e-Doctor user's Manual (DL08/DV11)

Overseas Service Team

e-Doctor is to

- Show engine failure Current status and history.

- View each engine components working condition & data value.

- Save engine data for checking engine condition & Troubleshooting.

- Check power deviation of each cylinder.

- Check compression deviation of each cylinder.

- Operate engine by lap top control.

- See ECU Configuration.

e-Doctor Kit Components (P/N : K9001683)

Program Installation CD

Gate way (Module)

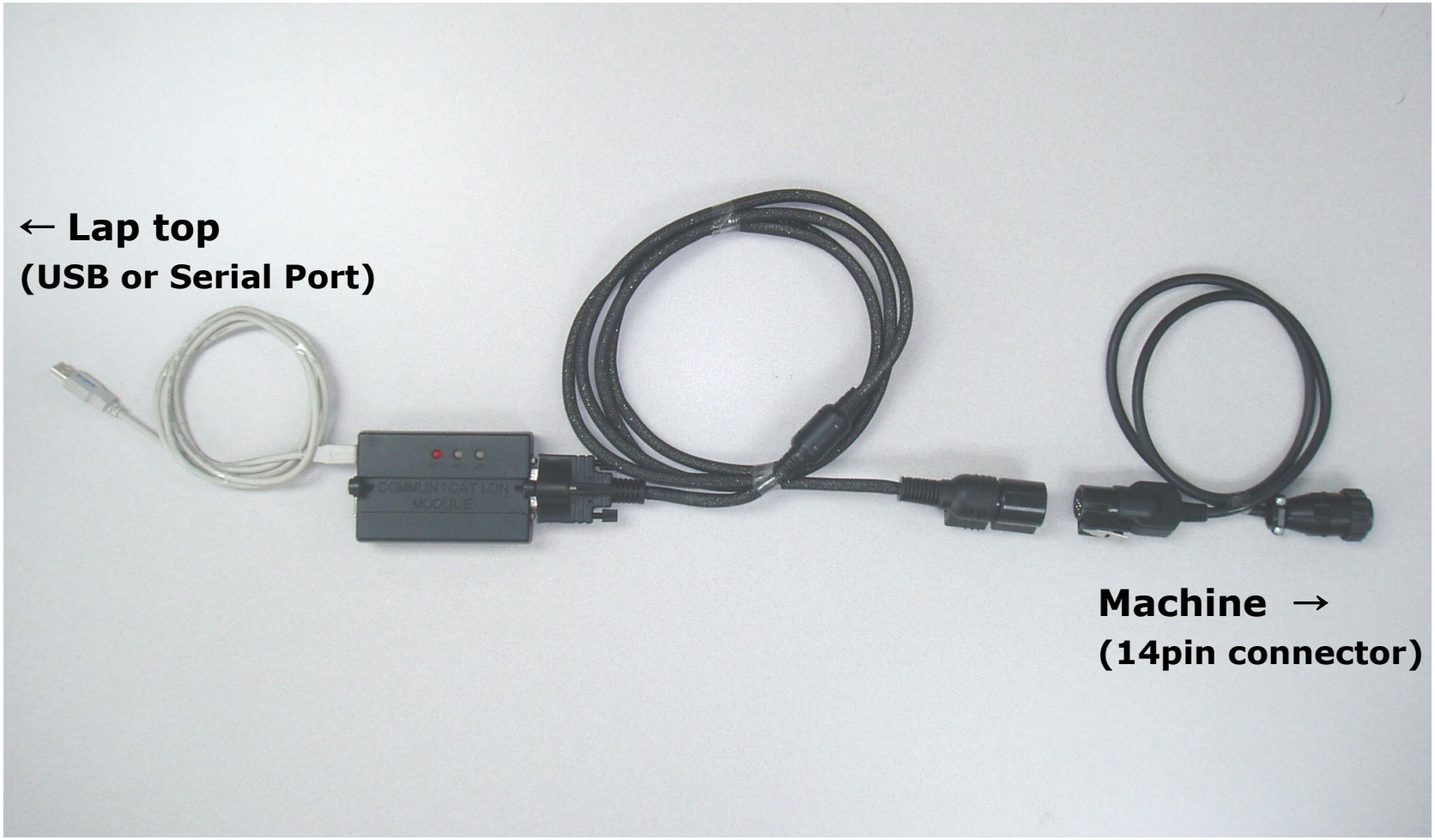
Main Harness (Module / 14 pin harness)

USB Port Harness (Module / Lap top)

Serial Port Harness (Module / Lap top)

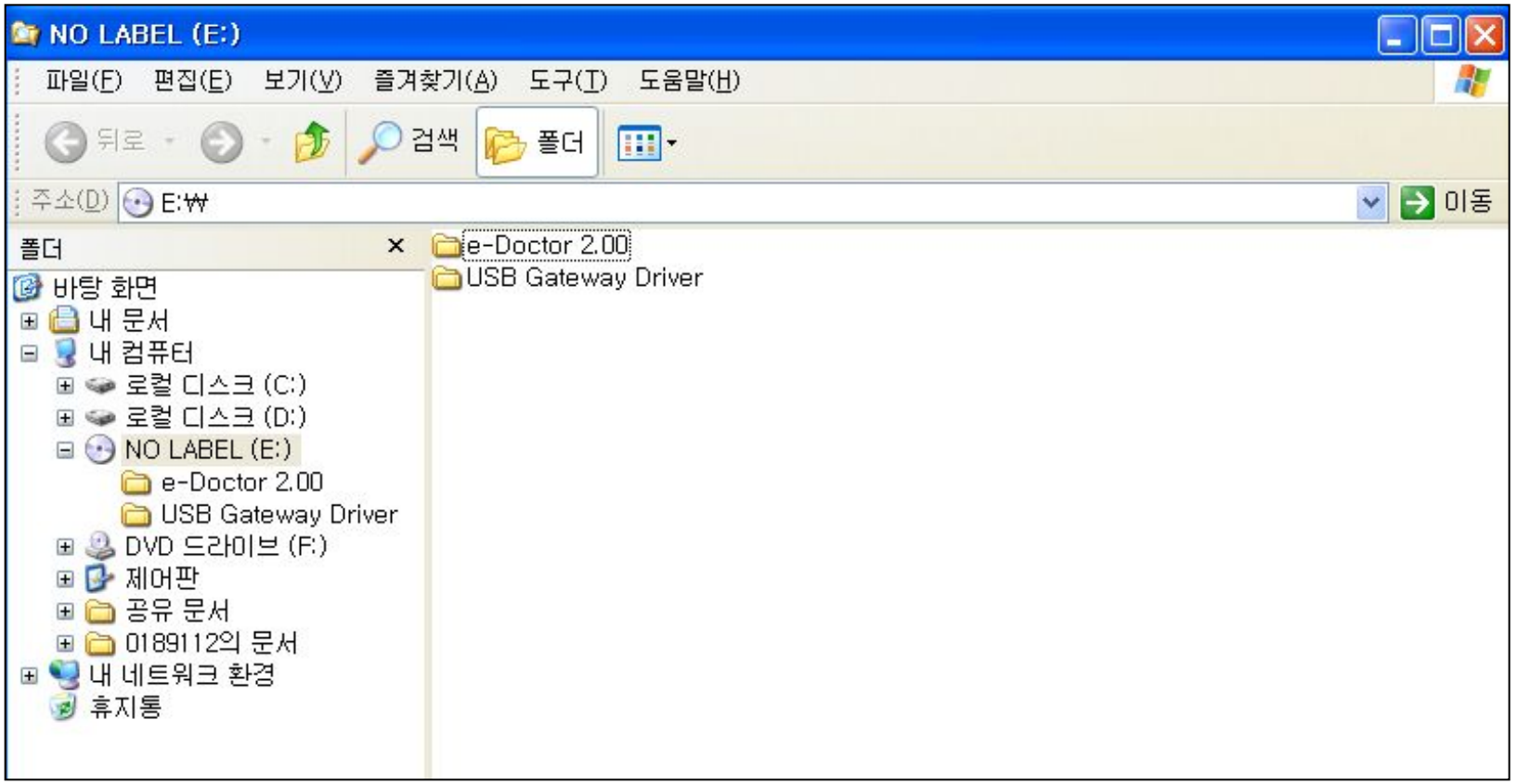
14 Pin Harness (Main harness / Check port)

Wiring *e*-Doctor with machine and laptop



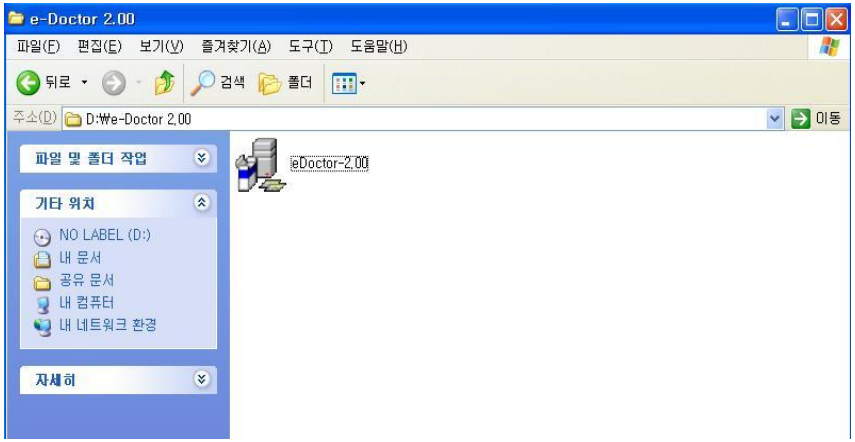
Install program

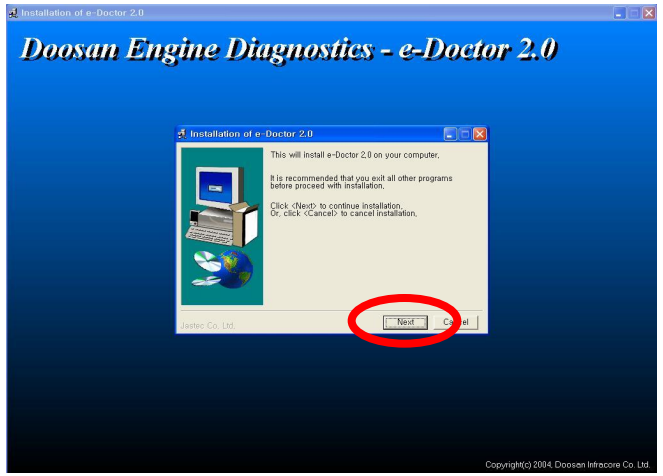
1. Insert program install CD in your lap top computer
   - Copy and save “USB gateway driver” on your lap top (any folder is okay).
   - Double click “e- Doctor2.00”



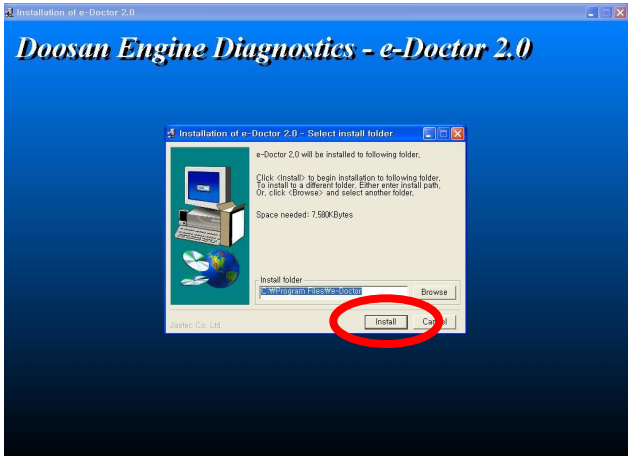
Install program

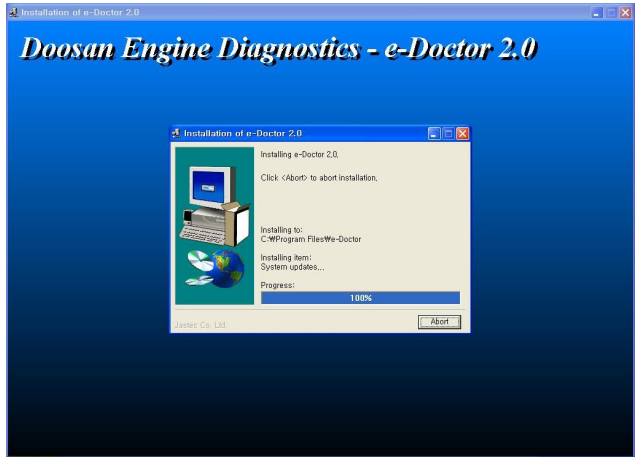
- Double click “e- Doctor2.00” and install program “Next”





