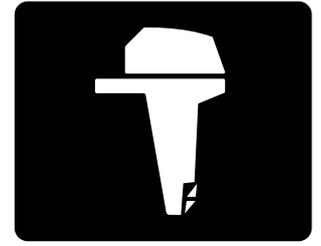




YAMAHA



**YAMAHA
DIAGNOSTIC
SYSTEM
VERSION 1.23a**

INSTRUCTION MANUAL

6P2-2819U-10●

PREFACE

This Instruction Manual, written for use by Yamaha Outboard Motor and Watercraft dealers, contains information on using the Yamaha Diagnostic System software and diagnosing problems in an outboard motor or watercraft.

This manual contains information to be used together with basic servicing procedures, and therefore requires that the person performing these procedures have a basic maintenance knowledge and technical skills of outboard motors or watercraft.

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**YAMAHA DIAGNOSTIC SYSTEM
VERSION 1.23a**

INSTRUCTION MANUAL

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IMPORTANT INFORMATION

In this Instruction Manual particularly important information is distinguished in the following ways.



The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

WARNING

Failure to follow **WARNING** instructions could result in severe injury or death to the Outboard motor or Watercraft operator, a bystander, or a person inspecting or repairing the outboard motor or watercraft.

CAUTION:

A **CAUTION** indicates special precautions that must be taken to avoid damage to the outboard motor or watercraft.

NOTE:

A **NOTE** provides key information to make procedures easier or clearer.



Outboard motors

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INTRODUCTION

FEATURES

The newly developed Yamaha Diagnostic System provides quicker detection and analysis of engine malfunctions.

By connecting your computer to the ECM (Electronic Control Module) of an outboard motor using the communication cable, this software can be used to display sensor data and data stored in the ECM on a computer's monitor.

If this software is run on Microsoft Windows® 95, Windows 98, Windows Me, Windows 2000, or Windows XP the information can be displayed in colorful graphics. Also, the software can be operated using either a mouse or a keyboard.

In addition, the data for the main functions (Diagnosis, Diagnosis record, Engine monitor, and Data logger) can be saved on a disk or printed out.

Functions

1. **Diagnosis:** With the engine main switch ON, each sensor's status and each ECM diagnosis code or item is displayed. This enables you to find malfunctioning parts and controls quickly.
2. **Diagnosis record:** Sensors that had been activated and ECM diagnostic codes that have been recorded are displayed. This allows you to check the outboard motor's record of malfunctions.
3. **Engine monitor:** Each sensor status and the ECM data are displayed while the engine is running. This enables you to find malfunctioning parts quickly. In addition, the data displayed using the Engine Monitor function can be displayed in a graph.
4. **Stationary test:** Operation tests can be performed with the engine off.
5. **Active test:** Operation tests can be performed with the engine running.
6. **Data logger:** Displays 13 minutes (on some models, 20 minutes) of recorded data for two or more of the items stored in the ECM. In addition, the operating time as compared to the engine speed and the total operating time are displayed. This allows you to check the operating status of the engine. For some models, you can also save the ECM record data in a file so that you can read and display the graph later.
7. **Some files:** Lets you select and run other applications while continuing to run the diagnostic program.

CONTENTS

1. CD-ROM (software + instruction manual) (1)
2. Adapter (1)
3. Communication cable (1)



Fig. 1

HARDWARE REQUIREMENTS

Make sure that your computer meets the following requirements before using this software.

Computer:	IBM PC/AT compatible computer
Operating system:	Microsoft Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP (English version)
CPU:	
Windows 95/98:	i486X, 100 MHz or higher (Pentium 100 MHz or higher recommended)
Windows Me/2000:	Pentium, 166 MHz or higher (Pentium 233 MHz or higher recommended)
Windows XP:	Pentium, 300 MHz or higher (Pentium 500 MHz or higher recommended)
Memory:	
Windows 95/98:	16 MB or more (32 MB or more recommended)
Windows Me:	32 MB or more (64 MB or more recommended)
Windows 2000:	64 MB or more (128 MB or more recommended)
Windows XP:	128 MB or more (256 MB or more recommended)
Hard disk free space:	20 MB or more (40 MB or more recommended)
Drive:	CD-ROM drive
Display:	VGA (640 × 480 pixels), (SVGA [800 × 600 pixels] or more recommended) 256 or more colors
Mouse:	Compatible with the operating systems mentioned above
Communication port:	RS232C (Dsub-9 pin) port, USB port
Printer:	Compatible with the operating systems mentioned above

NOTE:

- The amount of memory and the amount of free space on the hard disk differs depending on the computer.
 - Using this software while there is not enough free space on the hard disk could cause errors and result in insufficient memory.
 - This software will not run properly on some computers.
 - When starting up this program, do not start other software applications.
 - Do not use the screen saver function or the energy saving feature when using this program.
 - If the ECM is changed, restart the program.
 - Windows XP is a multiuser operating system, therefore, be sure to end this program if the login user is changed.
 - The USB adapter cannot be used with Windows 95.
-

COMPATIBLE MODELS

North American models:	Z150, LZ150, VZ150, Z175, VZ175, Z200, LZ200, VZ200, VZ200-2, Z225, VZ225, Z250, LZ250, VZ250, Z300, LZ300, VZ300, F50, T50, F60, T60, F75, F90, F115, LF115, F150, LF150, F200, LF200, F225, LF225, F250, LF250
Worldwide models:	Z150P, LZ150P, Z150Q, Z175G, Z175H, Z200N, LZ200N, Z200P, Z200Q, Z200R, Z225H, Z250D, LZ250D, Z250F, Z300A, LZ300A, Z300B, F50F, FT50G, F60C, FT60D, F75B, F80B, F90B, F100D, F115A, FL115A, F150A, FL150A, F200A, FL200A, F225A, FL225A, F250A, FL250A

INSTALLING THE YAMAHA DIAGNOSTIC SYSTEM

This section provides information on installing the Yamaha Diagnostic System under Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP.

INSTALLING THE YAMAHA DIAGNOSTIC SYSTEM UNDER Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP

NOTE:

- The USB adapter cannot be used with Windows 95.
 - Before installing the Yamaha Diagnostic System, check that your computer meets the specified requirements. For detailed information on the system requirements, see page 2.
 - It is strongly recommended that you exit all other programs before running the installer.
-

1. Turn on your computer and start up Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP.
2. Insert the compact disc into the computer's CD-ROM drive.
3. Double-click the **My Computer** icon, then the **CD-ROM drive** icon, and then double-click the **Setup.exe** icon to start up the installer. (Fig. 2)

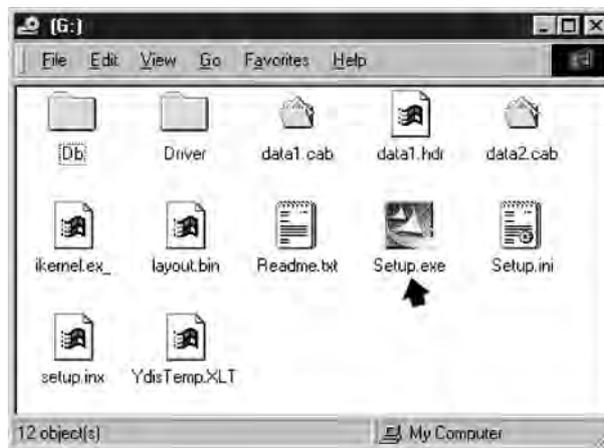


Fig. 2

4. Click the **Next** button to start the installation process. (Fig. 3)

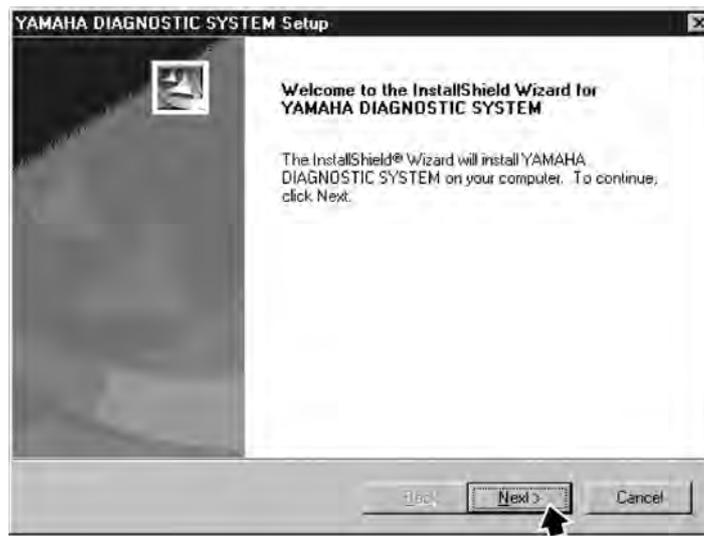


Fig. 3

NOTE:

If the Yamaha Diagnostic System has already been installed onto your computer, the following dialog box appears.

Click the **Yes** button to update this program, or click the **No** button to quit the installation. (Fig. 4)

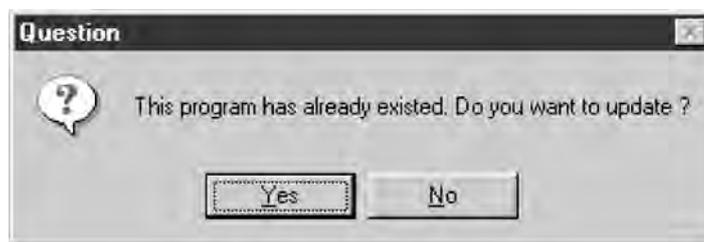


Fig. 4

NOTE:

- To quit the installation, click the **Cancel** button. The following dialog box appears. (See fig. 3.)

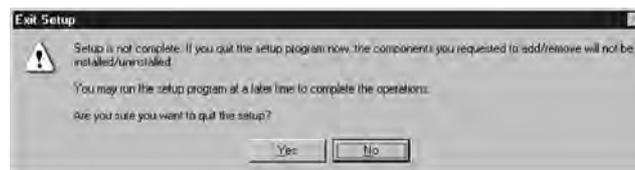


Fig. 5

- To quit the installation program, click the **Yes** button.
- To continue installation, click the **No** button. (Fig. 5)

- 5.** Check the target directory and the program name for the Yamaha Diagnostic System, which are displayed in the dialog box.
Click the **Next** button to start copying the program files.

NOTE:

- To go back to the previous dialog box (step 4), click the **Back** button.
- To quit the installation, click the **Cancel** button.

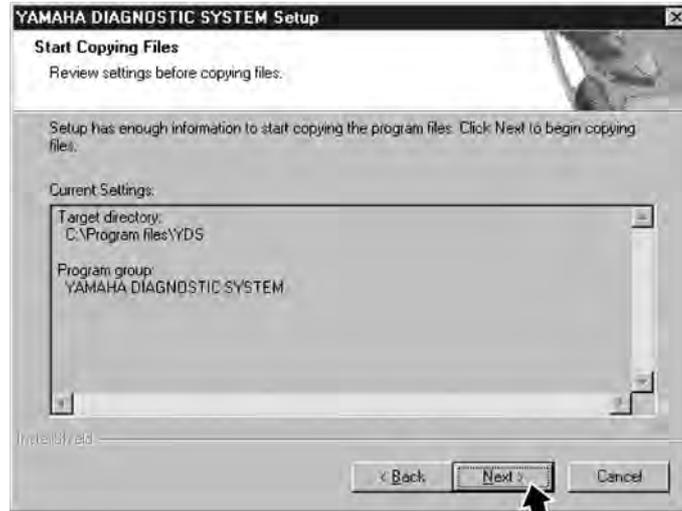


Fig. 6

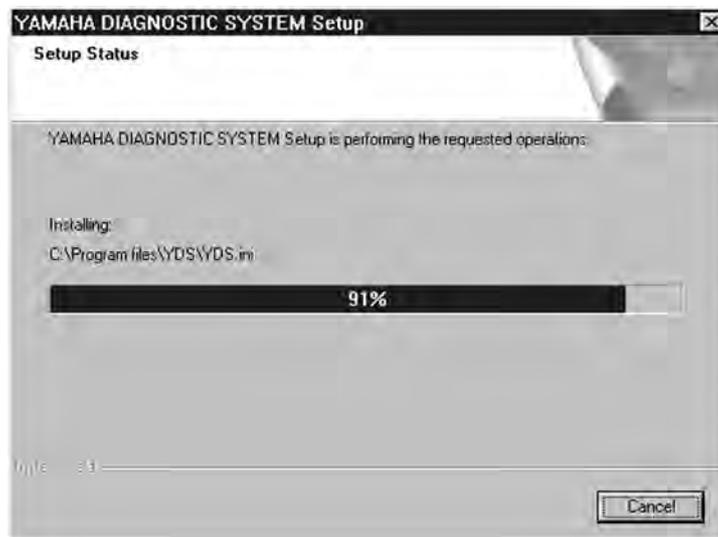


Fig. 7

NOTE:

- To quit the installation, click the **Cancel** button. The following dialog box appears. (See fig. 6.)

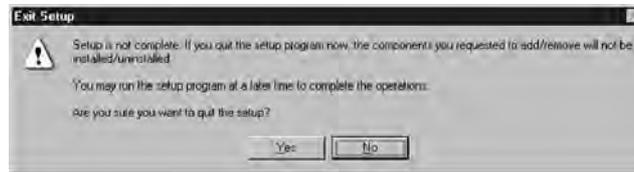


Fig. 8

- To quit the installation program, click the **Yes** button.
 - To continue installation, click the **No** button. (Fig. 8)
-

- 6.** After the installation is completed, the following dialog box appears. Click the **Finish** button to quit the installation program.

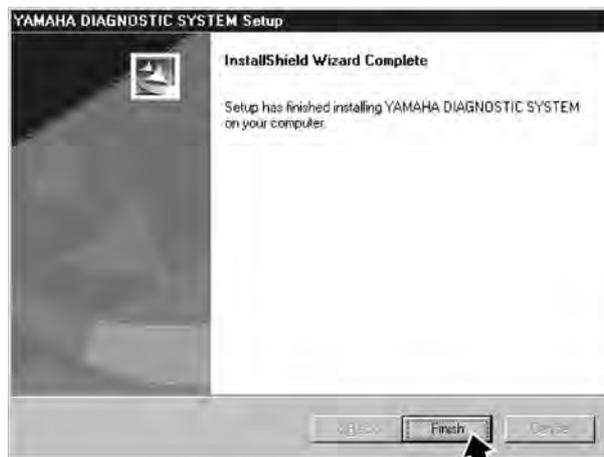


Fig. 9

NOTE:

Install the Database file before installing the Yamaha Diagnostic System, otherwise the program will not operate correctly. For installation procedures refer to "UPDATING THE DATABASE" on the next page.

UPDATING THE DATABASE

NOTE:

When installing the Yamaha Diagnostic System program for the first time, be sure to update the database.

