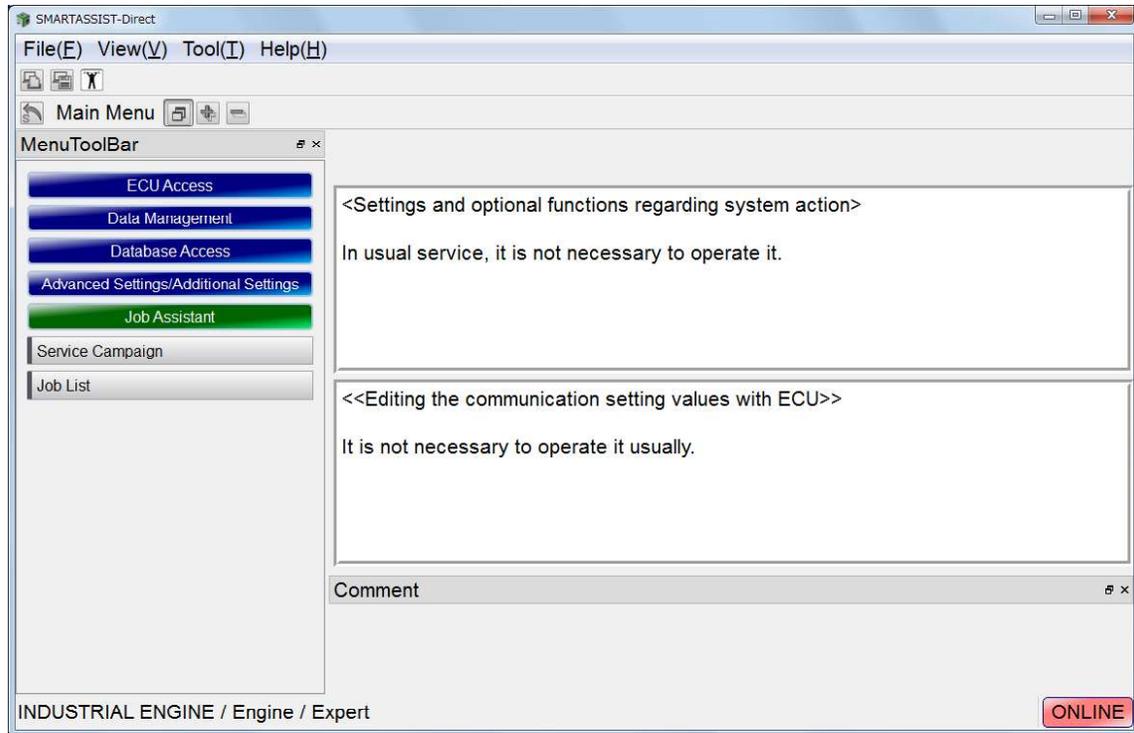


- 2 Select "Engine".

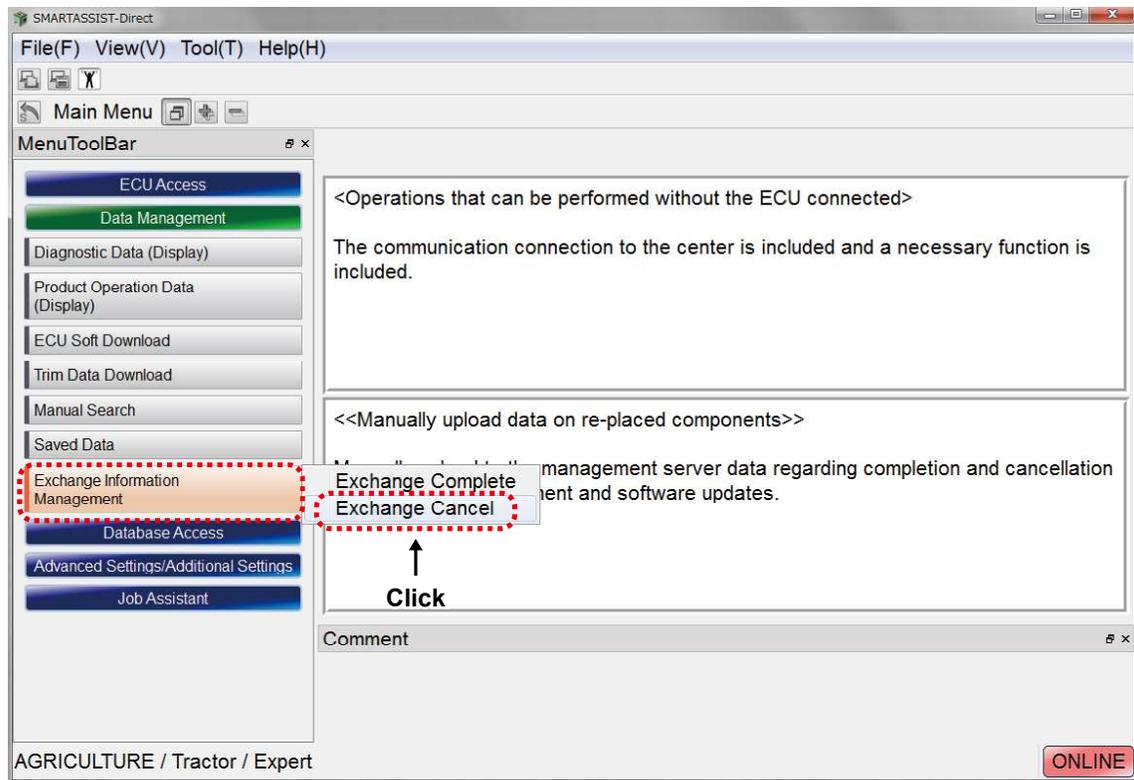


14. Exchange Information Management Function

3 The Main Menu Screen is displayed.

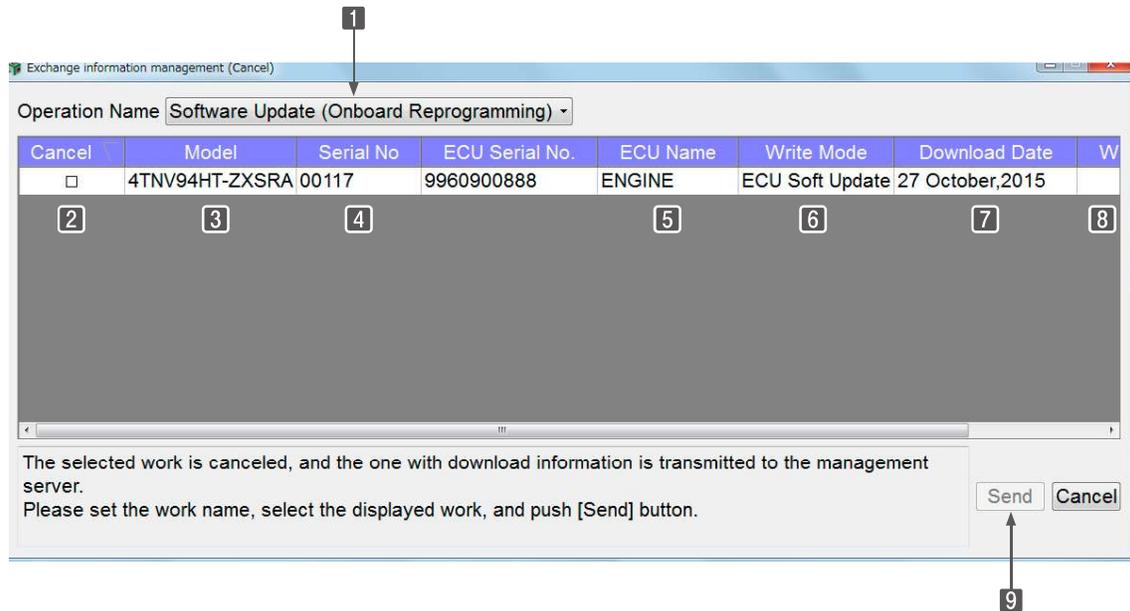


4 Click "Exchange Information Management" and "Exchange Cancel" on the tab "Data Management".



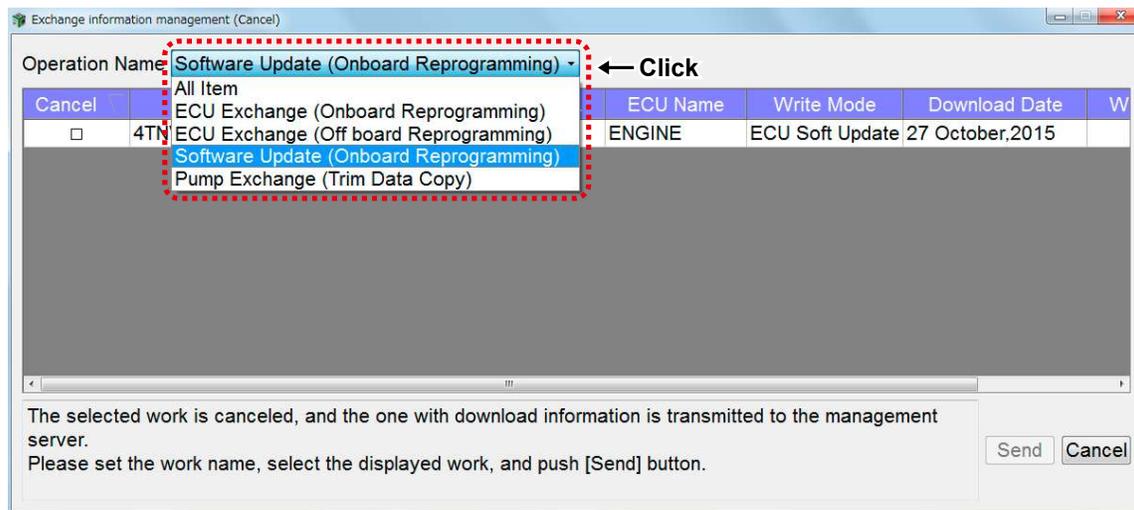
5 The Exchange Information Management (Cancel) Screen is displayed.**1** Operation Name selection

Select "Replace ECU (onboard reprogramming)" "Replace ECU (offboard reprogramming)" "Overwrite/correct (onboard reprogramming)", "Replace Pump (copy correction values)", "Replace Nozzle (copy correction values) etc.

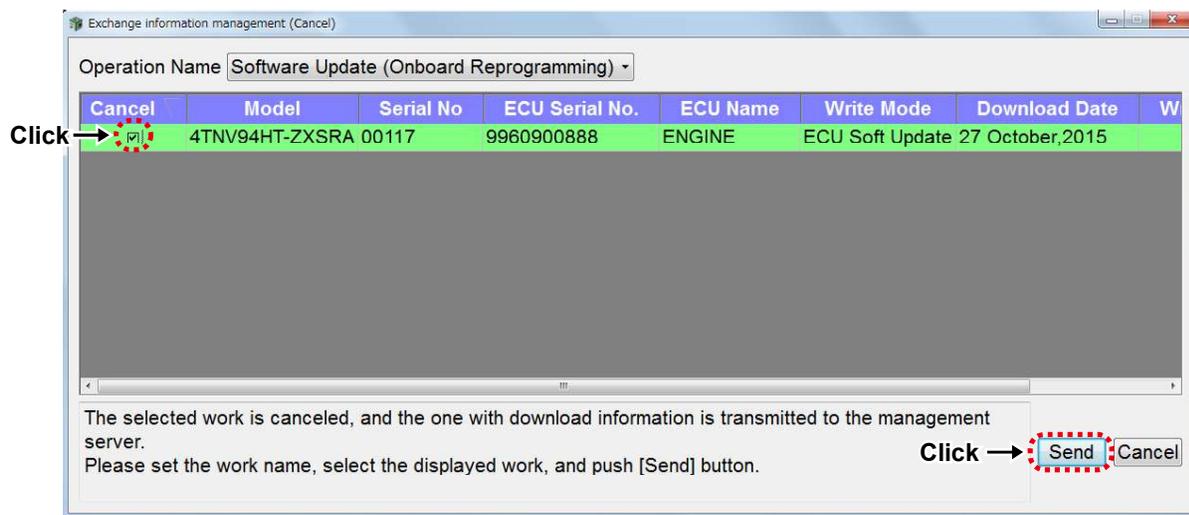
2 Checkbox when canceling replacement**3** Model**4** Serial No**5** ECU Name**6** Write Mode**7** Download Data**8** Write Data**9** Send button

14. Exchange Information Management Function

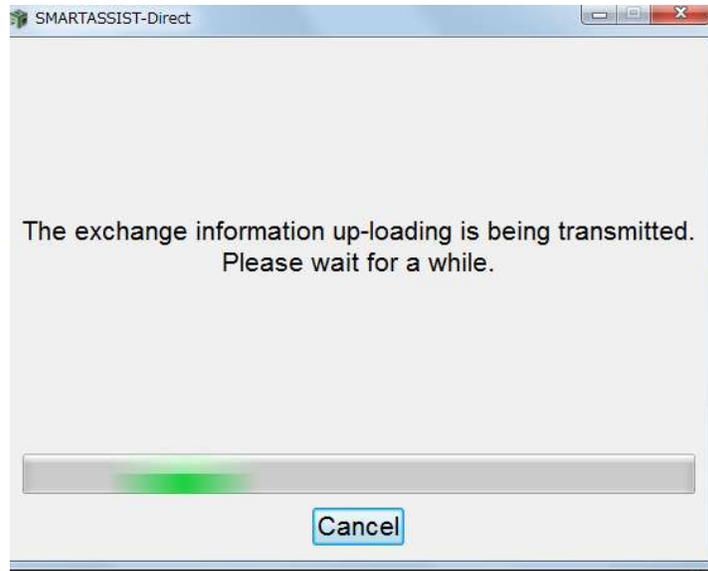
- 6 The Exchange Information Management (Cancel) Screen is displayed. Click the "Task Name" tab and select the task name of cancellation you want.