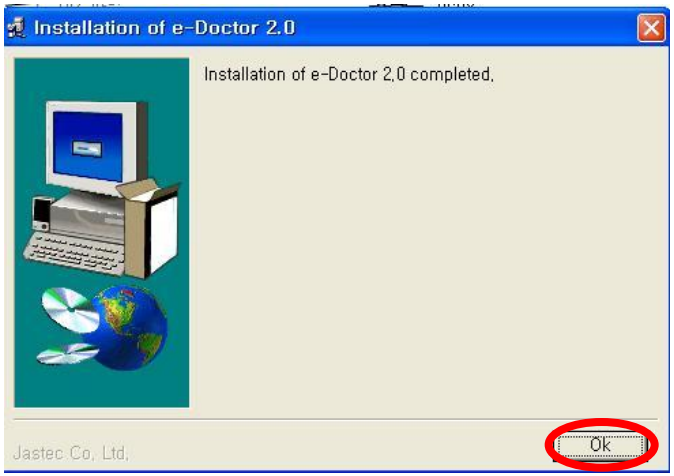
- Click “Install”



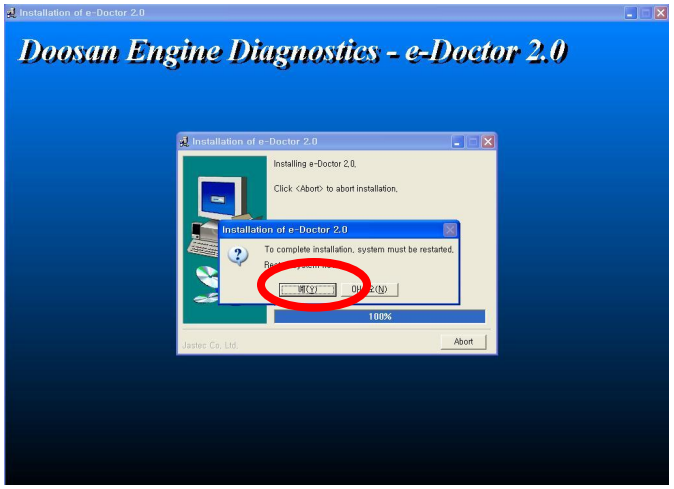


Install program

- Click “OK”



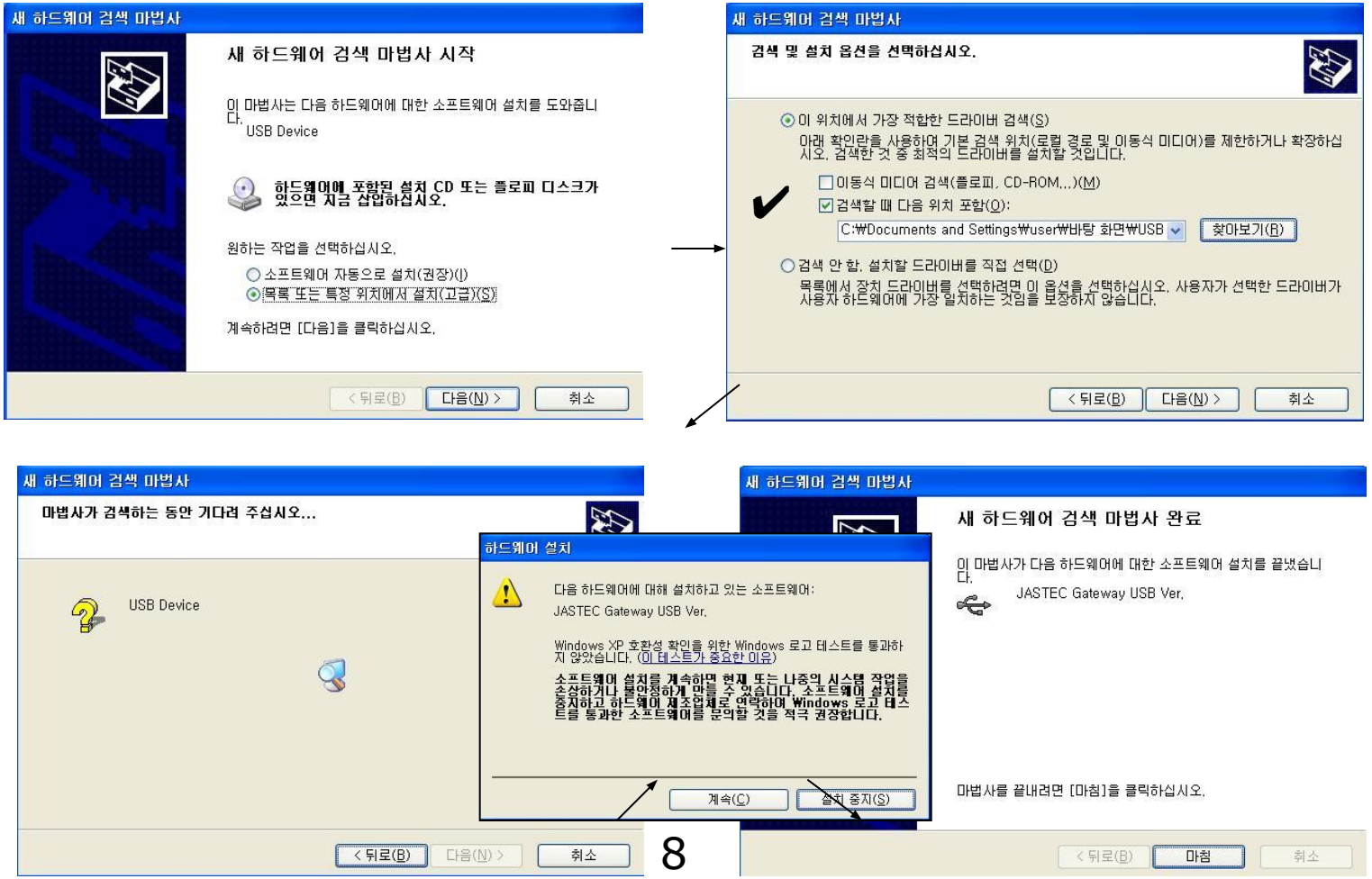
Restart system



The e- Doctor program is installed completed on your lap top

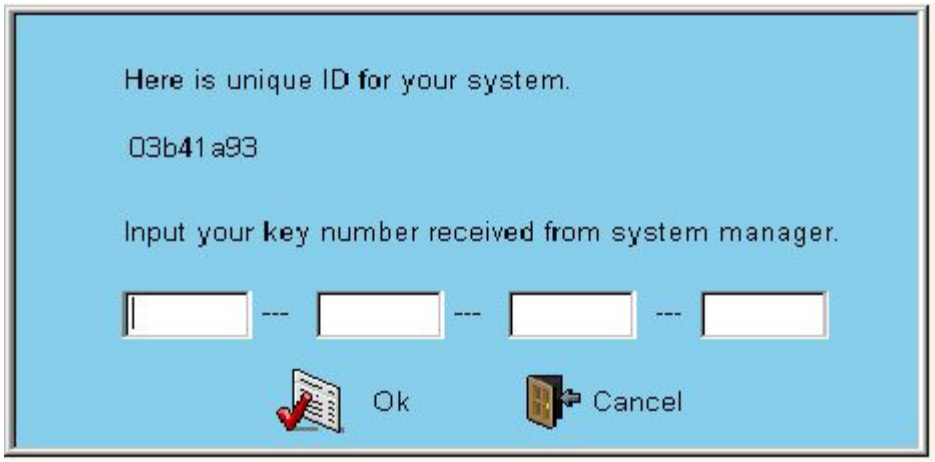
Install program

2. Connect USB cable with gateway and put cable in USB port on your lap top then, your lap top will recognize the new hard ware as below
If Your lap top look for the USB gate way driver, indicate the driver location , then click " OK ".



User Registration and Log In

1. User Registration

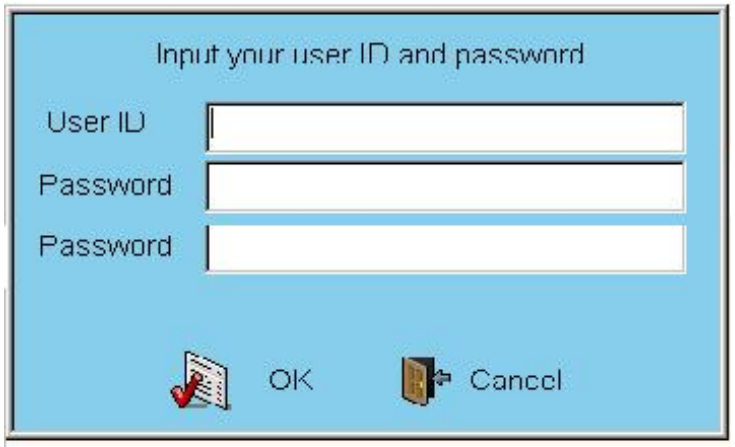


As soon as finish the installation, click e Doctor icon, then you can see above massage. You can find out the unique ID, please let the program manager in DIEU,DIA know the above unique ID, When you inform the unique ID, prepare and inform your user ID (6 digital), this user ID is not given from the program manager, you have to make your user ID as you want. If you notice the unique No and user ID to program manger, he will give you system key No and password related with your ID.
(The program manager will be the service manager in DIEU and DIA).

Note) One hardware (lap top) has its own unique ID, If hardware is changed, you have to get another system key No and password with different unique ID.

User Registration and Log In

1. User Registration



If you fill the system key No which is acquired from the program manager, you can see the above window.

Then put in your ID and password which is taken from program manger. and click OK. Now, You can use e Doctor.

Every time you run the E-Doctor, the system will ask you ID and password.

User Registration and Log In

2. Log in

Enter your ID and password when you run the program.

※ If you lost your password, contact the program manager and get a new password and user ID. You have to reinstall the program again.

Operation *e* - Doctor

1. Top menu

- Menu (M)
  - Exit: exit the program.

- Communication (C)
  - Start: Start the communication with the machine.
  - Stop: Stop the communication with the machine.

- Preference (P)
  - COM1 : Select to connect to the COM port #1 of your laptop computer.
  - COM2 : Select to connect to the COM port #2 of your laptop computer.
  - USB : Select to connect to the any USB port of your laptop computer.

- Help (H)
  - About: You can see the copyright and version information.
  - Help: You can see the online help for the diagnosis program. (Manual here)

Operation *e* - Doctor

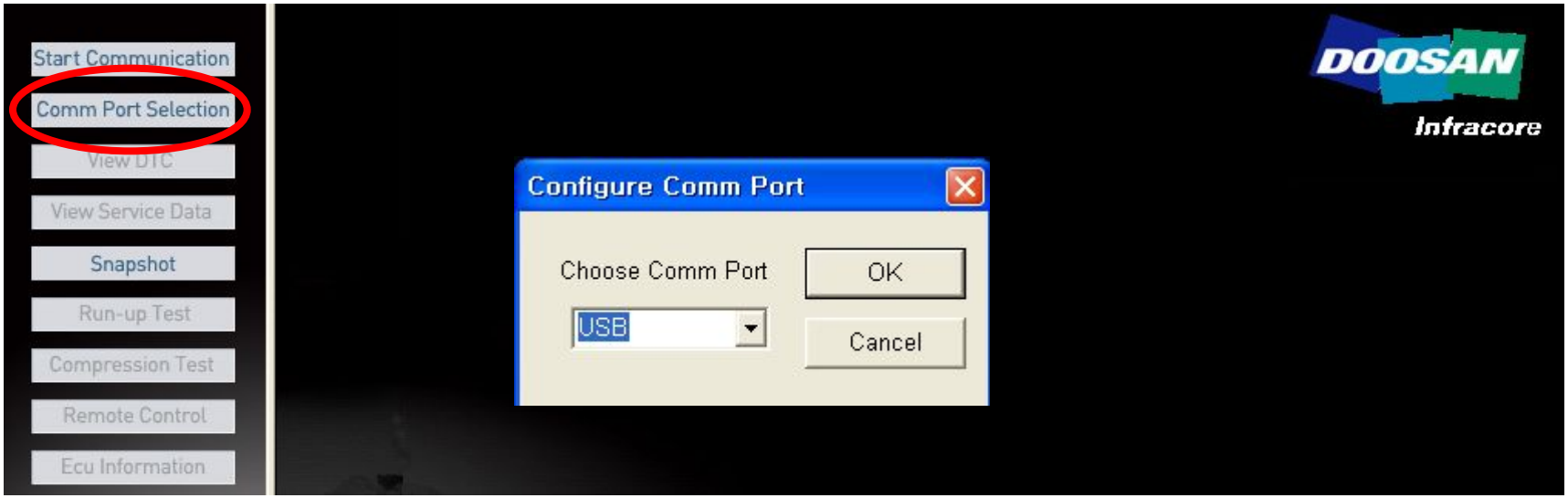
2. Start Communication / Stop communication

- Start communication icon
  - Make the e Doctor and engine ECU communicate.
  - Let you know what engine is installed on machine.

- Stop communication icon
  - Make the communication stop.

※ Wait 5 seconds before resuming the communication.