1. Turn on your computer and start up Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP.
2. From the taskbar at the bottom of your computer screen, click the **Start** button (fig. 10), point to **Programs**, and then click **YAMAHA DIAGNOSTIC SYSTEM** to open the Yamaha Diagnostic System window. (Fig. 11)



Fig. 10

3. After about three seconds the display will automatically go to the first menu display, or you can click or press any key to go to the first menu. (See fig. 12.)



Fig. 11

4. Click the **Update database [F1]** button or press the F1 key on your keyboard. (Fig. 12)



Fig. 12

NOTE:

- Do not click the **Starting service tool [Enter]** button or press the Enter key on your keyboard until the database has been updated, otherwise the program will not operate correctly.
- To quit the update of the database, press the ESC key on your keyboard.

5. Insert the compact disc into the computer's CD-ROM drive.

NOTE:

- All the database files will be copied from the compact disc to the computer's hard drive automatically.
 - Any earlier version of the database saved on the hard drive will be overwritten.
-

6. Click the **OK** button or press the Enter key on your keyboard to start copying the database files. (Fig. 13)

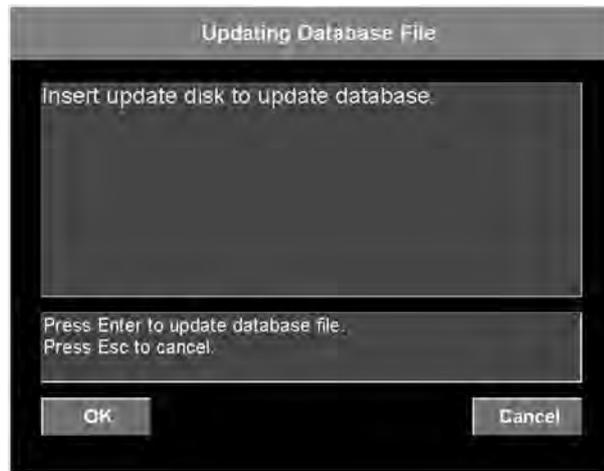


Fig. 13

NOTE:

If an error message appears and the program stops operating, follow the error message. (Fig. 14)



Fig. 14

7. When the database is updated a confirmation screen is displayed.
 To quit, click the **OK** button or press the Enter key on your keyboard. (Fig. 15)
 To return to the first menu screen, click the **Cancel** button or press the Esc key on your keyboard.



Fig. 15

NOTE:

- Display the program and database information to check version. (Fig. 16)
 To display information, click the title in the first menu screen while pressing the Shift key or press the Enter key while pressing Shift key. (See fig. 12.)

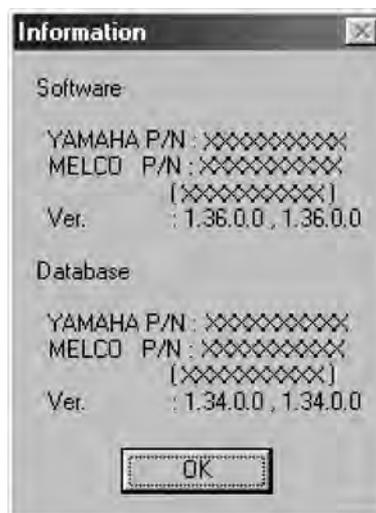


Fig. 16

8. To quit the Yamaha Diagnostic System from the first menu (see fig. 12), press the Esc key on your keyboard.

INSTALLING THE USB DRIVER

1. Connect one end of the USB cable to 3-pin communication coupler on the outboard motor engine. Connect the other end to the included USB adapter, and connect the adapter to the USB port on the computer.
2. Turn the start switch to ON.
3. The Windows operating system senses the USB connection to the outboard motor and automatically displays the hardware wizard.



Fig. 17

4. Click the Next button. (Fig. 18)



Fig. 18

5. Select Search for the best driver for your device (Recommended), and then click the **Next** button. (Fig. 19)



Fig. 19

6. Select CD-ROM drive, and click the **Next** button. (Fig. 20)



Fig. 20

7. Click the **Next** button again. (Fig. 21)



Fig. 21

8. Click the **Next** button one more time. (Fig. 22)



Fig. 22

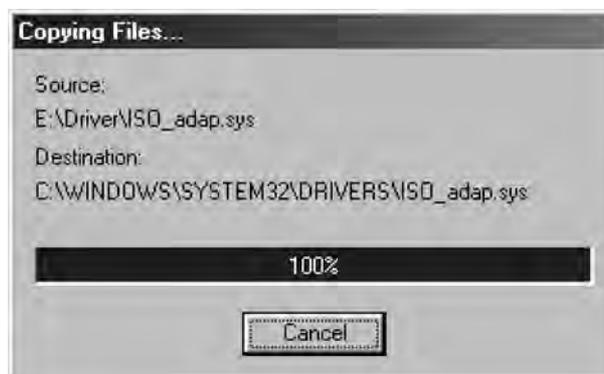


Fig. 23

9. Click the **Finish** button. (Fig. 24)



Fig. 24

OPERATING

CONNECTING THE COMPUTER TO THE OUTBOARD MOTOR

NOTE:

Be sure to use the enclosed communication cable ① to connect the computer and adapter ② to the outboard motor.

1. Quit any applications that are running, and then turn off the computer.
2. Connect the communication cable to the 3-pin communication coupler of the outboard motor, the adapter, and the communication port of your computer.

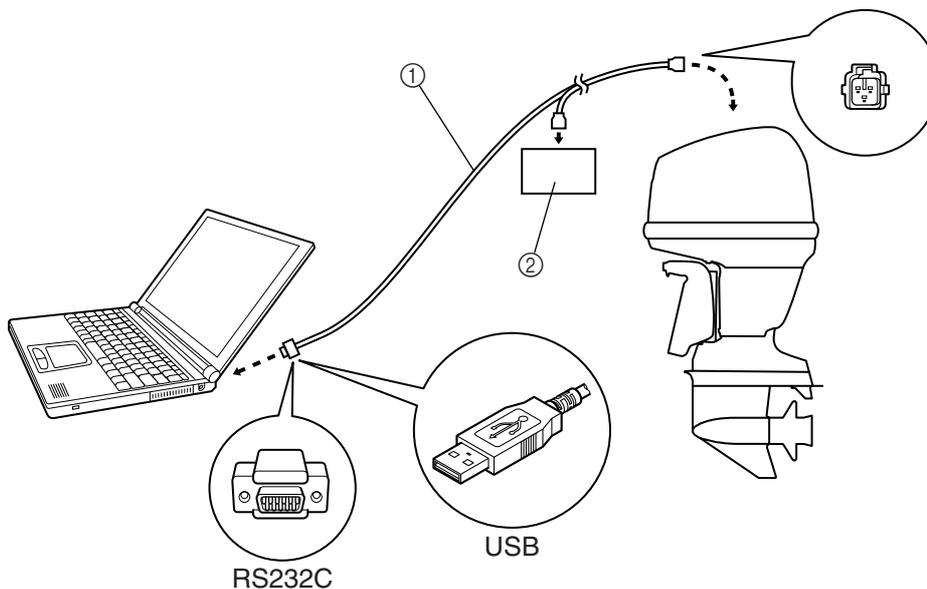


Fig. 25

NOTE:

Use either the COM1 or COM2 port, and, if necessary, set the serial port as specified in the computer's manual. Set the serial port where the RS232C (Dsub-9 pin) cable is connected to COM1 or COM2.

NOTE:

If using the USB adapter, be sure that you have installed the USB driver.

3. Connect the remote control to the outboard motor.
4. Connect the 12 V battery to the outboard motor.

NOTE:

The following items should be checked before starting the Yamaha Diagnostic System.

- The battery is properly charged and its specific gravity is within specification.
 - There are no incorrect wiring connections.
 - Wiring connections are properly secured and are not rusty.
 - There are enough fuel and oil in each tank.
-

CONNECTING THE COMMUNICATION CABLE TO THE OUTBOARD MOTOR

For connection, see the applicable outboard motor service manual.

STARTING THE YAMAHA DIAGNOSTIC SYSTEM

1. Turn the main switch of the outboard motor to ON.
2. Turn on your computer and start up Windows 95, Windows 98, Windows Me, Windows 2000, or Windows XP.

NOTE:

The USB adapter cannot be used with Windows 95.

3. From the taskbar at the bottom of your computer screen, click the **Start** button (Fig. 26), point to **Programs**, and then click **YAMAHA DIAGNOSTIC SYSTEM**.



Fig. 26

4. Open the Yamaha Diagnostic System window. (Fig. 27) After about three seconds the display will automatically go to the first menu, or click or press any key to go to the first menu. (See fig. 28.)



Fig. 27



Fig. 28

NOTE:

- If you wish to use the service tools: Click the **Start service tool [ENTER]** button, or hit the Enter key.
 - If you want to update the database: Click the **Update database [F1]** button, or hit the F1 key.
 - If you wish to switch between color and monochrome display: Click the **Change Colors [F10]** button, or hit the F10 key.
-

5. Click the **Starting service tool [Enter]** button or press the Enter key on your keyboard. (Fig. 29)



Fig. 29

NOTE:

- If an error message appears and the program stops operating, follow the error messages.
- If the program doesn't start, an error message will explain the problem. If the program doesn't start and an error message is not displayed, the cause of the problem is most likely insufficient computer memory.
- To cancel, press the ESC key on your keyboard.

6. Click or press any key to display the main menu.

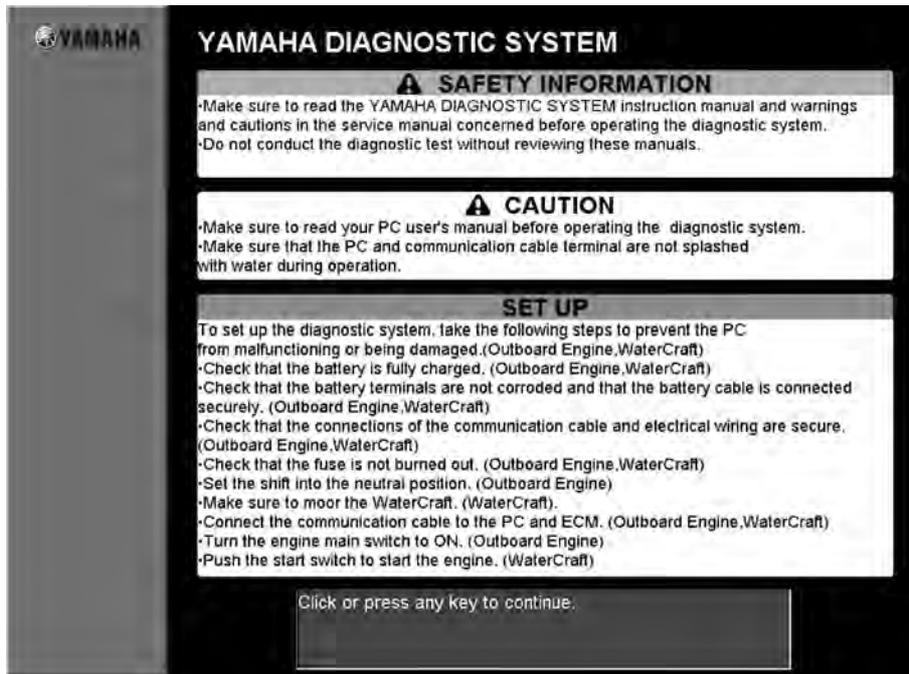


Fig. 30

NOTE:

If a diagnosis record is stored in the ECM, "Diagnosis record available," appears as a confirmation message before the Main Menu is displayed. (Fig. 31)

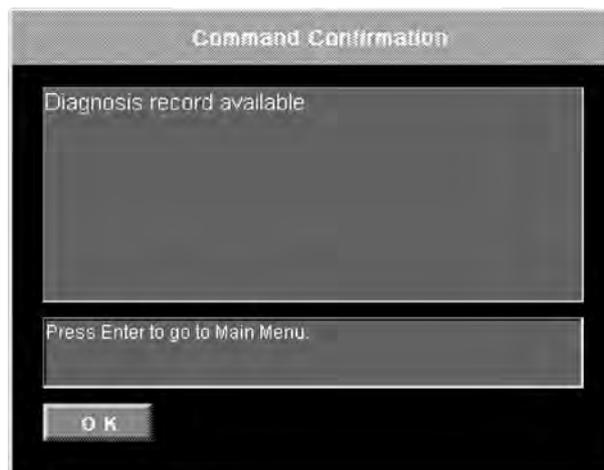


Fig. 31

SELECTING COMMANDS FROM THE MAIN MENU

Eight commands appear in the Main Menu. Select a command in any of the following three ways.

Three ways to select command

- Move the mouse pointer over the selected command ① until it appears as a finger mark, and then click the selected command.
- Move the mouse pointer over the selected command ② until it appears as a finger mark, and then click the selected command.
- Press any key number (1–8) corresponding to the selected command.