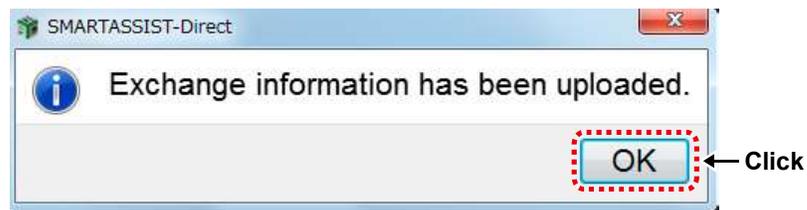
- 7 Select the task name of cancellation you want, then tick the check mark for "Cancel" when the ECU software corresponding to cancellation appears, and click "Send".



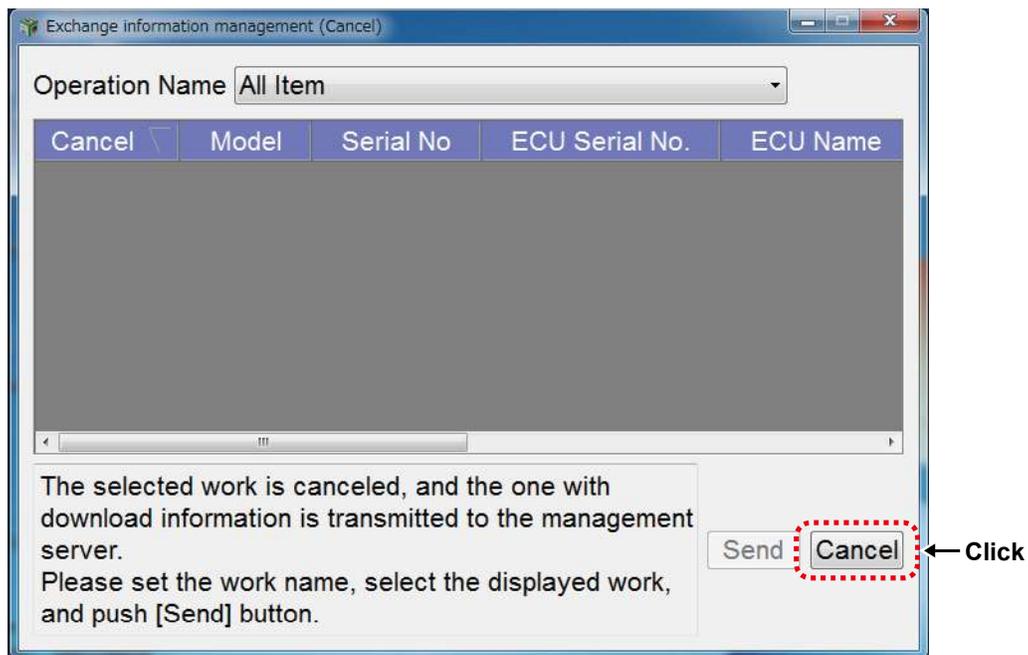
8 The Exchange Information Management (Cancel) process starts.



9 A message box notifies you when the Exchange Information Management (Cancel) process has finished. Click "OK".

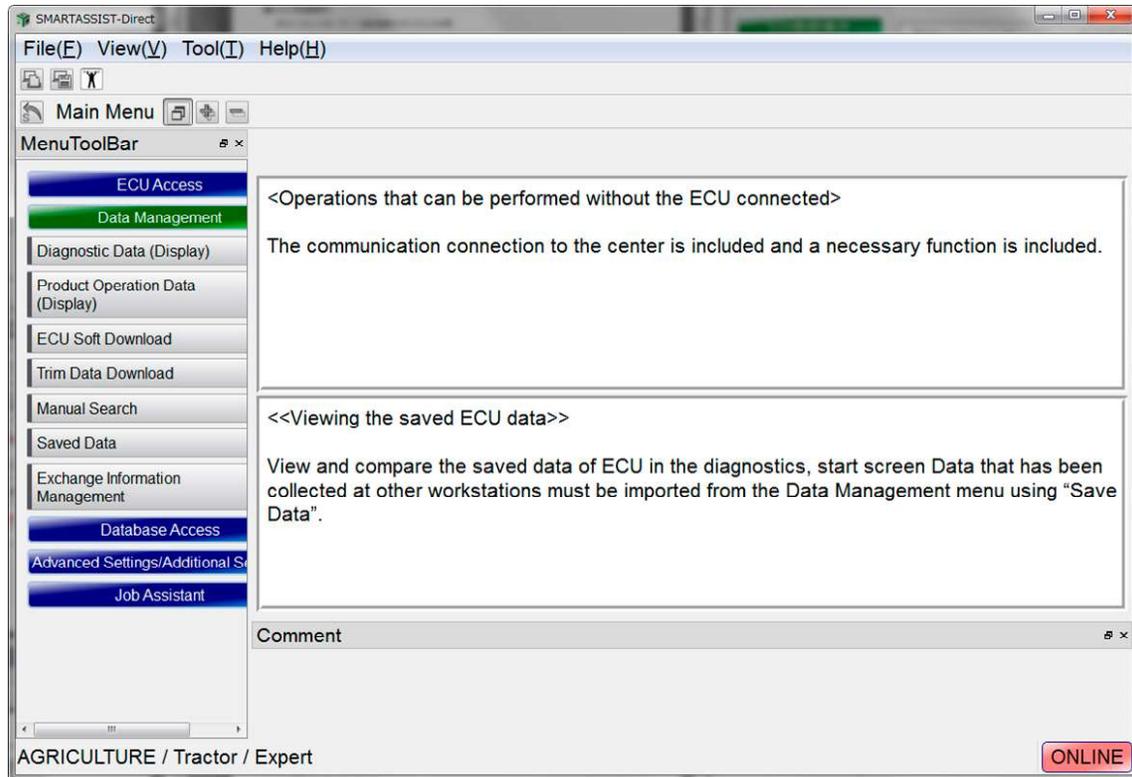


10 The Exchange Information Management (Cancel) Screen displays. Click "Cancel" and return to the main menu.



14. Exchange Information Management Function

11 The Main Menu screen starts up, and the Exchange Information Management (Cancel) task is finished.



14.4 Alarm Function when Replacement Data is Not Uploaded

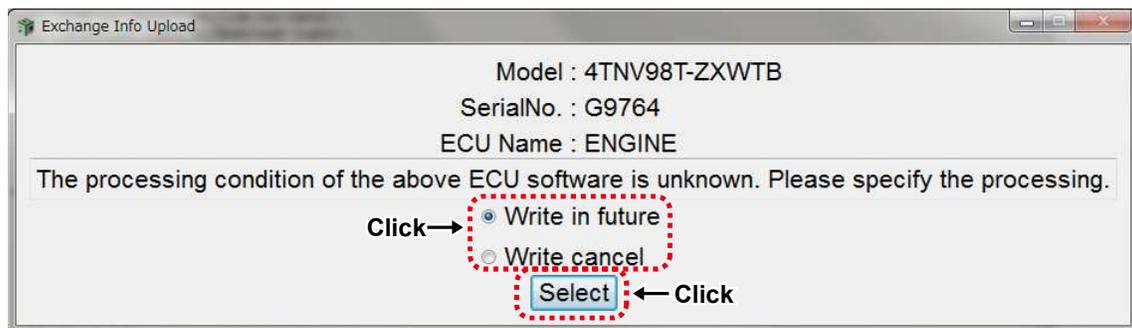
■ Alarm Function when Replacement Data is Not Uploaded for 30 Days

The "Replacement Data Not Uploaded for 30 Days" alarm function is displayed 30 days after one of the below conditions is met.

- No matter whether data was downloaded or not, the writing or cancellation process has not been performed.
- No matter whether the downloaded data was written to the ECU or the replaced pump (correction values), the upload process was not performed.
- No matter whether the ECU was replaced or not, the automatic upload could not be performed because there is no connection to the Internet.

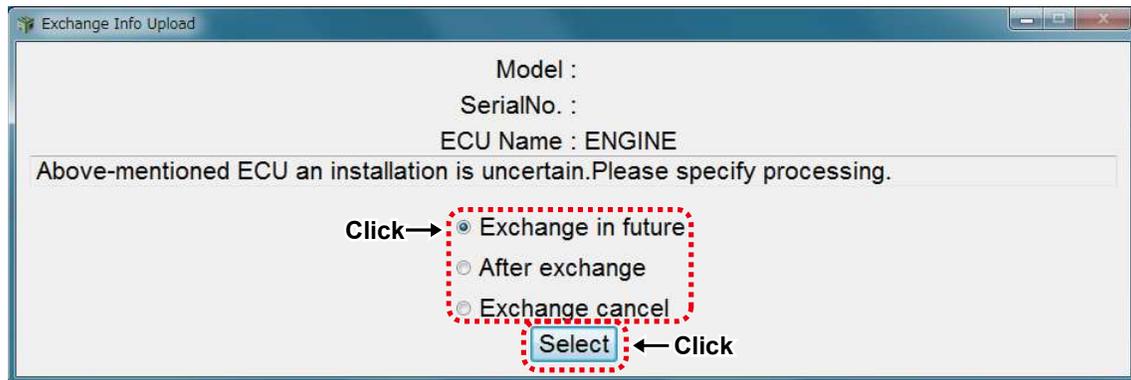
14.4.1 Alarm Screen (During Online Operation/Data Download/Not Yet Written)

- 1 This screen is displayed during the online connection.
- 2 Select "Proceed to writing" or "Cancel writing", and click "Select".



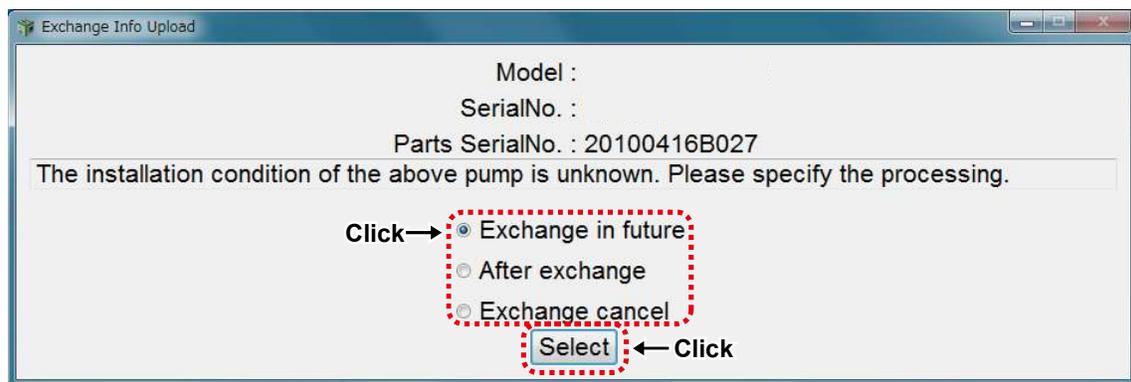
14.4.2 Alarm Screen (During Online Operation/ECU Not Yet Replaced)

- 1 This screen is displayed during the online connection.
- 2 Select "Proceed to writing" or "Cancel writing", and click "Select".