3. Communication port selection

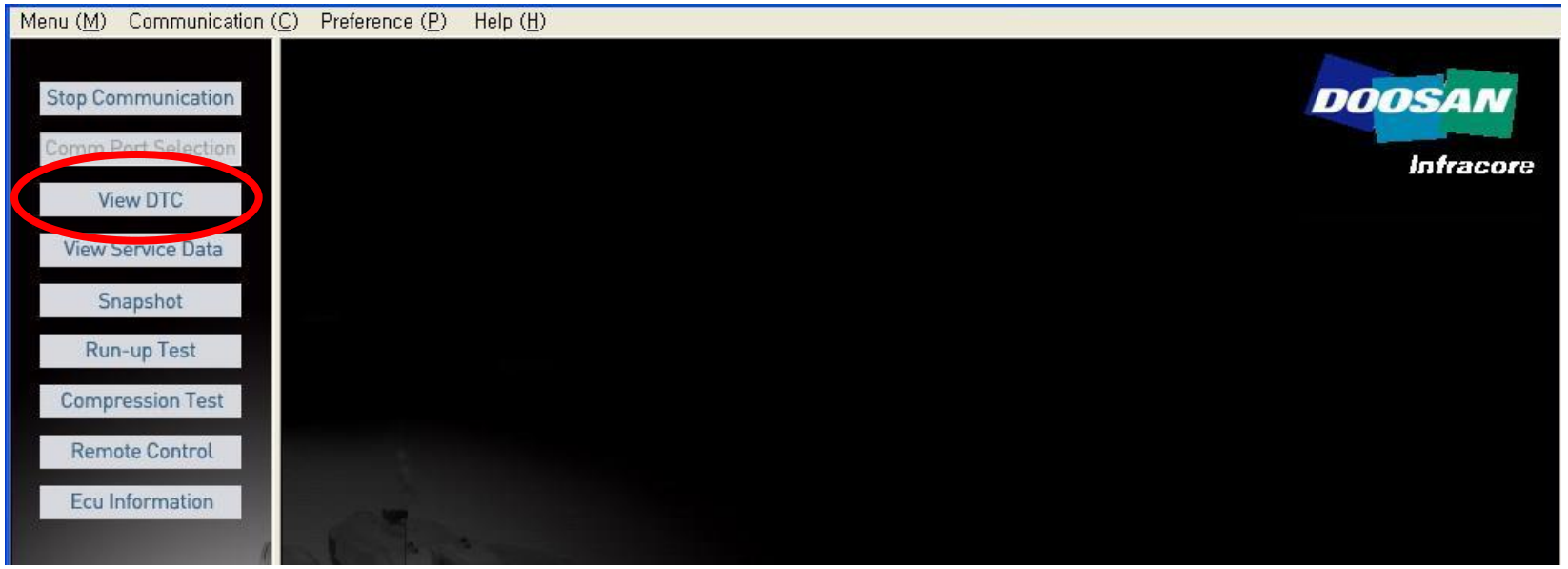


- COM1 : Connect the main harness cable (which is connected to a gateway module) to the serial port #1 of your laptop computer.

- COM2 : Connect the main harness cable (which is connected to a gateway module) to the serial port #2 of your laptop computer.

- USB : Connect the USB cable (which is connected to a gateway module) to the USB port of your laptop computer.

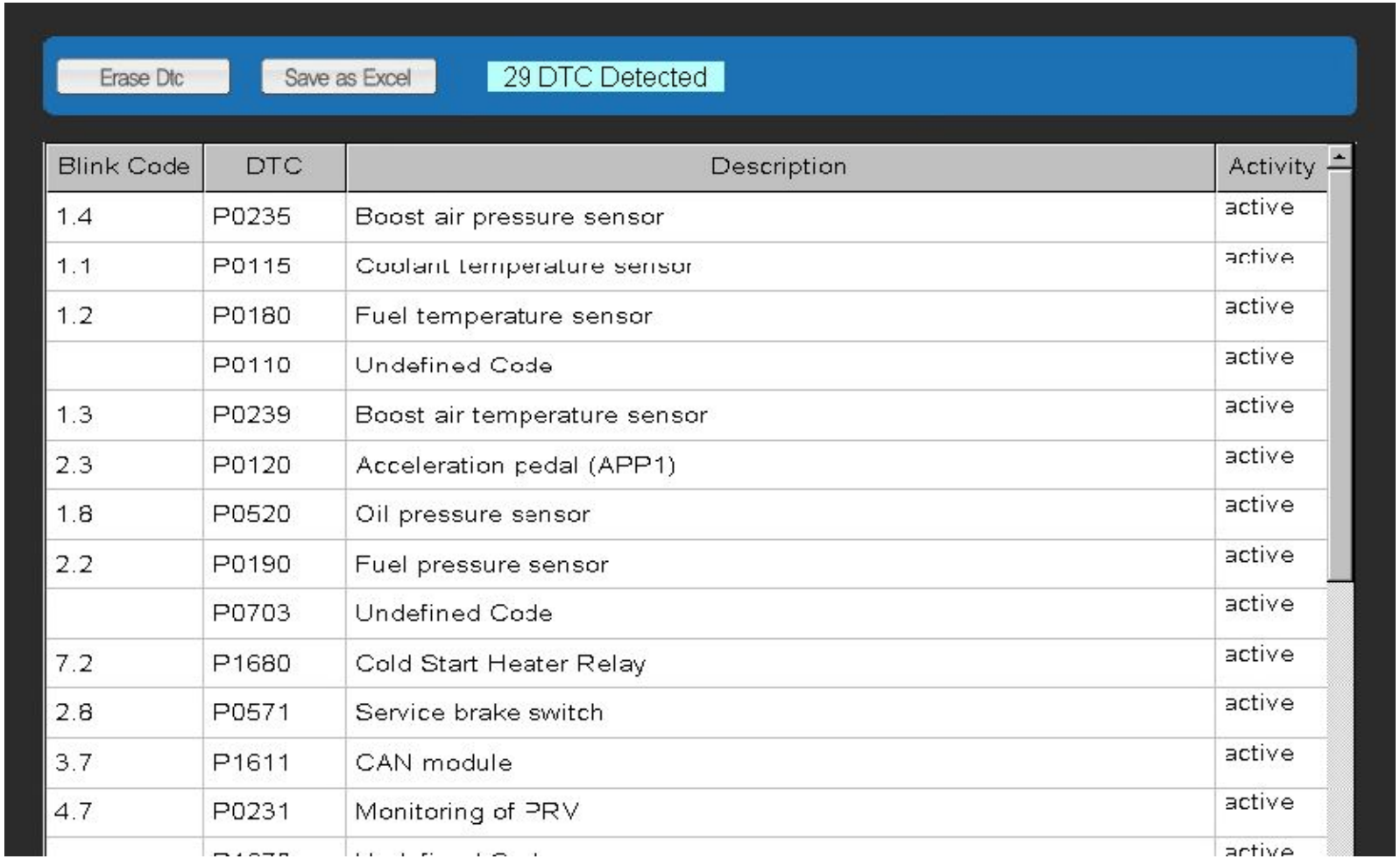
4. View DTC (Diagnostic Trouble Code)



- Check Engine failure condition now and before

Operation *e* - Doctor

4. View DTC (Diagnostic Trouble Code)



Blink Code	DTC	Description	Activity
1.4	P0235	Boost air pressure sensor	active
1.1	P0115	Coolant temperature sensor	active
1.2	P0180	Fuel temperature sensor	active
	P0110	Undefined Code	active
1.3	P0239	Boost air temperature sensor	active
2.3	P0120	Acceleration pedal (APP1)	active
1.8	P0520	Oil pressure sensor	active
2.2	P0190	Fuel pressure sensor	active
	P0703	Undefined Code	active
7.2	P1680	Cold Start Heater Relay	active
2.8	P0571	Service brake switch	active
3.7	P1611	CAN module	active
4.7	P0231	Monitoring of PRV	active

Operation *e* - Doctor

4. View DTC (Diagnostic Trouble Code)

▪ Erase DTC
- Let the user erase all past error data in ECU.

▪ Save as Excel
- Let the user save the list of error as a Excel file.

▪ Blink Code (This is Error code)
- Let you know the error codes of the engine.

▪ DTC
- For R & D in Factory (No need to know)

▪ Description
- Provide the detail information about each fault code.
- 'Blank' means that the description for a fault code is not defined yet or no error.

▪ Activity
- 'Active' means that there is currently any fault in engine.
- 'History' means the faults generated in the past.

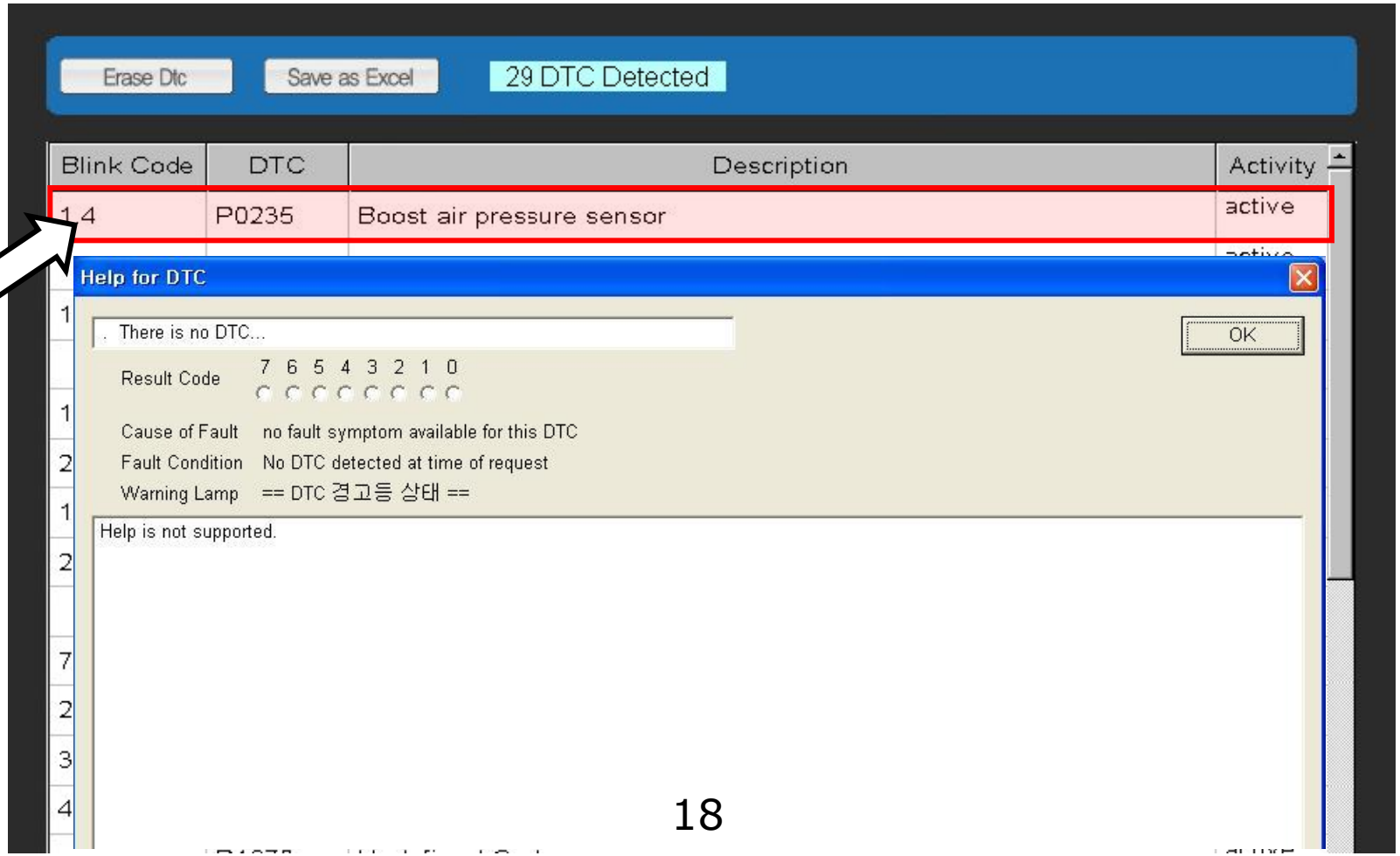
▪ Help for DTC
- Click on the fault code line to open the help window.

Operation e - Doctor

4. View DTC (Diagnostic Trouble Code)

- Help for DTC

- Click on the fault code line to open the help window.
- You can see the fault detail, cause result & repair point.