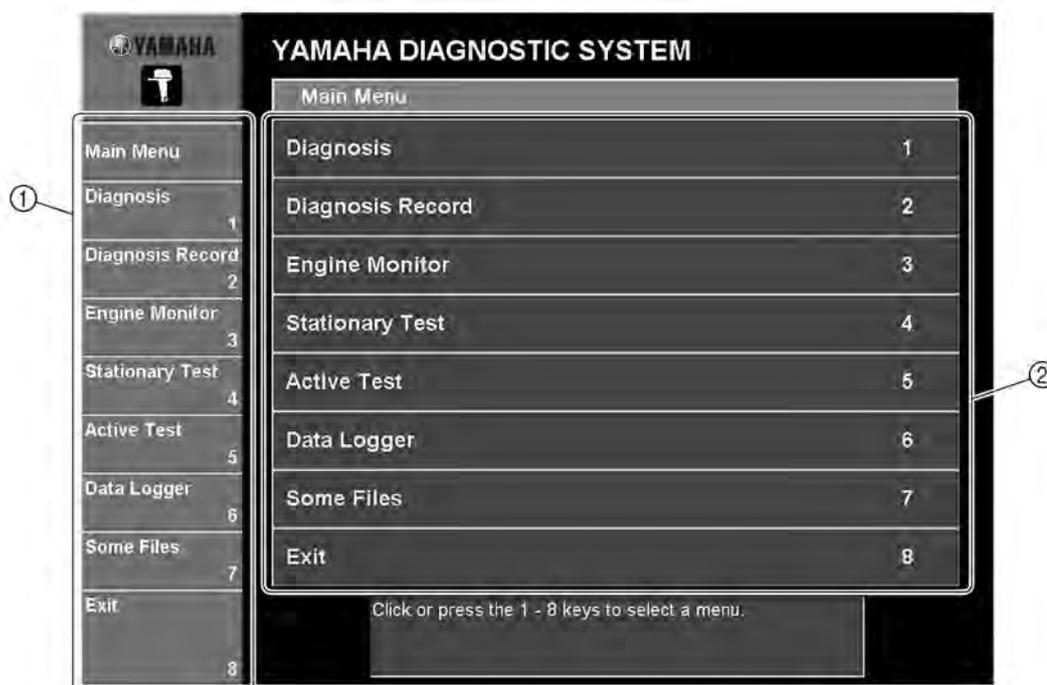


Fig. 32

NOTE:

Some commands may not be available depending on the model of the outboard motor. If the command is not available, "Unavailable" appears to the right of the command. (Fig. 33)

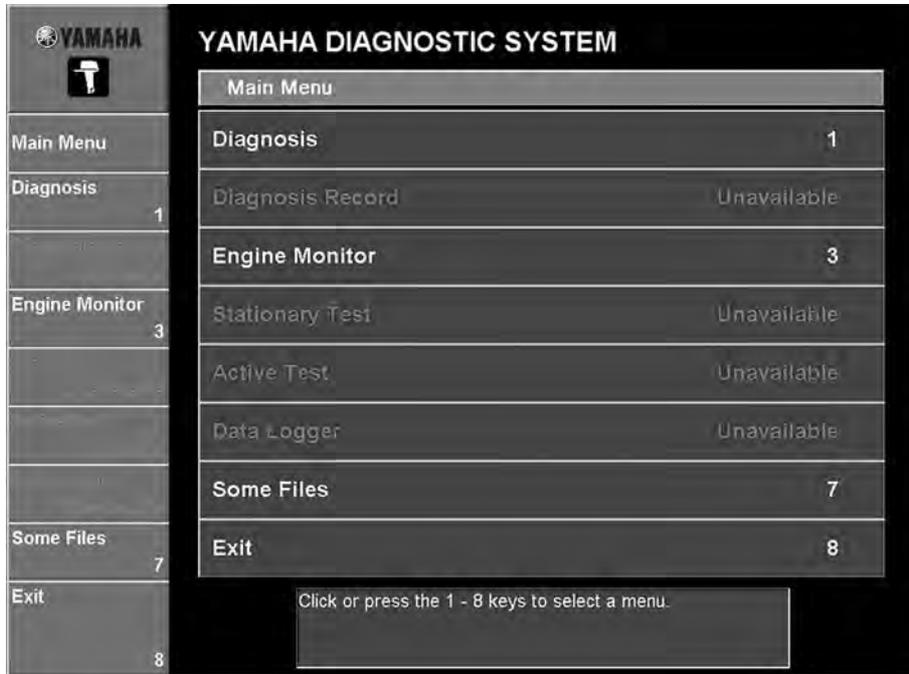


Fig. 33

DIAGNOSIS

The diagnosis codes of malfunctions recorded in the outboard motor's ECM, the diagnosis codes' corresponding part name, the results of the diagnosis, and the condition of the part are listed.

Abnormal items are identified by terms other than "Normal" in the **Result** column and are displayed at the top of the list. The results for those items are highlighted in red.

Eight items can be displayed at one time. To check the other items, scroll the display.

Troubleshooting procedures for the selected code are displayed in the box below the list.

List of diagnosis codes and items

Code	Item
13	Pulser coil
14	Crank position sensor
15	Water temp sensor
15	Engine temp sensor
17	Knock sensor
18	Throttle position sensor
19	Battery voltage
22	Atmospheric press sensor
23	Intake temp sensor
24	Cam position sensor (EXH)
25	Fuel press sensor
26	Injector
27	Water in fuel
28	Shift position switch
29	Intake press sensor
37	Intake air passage
39	Oil press sensor
44	Engine stop lanyard switch
45	Shift cut-off switch
46	Overheat thermoswitch
49	Over cooling
59	Memory data
68	Variable cam timing (STBD)
69	Variable cam timing (PORT)
71	Cam position sensor (STBD INT)
72	Cam position sensor (PORT INT)
73	Oil control valve (STBD)
74	Oil control valve (PORT)
112	Electronic throttle system
113	Electronic throttle system

Code	Item
114	Electronic throttle system
115	Electronic throttle system
116	Electronic throttle system
117	Electronic throttle system
118	Electronic throttle system
119	Electronic throttle system
121	Electronic throttle system
122	Electronic throttle system
123	Electronic throttle system
124	Throttle position sensor
125	Throttle position sensor
126	Throttle position sensor
127	Throttle position sensor
128	Throttle position sensor
129	Electronic throttle system
131	Accelerator position sensor
132	Accelerator position sensor
133	Accelerator position sensor
134	Accelerator position sensor
135	Accelerator position sensor
136	Electronic throttle system
137	Electronic throttle system
138	Electronic throttle system
139	Electronic throttle system
141	Electronic throttle system
142	Electronic throttle system
143	Electronic throttle system
144	Electronic throttle system
145	Electronic throttle system

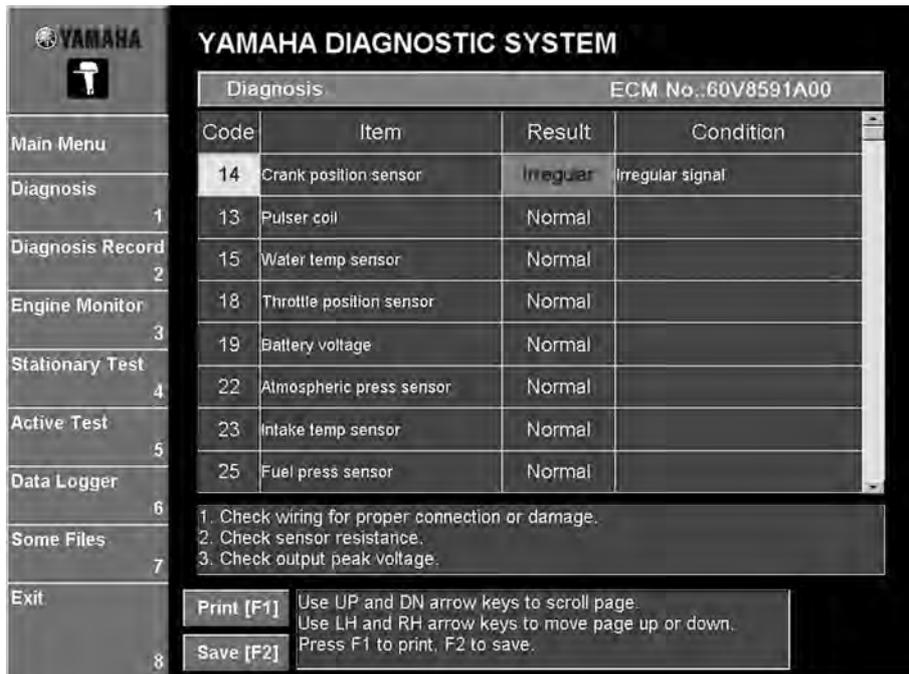


Fig. 34

NOTE:

Some items may not be available depending on the model of the outboard motor. Refer to the corresponding Service Manual for further information.

Operating procedure

Select the code number that you wish to view a diagnosis record for by either clicking it or pressing the up or down arrow keys on your keyboard.

To scroll the display and view other items, click ▲ or ▼ in the scroll bar, or press the up or down arrow keys on your keyboard.

NOTE:

- Items where “Normal” does not appear in the **Result** column are displayed at the top of the list. Items with 3-digit code numbers are listed above those with 2-digit code numbers.
- The selected code is highlighted in light blue and its confirmation procedure is displayed below the table.

Print

By selecting the **Print** command in the Diagnosis, Diagnosis record, Engine monitor, or Data logger mode, the data from the corresponding window can be printed.

1. Click the **Print [F1]** button or press the F1 key on your keyboard. The **Print** dialog box is displayed. (Fig. 35)

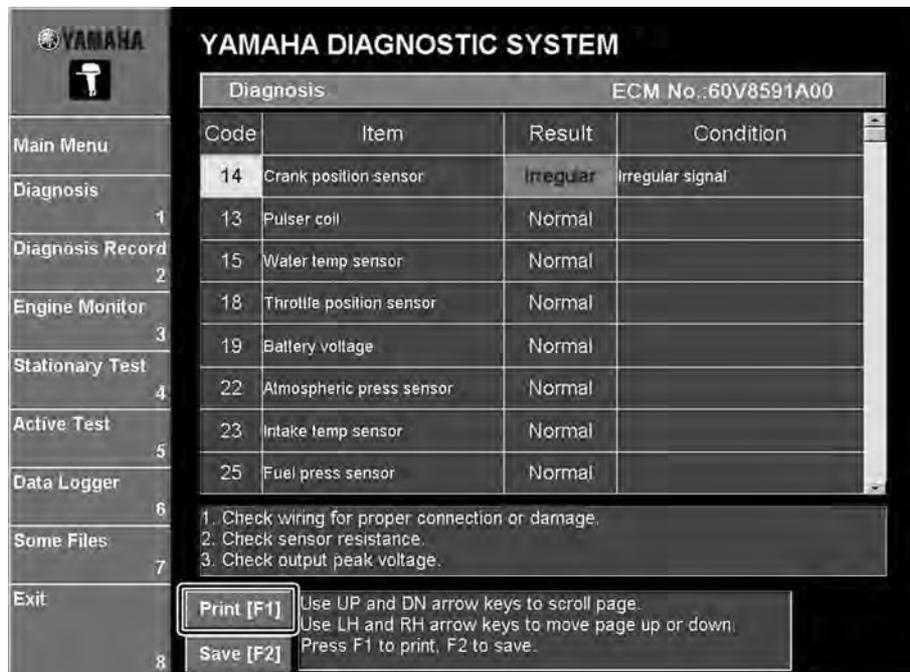


Fig. 35

2. Specify the printer, the printing range, and the number of copies to be printed.

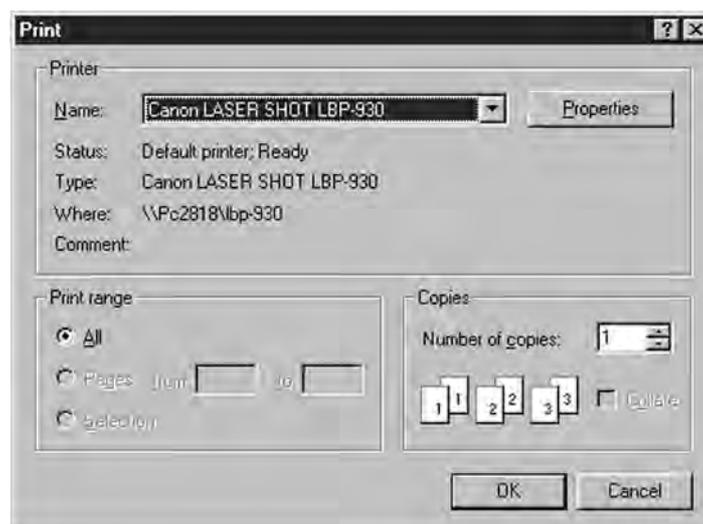


Fig. 36

- Click the **OK** button to begin printing.
To cancel printing, click the **Cancel** button.

NOTE: _____
The Print Screen function in Windows cannot be used since scroll data cannot be printed.

Save

By selecting the **Save** command in the Diagnosis, Diagnosis record, Engine monitor, or Data logger mode, the corresponding data can be saved on a disk.

Operating procedure:

- Click the **Save [F2]** button or press the F2 key on your keyboard. The **Save As** dialog box is displayed. (Fig. 37)

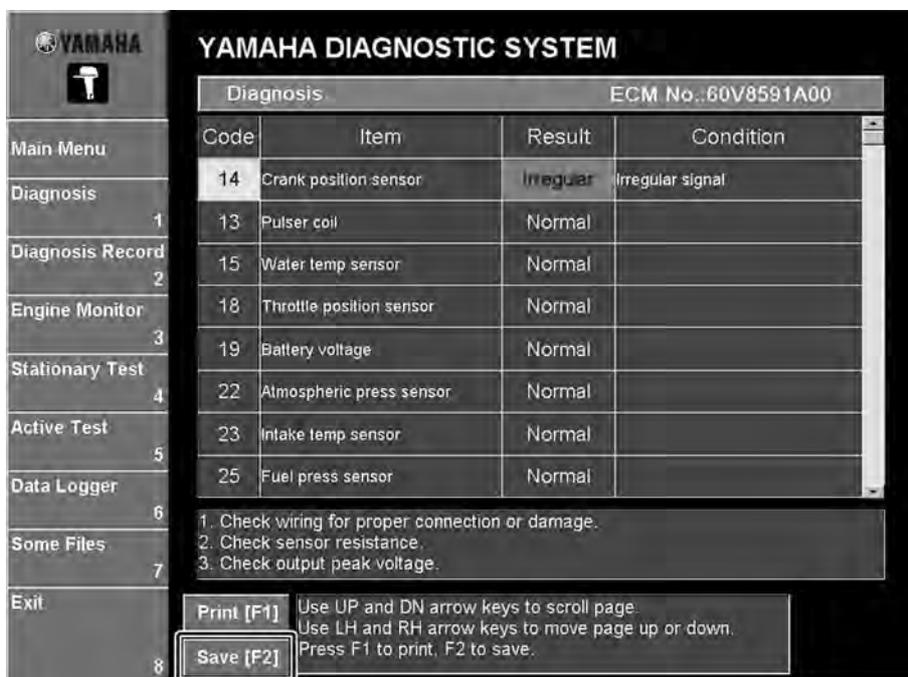


Fig. 37

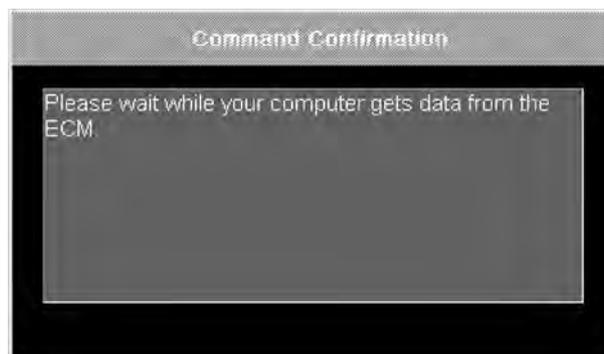


Fig. 38

2. Select the disk and folder where the data will be saved and specify its file name. (Fig. 39)



Fig. 39

NOTE:

The default file name is assigned as shown below.