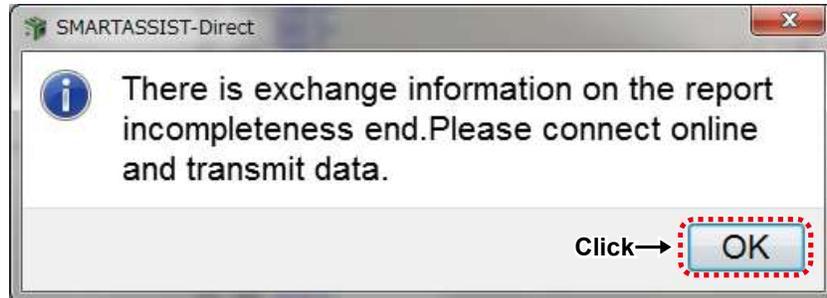
14.4.3 Alarm Screen (During Online Operation/Pump Not Yet Replaced (Trim Data Write))

- 1 This screen is displayed during the online connection.
- 2 Select "Proceed to writing" or "Cancel writing", and click "Select".



14.4.4 Alarm Screen (During Offline Operation/Automatic Replacement Completion Process Not Yet Performed)

- 1 This screen is displayed during the offline connection.
- 2 Connect to the Internet and make sure that the system is able to send.

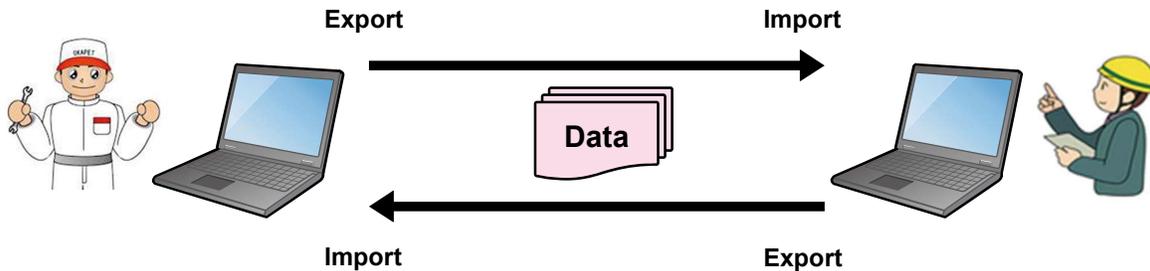


15. Data Management / Update Function

15.1 Data Management Function

■Data Management Function

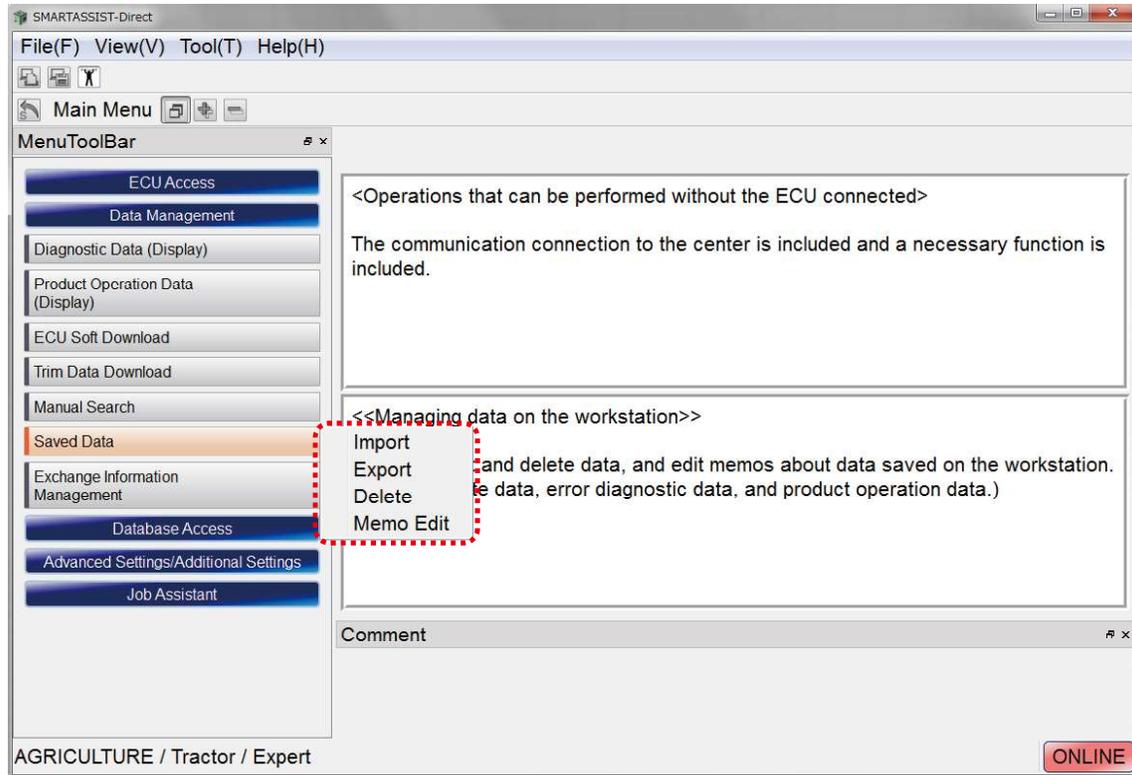
When exchanging diagnosis results and maintenance data between SMARTASSIST-Direct users on different PCs, it is necessary to import and export data in a usable format with the data management function.



For data to be usable by SMARTASSIST-Direct, it is copied by a specific method from the PC (export), and stored at a specified folder (import).

Note When data is exported from a PC, user information is stored together with the data (history management).

Start Data Management from the Main Menu, "Saved Data".



15.1.1 Import Function

The object Items of the import function are shown below.

All Data	All Data Shown Below
Writing Data	ECU Software (Engine)
	ECU Software (Machine)
	ECU Software (Driver)
	Pump Correction Values
	Nozzle Correction Values
Processing the Service ECU	ECU Software (Engine)
	ECU Software (Machine)
	ECU Software (Driver)
Error Diagnosis Data	ECU Storage Data
	Data Logging
	Active Control
	Hysteresis
	Data Logging User Settings
Product Operation Data	Save Data
	Maintenance Information Clear Table
Campaign	ECU Soft
Upload data	Campaign write data
Pattern drive	Save data
	Scenario file

Note The imported ECU Software cannot be exported.

15.1.2 Export Function

The object Items of the export function are shown below.

Writing Data	ECU Software (Engine)
	ECU Software (Machine)
	ECU Software (Driver)
	Nozzle Correction Values
Error Diagnosis Data	ECU Storage Data
	Data Logging
	Active Control
	Hysteresis
	Report File
Product Operation Data	Data Logging User Settings
	Save Data
System Management Data	Maintenance Information Clear Table
	Job List
Upload data	Software Writing Log
	Campaign write data
Pattern drive	Save data

Note The exported ECU software does not remain on the PC (It is not copied).

15.1.3 Delete Function

The object Items of the delete function are shown below.

Writing Data	Nozzle Correction Values
Processing the service ECU	ECU Software (Engine)
	ECU Software (Machine)
	ECU Software (Driver)
Error Diagnosis Data	ECU Storage Data
	Data Logging
	Active Control
	Hysteresis
	Data Logging User Settings
Product Operation Data	Save Data
	Maintenance Information Clear Table
System Management Data	Job List
	Software Writing Log

15.1.4 Memo Edit Function

The object Items of the memo edit function are shown below.

Error Diagnosis Data	ECU Storage Data
	Data Logging
	Active Control
	Hysteresis
	Data Logging User Settings
Product Operation Data	Save Data

15.2 Data Update Function

15.2.1 Types of Data Updates

There are 3 methods to update necessary data for SMARTASSIST-Direct.

- Automatic scheduled update
- Auto Update upon login to the center
- Manual update by the user when connected to the center

■ Automatic scheduled update

This applies to data specified for auto updates.

The data is updated in regular intervals (once per quarter) or when a new model is released.

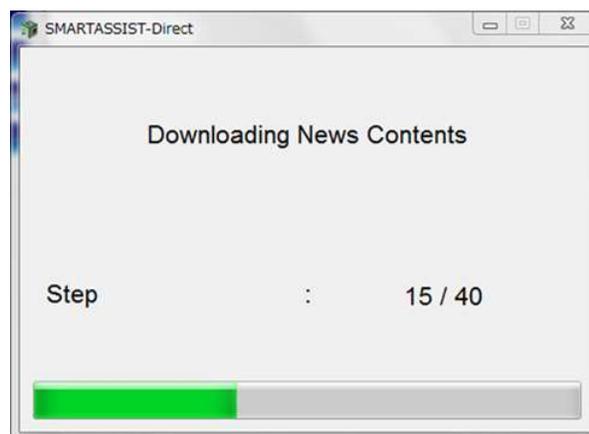
1	Data for correction of the existing data
2	Files corresponding to the new models
3	Additional function of SMARTASSIST-Direct
4	Program correction data of SMARTASSIST-Direct
5	Maintenance information data of product operation data function
6	Compatible information data between engine and machine model

■ Auto update upon login to the center

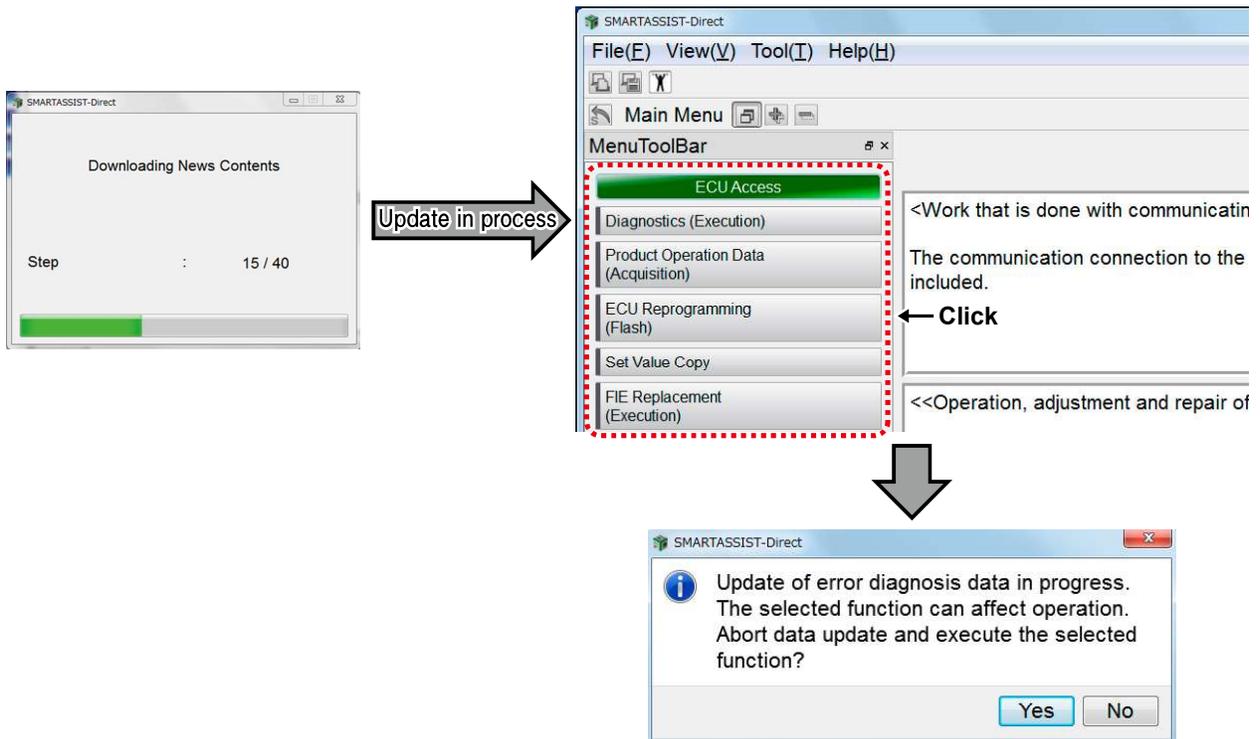
Important data and data that is changed in short intervals is automatically sent and updated upon login to the center.

1	Update the security period (license information)
2	Average value data per model of product operation data function and year of shipment
3	News data for News Link

Remark It is updated at login by this process.