Operation e - Doctor

4. View DTC (Diagnostic Trouble Code)

- Result Code (Fault Status)
  - 0 Bit – Higher output voltage than the max(4850mV) limit
  - 1 Bit - Lower output voltage than the min(250mV) limit
  - 2 Bit - No signal
  - 3 Bit - Abnormal signal (Tottering signal)
  - 4 Bit - The sensor power supply voltage is higher than the max. value.
  - 5 Bit - The sensor power supply voltage is lower than the min. value.
  - 6 Bit - Higher than the limit value
  - 7 Bit - Lower than the limit value

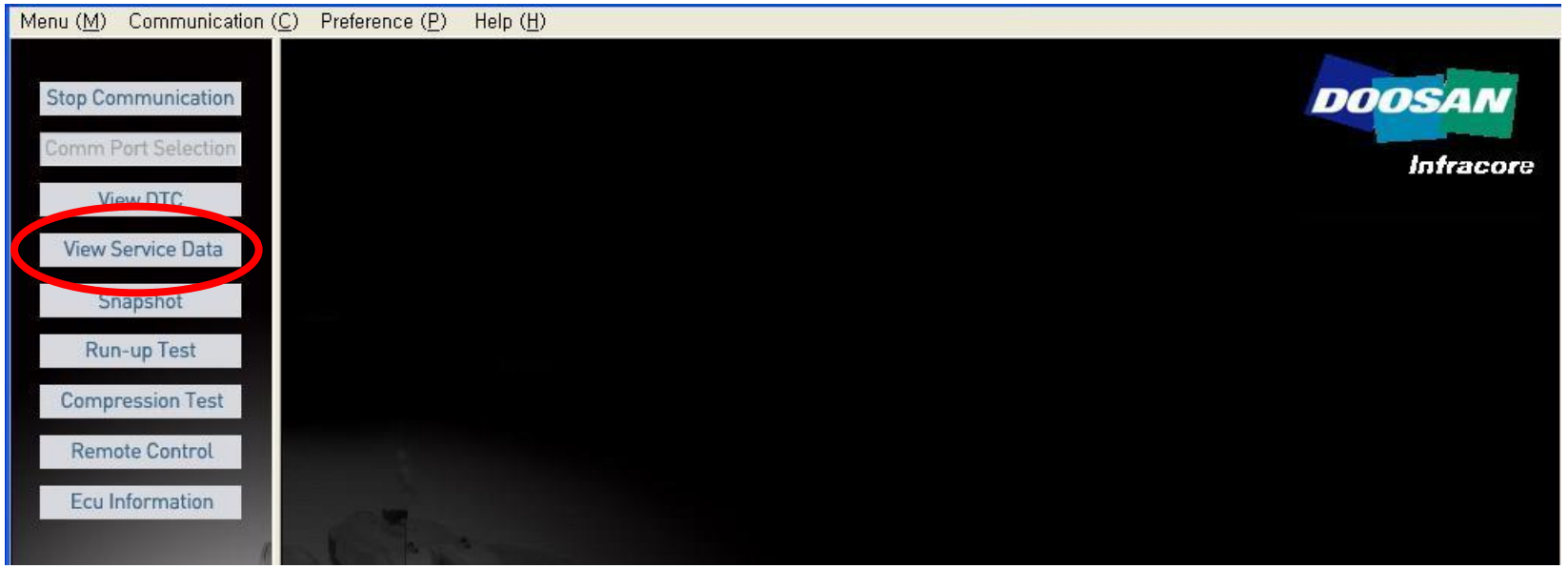
- Cause of fault

- Fault condition
  - Shows four different status (No faults, old faults, intermittent faults, current faults)

- Warning lamp
  - OFF / ON

- Help
  - It provides the descriptions, symptoms, conditions and actions for the fault codes.

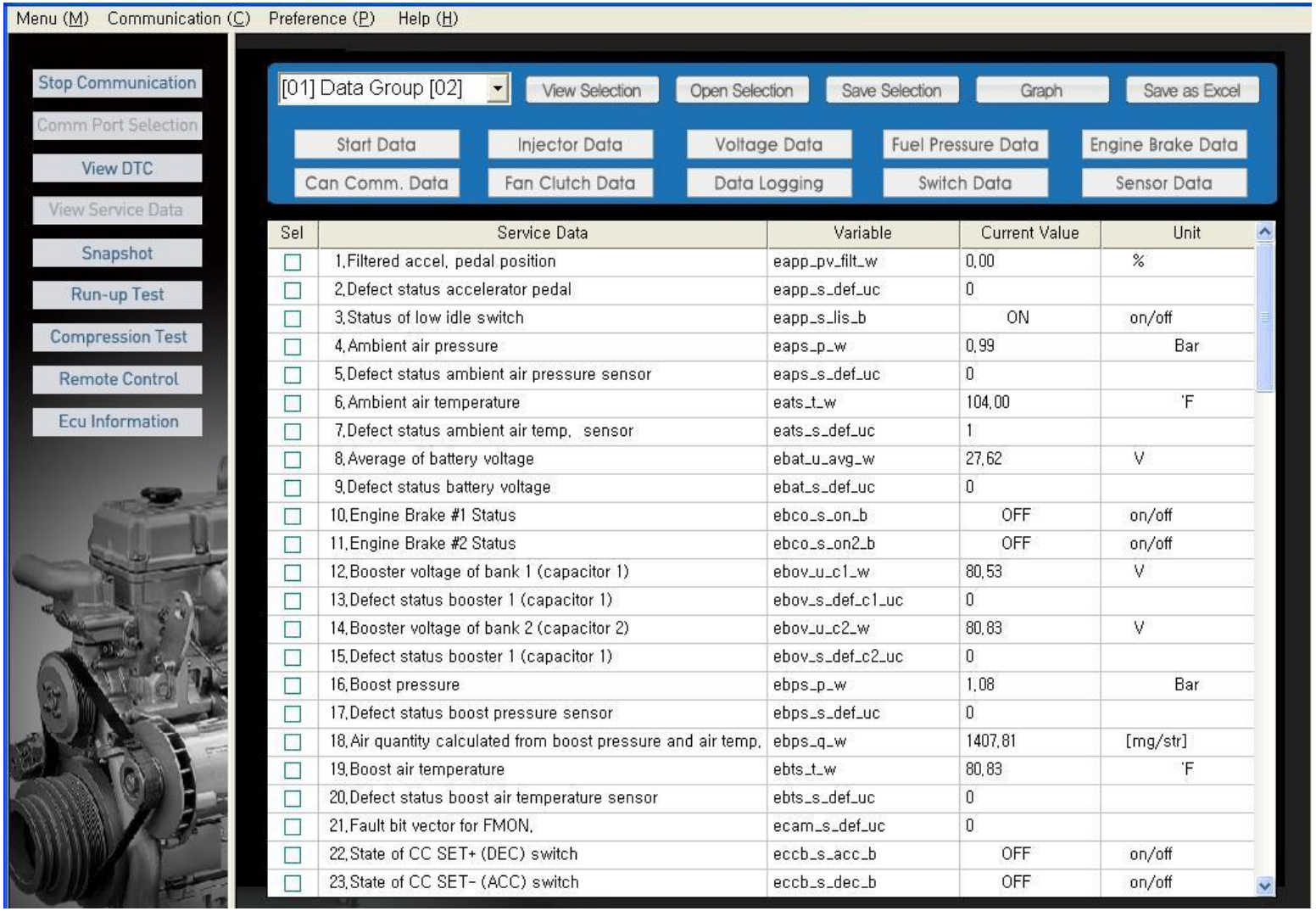
5. View Service Data



- View service data enables you to check the sensors and service data values of the engine, and check the status of the electric components such as sensor or switches.

Operation *e* - Doctor

5. View Service Data



Sel	Service Data	Variable	Current Value	Unit
☐	1,Filtered accel. pedal position	eapp_pv_filt_w	0,00	%
☐	2,Defect status accelerator pedal	eapp_s_def_uc	0	
☐	3,Status of low idle switch	eapp_s_lis_b	ON	on/off
☐	4,Ambient air pressure	eaps_p_w	0,99	Bar
☐	5,Defect status ambient air pressure sensor	eaps_s_def_uc	0	
☐	6,Ambient air temperature	eats_t_w	104,00	'F
☐	7,Defect status ambient air temp. sensor	eats_s_def_uc	1	
☐	8,Average of battery voltage	ebat_u_avg_w	27,62	V
☐	9,Defect status battery voltage	ebat_s_def_uc	0	
☐	10,Engine Brake #1 Status	ebco_s_on_b	OFF	on/off
☐	11,Engine Brake #2 Status	ebco_s_on2_b	OFF	on/off
☐	12,Booster voltage of bank 1 (capacitor 1)	ebov_u_c1_w	80,53	V
☐	13,Defect status booster 1 (capacitor 1)	ebov_s_def_c1_uc	0	
☐	14,Booster voltage of bank 2 (capacitor 2)	ebov_u_c2_w	80,83	V
☐	15,Defect status booster 1 (capacitor 1)	ebov_s_def_c2_uc	0	
☐	16,Boost pressure	ebps_p_w	1,08	Bar
☐	17,Defect status boost pressure sensor	ebps_s_def_uc	0	
☐	18,Air quantity calculated from boost pressure and air temp.	ebps_q_w	1407,81	[mg/str]
☐	19,Boost air temperature	ebts_t_w	80,83	'F
☐	20,Defect status boost air temperature sensor	ebts_s_def_uc	0	
☐	21,Fault bit vector for FMON.	ecam_s_def_uc	0	
☐	22,State of CC SET+ (DEC) switch	eccb_s_acc_b	OFF	on/off
☐	23,State of CC SET- (ACC) switch	eccb_s_dec_b	OFF	on/off

5. View Service Data

▪ Data Group
- Select the service data you want to see using the fall-down menu.
- Data Group [02]
- Data Group [03] – not use
- Data Group [14]
- Data Group [15] - not use
- Related Button Bar
- Collect the measured data items for data groups (02, 03, 14, 15) by each related function items.
- The selection menus (engine starting performance, Injector, voltage, fuel pressure, engine brake, CAN communication, fan clutch, data logging, switch or sensor) have the same function.

▪ View Selection
- Shows the service data you want to see on you laptop monitor (use check mark).

▪ Open Selection
- Opens the service data you saved in lap top.

Operation *e* - Doctor

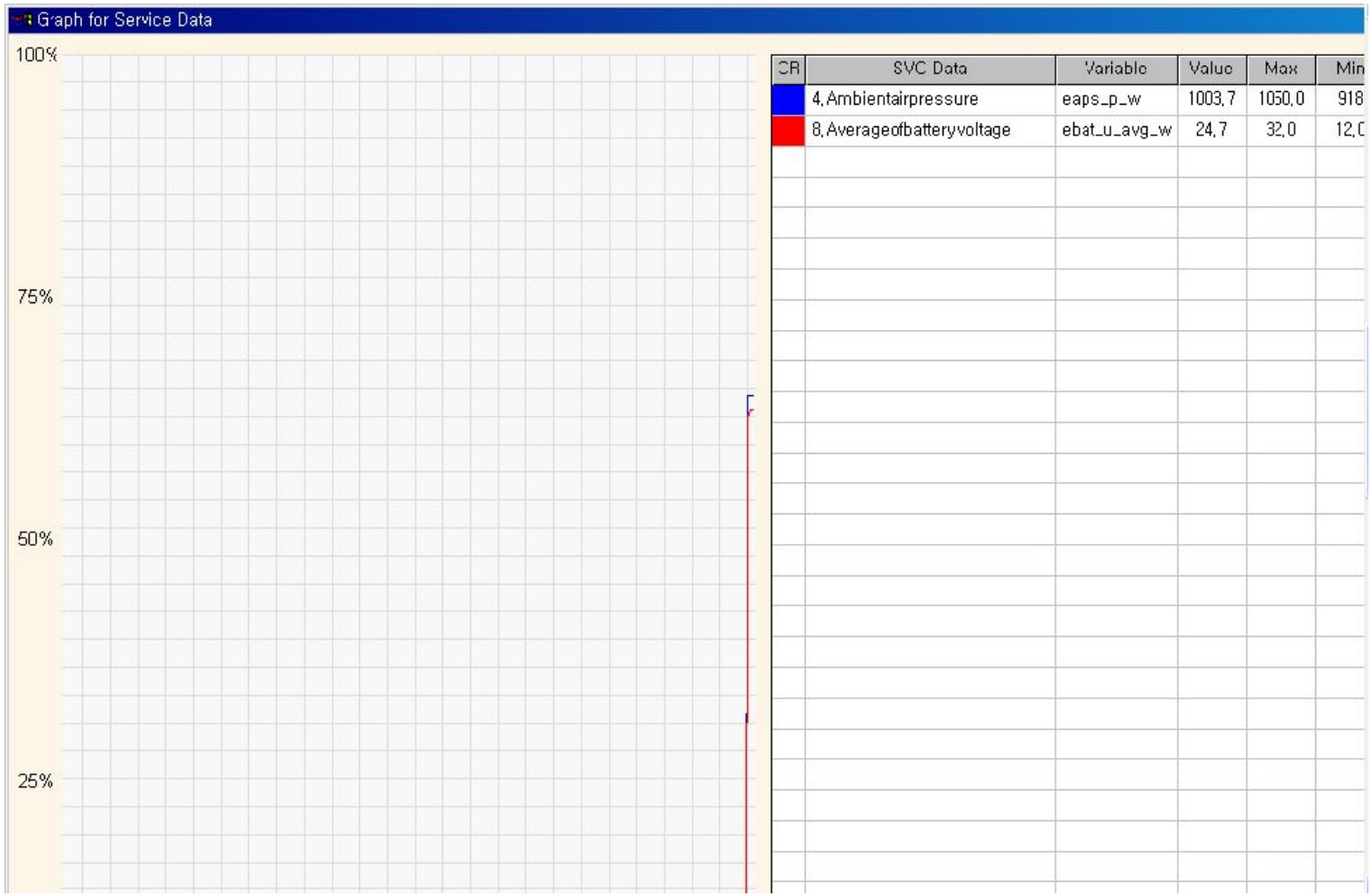
5. View Service Data

▪ Save Selection
- You can save the specified service data which you selected from the all service data
- The filename has a *.sds extension.