Example: D 60E 02 06 13 1105 XX .csv
 ID code Model Year Month Day Time File serial number

3. Click the **Save** button to save the data. (without Microsoft Office)
 To cancel saving, click the **Cancel** button. (Fig. 39)
 The data you saved can be viewed in Microsoft Excel. (Fig. 40)

	A	B	C	D	E
1	Save date	September 10 2000			
2	ECM No.:	60E8591 A01			
3					
4	Diagnosis				
5		Code	Item	Result	Condition
6			15 Engine temp sensor	Irregular	Out of specification
7			13 Pulser coil	Normal	
8			18 Throttle position sensor	Normal	
9			19 Battery voltage	Normal	
10			23 Intake temp sensor	Normal	
11			24 Cam position sensor	Normal	
12			29 Intake press sensor	Normal	
13			47 Slant detection switch	Normal	
14					
15	Diagnosis Record				
16		Total hours of operation:		0	
17		Code	Item	Occurred	
18			Low oil pressure warning	0.05	
19			15 Engine temp sensor	0.05	
20					
21	Engine Monitor				
22		Monitor Item	Result	Unit	
23		Engine speed		0 r/min	
24		Intake pressure		100.42 kPa	
25		Intake pressure		29.66 inHg	
26		Atmospheric pressure		1004.2 hPa	
27		Atmospheric pressure		29.7 inHg	
28		Ignition timing	-	deg	
29		Battery voltage (12-16)		12.23 V	
30		TPS voltage (0.5-4.5)		0.762 V	
31		Throttle valve opening (0-90)		1.5 deg	
32		Fuel injection duration		0 ms	
33		Engine temperature (below 120)		34 -C	
34		Engine temperature (below 248)		93.2 -F	
35		Intake temperature (below 70)		21 -C	
36		Intake temperature (below 158)		69.8 -F	
37		Engine stop lanyard switch	OFF		
38		Overheat thermoswitch	OFF		
39		Slant detection switch	OFF		
40		Oil press switch	ON		
41					

Fig. 40

NOTE:

- The program saves the data in both CSV format and Excel format. (with Microsoft Office)
- If Microsoft Excel (version 97 or later) is installed on your computer, you can save the data onto a one-page US Letter-size form as shown below.

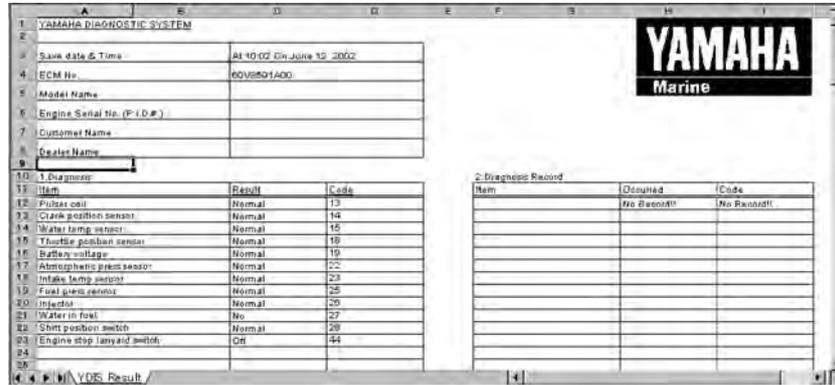


Fig. 41

DIAGNOSIS RECORD

The diagnosis codes of malfunctions that have been recorded in the outboard motor's ECM, the diagnosis codes' corresponding items, and the time when the malfunctions occurred are listed.

In addition, if engine history information exists, a table listing the items and results appears.

The latest occurrence appears on top. In addition, diagnosis codes stored in the ECM can be deleted.

List of diagnosis record codes and items

Code	Item
13	Pulser coil
14	Crank position sensor
15	Water temp sensor
17	Knock sensor
18	Throttle position sensor
19	Battery voltage
22	Atmospheric press sensor
23	Intake temp sensor
24	Cam position sensor (EXH)
25	Fuel press sensor
26	Injector
27	Water in fuel
28	Shift position switch
29	Intake press sensor
37	Intake air passage
39	Oil press sensor
44	Engine stop lanyard switch
45	Shift cut-off switch
46	Overheat thermoswitch
49	Over cooling
59	Memory data
62	Fuel pressure too low
68	Variable cam timing (STBD)
69	Variable cam timing (PORT)
71	Cam position sensor (STBD INT)
72	Cam position sensor (PORT INT)
73	Oil control valve (STBD)
74	Oil control valve (PORT)
112	Electronic throttle system
113	Electronic throttle system
114	Electronic throttle system

Code	Item
115	Electronic throttle system
116	Electronic throttle system
117	Electronic throttle system
118	Electronic throttle system
119	Electronic throttle system
121	Electronic throttle system
122	Electronic throttle system
123	Electronic throttle system
124	Throttle position sensor
125	Throttle position sensor
126	Throttle position sensor
127	Throttle position sensor
128	Throttle position sensor
129	Electronic throttle system
131	Accelerator position sensor
132	Accelerator position sensor
133	Accelerator position sensor
134	Accelerator position sensor
135	Accelerator position sensor
136	Electronic throttle system
137	Electronic throttle system
138	Electronic throttle system
139	Electronic throttle system
141	Electronic throttle system
142	Electronic throttle system
143	Electronic throttle system
144	Electronic throttle system
145	Electronic throttle system
FD	Overheat
FD	Overheat warning
FD	Low oil pressure warning

List of engine history information items (displayed only when ECM record data exists)

Item
Engine speed maximum
Fuel pressure minimum
Over rev.control record
Overheat record

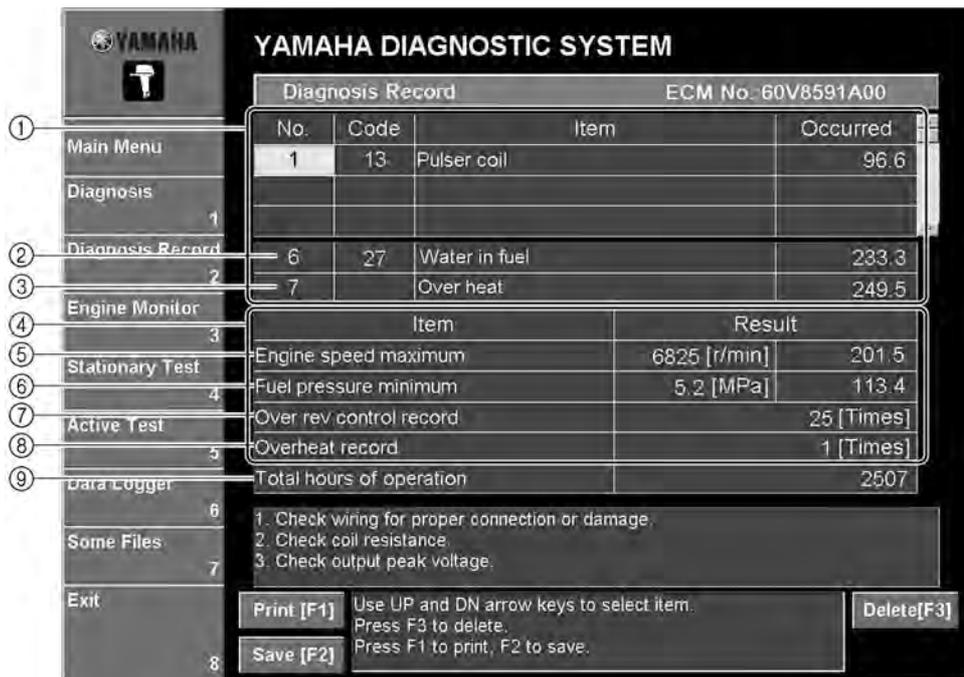


Fig. 42

- ① Displays diagnosis codes information.
- ② Display row used for “Water in fuel” diagnosis code only.
- ③ Display row used for “Over heat” or “Overheat warning” diagnosis code only. (Displayed code varies by model.)
- ④ Displays engine history information. (Fields will be left empty if recorded data does not exist in the ECM.)
- ⑤ Indicates all-time peak engine speed (RPM), and time of its occurrence.
- ⑥ Indicates all-time minimum recorded fuel-pressure value, and time of occurrence.
- ⑦ Indicates the number of times that over-rev prevention control has been triggered during motor’s operating life to date.
- ⑧ Indicates the number of times that the overheat switch has been activated during motor’s operating life to date.
- ⑨ Shows total hours of operation.

NOTE:

- Please never run the engine with the fuel supply cut off, as doing so may cause inappropriate values to be recorded.
- If you have deleted data from the ECM, the program will reflect only the data recorded following the last reset.
- Some items may not be available depending on the model of the outboard motor.

NOTE:

When a Diagnosis record is not available, "Diagnosis Record is unavailable" is displayed. (Fig. 43)

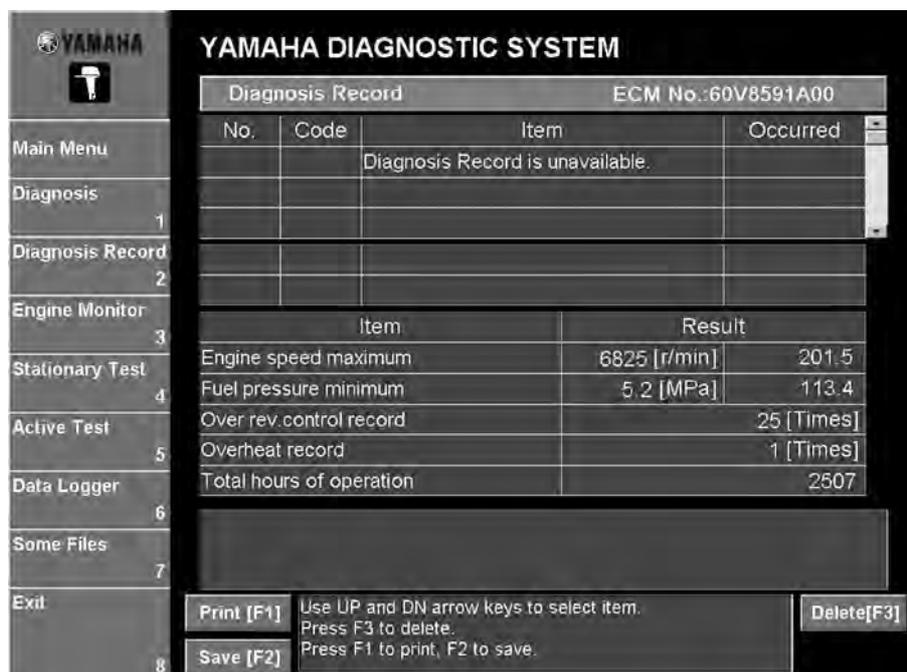


Fig. 43

Deleting diagnosis record in the ECM

1. Select the item that you wish to delete by either clicking it or pressing the up or down arrow keys on your keyboard.

NOTE:

- The selected code is highlighted in light blue.
- Check that the items deleted are normal in the Diagnosis Record. If the items remain irregular, they will appear as irregular in the Diagnosis Record even if you try to delete them they are undeletable.

2. Click the **Delete [F3]** button or press the F3 key on your keyboard. (See fig. 43.) A confirmation message appears. (Fig. 44)

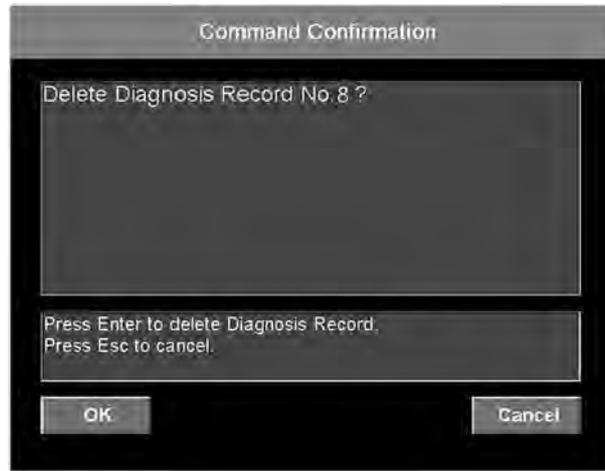


Fig. 44

NOTE:

Engine history information (Engine speed maximum, Fuel pressure minimum, Over rev. control record, and Overheat record) cannot be deleted.

3. Click the **OK** button or press the Enter key on your keyboard. (Fig. 44) The selected item is deleted. To cancel deleting the item, click the **Cancel** button or press the Esc key on your keyboard.

NOTE:

If an error occurs while an item is being deleted, an error message appears. Follow the instructions that appear in the error message. (Fig. 45)

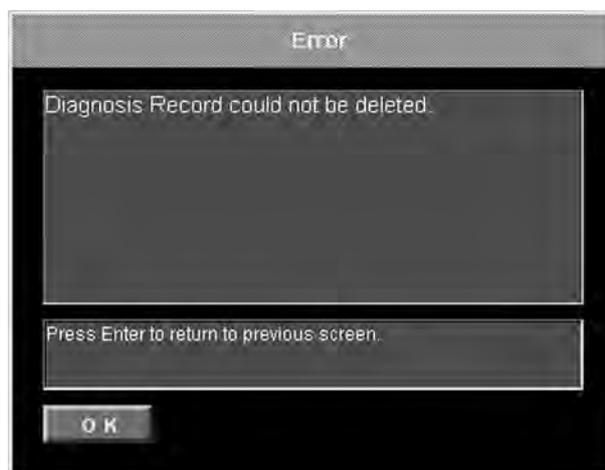


Fig. 45

ENGINE MONITOR

⚠ WARNING

Do not use the Engine Monitor function to check the engine condition while operating a boat, otherwise you may become distracted, which could result in a collision.

CAUTION:

Be sure to avoid splashing water on the laptop computer, adapter, and communication cable, and to avoid damaging them with strong sudden jolts or vibration.

The data from the ECM of the outboard motor is displayed.

Ten items can be displayed at one time. To view the other items, scroll the display. Displayed items can be changed as necessary.

List of engine monitor items

Monitor item
Accelerator position sensor 1
Accelerator position sensor 2
Atmospheric pressure
Battery voltage
Dual engine system switch
Electric oil pump
Electronic throttle relay
Engine speed
Engine stop lanyard switch
Engine temperature
Firing of cylinder
Fuel injection duration
Fuel pressure
Fuel pump relay
Ignition timing
Intake cam timing (STBD)
Intake cam timing (PORT)
Intake pressure
Intake temperature
ISC valve opening

Monitor item
Main relay
Main switch
Oil level switch (remote tank)
Oil level switch (engine tank)
Oil pressure
Oil pressure switch
Overheat thermoswitch
Over-rev control release lead
Oxygen sensor voltage
Shift cut-off switch
Shift position switch
Starter switch
Throttle position sensor 1
Throttle position sensor 2
Throttle valve opening
TPS voltage
Throttle valve opening
Water detection switch
Water temp switch (overheat)
Water temperature

YAMAHA		YAMAHA DIAGNOSTIC SYSTEM		
		Engine Monitor	ECM No.:60V8591A00	
Main Menu		Monitor Item	Result	Unit
Diagnosis	1	Engine speed	3225	r/min
Diagnosis Record	2	Fuel pressure (7.0±1.5)	5.68	MPa
Engine Monitor	3	Fuel pressure (1015±217)	823.74	psi
Stationary Test	4	Atmospheric pressure	631.8	HPa
Active Test	5	Atmospheric pressure	18.7	inHg
Data Logger	6	Ignition timing	ATDC 30	deg
Some Files	7	Battery voltage (12-16)	15.23	V
Exit	8	TPS voltage (0.5-4.5)	0.00	V
		Throttle valve opening (0-90)	-10.5	deg
		Fuel injection duration	3	ms

Print [F1]	Use UP and DN arrow keys to scroll page. Use LH and RH arrow keys to move page up or down.	Select [F3]
Save [F2]	Press F1 to print, F2 to save, F3 to display data. Press F4 to Engine Monitor Comparison Graph.	Graph [F4]

Fig. 46

NOTE:

- In the **Monitor Item** column, the standard value (range) for each item is enclosed in parentheses.
- The diagnosis results displayed in the **Result** column are highlighted in red if they are out of specification. (Fig. 46)
- If the results for a monitor item are highlighted in red, refer to “DIAGNOSIS RECORD”. Refer to the corresponding service manual for the appropriate inspection and adjustment procedures.