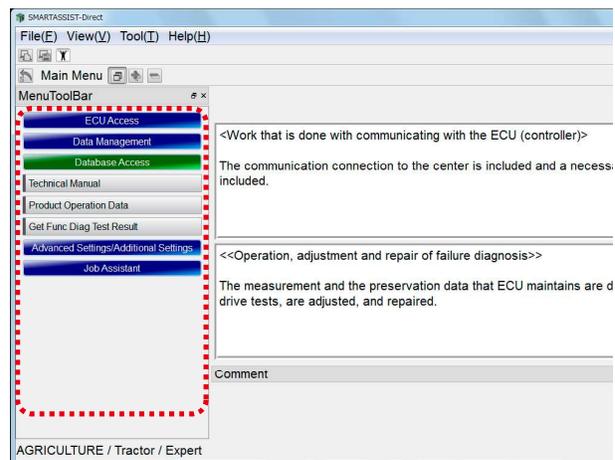
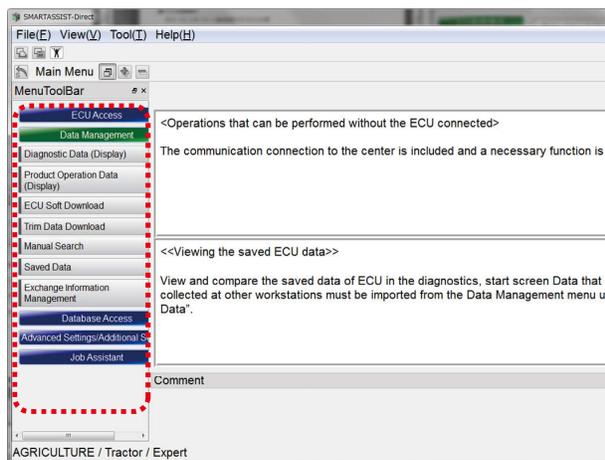
If a connection to the product is established through a menu selection during an update of the error diagnosis data, an alarm is displayed that confirms whether the data update should be interrupted. The purpose of this is to exclude the possibility of misuse of the product.



Manual update by the user when connected to the center

This applies to data selected for download by the user.

1	ECU software (pump correction values and customization data)
2	Manual data for manual link
3	Product operation data saved in the center



16. Tool Function

16.1 Communication Settings

This is the screen to perform the communication settings between the SMARTASSIST-Direct and the product. When connected to the product, it is automatically set, so there is no need to operate during normal service. Change the settings only when instructed to do so by YANMAR.

Important The parameters for CAN communication can be changed. To change the parameters, you need to have sufficient knowledge of CAN. As the communication can be cut off, change only when instructed to do so by YANMAR.

● Settings Screen

You can open the communication settings screen by clicking the "Communication Settings" button in the tab "Advanced Settings/Additional Settings" in the main menu. (You can also open the screen from the control screen.)

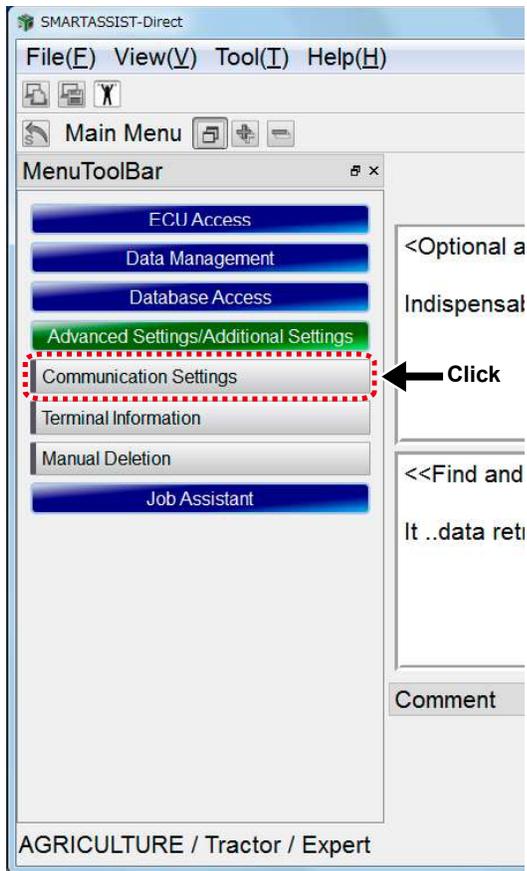


Figure 16-1 Control Screen

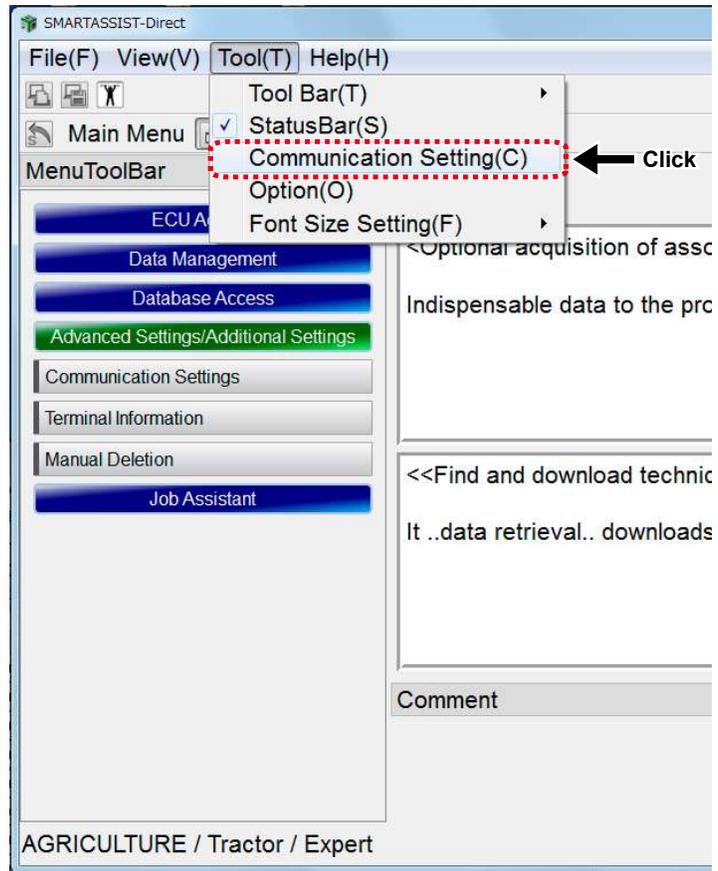


Figure 16-2 Main Menu

● Control Method

- 1 **Set Select** : Four types of names can be registered and read.
- 2 **Port** : Fixed at USB.
- 3 **Version Select** : As some initial ECU for small-sized engine have a different communication specification, the version can be selected.
- 4 **CAN ID** : There is no need to change the parameters for the CAN signal.
- 5 **Priority** : The standard value is 6.
- 6 **Physical Address** : The standard value is DA00h. In systems with multiple ECU, it is required to change it to 00h.
- 7 **Function Address** : Fixed at DB33h.
- 8 **SA** : Address for the service tool, fixed at F0h.

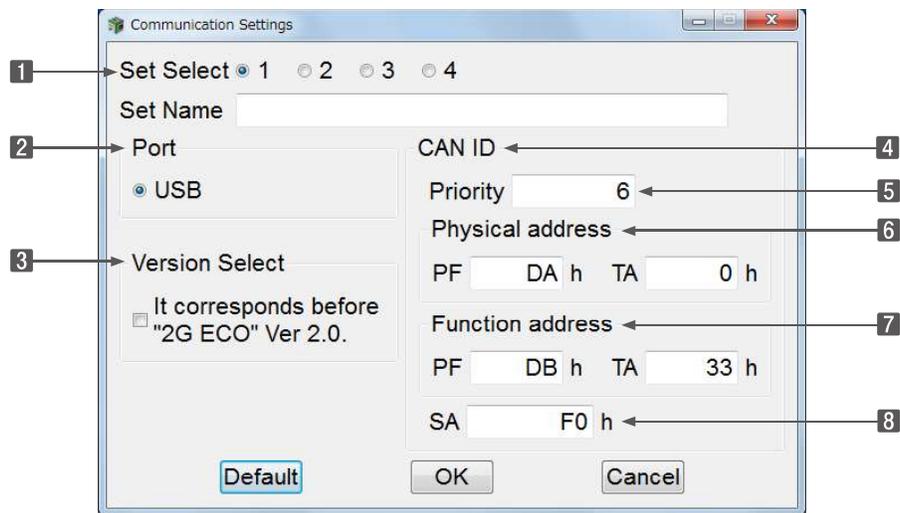


Figure 16-3 Graph Control Screen

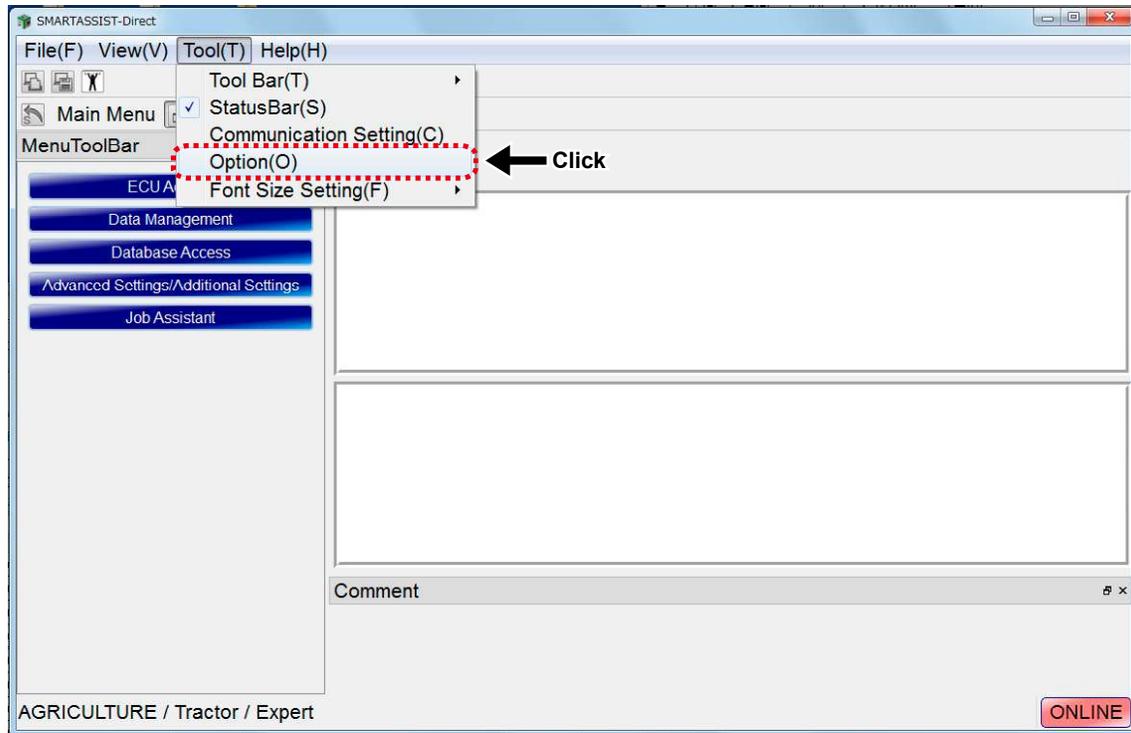
16.2 Option Settings

This is a screen to perform the screen settings. Mainly, the following settings can be performed.

- Change the display unit.
- Change the language.

● Settings Screen

You can open the settings screen by clicking "Option" in "Tool" in the control screen.



● Control Method

1 Unit setting : Set the units for temperature and pressure.

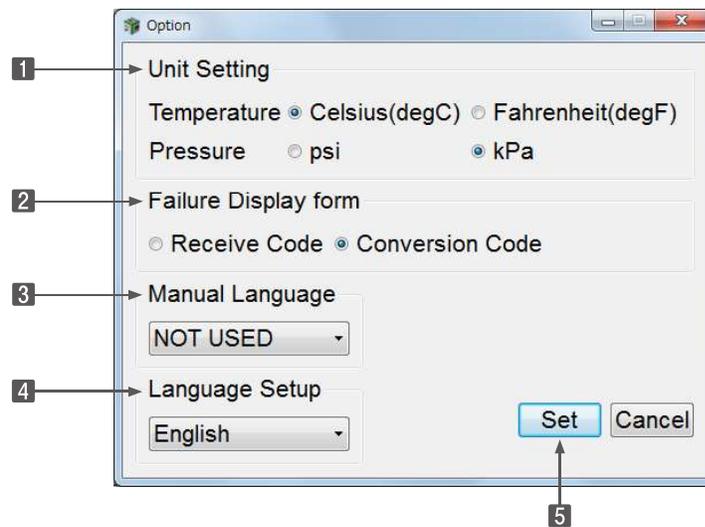
2 Failure Display from : Change the display format of the error codes.

Point Normally set in the determined display format for the product, but if you want to see it in another error code format, you can change it.