▪ Graph
- Shows the values for each service data as a graph.
- You can view up to 10 service data at a time.

▪ Save as excel
-The service data names, parameter names, current values and units which are shown are saved as Excel format.

5. View Service Data



Operation *e* - Doctor

5. View Service Data

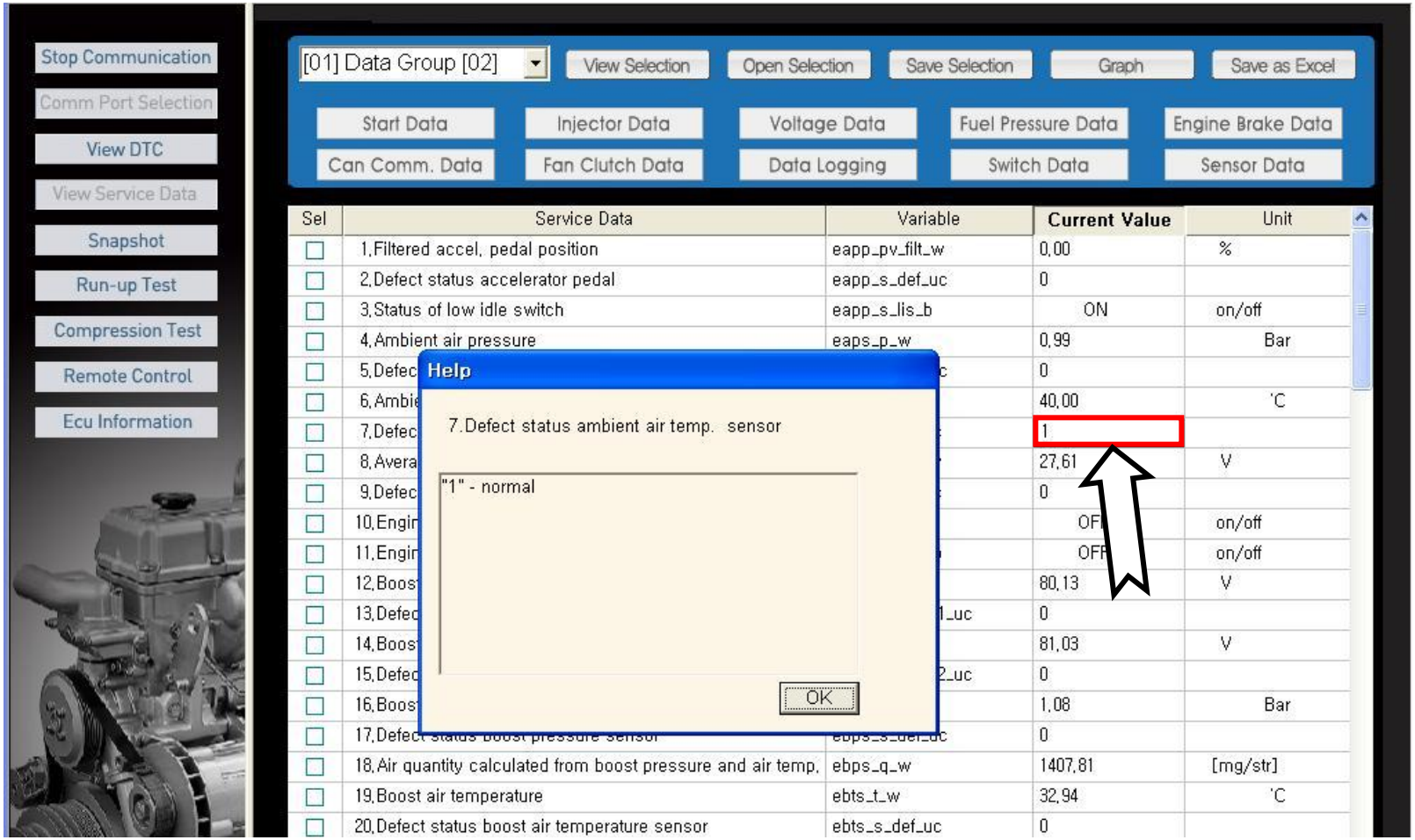
- Graph
  - Color: Indicates the line color on the graph.
  - Service Data Name/Parameter Name: Indicates the service data names/parameter names shown on the graph.
  - Current Value: Indicates the parameter value, shown as Y-coordinate.
  - Max: Indicates the max. value of the parameter, shown on the top of the graph.
  - Min: Indicates the min. value of the parameter, shown on the bottom of the graph.
  - Time: X-coordinate
  - Scroll bar: It is active when going over the next frame.
  - Stop button: Temporarily stops the measurement on the graph.
  - Exit: Closes the graph window.

Operation *e* - Doctor

5. View Service Data

▪ Sensor condition

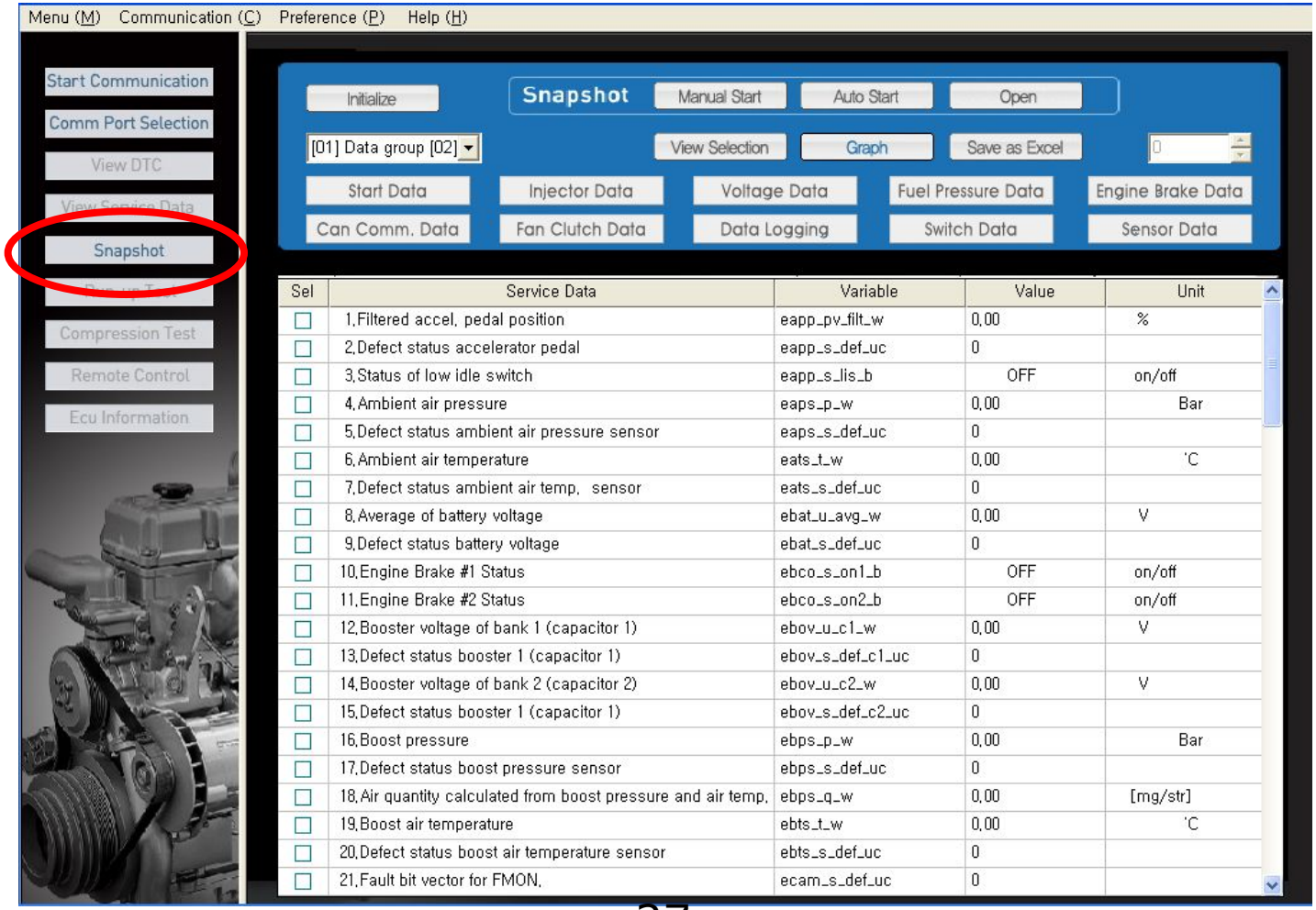
- If click any column of current value line, you can see its sensor working condition



Operation *e* - Doctor

6. Snap shot

- The Snapshot enables you to record and display the long period of data while operating



Operation *e* - Doctor

5. Snap shot

- Initialize
  - The Initialize icon has the same function as the service data check.

- Data Group
  - Select the service you want to see using the fall-down menu.
  - Data Group [02]
  - Data Group [03]- not use
  - Data Group [14]
  - Data Group [15]- not use
  - Related Button Bar
  - Collect the measured data items for data groups (02, 03, 14, 15) by each related function items.
  - The selection menus (engine starting performance, Injector, voltage, fuel pressure, engine brake, CAN communication, fan clutch, data logging, switch or sensor) have the same function.

- View selection
  - Show the service data you want to see on your laptop monitor.

- Save As Excel
  - The service data names, parameter names, values and units which are shown are saved as Excel format

Operation *e* - Doctor

5. Snap shot

- Manual Start
  - Data can be saved up to 200 seconds (100 seconds before and after starting).
  - If you click the Manual Start icon, the icon will be changed to the Manual Stop icon so that you can control the saving time.

- Manual Stop
  - If you click the Manual Stop icon, the button will be changed to the Manual Start icon.
  - If you click the Manual Stop icon, you can store the data up to max 200 seconds (respectively 100 seconds before and after starting).
  - The filename has a *.snp extension.

- Auto Start
  - If you click the Auto Start icon, the system will wait until any fault generates and start to save the fault data.
  - e-doctor will save automatically the fault data for 200 seconds before and after fault.

- Open
  - Load and run a stored snapshot file.

- Time Frame Scroll
  - Change the time frame scroll to check the current value of each time.