Selecting the monitor items

Select the items in the **Monitor Item Selection** window that you wish to display in the **Engine monitor** window.

1. To change a displayed item, click the **Select [F3]** button or press the F3 key on your keyboard.

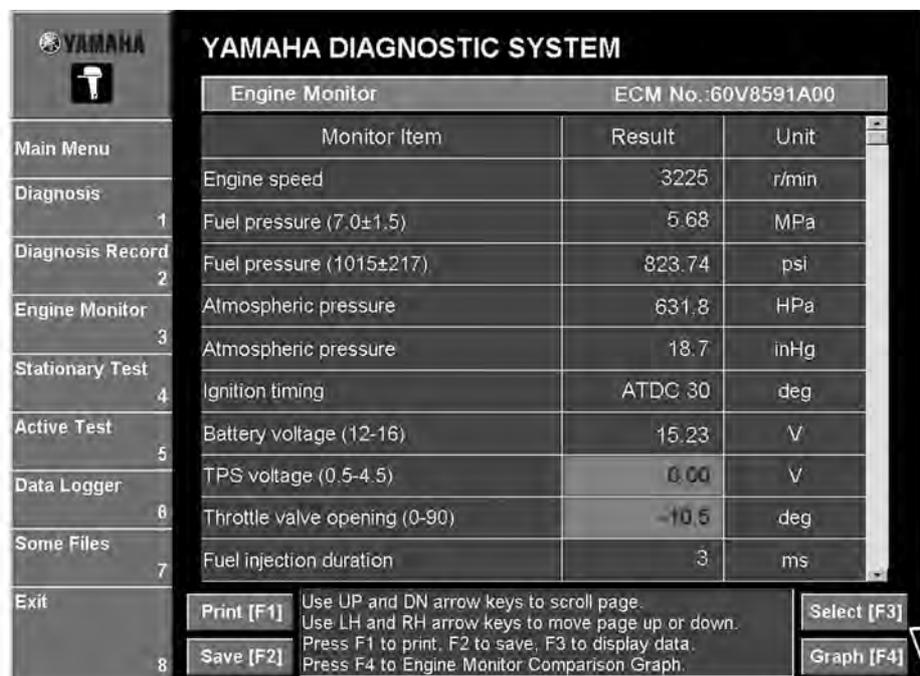


Fig. 47

2. Select an item by either clicking it or pressing the up or down arrow keys on your keyboard, and then press the space bar. (Fig. 48)

NOTE:

- Selected items ① have a light blue background. Items that are not selected have a blue background.
 - At initialization, all items are displayed.
-

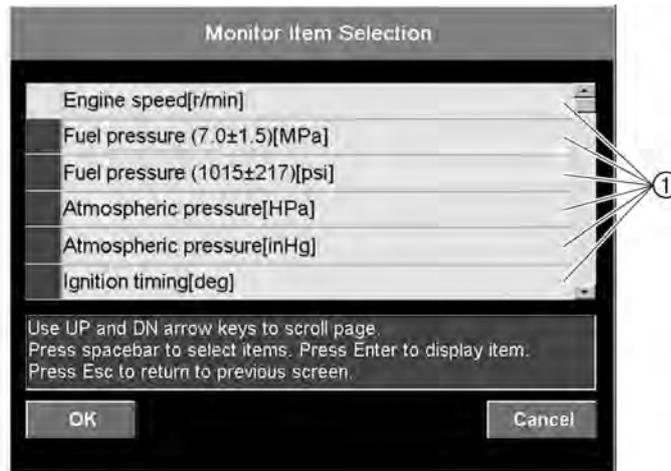


Fig. 48

3. Click the **OK** button or press the Enter key on your keyboard. The **Engine monitor** window appears. To cancel the monitor, click the **Cancel** button or press the Esc key on your keyboard. (Fig. 48)

Using the graph feature

The graph feature lets you generate a graph from the monitored engine data. The program reads the monitored input signal and generates the graph accordingly. You can also save the monitored signal data to disk so that you can regenerate and review the graphs later.

1. Click the **Graph [F4]** button at the bottom right of engine monitor window, or else hit the F4 key. (Fig. 49)

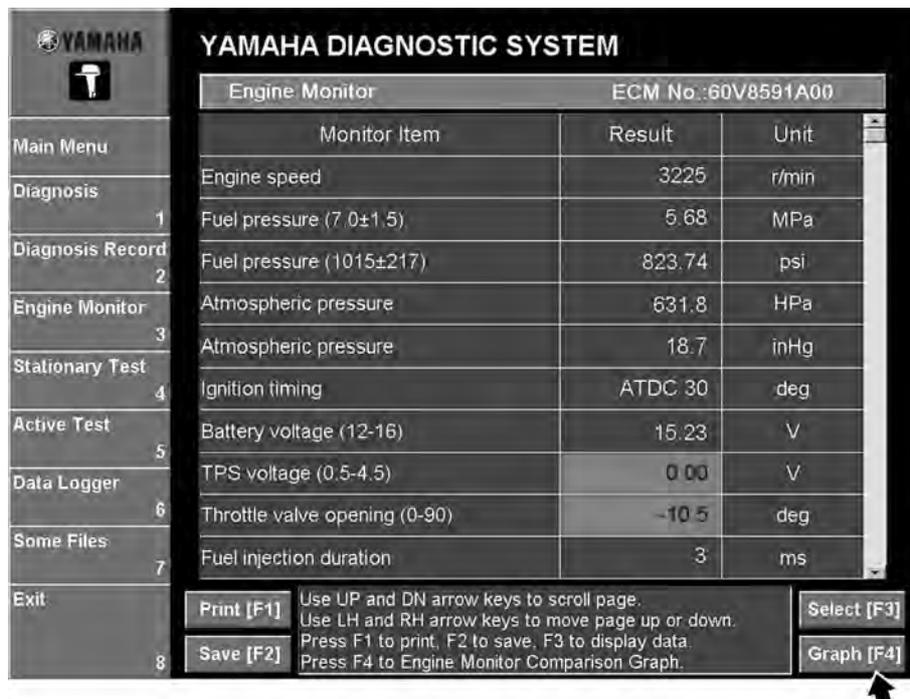


Fig. 49

2. The program displays the comparison graph window. (Fig. 50)

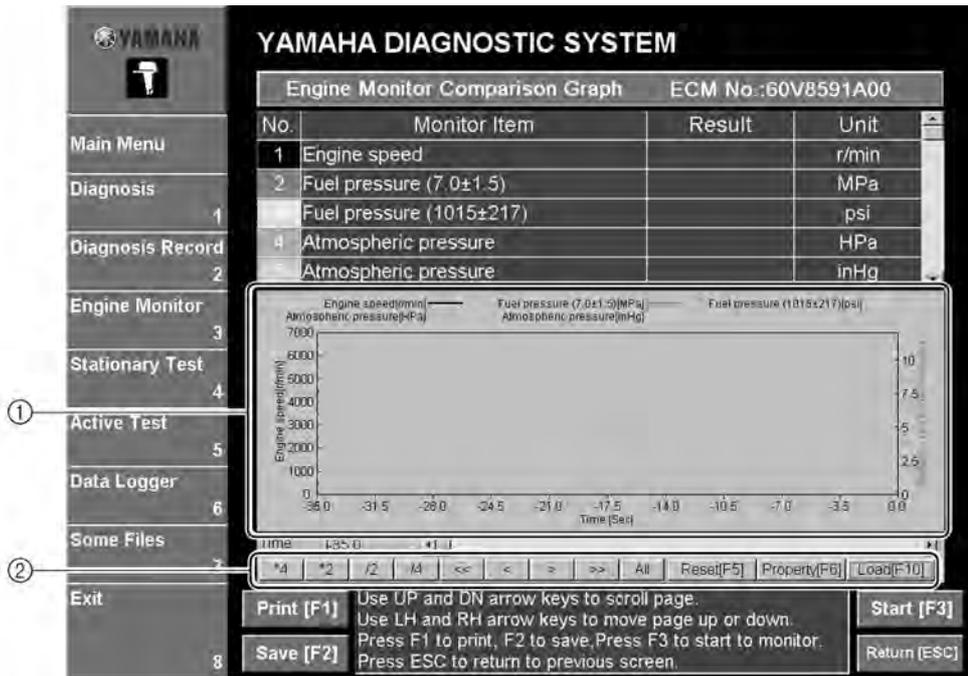


Fig. 50

- ① Freely select up to five items for display in the graph.
- ② These are the graph control buttons. These buttons are disabled while monitoring is in progress. For information about how to use these buttons, refer to “Graph window controls (keys and buttons)”.

3. Click the **Property [F6]** button at the bottom of the graph or press the F6 key on your keyboard.

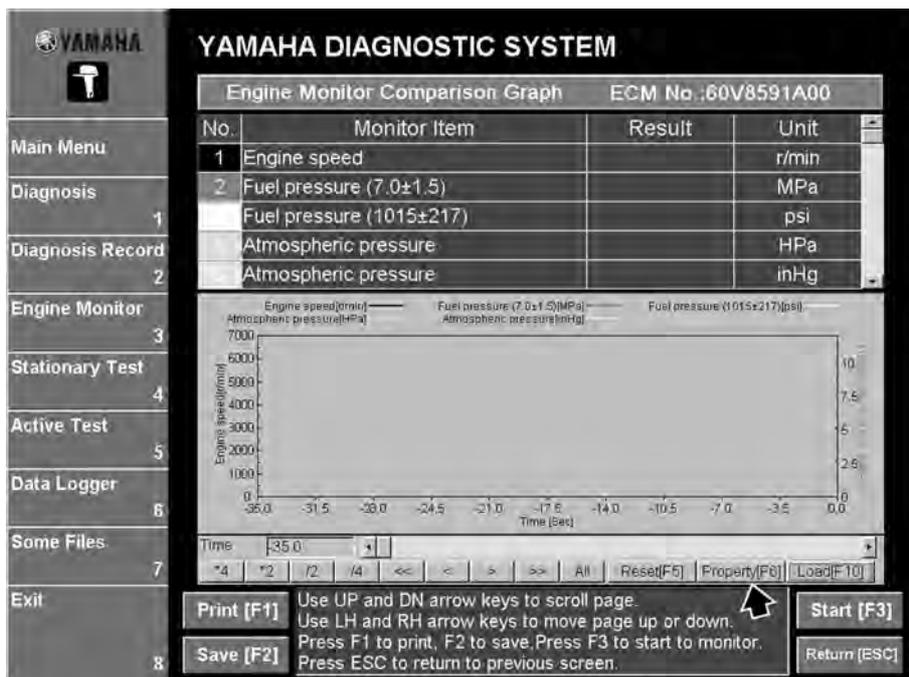


Fig. 51

4. The program displays the **Comparison Graph Property** window. Click the Logging, Graph, and Color tabs and perform the appropriate settings. For detailed information on the graph properties, refer to the graph setting table.

Logging

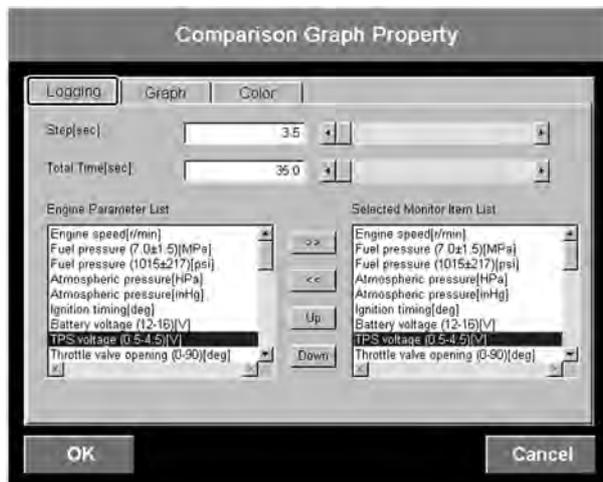


Fig. 52

Graph setting table

Tab	Property	Range
Logging	Step (sec)	Sets the period at which the program reads the signals being monitored. The minimum setting varies according to the number of items you are monitoring: starting at 0.5s for up to five items and then rising 0.5s for each multiple of five that you pass. Example: If one to five items, the available range is 0.5s to 60s. If six to ten items, the available range is 1.0s to 60s. Note: If the program is unable to read data at the exact interval that you select, it will operate at the nearest available interval.
	Total Time (sec)	Sets the total monitoring time. At 0.5s resolution: 5s to 7 hours At 60s resolution: 600s to 700 hours
	Item Display Order	Changes the order of the items on the display.