3 Manual Language : Set the language for the manual link data of the error diagnosis function.

4 Language Setup : Change the display language of SMARTASSIST-Direct.

5 Set : Confirm the changed content.



17. Glossary

Abbrevia- tion	Name	Content
BS	Block Size	Flow control related parameters used in ISO 15765
CAN	Controller Area Network	Communication standard used in the in-vehicle LAN
CSV	Comma Separated Values	File format used in PC
DA	Destination Address	ID information for the CAN communication data
D-SUB	Connector Standard	-
DTC	Error Diagnostic Code	Coded information according to the failure content
ECU	Engine (or Electronic) Control Unit	Also called ECM.
FFD	Freeze Frame Data	Data related to before and after the failure
FMI	Failure Mode Identifier	Detailed failure information added to the DTC
LID	Local Identifier	ID information specific to the controller
OC	Occurrence Counter	Number of DTC occurrences
PC	Personal Computer	-
PF	Protocol Data Unit Format	ID information for the CAN communication data
PDM	Product Data Management	-
SA	Source Address	ID information for the CAN communication data
SAE	Society of Automotive Engineers	-
Sno.	Serial Number	Manufacturing serial number for engine, pump and ECU
SPN	Source Parameters Number	Common ID used in SAE J1939
USB	Universal Serial Bus	Serial communication port used in PC

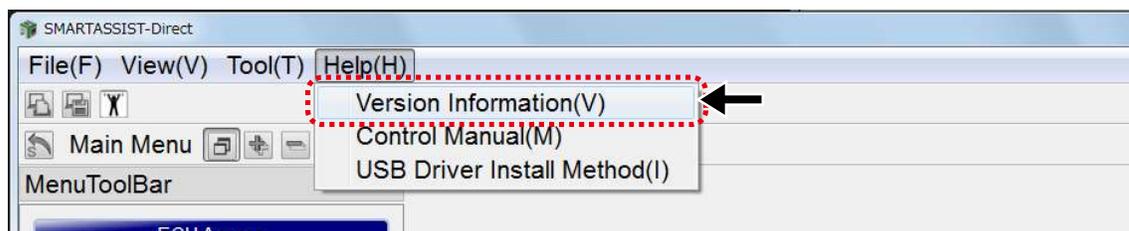
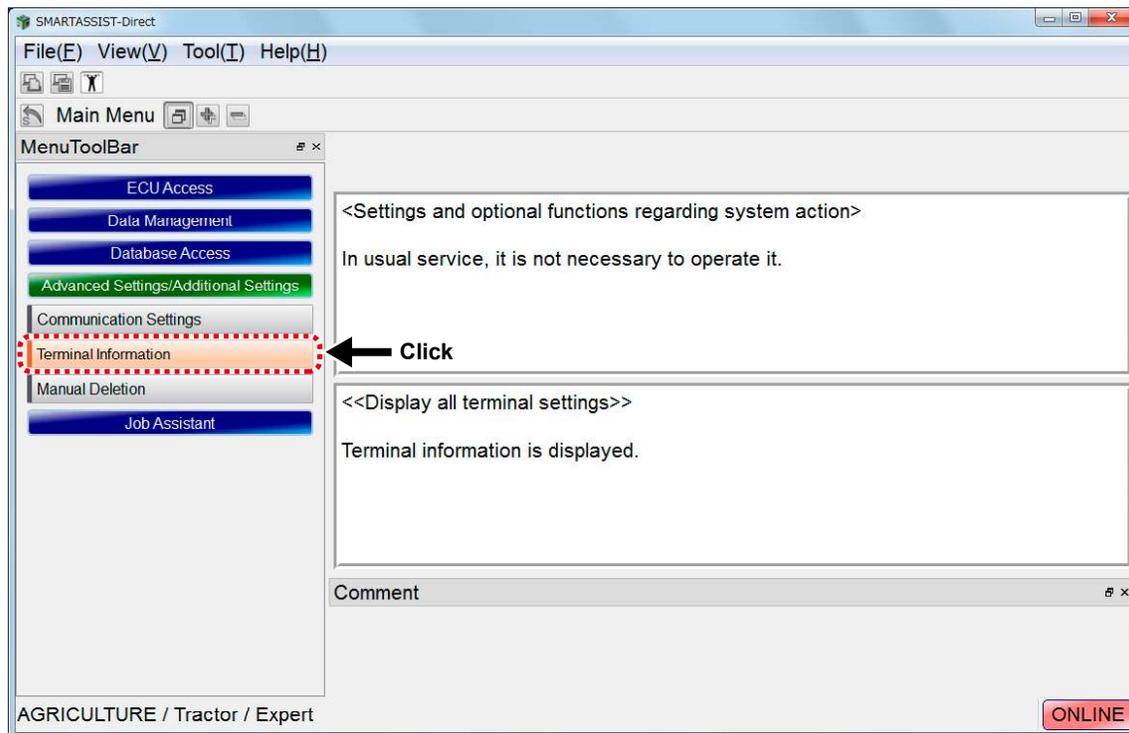
18. Terminal Information (Version Information)

You can check the SMARTASSIST-Direct software information.

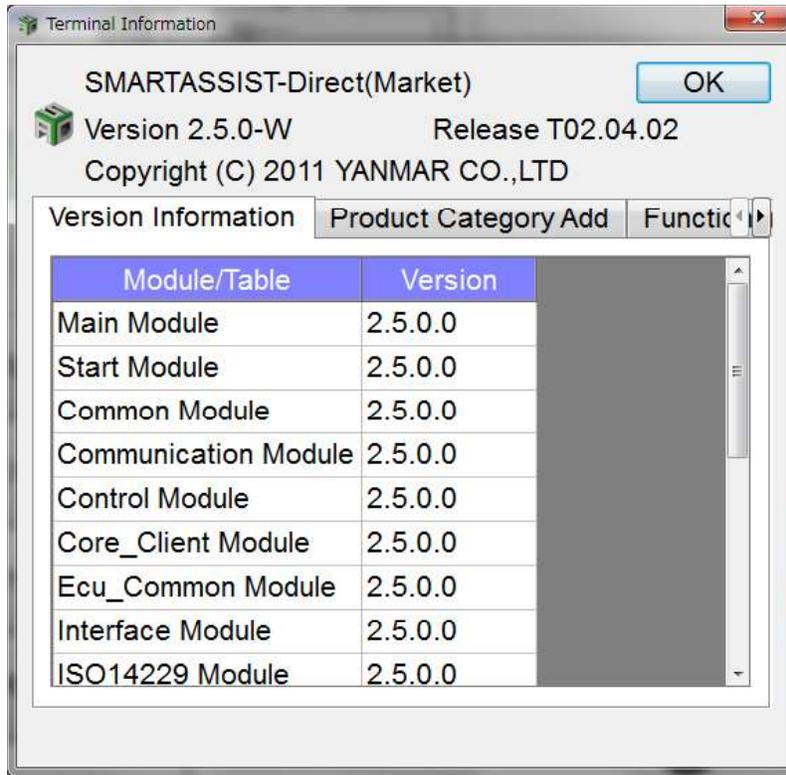
- Software version information.
- Updated information of the corresponding models.
- License expiration date and authority information.

● Check screen

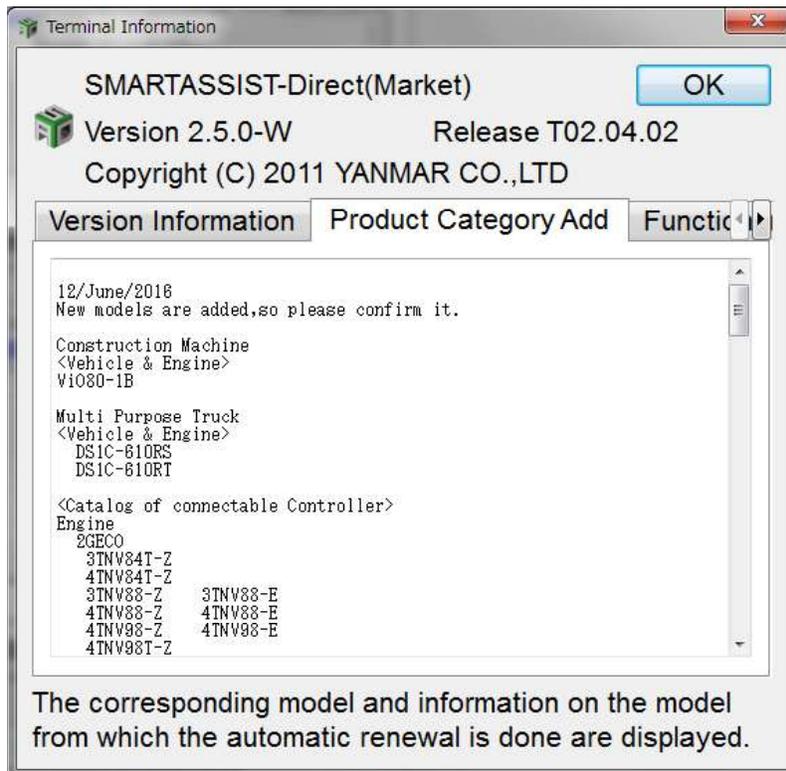
You can open the check screen by clicking "Terminal Information" in the tab "Advanced Settings/Additional Settings" in the main menu. (You can also open the screen from the control screen.)



● Version Information Screen



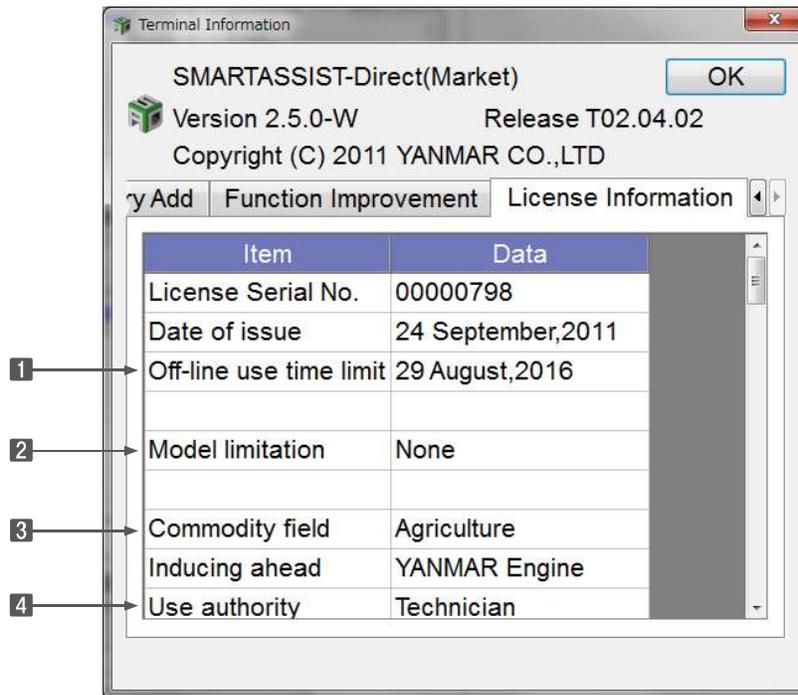
● Updated Information Screen of the Supported Models



● License Information Screen

- 1 **Off-line use time limit** : Display the security check period.
- 2 **Model limitation** : Presence and absence of the utilization limitation by model
- 3 **Commodity field** : Available product category
- 4 **Use authority** : License mode
- 5 **ECU Type limitation** : Presence and absence of the utilization limitation by ECU/controller

Note To use the SMARTASSIST-Direct, a security check is required every 3 months. Check this screen periodically and make sure that your license does not become invalid. Start the SMARTASSIST-Direct with your PC connected to the Internet. The software automatically communicates with the center and the security check is performed.



19. Error Screen and Warning Screen

Various "Error Screen" and "Warning Screen" appear while you are using the SMARTASSIST-Direct.

19.1 Error Screen

Screen when a failure occurred mainly in the stage of communication processing between the SMARTASSIST-Direct and the product.