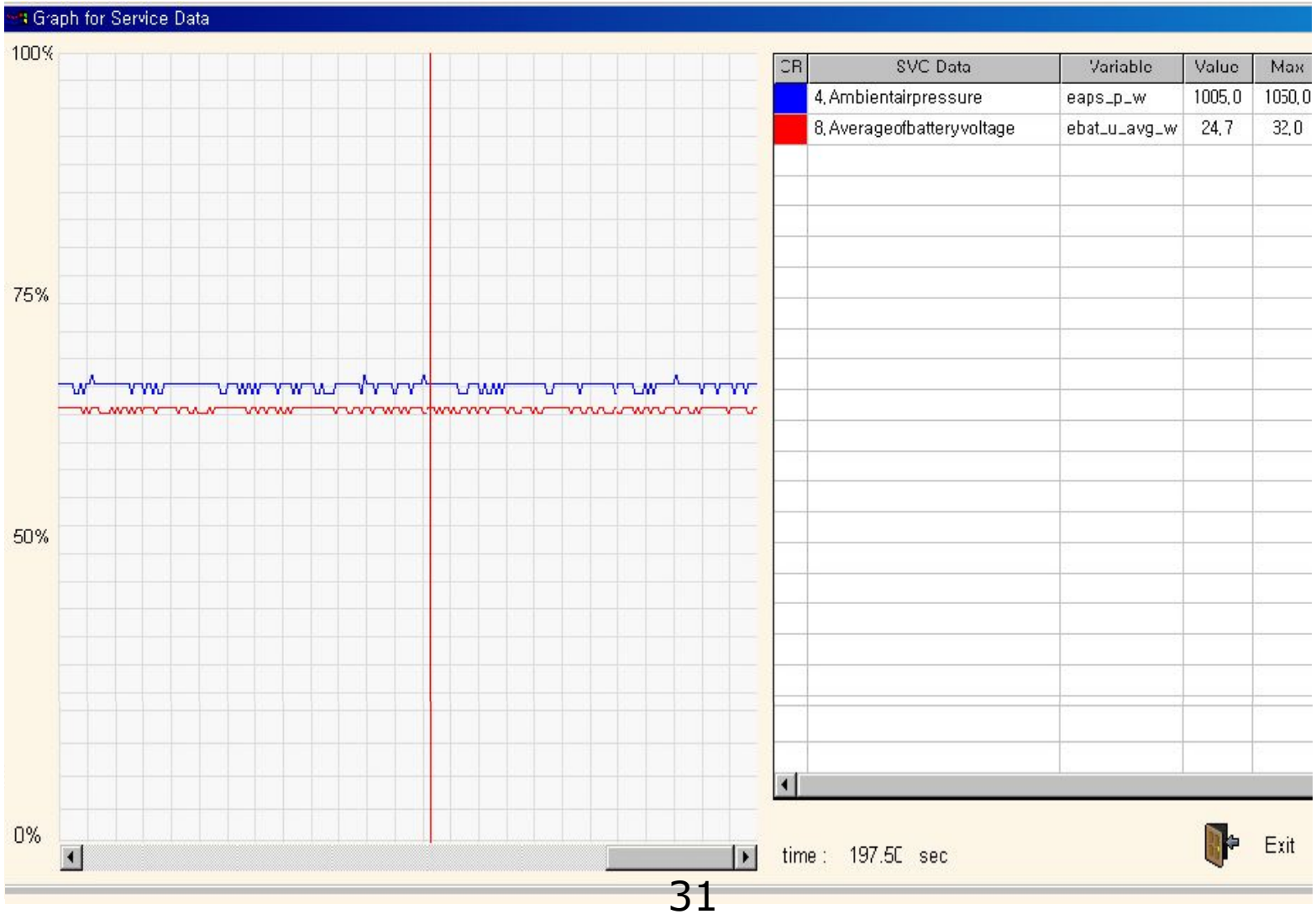
Operation *e* - Doctor

5. Snap shot

- Graph
  - It will be activated when selecting to save the snapshot manually or automatically.
  - Color: Indicates the line color on the graph.
  - Service Data Name/Parameter Name: Indicates the service data names/parameter names shown on the graph.
  - Current Value: Indicates the parameter value, shown as Y-coordinate.
  - Max.: Indicates the max. value of the parameter, shown on the top of the graph.
  - Min.: Indicates the min. value of the parameter, shown on the bottom of the graph.
  - Time: X-coordinate
  - Scroll bar: It is active when going over the next frame.
  - Stop button: Temporarily stops the measurement on the graph.
  - Exit: Closes the graph window
  - You can acknowledge the time and current value of the graph when you click on the X-axis on the graph..

Operation *e* - Doctor

5. Snap shot



6. Run up Test

- This test is for checking the power deviation of each cylinder.

6. Run up Test

- Auto Start icon
  - Start and idle the engine before clicking the Auto Start icon.
  - The test will be started as soon as you click the start icon.
  - The test will be performed six times automatically.
  - After performing the test six times, automatically will be stopped.

- Manual Start icon
  - Select the cylinders you want to test.
  - If the Manual Start icon is clicked, perform the test for only the selected cylinders.

- Stop icon
  - Makes the test stop.

- Status message
  - It enables you to trace the test progress.

- Measurement result
  - Max speed: Indicates the max. RPM of each cylinder during the test.
  - Min speed: Indicates the min. RPM of each cylinder during the test.
  - Elapsed time: Indicates the time to reach the max. RPM. from min. RPM

Operation *e* - Doctor

6. Run up Test

▪ How to view the graph

- It shows the results (in percentage) the deviation between cylinders based on the cylinder having the longest time until RPM reaches max.

-If the deviation of any cylinder exceeds than standard value, you can assume that the cylinder or the unit injector for the cylinder is defective.

▣ case study of run up test

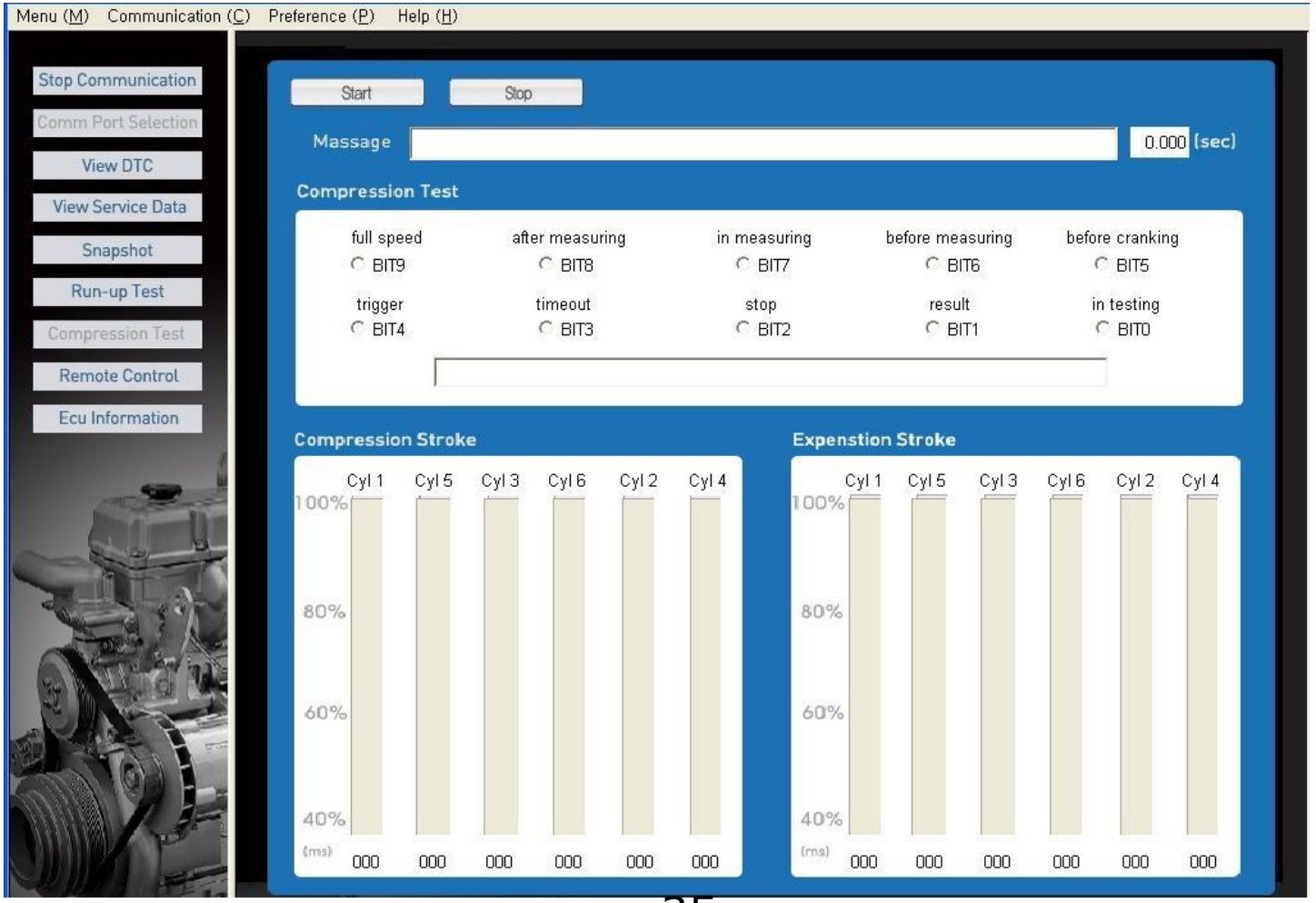
For example, there is one engine which Cyl. No 2 injector is bad condition.

Once you press run up test button, The ECU cut No1 injector off and start to check engine power (The engine is running with 5 cylinder power only. at that time, ECU gives signal to 5 injectors to maintain 6 cylinder working power)
But engine power will not be reached up to 6 cylinder output because No 2 injector cannot make a normal output as above assumption.
Next, the ECU will cut No2 injector off and start to check engine power.
In this case, engine power will be OK as 6 cylinder working because other five cylinders have no problem.
And the ECU cut No3 injector off and check engine power.
Then, engine power cannot be reached as 6 cylinder power because No 2 injector cannot make a normal output.
This test will be repeated until No.6 cylinder. By checking each cylinder output, ECU can recognize that No2 injector is bad.

Operation *e* - Doctor

7. Compression Test

- This is to check the deviation of the compression function of each cylinders.



Operation *e* - Doctor

7. Compression Test

- Start icon
  - Be sure compression test must be conducted on " Key On "position after stop Engine running.
  - The test will be started when you click the Start icon with engine cranking.

- Stop icon
  - Clicking the icon makes the test stop.

- Status message
  - It enable you to trace the test progress.

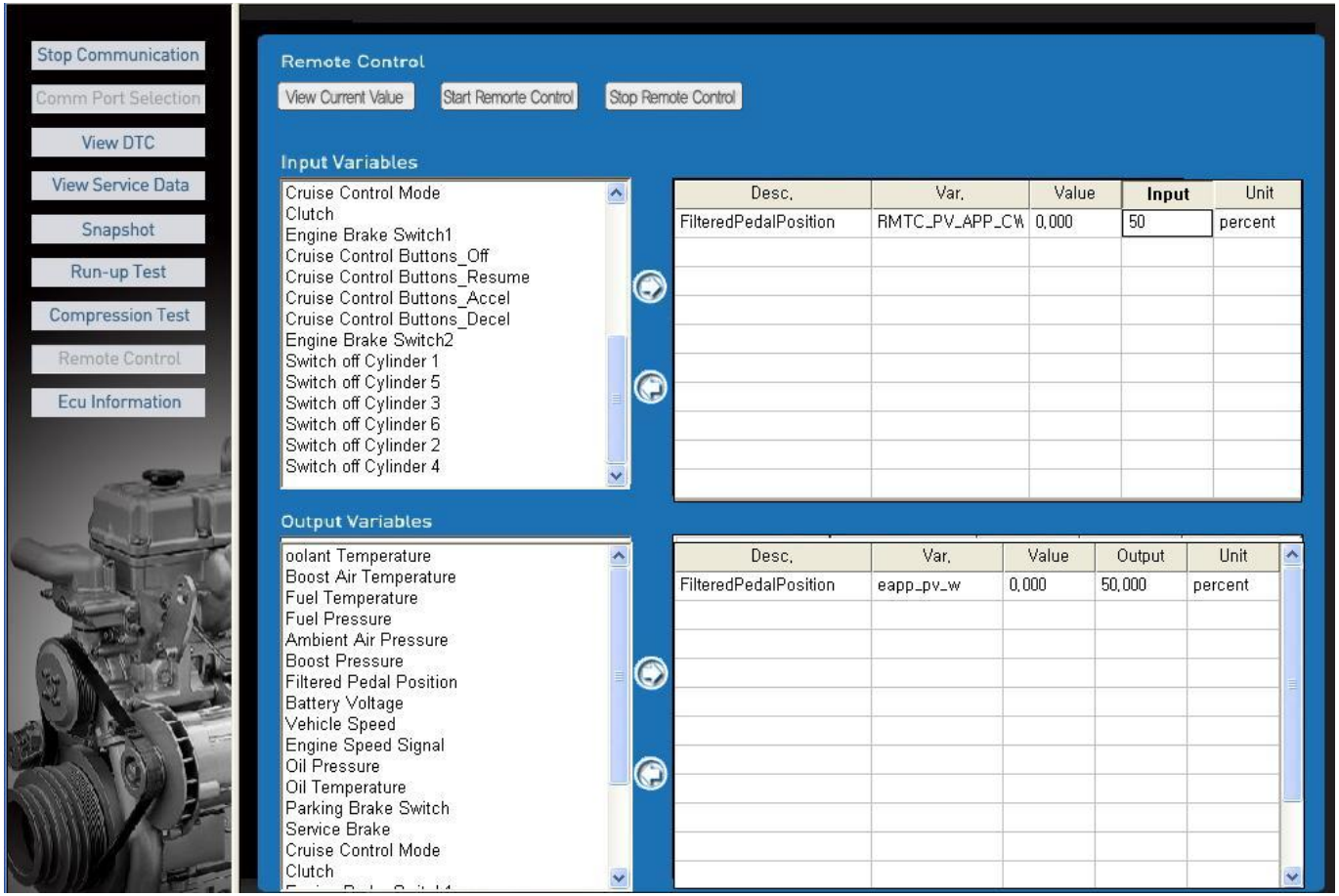
- Cranking message
  - Start cranking when prompted to start.
  - Stop cranking when prompted to stop.

- How to view the graph
  - It shows the results (in percentage) produced on basis of cylinder which has the longest measurement time.
  - If the compression of a cylinder is lower than other cylinders when the cylinder is compressed or expanded, the measurement time will be short.