Graph

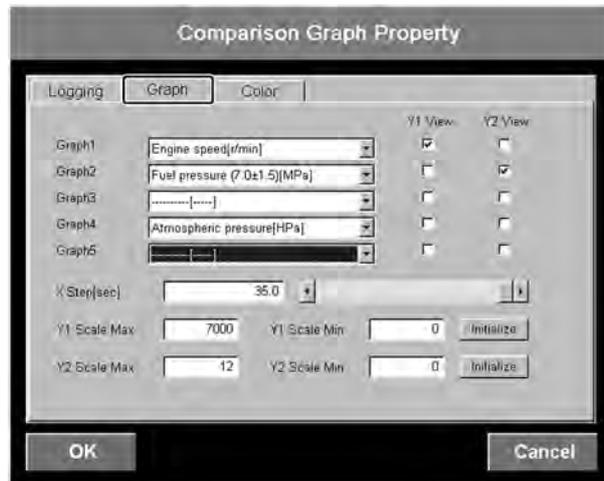


Fig. 53

Graph setting table

Tab	Property	Range
Graph	Selects item to be plotted on graph.	Select up to a maximum of five items for display on the graph.
	Y1 View	If you check the box, the graph plots the corresponding item against the left Y axis.
	Y2 View	If you check the box, the graph plots the corresponding against the right Y axis.
	X Step (sec)	Sets the length (in seconds) for the graph's X axis. The available range is the same as the range for the Total Time setting. Example: If you set the Step setting (on the Logging sheet) to 0.5s and you set X Length to 5s, the resulting graph display will show ten discrete steps.
	Y1 Scale Max	Sets the top value for the left Y axis. The range varies according to the input step setting (the Step setting on the Logging sheet).
	Y1 Scale Min	
	Y2 Scale Max	Sets the top value for the right Y axis. The range varies according to the input step setting (the Step setting on the Logging sheet).
	Y2 Scale Min	

Color

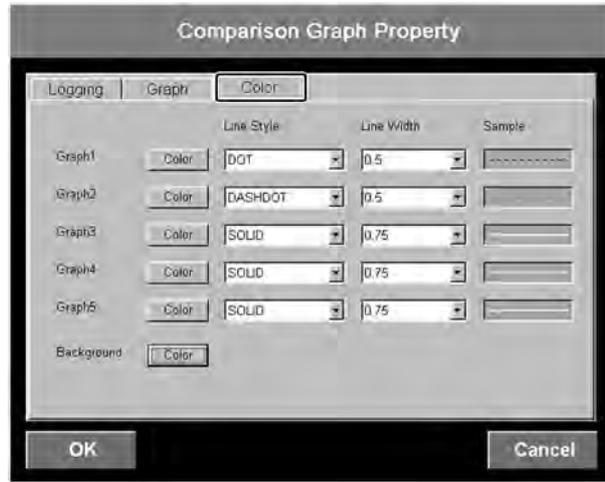


Fig. 54

Graph setting table

Tab	Property	Range
Color	Color	Select any color available on your system.
	Line Style	Select from five styles: SOLID, DASH, DOT, DASHDOT, DASHDOTDOT (DASH, DOT, DASHDOT, and DASHDOTDOT are available only if line width is set to 0.5pt.)
	Line Width	Select from five widths: 0.5pt, 0.75pt, 1pt, 1.5pt, 2pt
	Background	Select any color available on your system.

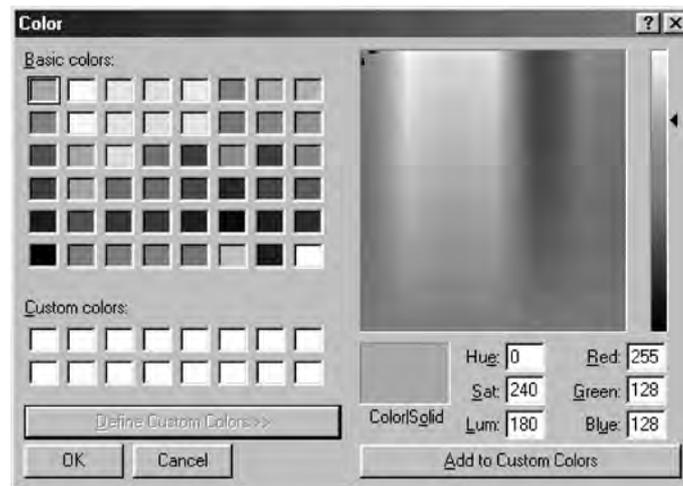


Fig. 55

- Click the **Start [F3]** button or press the F3 key to begin graphing. Once monitoring has started, the button name changes to **Stop [F3]**. The program automatically stops reading the signal data when the specified time elapses. (Fig. 56)

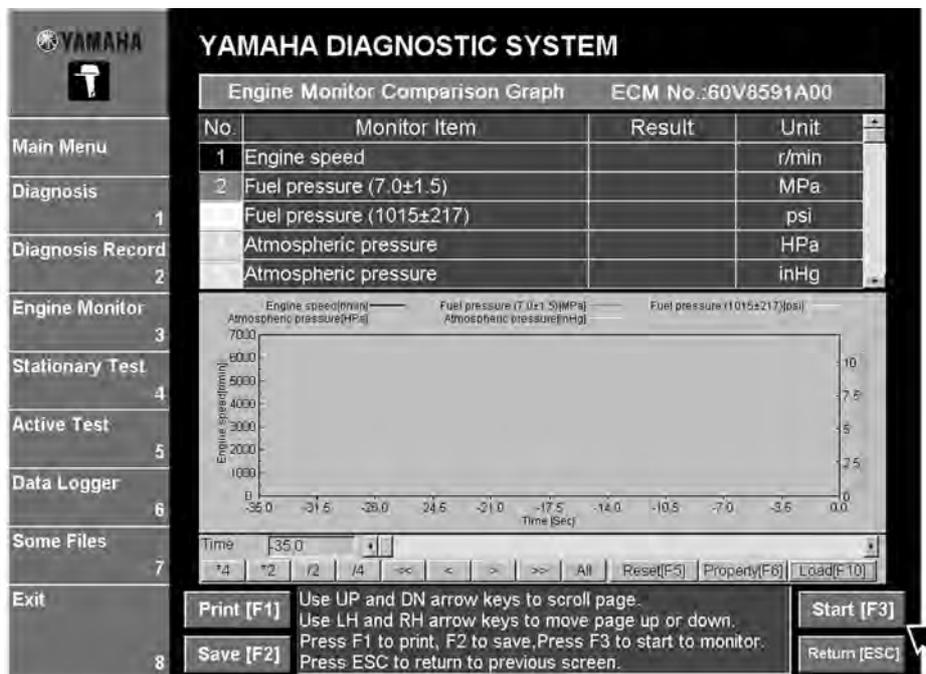


Fig. 56

Graph window controls (keys and buttons)

Keyboard	Button	Operation	Remarks
← →		Moves cursor in indicated direction (by one sample increment).	Disabled when monitoring.
Shift + ← →		Moves cursor in indicated direction (by ten sample increments).	Disabled when monitoring.
Ctrl + ← →	None	Moves cursor in indicated direction (by 100 increments).	Disabled when monitoring.
Insert		Zooms in on time axis (2x zoom, centered on cursor).	Disabled when monitoring.
Delete		Zooms out on time axis (1/2 zoom, centered on cursor).	Disabled when monitoring.
PageUp		Zooms in on time axis (4x zoom, centered on cursor).	Disabled when monitoring.
PageDown		Zooms out on time axis (1/4 zoom, centered on cursor).	Disabled when monitoring.
Space		Returns graph display settings to their defaults.	Disabled when monitoring.
F5		Deletes currently saved data and returns graph display settings to their defaults. (This feature is disabled during offline operation.)	Disabled when monitoring.
F6		Displays the graph properties window. (Note that the Logging settings are disabled during offline operation.)	Disabled when monitoring.
F10		Loads recorded data. When the coupler is connected and communication is in progress, this feature can be used to load and display the recorded data corresponding to the engine ECM No. The loaded data can be regraphed using the saved settings.	Disabled when monitoring.

- Click the **Save [F2]** button or press the [F2] to save the graph.

NOTE:

The default file name is assigned as shown below.

Example: L 60V 02 06 12 1817 XX .csv
ID code Model Year Month Day Time File serial number

- When you are finished with graphic monitoring, click the **Return [Esc]** button (or press the ESC key). (Fig. 56)
- The program displays a confirmation dialog asking whether you are sure you wish to delete previously saved signal and graph data (see Fig. 57). Click the **OK** button (or press the Enter key) to save the new data (overwriting the old data). The graph window will then close.

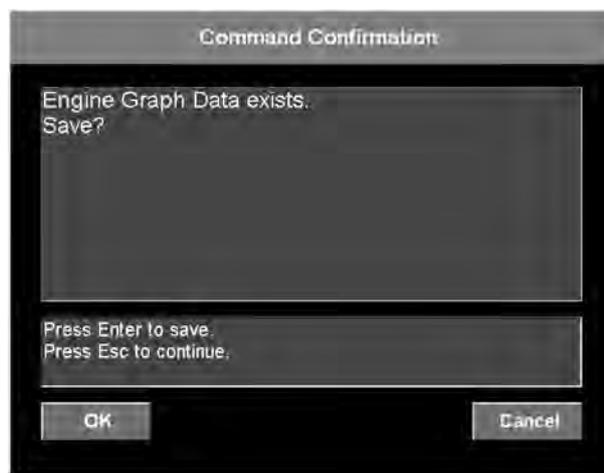


Fig. 57

Viewing saved graphs offline

The program allows you to view saved graph data offline. Once you have saved some graph data, you can recall it and review it with no need to connect to the ECM.

1. With the adapter disconnected, start up the Yamaha Diagnostic System on your computer. Then click the **Starting service tool [Enter]** button, or hit the Enter key. (Fig. 58)

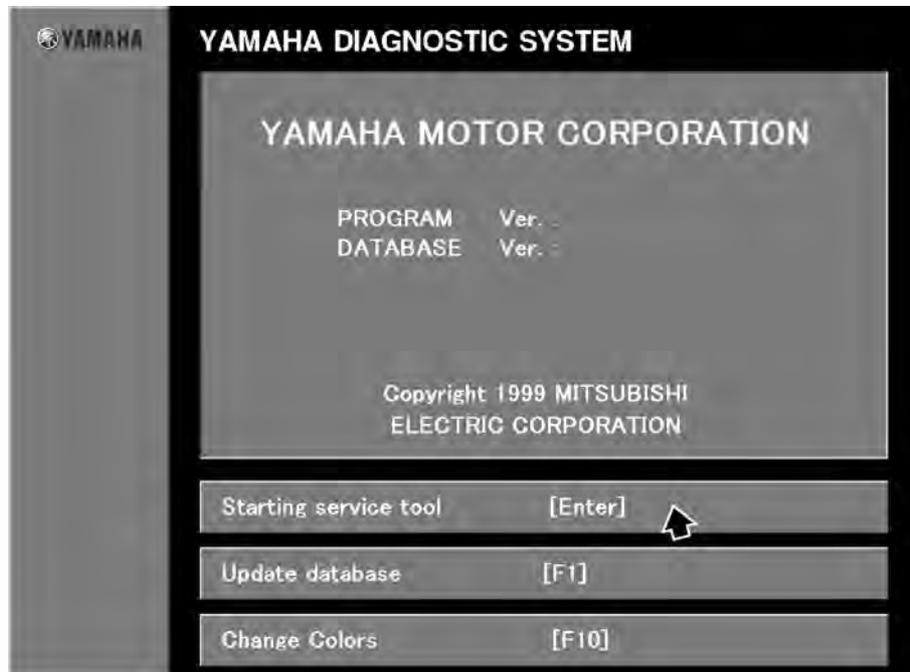


Fig. 58

2. When the "communication error" dialog appears, click the **OffLine** button. (Fig. 59)

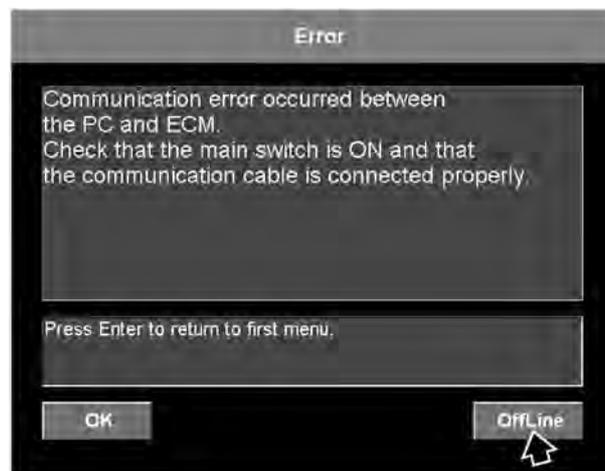


Fig. 59

3. Click the **Engine Monitor** command in the Main Menu or press the 3 key on your keyboard. (Fig. 60)

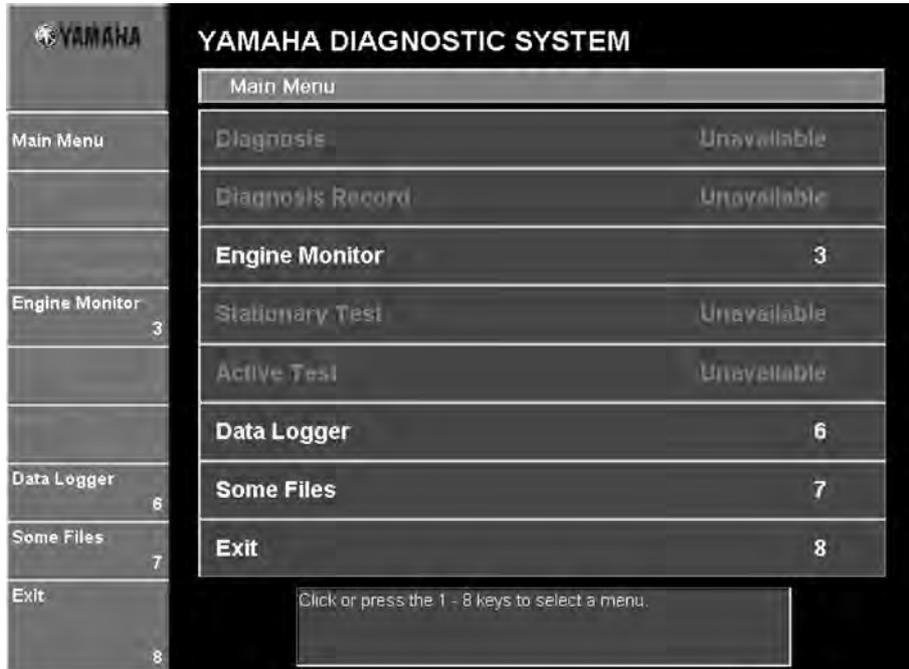


Fig. 60

4. Click the **Load [F10]** button, or hit the F10 key. (Fig. 61)

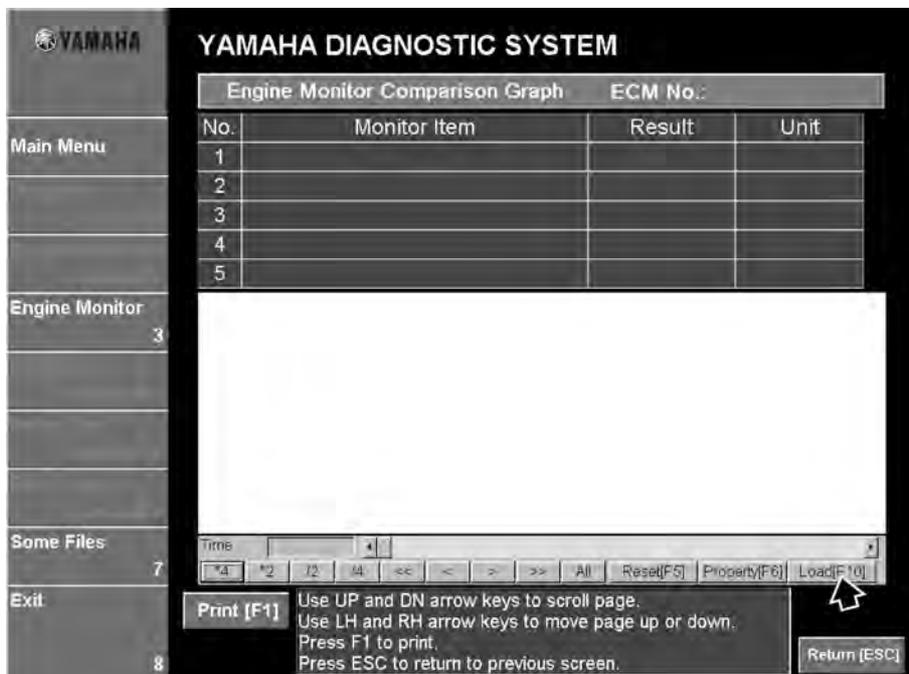


Fig. 61

5. Select the file containing the saved graph data that you want to view, and then click the **Open** button. (Fig. 62)

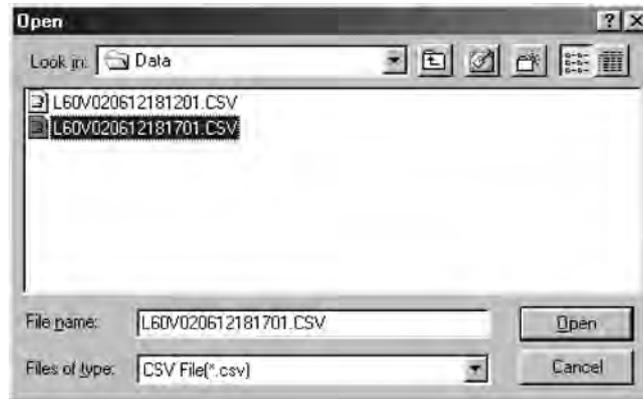


Fig. 62

NOTE: Graph files no saved in the Engine Monitor Comparison Graph mode cannot be opened.