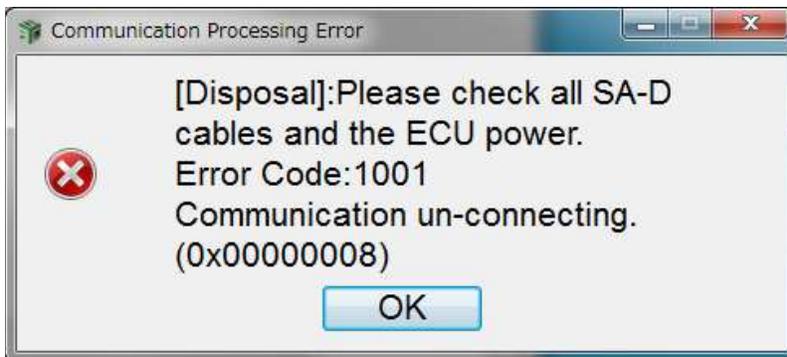


Figure 19-1 Error screen example

Error Message List

No.	Error message	Cause
1	<p><u>Error code: 1001</u></p> <p><u>Error content: Not connected (code)</u></p> <p><u>Process message: "Check the communication cable and the ECU power supply".</u></p> <p><u>*The code is displayed in the return value from the I/F Box in hexadecimal.</u></p>	<ul style="list-style-type: none"> ● <u>Undefined error occurred (0x00000007) (0x00000008) (0xFFFFFFFF)</u> <ul style="list-style-type: none"> • <u>When the I/F Box is not connected</u> • <u>When the ECU power is not turned on</u> • <u>The USB driver is not correctly installed</u> • Incomplete setting of PDIB32.dll (production bench only) ● Time-out occurred (0x00000009) ● Message buffer is empty (0x00000010) <ul style="list-style-type: none"> • This error occurs when the source address is different.

<p>2</p>	<p>Error code: 1002</p> <p>Error content: Abnormal communication (code)</p> <p>Process message: "Upgrade the version of the ECU, I/F Box, and service tool."</p> <p>*The code is displayed in the return value from the I/F Box in hexadecimal.</p>	<p>Error from the I/F box determined.</p> <p>(0xFFFFFFFF): When there is a problem in the ECU side setting (EEPROM fault, etc.): 1002</p> <ul style="list-style-type: none"> ● Unsupported function is requested (0x00000001). ● Invalid channel ID is specified (0x00000002) ● Invalid protocol ID is specified (0x00000003) ● Null pointer is specified (0x00000004) ● Invalid message buffer size is specified (0x00000005) ● Invalid flags are specified (0x00000006) ● Invalid message is specified (0x0000000A) ● Invalid time interval is specified (0x0000000B) ● Periodic Msg Filter setting that exceeds the limit is requested (0x0000000C) ● Invalid Msg ID is specified (0x0000000D) ● Invalid Error ID is specified (0x0000000E) ● Invalid loctl ID is specified (0x0000000F) ● Message buffer is full (0x00000011) ● Message buffer is overflown (0x00000012) ● Invalid pin number is specified (0x00000013) ● Specified Channel ID is in use (0x00000014) ● Protocol ID in the message is invalid (0x00000015) ● Tester message transmission failed (0x800D0001) ● ECU reception error occurred (0x800E0001) ● ECU message checksum error (0x800F0001) ● ECU message structure error (0x80100001) ● ECU message byte time error (0x80110001) ● ECU message time error (0x80120001) <p>Other errors</p> <p>(0xFFFFFFFF): Incorrect argument error: 1002</p> <p>(0xFFFFFFFFC): Incorrect response data error: 1002</p> <p>(0xFFFFFFFFB): Security access denial error: 1002</p> <p>(0xFFFFFFFFA): Different protocol error: 1002</p> <p>(0xFFFFFFFF9): Abnormal memory error: 1002</p>
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19. Error Screen and Warning Screen

3	<p>Error code: 1003</p> <p>Error content: <u>Abnormal service response (code)</u></p> <p>*The code is displayed from the ECU in hexadecimal. When there is no response, the display is blank.</p> <p>Process message: "<u>Check the version of the ECU, IF/Box, and service tool.</u>"</p>	<p>When the following negative response is received from the ECU</p> <ul style="list-style-type: none"> ● General refusal (0x10) ● Service not provided (0x11) ● Subfunction not provided (0x12) ● <u>When the conditions of the ECU are not met (active control, etc.)</u> ● Out of request range (0x31) ● Security access refused (0x33) ● Invalid security key (0x35) ● Download not permitted (0x40) ● Incompatible download format (0x41) ● Specified download address disapproved (0x42) ● Number of download request bytes disapproved (0x43) ● Service not provided in the current diagnostic mode (0x78) <p>No response from the ECU</p>
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Note When an error other than the underlined error code occurred, it is possibly related to development of the product. Contact YANMAR.

19.2 Error (Warning) Message

■At Application Start-up

Function	Process	Message (example)	Cause	Operation after display	Remark
Direct start-up	License	There is a problem with the license. Please repeat the set-up.	Installation failure. There is a problem with the license file. (YSASS_License.lic)	Application closed.	
		Unable to start because the version is incorrect. Please repeat the set-up.	Installation failure. Updating the module failed. The module structure of the version is incorrect (not matched).	Application closed.	
		The license number may be invalid or the initialization was not completed. Please close the software, recheck the license and User ID. Confirm the computer is connect to the internet and restart the software to finish the initialization.	The license file and the user information are not collected.	Start with the default mode.	
			The license key of the license file does not match the install key.	Start with the default mode.	
			License is expired.	Start with the default mode.	
		The license security period is about to expire on xxxx.xx.xx. You must connect to the internet to update.	License will be expired.	Normal operation (Only for the displayed valid term)	
			The license was not updated because the license update file is incorrect. The software utilization term has expired. If the latest software is not installed within 7 days, writing is disabled.	License has expired.	Normal operation (Only for the displayed valid term)
		License conditions were changed, The utilization term is until XXXX/XX/XX.	License was updated.	Normal operation	
Login		Enter the user ID.	Your user ID is not entered at login.	Re-enter login	
		Enter your password.	Your password is not entered at login.	Re-enter login	
		The user ID or your password is different. Note: Using a common password with YDS might have changed the password. To update the setting file: Exit the software, confirm that the computer is connected to the Internet, start the software again, and log in.	Wrong user ID or password is entered.	Re-enter login	
		Click OK to exit.	When you exit the program	When "Yes", Direct closes. When "No", Exit is canceled.	
Start Menu	Exit operation	Click OK to exit.	When you exit the program	When "Yes", Direct closes. When "No", Exit is canceled.	
Main Menu		Target is not found.	When there is no parts replacement information in the parts replacement screen.	Process is canceled	
		Reading the save data failed.	For some reason (internal cause or breakage of a file), reading the product operation data failed.	Process is canceled	
		Operation is not possible because the server is offline.	The menu is selected when the server is offline.	Not operable	Currently not supported

19. Error Screen and Warning Screen

Function	Process	Message (example)	Cause	Operation after display	Remark
Common for each view	Function change	Switch to XXXX function?	The function selection combo box for each function screen is changed.	When "Yes", execute change. When "No", do not change.	
	ECU change	Switch to XXXX?	The ECU selection combo box for each function screen is changed.	When "Yes", execute change. When "No", do not change.	

■ Defect Display

Function	Process	Message (example)	Cause	Operation after display	Remark
Current Defect	Manual display	The manual does not exist.	The selected manual file does not exist.	The manual is not displayed.	

■ Freeze Frame Data

Function	Process	Message (example)	Cause	Operation after display	Remark
Trend Graph	Graph Settings	Check the conditions of the range setting. (Select the settings so that the lower limit is smaller than the upper limit.)	In the minimum and maximum settings for graph, a minimum value that is greater or equal to the maximum was set.	Re-enter in the graph settings screen.	

■ Diagnostic Tests

Function	Process	Message (image)	Cause	Operation after display	Remark
Digital Out	Data Set	Unable to apply the change.	When the selected data cannot be changed	No action.	
	Screen change	Stop the forced driving?	When the screen change is executed while executing the force operation (fixed control)	When "Yes", recover control. When "No", control remains fixed. Change the screen, respectively.	
Active Control	Data Set	Unable to apply the change.	When the selected data cannot be changed	No action.	
		Stop the forced driving?	When the screen change is executed while executing the force operation (fixed control)	When "Yes", recover control. When "No", control remains fixed. Change the screen, respectively.	
		Switch to the hysteresis graph?	When the hysteresis measurement is performed and exited	When "Yes", change to the graph screen. When "No", no action.	
Active Control (Graph)		Check the conditions of the range setting. (Select the settings so that the lower limit is smaller than the upper limit.)	In the minimum and maximum settings for graph, a minimum value that is greater or equal to the maximum was set.	No action. Re-enter in the graph settings screen.	
		Save the measured data?	When saving the measured data.	When "Yes", save. When "No", do not save.	
		Measure data saved.	The measured data is complete.		
		Saving the measured data failed.	For some reason, saving the measured data failed.	Saving is interrupted.	
Hysteresis Measure		Same as the Active Control (Graph)			

■ Data Logging

Function	Process	Message (image)	Cause	Operation after display	Remark
Data Monitor		reating the user settings file failed.	For some reason (internal cause), saving the user settings information file failed.	The process is canceled.	
		Saving the measured data failed.	For some reason (internal cause), saving the measured data failed.	The process is canceled.	
		Polling mode is not supported.	When the polling mode is set for the sampling settings in the beginning of logging and the ECU does not support the polling mode.	The process is canceled.	
		Acquiring saved user settings data failed.	For some reason (internal cause), reading the user settings information file failed.	The process is canceled.	
		Settings are not saved.	When trying to read the user settings information file, but nothing was saved	The process is canceled.	
Save Data		reating the user settings file failed.	For some reason (internal cause), saving the user settings information file failed.	The process is canceled.	
		Saving the measured data failed.	For some reason (internal cause), saving the measured data failed.	The process is canceled.	
Trend Graph		Check the conditions of the range setting. (Select the settings so that the lower limit is smaller than the upper limit.)	In the minimum and maximum settings for graph, a minimum value that is greater or equal to the maximum was set.	No action. Re-enter in the graph settings screen.	

■ Settings

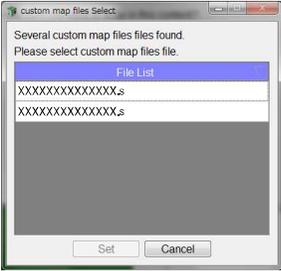
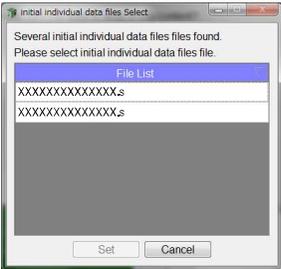
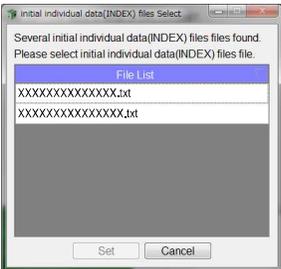
Function	Process	Message (image)	Cause	Operation after display	Remark
Configuration (Configuration)	Data Set	Unable to apply the change.	The selected data cannot be changed.	No action.	
Calibration		Same as the configuration			
Tuning		Same as the configuration			
Initial Settings	Data Set	Unable to apply the change.	The selected data cannot be changed.	No action.	
	Data Set	Sequence data not found.	Not processed, due to inconsistency in the sequence settings.	The process is canceled.	
	Data Set	Unable to extract local ID from the process ID.	Not processed, due to inconsistency in the sequence settings.	The process is canceled.	