Operation *e* - Doctor

8. Remote control

- This is to test ECU when the user provided abnormal signal.
- You can check engine reaction when lap top gives wrong signal to ECU.



8. Remote control

- View current value
  - Show current working value

- Start remote control
  - Start remote control engine by lap top signal

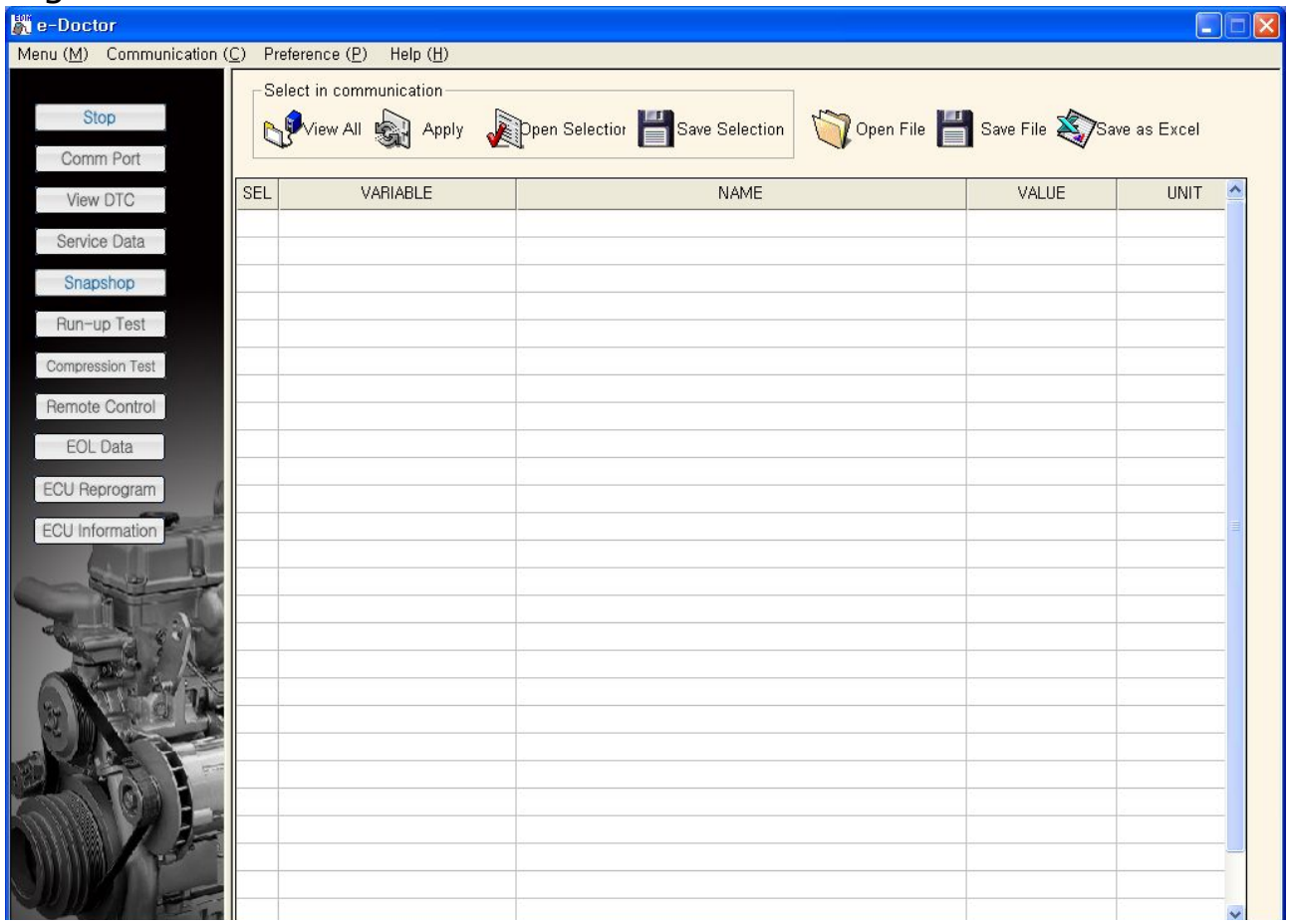
- Stop remote control
  - Stop remote control test on engine.

- 

  - Choose and remove test data for testing engine .

Operation *e* - Doctor

9. EOL Data
   - You can key in engine No. and machine ID on ECU.
   - After Reprogramming on ECU, the engine No. and machine ID is not saved on ECU.
   - The engine No. and machine ID on ECU must be saved in the ECU.



Operation *e* - Doctor

9. EOL Data

▪ Select in communication

- View all : Click view all icon, you can see the all EOL data.
  . CUID_D_DSID_CUC : Record engine ID
  . CUID_D_VIN_CUC : Record machine ID

- Apply : New value is applied (saved) in ECU
- Open selection : Opens the data item you want to save in lap top.
- Save selection : Save the data item you want to see.

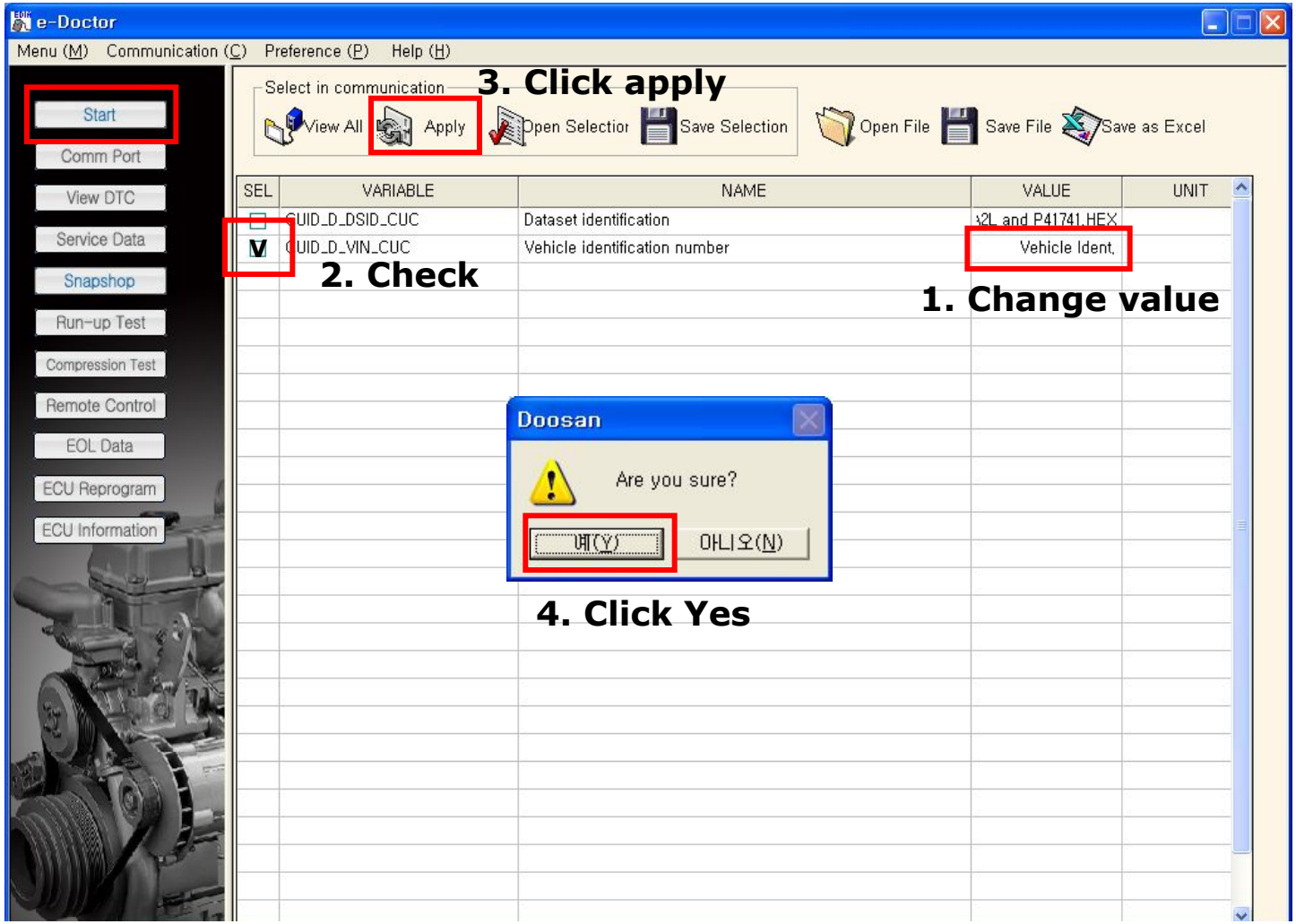
▪ Open file : Open specified service data and value you saved before.
▪ Save file : Save specified service data and value.
▪ Save as excel : Save specified service data and value as excel.

▪ Change data value

- After change EOL data value, click "√" on select blank.
- After "√"mark on select blank, Click "Apply", then changed data value is saved in ECU.
- Click Stop icon, and wait a few miunite.
- The changed value is shown on ECU information.

*The engine must be stop (Key on condition), when you do the ECU reprogramming and Change EOL data.

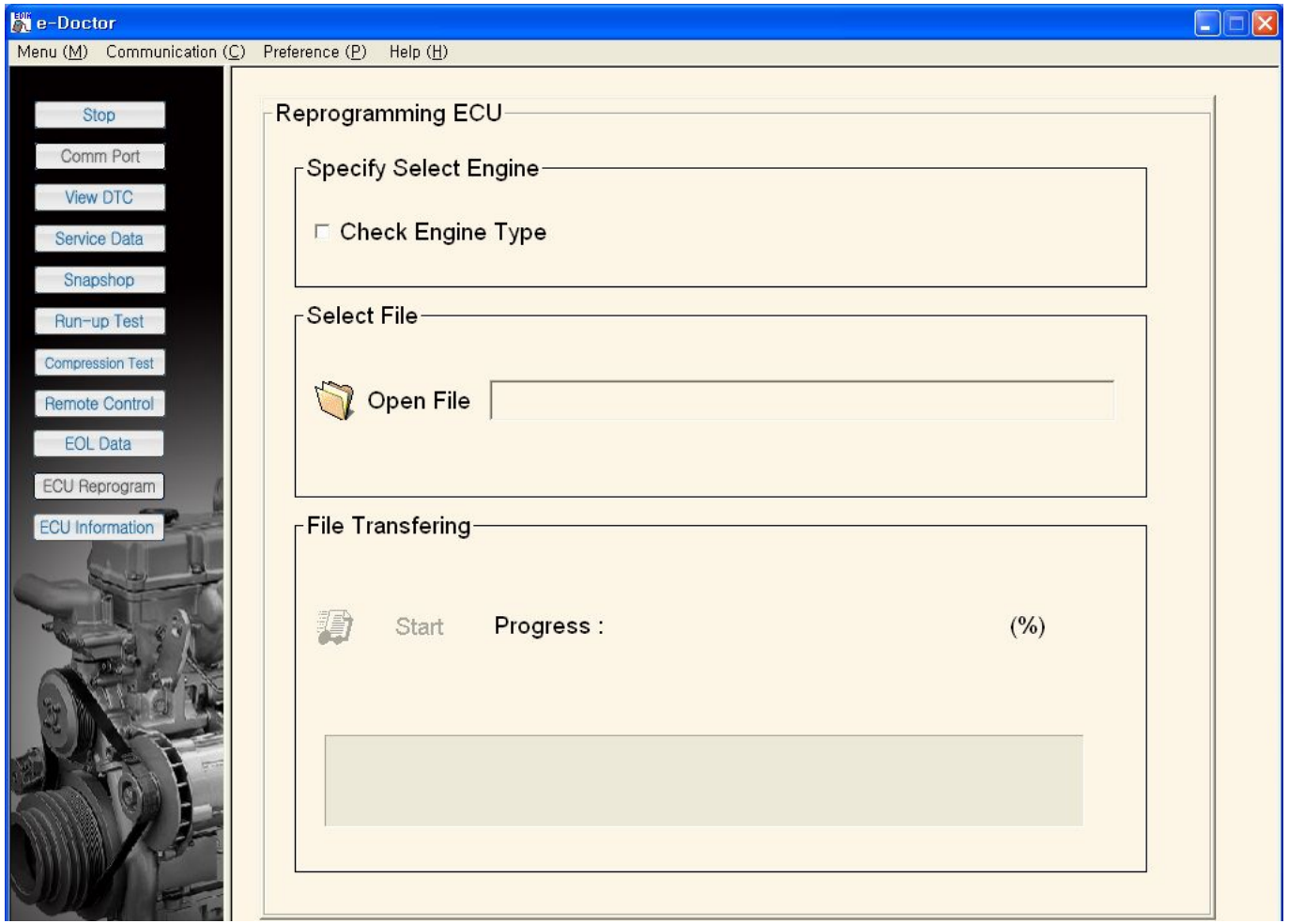
9. EOL Data


e-Doctor
Menu (M)
Communication (C)
Preference (P)
Help (H)
Start
Comm Port
View DTC
Service Data
Snapshop
Run-up Test
Compression Test
Remote Control
EOL Data
ECU Reprogram
ECU Information
Select in communication
View All
Apply
Open Selection
Save Selection
Open File
Save File
Save as Excel
SEL
VARIABLE
NAME
VALUE
UNIT
GUID_D_DSID_CUC
Dataset identification
GUID_D_VIN_CUC
Vehicle identification number
Vehicle Ident.
Doosan
Are you sure?
예(Y)
아니오(N)
5. Click stop
3. Click apply
2. Check
1. Change value
4. Click Yes

Operation *e* - Doctor

10. Reprogramming ECU

- You can use this menu for re programming program on ECU.