6. The program displays the selected graph data. (Fig. 63)

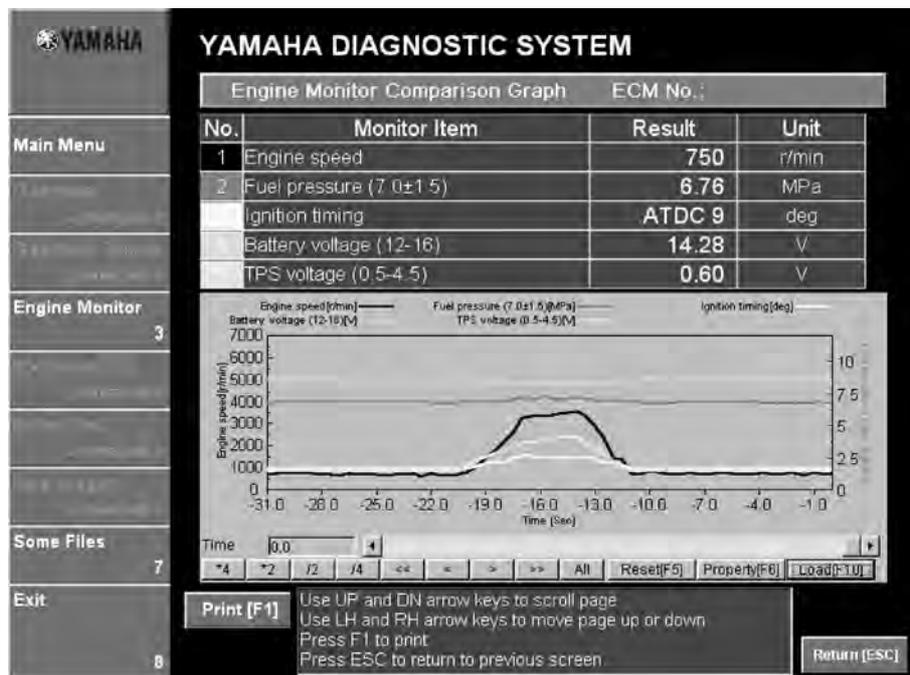


Fig. 63

NOTE: Remember that you cannot carry out actual monitoring while working offline. Offline graph operation is limited to recalling and viewing saved graph data.

STATIONARY TEST

Selecting this command displays a window where stationary tests can be selected.

List of stationary test items

Item
Ignite ignition coil
Oil ctrl. valve drive (PORT)
Oil ctrl. valve drive (STBD)
Operate elect. fuel feed pump
Operate electric fuel pump

Item
Operate electric oil pump
Operate injector
Operate ISC valve
Spark ignition coil

⚠ WARNING

Avoid clicking the Execute and Cancel buttons repeatedly, otherwise the ECM or PC may not work properly and they may be damaged.

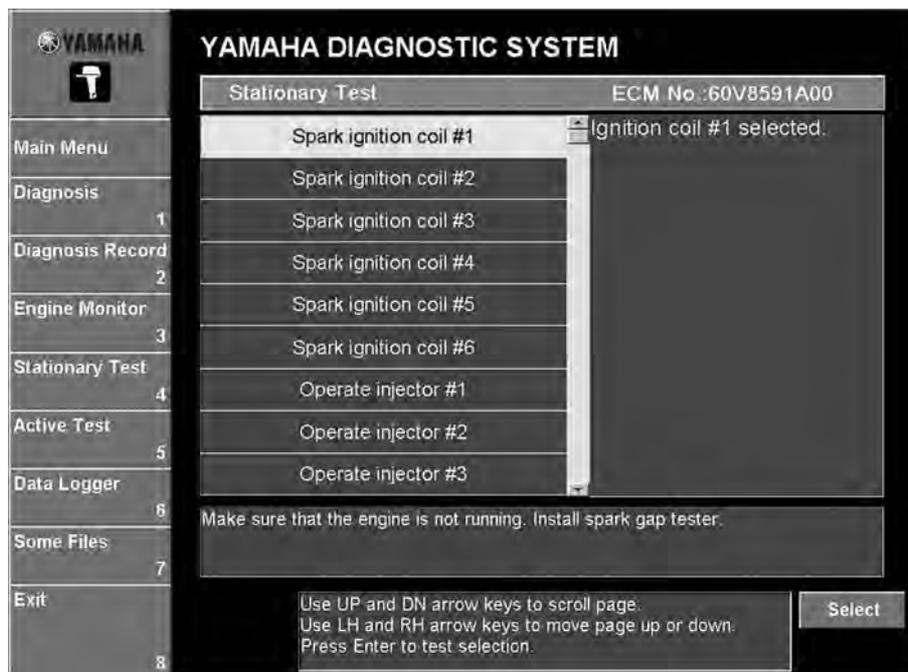


Fig. 64

Sparking ignition coil procedure

A voltage is applied to the ignition coil of the selected cylinder, a spark is created in the spark gap tester, and then the ignition system is checked. Five sparks are created within five seconds.

⚠ WARNING

- Do not touch any connections of the spark gap tester lead wires.
- Do not let sparks leak out of the removed spark plug cap.
- Keep flammable gas or liquids away since this test will produce sparks.

1. Select the test that you wish to perform by either clicking it or pressing the up or down arrow keys on your keyboard. (Fig. 64)

NOTE: _____

- Make sure that the engine is not running.
 - The selected item is highlighted in light blue.
 - The details of the selected test are displayed in the column on the right, and the items that must be either checked or performed before the test can start are displayed below the table.
 - Only one item can be selected at one time.
 - A special tool (spark gap tester YM-34487/90890-06754) is needed.
-

2. Connect the spark plug cap of the cylinder that will be tested to the spark gap tester.

Spark gap tester

A YM-34487 / B 90890-06754

3. Set the spark gap length on the adjusting knob.

Ignition spark gap: 9 mm (0.4 in)

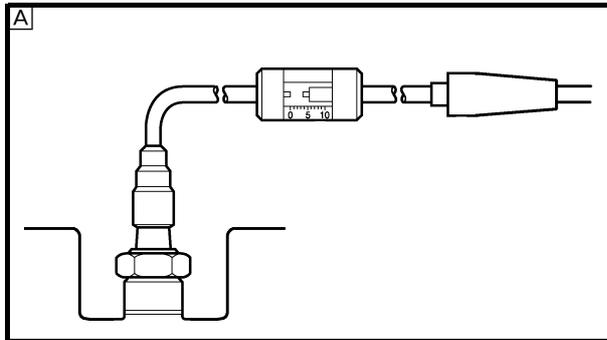


Fig. 65

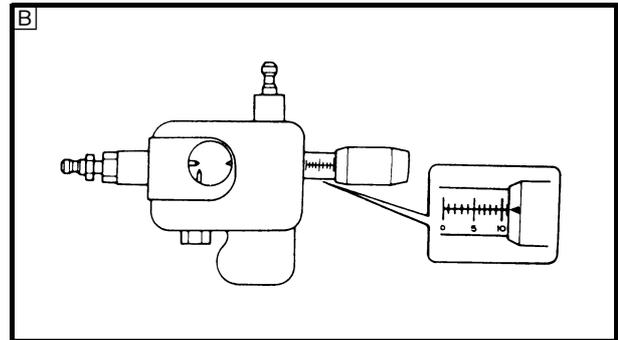


Fig. 66

4. Select the cylinder number where the spark gap tester is connected, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 64)

- Click the **Execute** button or press the Enter key on your keyboard. (Fig. 67)

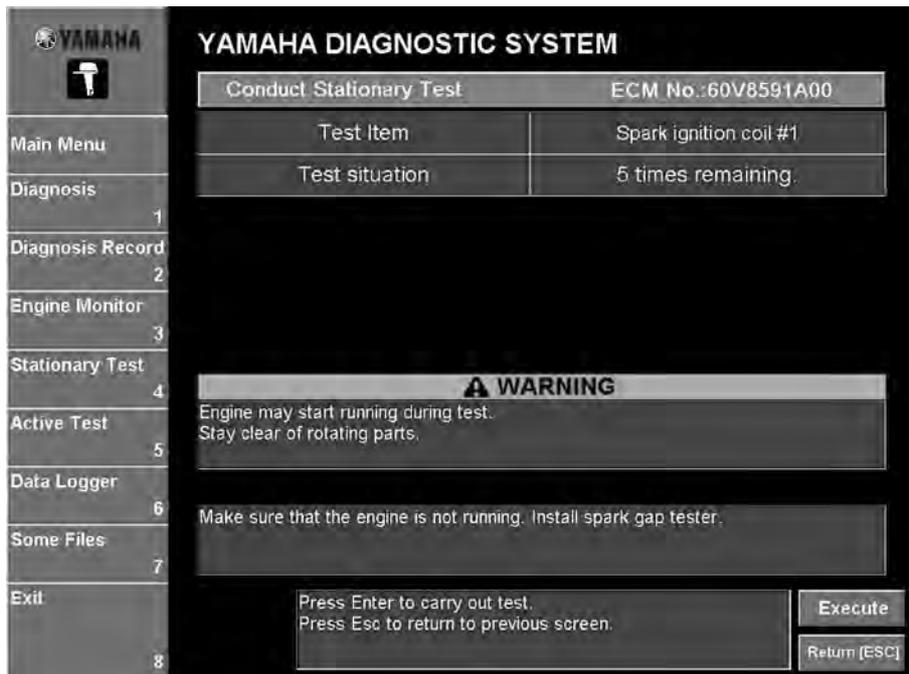


Fig. 67

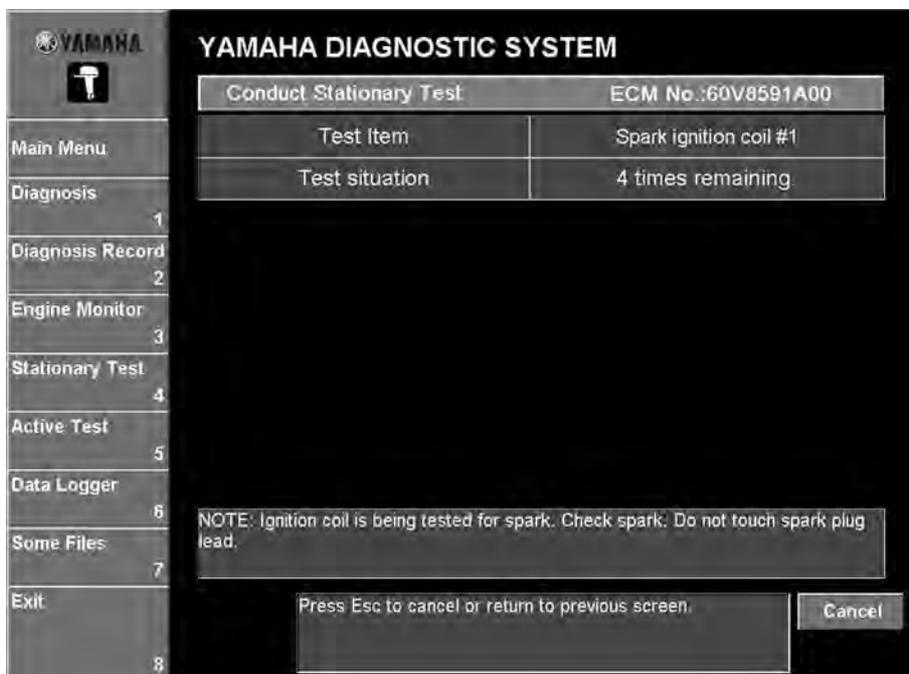


Fig. 68

NOTE:

If the engine is running or not in neutral, an error message is displayed. Follow the instructions that appear. (Fig. 69)



Fig. 69

-
6. While checking the information that appears in the **Test situation** column, follow the test instructions in the messages that are displayed. (See fig. 68.)

NOTE:

If an error occurs while the test is being performed, an error message is displayed. Follow the instructions that appear in the error message. (Fig. 70)

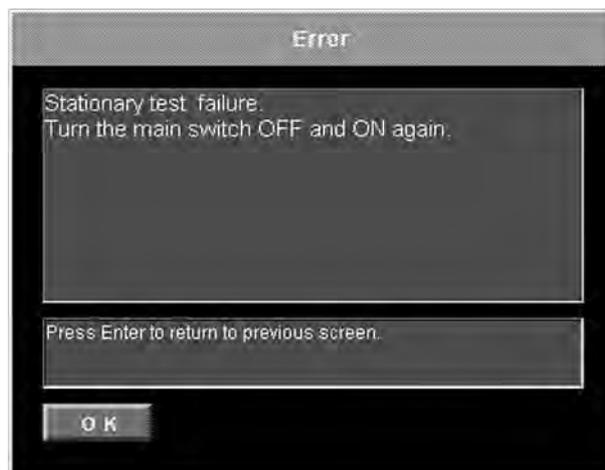


Fig. 70

-
7. To stop the stationary test, click the **Cancel** button. (See fig. 68.)
 8. Observe the spark through the discharge window of the spark gap tester.