■ Development mode

Function	Process	Message (image)	Cause	Operation after display	Remark
Common ID access		This summary CID cannot be added because it is set as a string. Check the settings file.	The specified CID is set as a string.	The process is canceled.	
		The CID is not registered in the LID/CID response list.	SPN is not set in the settings file. (In case of ISO 14229)	The process is canceled.	
Common ID access	Processing file	File is defective. (verification error)	The file model did not match while reading the settings file.	The process is canceled.	
		The file can't open.	Settings file not found.	The process is canceled.	
		The file can't open.	For some reason (internal cause), saving the settings file failed.	The process is canceled.	
Common ID access	Processing file	Unable to apply the change.	The selected data cannot be changed.	The process is canceled.	
Common ID access (text)		This summary XXXXCID cannot be added because it is set as 2D or 3D map. Check the settings file.	2D, 3D maps are set in the common ID access (text) function.	The process is canceled.	
		The CID is not registered in the LID/CID response list.	SPN is not set in the settings file. (In case of ISO 14229)	The process is canceled.	
		File is defective. (verification error)	The file model did not match while reading the settings file.	The process is canceled.	
		The file can't open.	Settings file not found.	The process is canceled.	
		The file can't open.	For some reason (internal cause), saving the settings file failed.	The process is canceled.	
	Data Set	Unable to apply the change.	When the selected data cannot be changed	No action.	
Address specified access		Unable to apply the change.	Out of the address range	No action.	
			The "+F" row is pressed by WORD specification.	No action.	
Data ID specified access					

■ ECU Software Writing

Function	Process	Message (image)	Cause	Operation after display	Remark
Preparation for writing		Copying the file to the write process sheet failed.	For some reason (internal cause), copying the downloader file and the writing settings file failed.	The process is canceled.	
		Reading the engine production history data failed.	For some reason (internal cause), reading the engine production historical data failed.	The process is canceled.	
		Reading the individual data definition file failed.	For some reason (internal cause), reading the individual data definition file failed.	The process is canceled.	
		Reading the initial individual data file failed.	For some reason (internal cause), reading the initial individual file failed.	The process is canceled.	
		Reading the implement production history data failed.	For some reason (internal cause), reading the implement production historical data failed.	The process is canceled.	
		Reading the specified pump correction data file failed.	For some reason (internal cause), reading the pump correction data file failed.	The process is canceled.	
		Reading the specified ROM writer data file (ZIP) failed.	For some reason (internal cause), reading the ROM writer data file (ZIP) failed.	The process is canceled.	
		Reading the specified initial individual data file (LZH) failed.	For some reason (internal cause), reading the initial individual file (LZH) failed.	The process is canceled.	
		Reading the specified ROM writer data file (LZH) failed. Copy UNLHA32.DLL to the SYSTEM32 folder.	Because the compression/decompression DLL is not set, reading the ROM writer data file (LZH) failed.	The process is canceled.	
		Reading the individual data definition file failed.	Because the compression/decompression DLL is not set, reading the initial individual file (LZH) failed.	The process is canceled.	
		Mask processing of the map file failed.	For some reason (internal cause), reading or writing the map file failed.	The process is canceled.	
		Writing the individual data file failed.	For some reason (internal cause), reading the individual file failed.	The process is canceled.	
		Reading the specified ROM writer data file (ZIP) failed.	For some reason (internal cause), extracting the ROM writer data file (ZIP) failed.	The process is canceled.	
		Reading the individual data definition file failed.	For some reason (internal cause), extracting the initial individual file (ZIP) failed.	The process is canceled.	
		Creating the write process sheet failed.	For some reason (internal cause), writing the process sheet failed.	The process is canceled.	
		Custom map file not found.	For some reason (ROM writer data, internal cause), the custom map file could not be found.	The process is canceled.	
		Control map file not found.	For some reason (ROM writer data, internal cause), the control map file could not be found.	The process is canceled.	
		Mask map file not found.	For some reason (ROM writer data, internal cause), the mask map file could not be found.	The process is canceled.	
	Control program file not found.	For some reason (ROM writer data, internal cause), the control program file could not be found.	The process is canceled.		

Function	Process	Message (image)	Cause	Operation after display	Remark
Preparation for writing			For some reason (ROM writer data, internal cause), multiple custom map files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple engine production history files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple pump production history files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple individual data definition files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple initial individual files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple initial individual files (INDEX) are found after extracting the ROM writer data.		



19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Preparation for writing			For some reason (ROM writer data, internal cause), multiple control map files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple mask map files are found after extracting the ROM writer data.		
			For some reason (ROM writer data, internal cause), multiple implement production history files are found after extracting the ROM writer data.		
			Multiple files are found while reading the control map file.		
		Folder "Diag_Tool" not found in the extracted ROM writer data.	Folder "Diag_Tool" not found in the extracted ROM writer data.	The process is canceled.	
	Folder "Table" not found in the extracted ROM writer data.	Folder "Table" not found in the extracted ROM writer data.	The process is canceled.		
Flash writing		There is no manufacturer code that matches the license.	The manufacturer code collected from the writing process sheet could not match the manufacturer code of the license.	The process is canceled.	
		The checksum of the manufacturer code does not match.	Checksum for the manufacturer code of the writing process sheet did not match.	The process is canceled.	
		The checksum does not match.	Checksum of the writing process sheet did not match.	The process is canceled.	
		Delete the current control program and rewrite?	Check when the ECU, H/W, and serial No. collected from the writing process sheet did not match.	When "Yes", continue processing. When "No", interrupt processing.	
		ECU 3N does not match.	The ECU 3N code collected from the writing process sheet did not match.	The process is canceled.	
		ECU H/W part number does not match.	The ECU part No. collected from the writing process sheet did not match.	The process is canceled.	

19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Flash writing		ECU H/W serial number does not match.	The ECU, H/W, and serial No. collected from the map file did not match.	The process is canceled.	
		Unable to count RMNC.	The RMNC count did not match when processing the service ECU.	The process is canceled.	
		CB reset failed.	For some reason (ECU and internal cause), resetting in the CB area failed.	The process is canceled.	
		Engine serial number does not match.	The engine serial No. collected from the map file did not match.	The process is canceled.	
		Engine type does not match.	The engine model collected from the writing process sheet did not match.	The process is canceled.	
		Unable to change this ECU to a service ECU (RMNC error).	The RMNC count did not match when processing the service ECU.	The process is canceled.	
		Unable to change this ECU to a service ECU (TRUN error).	The TRUN count did not match when processing the service ECU.	The process is canceled.	
		Model name does not match.	The model name did not match when processing the model check.	The process is canceled.	
		Deleting Flash failed.	For some reason (ECU and internal cause), deleting Flash failed.	The process is canceled.	
		Communication with ECU failed.	Communication with ECU failed while writing ECU.	The process is canceled.	
		Clearing DTC failed.	Deletion failed in the deletion process of the DTC area.	The process is canceled.	
		ECU reset failed.	For some reason (ECU and internal cause), resetting ECU failed.	The process is canceled.	
		Writing for EEPROM initialization failed.	For some reason (ECU and internal cause), writing for the EEPROM initialization failed.	The process is canceled.	
		Writing initial setting data failed.	For some reason (ECU and internal cause), writing the initial data failed.	The process is canceled.	
		Verifying the key file failed.	Verifying the key collected from the writing process sheet failed.	The process is canceled.	
		Hard check of LY3 failed.	Hard check collection of LY3 (ECU S/N) failed.	The process is canceled.	
		Writing the manufacturer code failed.	For some reason (ECU and internal cause), writing the manufacturer code failed.	The process is canceled.	
		The checksum of the object does not match.	For some reason (internal cause), checksum of the object writing (APL software, map file, individual data) did not match.	The process is canceled.	
		Download of object failed.	For some reason (ECU and internal cause), downloading the object (APL software, map file, individual data) failed.	The process is canceled.	
		Reading of common data failed.	For some reason (ECU and internal cause), reading the common data failed.	The process is canceled.	
	Reading of data ID failed.	For some reason (ECU and internal cause), reading the data ID failed.	The process is canceled.		
	Reading of map category failed.	For some reason (ECU and internal cause), reading the map category failed.	The process is canceled.		

19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Flash writing		Reading of EEPROM failed.	For some reason (ECU and internal cause), reading the EEPROM data failed.	The process is canceled.	
		SBL download failed.	For some reason (ECU and internal cause), downloading SBL failed.	The process is canceled.	
		Security access failed.	For some reason (ECU and internal cause), the security access (programming mode, adjustment mode) failed.	The process is canceled.	
		Writing of common data failed.	For some reason (ECU and internal cause), writing the common data failed.	The process is canceled.	
		Writing of data ID failed.	For some reason (ECU and internal cause), writing the data ID failed.	The process is canceled.	
		Writing of EEPROM failed.	For some reason (ECU and internal cause), writing the EEPROM data failed.	The process is canceled.	
		Rewriting the fingerprint of data rewrite failed.	For some reason (ECU and internal cause), rewriting the data, rewriting the fingerprint failed.	The process is canceled.	
		Rewriting the fingerprint of software rewrite failed.	For some reason (ECU and internal cause), rewriting fingerprint of the software failed.	The process is canceled.	
		Unable to connect to the ECU because the license type is limited.	Because the limited models of the license function is set, the limited models do not match.	The process is canceled.	
		License key does not match.	The license key collected from the writing process sheet did not match.	The process is canceled.	
		Unable to perform the abnormal writing process.	Displayed when connected in the programming session before executing the abnormal writing.	The process is canceled.	
		Reading the write settings file failed.	Reading the write settings file collected from the writing process sheet failed.	The process is canceled.	
		Reading the write process sheet file failed.	For some reason (internal cause), reading the writing process sheet failed.	The process is canceled.	
		Failed to write a three-level code	For some reason (ECU and internal cause), writing the 3 level code failed.	The process is canceled.	
Flash ROM writing tool menu		Reading the download file (ZIP) failed.	For some reason (internal cause, corrupted file), reading the downloaded file failed.	The process is canceled.	
		The operation is currently not supported.	The download file type specified the files of 213, 2C3, and xx6.	The process is canceled.	
		Reading the key file failed.	For some reason (internal cause, corrupted file), reading the downloaded file failed.	The process is canceled.	
		The checksum does not match.	Checksum of the process sheet file collected from the extracted download file did not match.	The process is canceled.	
		Reading the write process sheet file failed.	Reading the process sheet file collected from the extracted download file failed.	The process is canceled.	

■ ECU Software Writing

Function	Process	Message (image)	Cause	Operation after display	Remark
ECU Exchange		Copy-protection: unable to write.	Writing failed due to the ECU copy limit.	The process is canceled.	
		Unable to apply the change.	Writing to the ECU was not allowed.	The process is canceled.	
		Verification of data failed.	The check data did not match when manually entering the ECU data.	The process is canceled.	
		Unable to write because the model or machine number is different.	Model or Serial No of the ECU data is different.	The process is canceled.	
		Writing data to the ECU failed.	For some reason (ECU and internal cause), writing the ECU failed.	The process is canceled.	
		The pump part code is different. Unable to write.	Do not perform writing except for the developer mode or the ECU is LY3. (If pump data is available.)	The process is canceled.	
Saving the report		Report format file not found.	For some reason (internal cause, file not installed), the format file could not be found.	The process is canceled.	
		Saving the report failed.	For some reason (ECU and internal cause), saving the report failed.	The process is canceled.	

■ Part Replacement

Function	Process	Message (image)	Cause	Operation after display	Remark
Pump replacement		File not found.	The file could not be found in reading the EXCDPF file, the EXCSF file, and the EXCDOC file.	The process is canceled.	
		The BCC of XXXX does not match.	BCC did not match when reading the EXCEL file.	The process is canceled.	
		Unable to apply the change.	Writing to the ECU was not allowed in writing the part replacement.	The process is canceled.	
		Unable to write because the model or machine number is different.	Model or Serial No of the ECU data is different.	The process is canceled.	
		Writing data to the ECU failed.	For some reason (ECU and internal cause), writing the ECU failed.	The process is canceled.	
		Reading the pump interchangeability file failed.	For some reason (internal cause), reading the pump compatibility file failed.	The process is canceled.	
		The replacement pump is not interchangeable. Unable to write.	When the replacement pump is not compatible.	The process is canceled.	
		The pump part code is different. Write the correct value?	A confirmation message is displayed to check whether or not to write the data when the mode is not the developer mode, the ECU is LY3, and the pump part code is different.	When "Yes", execute writing. When "No", interrupt processing.	
		The pump part code is different. Unable to write.	Do not perform writing except for the developer mode or the ECU is LY3.	The process is canceled.	
		The number is different. Write the correct value? (ECU: XXXX / Input: XXXX)	A confirmation message is displayed to check whether or not to write data when the name of the pump model matches up to the 11th character.	When "Yes", execute writing. When "No", interrupt processing.	
	Enter the parameter.	There is an omission in the input parameters of the ECU data.	The process is canceled.		
Pump replacement		Verification of data failed.	The check data did not match when reading the EXCDPF file, the EXCSF file, the EXCDOC file and the old ECU data.	The process is canceled.	
			The check data did not match when manually entering the ECU data.	The process is canceled.	
Injector replacement		Unable to apply the change.	Writing to the ECU was not allowed.	The process is canceled.	
		The data is defective. Enter it again.	The data is defective in the injector data entry.	The process is canceled.	
		Writing data to the ECU failed.	For some reason (ECU and internal cause), writing the ECU failed.	The process is canceled.	
Common	Saving the report	Report format file not found.	For some reason (internal cause, file not installed), the format file could not be found.	The process is canceled.	
		Saving the report failed.	For some reason (ECU and internal cause), saving the report failed.	The process is canceled.	
		Engine ECU or SCR ECU is not connected. Continue the Replacement Process?	For machine types that require more than one replacement at the same time, the ECU on one side is not connected.	If "Yes", continue with limited functions. If "No", return to the main menu.	