Operation *e* - Doctor

10. Reprogramming ECU

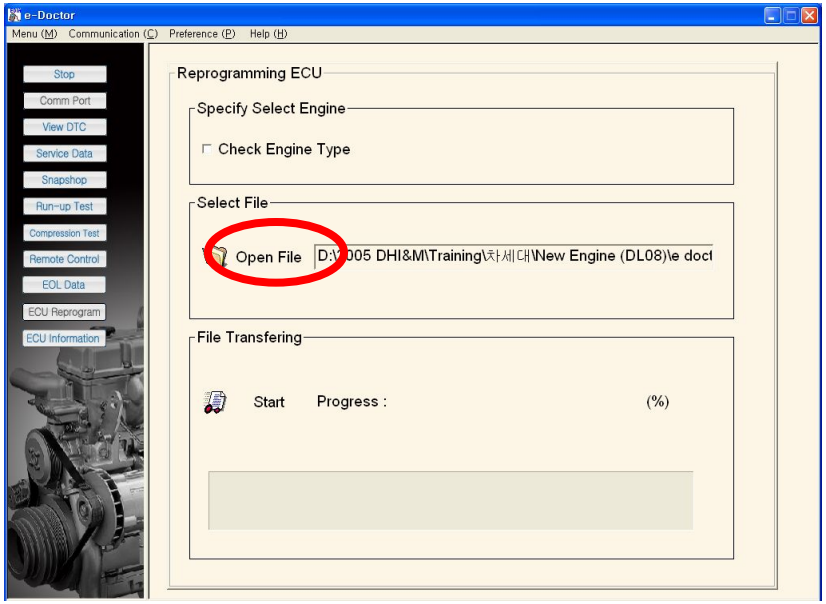
- Select Engine
  - No use

- Select file
  - Select ECU MAP file on your laptop computer for reprogramming or rework

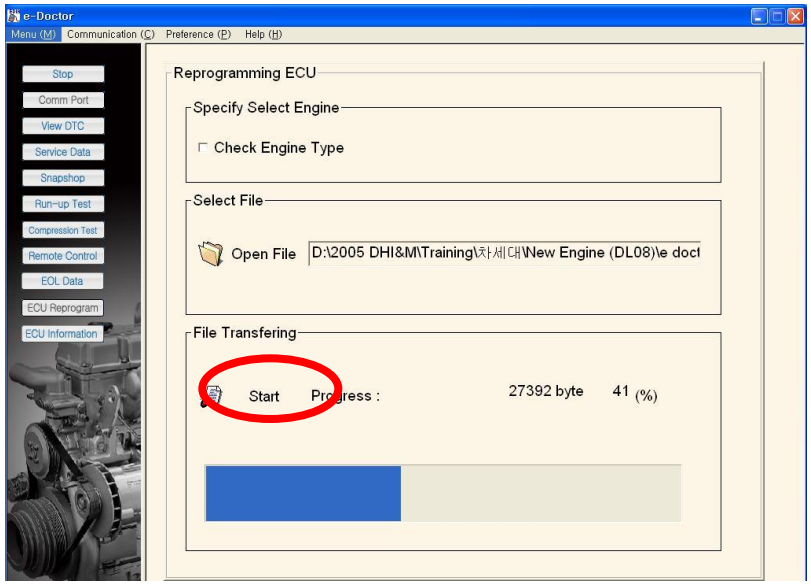
- File transfering.
  - Install Map file on ECU.
  - You can see the program installing progress rate

- Install completely (100%), you can see “install complete” message then, click “sure”
- You have to wait a few minute.
- Click stop icon (Start /Stop Icon), and restart e- Doctor
- After restart the e Doctor, Engine serial No must be key in ECU through EOL menu
- Reprogramming can do that the ECU installed same MAP program.
  Example) If the ECU has been installed EUJEA mapping, we can’t re program others suffix mapping (EUJEB/EUJEC) on ECU. Just same suffix program (EUJEA01 or 02…)a on ECU.

10. Reprogramming ECU

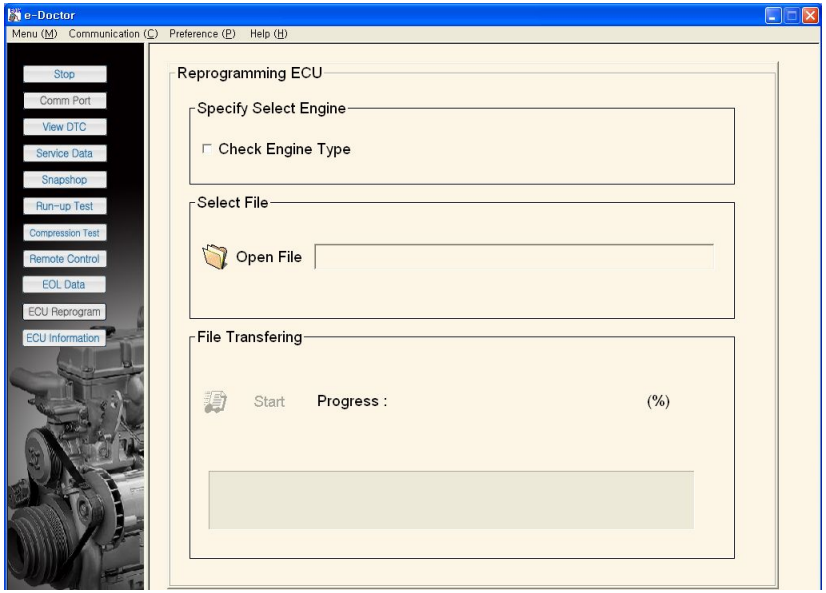


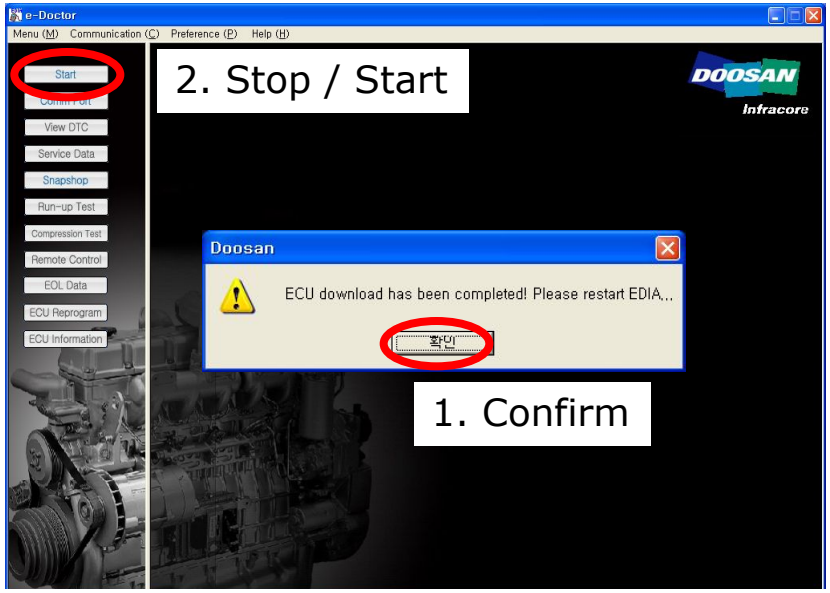
* Selecting Map file on your laptop



* Click “Start” then you can see progress rate

10. Reprogramming ECU

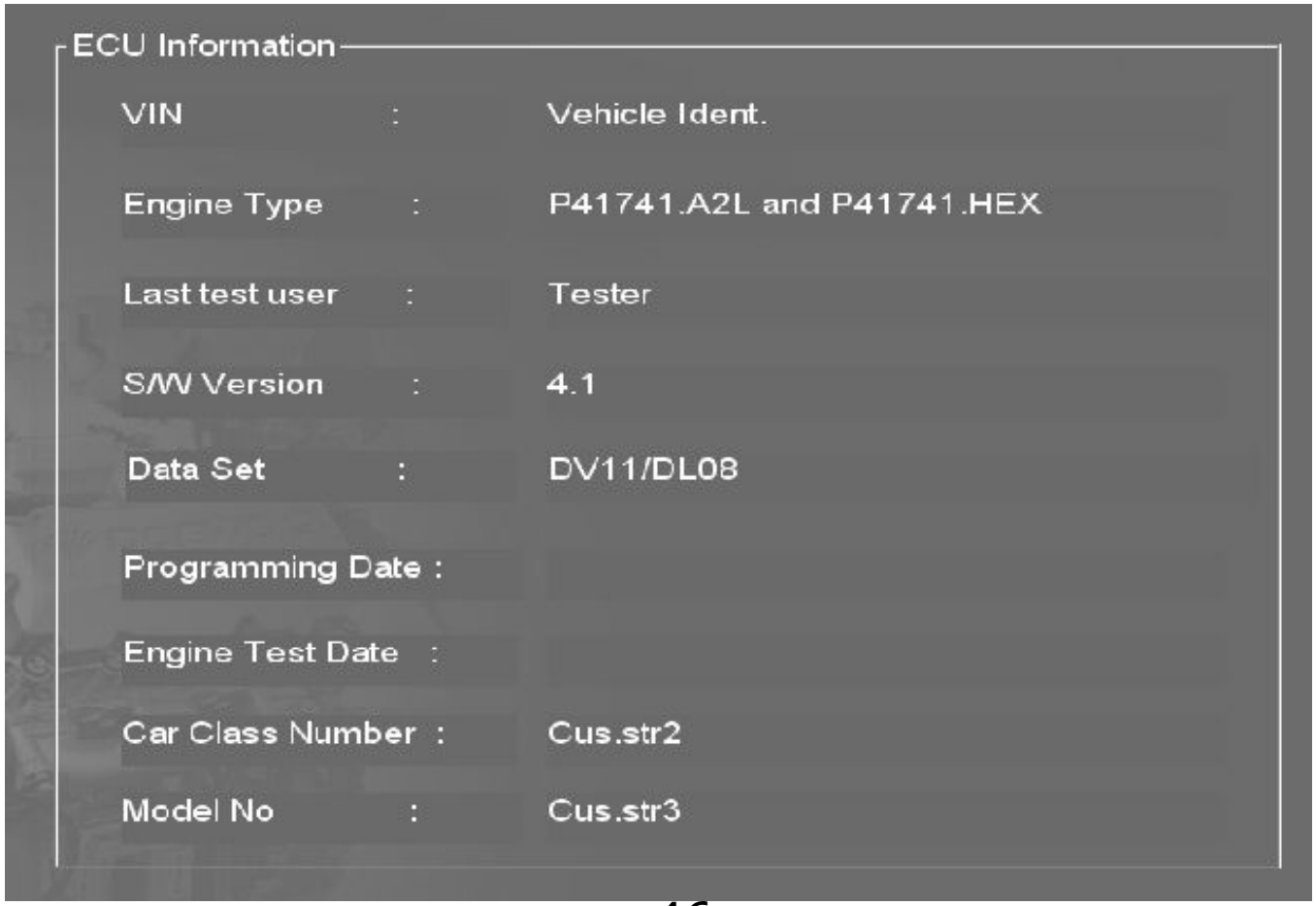




* After programming Click “confirm” and you must click STOP icon to re start e-Doctor after few minute later.

11. ECU information

- You can check that you are performing the test on the correct machine by checking the hardware, software and machine ID of ECU.



Operation *e* - Doctor

11. ECU information

- VIN
  - Machine Identification number
- Engine Type
  - Suffix / Engine Number
- Last test user
  - Indicates the ID number of the test user last modified program data.
- S/W Version
  - Indicates the software version.
- Data Set
  - Indicates the software components.
- Programming Date
  - Indicates the date last modified EOL data.
  - It will displayed as blank if you haven't changed before.
- Engine Test Date
  - Indicates the date last tested the engine.

Let's remember this....

- Do not disconnect communication cable from your lap top computer during diagnosis engine.

- If you disconnect communication cable from your lap top, It has get a serious system problem.

-If you want to disconnect the cable, you must use below icon to do "safety remove hardware" or turn off the engine.