■Part Replacement

Function	Process	Message (image)	Cause	Operation after display	Remark
Product operation data collection		Reading the unique ID table failed.	Occurs when the unique ID table file does not exist and the reading failed. (Opinf_UniqueID (K).tbl)	The process is canceled. Interrupt the product operation data collection and return to the main menu.	
		Reading the working machine initial setting table failed.	Occurs when the initial setting table file does not exist and the reading failed. (Opinf_InitSet (K).tbl)	The process is canceled. Interrupt the product operation data collection and return to the main menu.	
		Reading the data table for initial setting acquisition failed.	Occurs when the initial setting collection table file does not exist and the reading failed. (Opinf_InitItemInfo.tbl)	The process is canceled. Interrupt the product operation data collection and return to the main menu.	
		Reading the operation data auxiliary setting table failed.	Occurs when the product operation data auxiliary setting table file does not exist and the reading failed. (Opinf_Setting_Sub.tbl)	The process is canceled. Interrupt the product operation data collection and return to the main menu.	
Product operation data collection		Reading the display format file failed.	Occurs when the display format file does not exist and the reading failed. "xxxxx" of the file name is the support information number received from the ECU. (Opinf_Setting_XXXXX.tbl)	Although the screen (lifetime data, map, log) is not displayed, the data can be saved. Processing continues.	
		Saving failed.	Occurs when saving the data failed, such as the specified folder does not exist at the time of storing the product operation data file (for storing SA-D and uploading to the server), and the file with the same file name exists.	Processing continues, because the screen can be displayed.	
Refer to the save data.		Save data not found.	Occurs when there are no SA-D save data files in the specified folder. (MngData\OperationData)	Transfer to the file selection screen.	
Operation time manual entry screen		No			

19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Lifetime data information screen		Mean value data not found.	Occurs when the relevant average values for the displayed data could not be found at the time of clicking the average value display button.		
		Reading the mean value file (by model and year) failed.	Occurs when the relevant average values for the displayed data is found but the mean value file (by model and year) could not be found at the time of clicking the average value display button and the reading failed.		
		Reading the unique ID table failed.	Occurs when the unique ID table file does not exist and the reading failed. (Opinf_UniqueID (K).tbl)		
		Reading the save data failed.	Occurs when the reading failed including the incorrect data file format selected on the data selection screen at the time of clicking the save data display or reference data display button.	Return to the lifetime data screen display without reading the relevant data.	
		Reading the display format file failed.	Occurs when the display format file does not exist and the reading failed. "xxxxx" of the file name is the support information number received from the ECU. (Opinf_Setting_XXXXX.tbl)		
		Maintenance data not found.	Occurs when the relevant maintenance information for the displayed data could not be found at the time of clicking the maintenance information button.		
		Reading the maintenance data failed.	Occurs when the relevant maintenance information for the displayed data is found but the maintenance information file does not exist and the reading failed.		
		Excel write settings data not found.	Occurs when the display format file does not exist and the reading failed. "xxxxx" of the file name is the support information number received from the ECU. (Opinf_Setting_XXXXX.tbl)		
		Excel template file (XXXXXXXX) not found.	Occurs when the template file for EXCEL out does not exist. "xxx" of the file name is described in the display format file. (Opinf_E_Template_XXX(K).xls)		
		The operation failed because writing to the save file failed. Check that the writing file is not open and perform the operation again.	Occurs when copying to the specified location of the template file for EXCEL out failed or the file with the same file name exists.		
	Excel write settings data not found.	Occurs when opening the file failed including the display format file exists but the other program is opened for exclusive operation. (Opinf_Setting_XXXXX.tbl)			

19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Lifetime data information screen		Unable to open Excel file (XXXXXXXX).	Occurs when the EXCEL file could not be created.		
		Saving the maintenance data clear table failed.	Occurs when the file could not be created or the specified folder for the maintenance clear table file could not be found at the time of clicking the clear button.		
Map screen		Reading the unique ID table failed.	Occurs when the unique ID table file does not exist and the reading failed. (Opinf_UniqueID (K).tbl)		
Log screen		Reading the unique ID table failed.	Occurs when the unique ID table file does not exist and the reading failed. (Opinf_UniqueID (K).tbl)		
Product operation data download		Operation is not possible because the server is offline.	Occurs when tried to display the product operation data download screen in the offline condition (not connected to the server).	Without displaying the product operation data download screen, return to the main menu.	
		Enter the nameplate model with 2 letters or more.	Occurs when the entry is not made in "nameplate model", or less than 2 characters are entered and the search button is clicked.	Search is not conducted.	
		Enter the user ID.	Occurs when the search button is clicked without entering "User ID" while the "Specified User ID No." is selected for the "Data Search Object".	Search is not conducted.	
		Please input years correctly.	Occurs when the numeric value except for 1 to 12 for "Month" of "Upload Date" or "Collection Date" is entered and the search button is clicked.	Search is not conducted.	
		Please input years correctly.	Occurs when only the "Month" is entered and not the "Year" in "Upload Date" or "Collection Date" and the search button is clicked.	Search is not conducted.	
		Download failed. Check of Connection.	Occurs when there is no response for the search result from the server.		
		Communication failed. Error code: 0 Message: 0	Occurs when an error occurred on the server side.		
		Response error Error code: XXXX	Occurs when the search result response from the server is an error.		
		More than 300 search results. Narrow down the search parameters.	Occurs when the search result exceeds the specified number (300 items).	Search is not conducted.	
		Download failed. Check of Connection.	Occurs when the specified product operation data could not be downloaded.		
		Incorrect file.	Occurs when the downloaded product operation data is structurally incorrect.		
		Rename the operation data download file failed.	Occurs when the downloaded product operation data could not be moved to the specified folder, such as the folder does not exist.		

■ Data Management

Function	Process	Message (image)	Cause	Operation after display	Remark
Import	Execute	Unable to import XXXX.txt because the file format is wrong.	Importing a file with the file format that does not belong to the selected section or type was attempted.	No action. Return to the data management screen.	
		Registration of XXXX.xml failed. Retry?	When saving the file failed for some reason.	Press "Yes" to retry on the same file. Press "No" to not register and process the next file. Press "Cancel" to abort the process.	
		XXXX.zip is already registered. Overwrite?	Overwriting check when the file is already registered.	Press "Yes" to overwrite. Press "No" to not overwrite and process the next file. Press "Cancel" to abort the process.	
		Model XXXX or machine number XXXX is already registered. Overwrite?	Confirming to overwriting when the file with the same format and Serial No is registered for the ECU software and pump correction values.	Press "Yes" to overwrite. Press "No" to not overwrite and process the next file. Press "Cancel" to abort the process.	
Export	Execute	XXXX is already registered. Overwrite?	The file for export already exists in the output destination (same file name).	Press "Yes" to export by overwriting the file. Press "No" to cancel the operation.	
		Unable to export the specified data.	When trying to export a file that cannot be exported.	No action. Return to the data management screen.	
		Unable to export the specified data because the data was imported.	The file that was attempted to export cannot be exported because it is an imported file.	No action. Return to the data management screen.	
		Data export failed.	For some reason (internal cause), the export failed.	The process is canceled. Return to the data management screen.	
Delete	Select	Deleting XXXX failed.	For some reason (internal problem), it cannot be deleted.	The process is canceled. Return to the data management screen.	
Memo Edit	Select	Unable to edit because the memo was not found.	When there is no memo area in the data.	The process is canceled. Return to the data management screen.	
	Save	Saving the memo failed.	For some reason (internal cause), the memo registration failed.	The process is canceled. Return to the data management screen.	

Manual

Function	Process	Message (image)	Cause	Operation after display	Remark
Download		Operation is not possible because the server is offline.	The "Manual" menu of the main menu is selected when the server is offline.	The process is canceled.	
		Download failed, Cancel process?	For some reason (internal cause or communication cause, etc.), downloading failed.	Press "Yes" to continue downloading the next manual. Press "No" to interrupt downloading.	
		ZIP file not found.	The manual file (ZIP file) could not be downloaded.		
		It failed in download of Manual List. Check of Connection.	There was a problem while downloading the manual list.	The process is canceled.	
Initialization and folder check		The data for the service manual of the acquired model does not exist.	Manual not found.		
Delete	Execute	Unable to delete XXXX.	There is no selected manual in the manual deletion screen.	The process is canceled.	

News Link

Function	Process	Message (image)	Cause	Operation after display	Remark
Download	Main Menu	Update of error diagnosis data in progress. The selected function can affect operation. Abort data update and execute the selected function?	Check when the ECU Access operation is selected while downloading.	Press "Yes" to interrupt downloading and execute the selected process. Press "No" to continue downloading and do not execute the selected process.	
News Link	Detail display	The file is not found.	Although the attached file was selected on the news detail screen, the specified file could not be found.	No action. (The attached file is not opened.) Return to the bulletin detail screen.	

Saving the ECU Storage Data

Function	Process	Message (image)	Cause	Operation after display	Remark
ECU Storage Data	Save	Saving the ECU data failed.	For some reason, saving failed.	The process is canceled. (Not stored)	Does not happen under normal circumstances.
Measurement data	Reading	Same as the ECU storage data			

19. Error Screen and Warning Screen

■ Download/Upload (ECU software related)

Function	Process	Message (image)	Cause	Operation after display	Remark
Common server communication		Process aborted.	When processing is aborted by the cancel button while communicating to the server	The process is canceled.	
		Communication failed. Error code: XX Message: XXXX	This occurs when the content of the "Status" tag is "False". (* This is improbable in the current specification according to YISS.)	The process is canceled.	Display the content of the server response tags "errorcode" and "message".
		Response error Error code: XX	This occurs when an undefined response code is received from the server.	The process is canceled.	Display the content of the "resp-code" tag.
		Response error Error code: 10 (The specified model was not found.)	This occurs when the response code 10 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "10".
		Response error Error code: 20 (Specified No. was not found.)	This occurs when the response code 20 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "20".
		Response error Error code: 30 (The digit number of serial No is unusual.)	This occurs when the response code 30 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "30".
		Response error Error code: 40 (It is unauthorized.)	This occurs when the response code 40 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "40".
		Response error Error code: 50 (There is no object.)	This occurs when the response code 50 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "50".
		Response error Error code: 60 (The exchange is being processed.)	This occurs when the response code 60 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "60".
		Response error Error code: 70 (It is ECU while using it.)	This occurs when the response code 70 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "70".
		Response error Error code: 80 (Part exchange information is abnormal.)	This occurs when the response code 80 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "80".
		Response error Error code: 99 (The abnormalities in a server process and an administrator will be contacted.)	This occurs when the response code 99 is received from the server.	The process is canceled.	If the "resp-code" tag has the value "99".
ECU list download		input a model and a machine turn in less than 20 characters.	This occurs when the clear transmission button was pressed without entering the model or Serial No.	The process is canceled.	
		Input type is not the Engine. Enter the model again.	This occurs when the machine model was entered despite the engine being selected on the machine selection screen.	The process is canceled.	
		Input type is not the Agri. Machine. Enter the model again.	This occurs when the engine model was entered despite the engine being selected on the engine and machine selection screen.	The process is canceled.	
ECU write download		Select an item for download.	This occurs when the transmission button was clicked without selecting (ticking) the download Item.	The process is canceled.	
		Enter the serial number.	This occurs when the transmission button is pressed without entering the serial number for ECU exchange (actual machine/desktop) only.	The process is canceled.	
		Reading the download file (ZIP) failed.	This occurs when the ECU software ZIP file does not exist and could not be stored in the specified file.	The process is canceled.	

19. Error Screen and Warning Screen

Function	Process	Message (image)	Cause	Operation after display	Remark
Part Re- placement	Pump re- placement	input a model and a machine turn in less than 20 characters.	This occurs when the clear transmission button was pressed without entering the model or Serial No.	The process is canceled.	
		Select an item for download.	This occurs when the transmission button was dicked without selecting (ticking) the download item.	The process is canceled.	

20. Attached Documents

Attached document: FMI (Failure Mode Identified) list

FMI	Content
0	The data is valid, but exceeds the normal operation range. (Upper limit exceeded)
1	The data is valid, but does not reach the normal operation range. (Lower limit exceeded)
2	The data is unstable, intermittent, and inappropriate. (Intermittent fault)
3	The voltage exceeds the normal operation range or short-circuited on the high-voltage side. (Signal fault upper limit)
4	The voltage does not reach the normal operation range or short-circuited on the low-voltage side. (Signal fault lower limit)
5	The current does not reach the normal operation or the circuit is open. (Electric current fault low)
6	The current does exceeds the normal operation or the circuit is grounded. (Electric current fault high)
7	The machine system is not reacting or misaligned. (Machine system fault)
8	The rotational speed or pulse width/cycle is faulty. (Rotational speed, pulse width fault)
9	The update ratio is faulty. (Smart sensor and actuator fault)
10	The rate of change is faulty. (Rate of change fault)
11	The error code is unknown. (Incorrect sub-system error code)
12	There is a problem in the intelligent device/component. (Intelligent device problem)
13	Unable to calibrate. (Calibration disabled)
14	This is a special command. (Special command)
15	Normal. (Normal)