-
9. To perform the test again to the same cylinder, click the **Execute** button or press the Enter key on your keyboard. To perform the test on a different cylinder, click the **Return [ESC]** button or press the Esc key on your keyboard to return to main menu where a different test can be selected.

NOTE:

If an error occurs while the test is being performed, the following message is displayed.



Fig. 71

Operating injector procedure

A voltage is applied to the injector of the selected cylinder, the injector is activated, and then the fuel system is checked. The fuel is injected 20 times within two seconds.

⚠ WARNING

- Do not perform the test with the injector removed from the cylinder head or with any fuel system parts removed. High-pressure fuel may spurt out.
- When performing the this operation, keep all sparks, flames, or other sources of ignition away from the testing area. Gasoline is highly flammable.

1. Select the test that you wish to perform by either clicking it or pressing the up or down arrow keys on your keyboard. (Fig. 72)

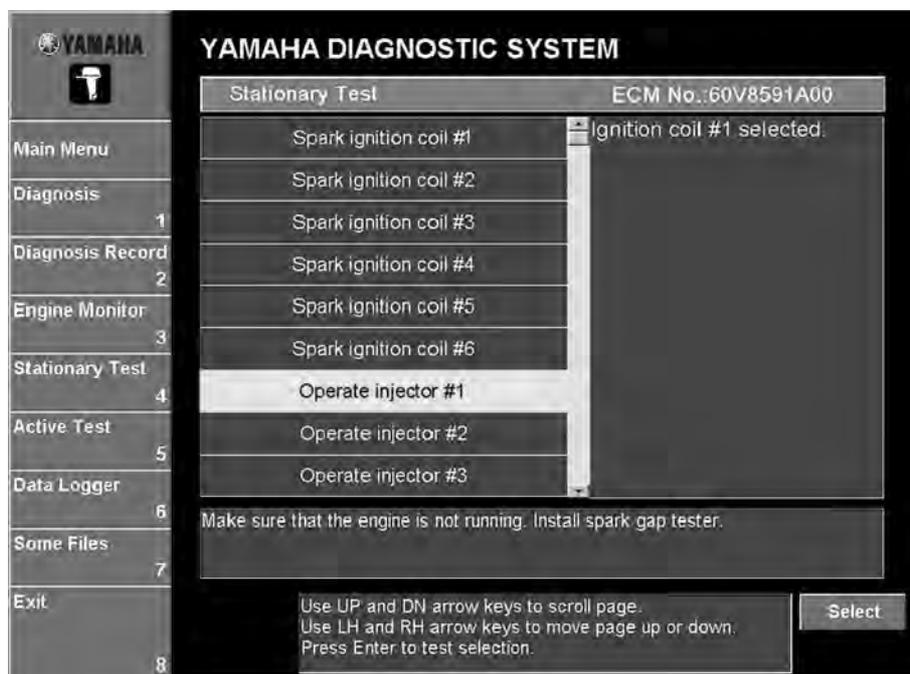


Fig. 72

NOTE:

- Make sure that the engine is not running.
- The selected item is highlighted in light blue.
- The details of the selected test are displayed in the column on the right, and the items that must be either checked or performed before the test can start are displayed below the table.
- Only one item can be selected at one time.
- Make sure that there is fuel in the fuel tank, otherwise an error will occur and the test cannot be performed.

2. Select the cylinder to be tested, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 72)

3. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 73)

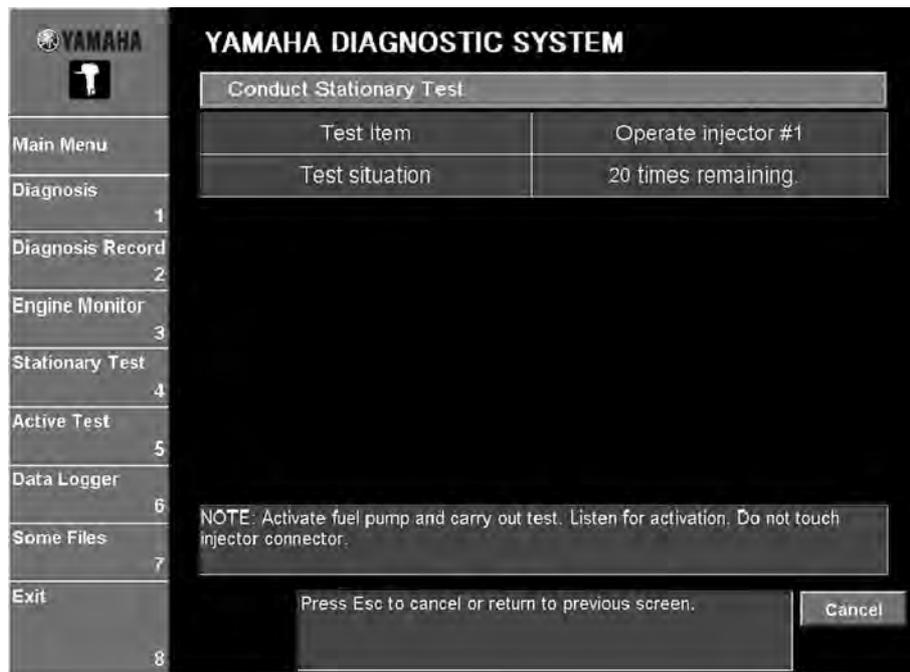


Fig. 73

NOTE: If an error occurs while the test is being performed, an error message is displayed. Follow the instructions that appear.

4. Listen to the operating sound of the injector for the cylinder being tested.

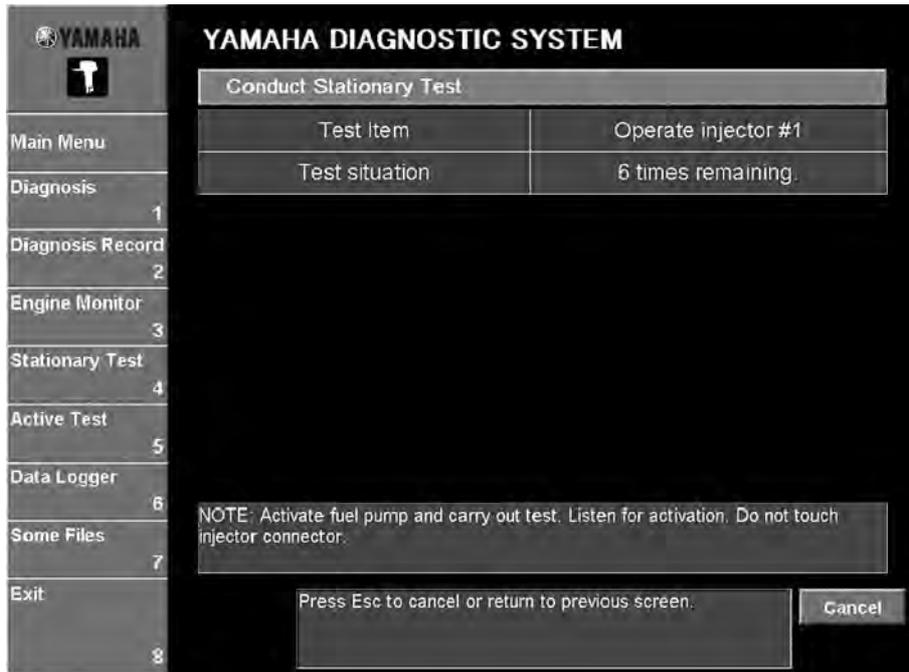


Fig. 74

⚠ WARNING

Do not touch the injector connector.

NOTE:

Before activating the injector, operate the electric fuel pump for ten seconds in order to build up fuel pressure.

5. To perform the test again on the same cylinder, click the **Execute** button or press the Enter key on your keyboard. To perform the test on a different cylinder, click the **Return [ESC]** button or press the Esc key on your keyboard to return to the window where a different test can be selected. (Fig. 75)

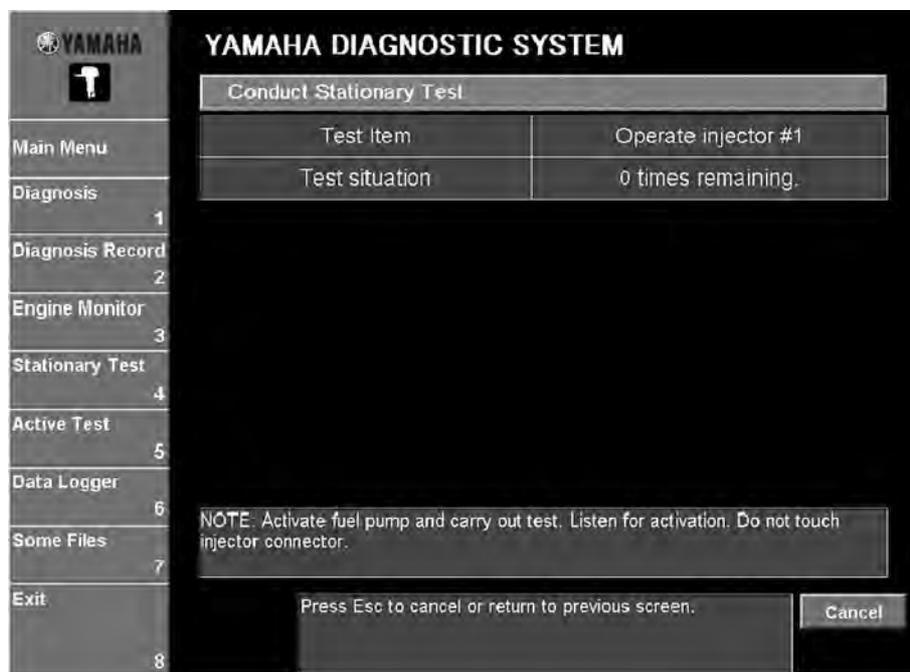


Fig. 75

CAUTION:

Do not test the same cylinder three or more times, otherwise the spark plug insulator may be damaged.

Operating the electric fuel pump

A voltage is applied to the electric fuel pump, the electric fuel pump is operated, and then the fuel system is checked. The electric fuel pump is operated for ten seconds.

⚠ WARNING

- Do not perform the test with the injector removed from the cylinder head or with any fuel system parts removed. High-pressure fuel may spurt out.
- When performing this operation, keep all sparks, flames, or other sources of ignition away from the testing area. Gasoline is highly flammable.

NOTE:

Make sure that there is fuel in fuel tank, otherwise an error will occur and the test cannot be performed.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 76)

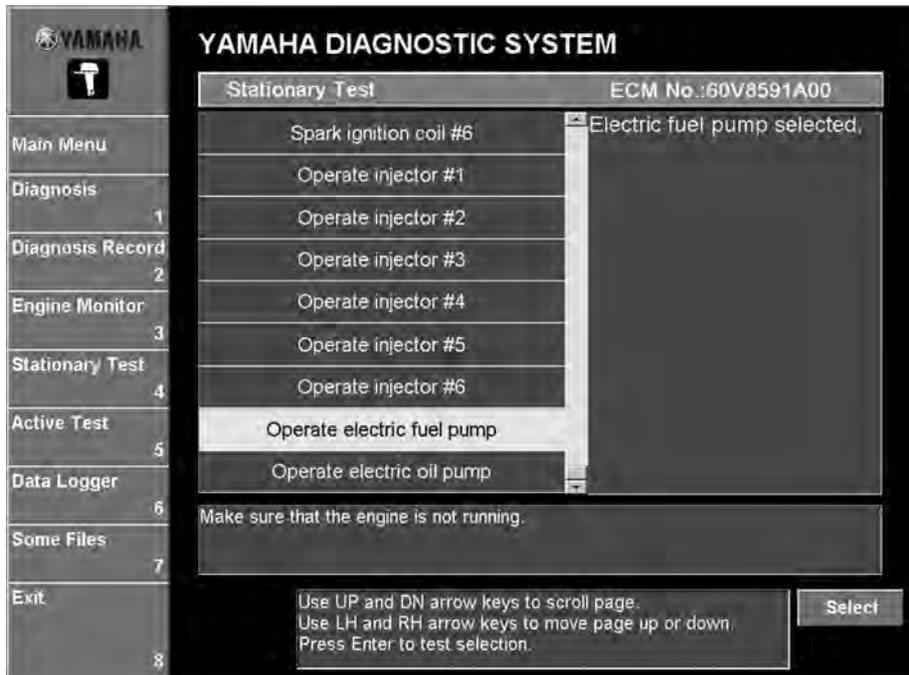


Fig. 76

NOTE:

- Make sure that the engine is not running.
- The selected item is highlighted in light blue.
- The details of the selected test are displayed in the column on the right, and the items that must be either checked or performed before the test can start are displayed below the table.
- Only one item can be selected at one time.

2. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 77)

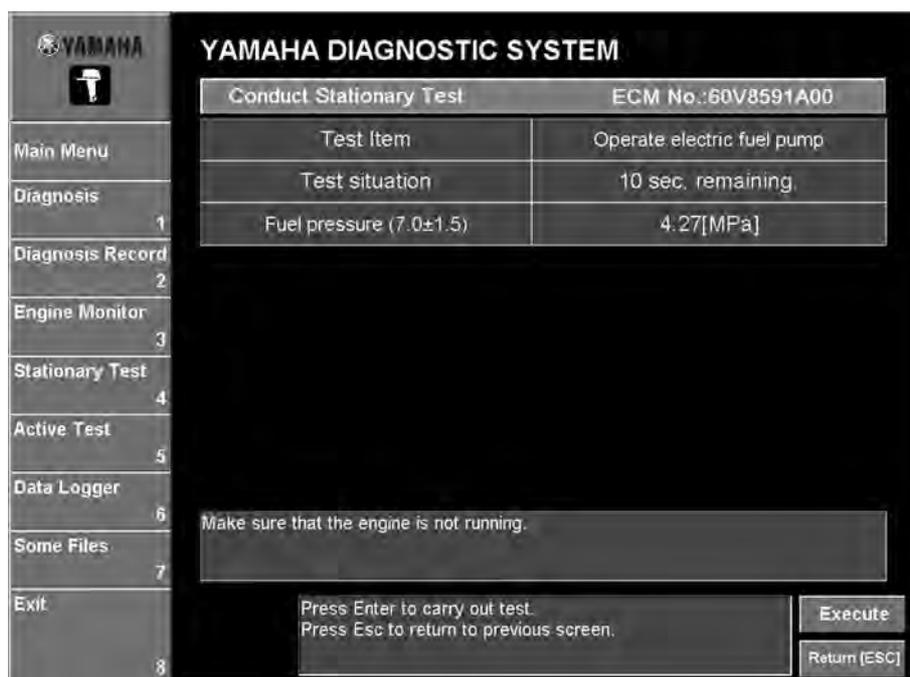


Fig. 77

NOTE:

If an error occurs while the test is being performed, an error message is displayed. Follow the instructions that appear.

3. Listen to the operating sound of the electric fuel pump.

4. To perform the test again click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return [ESC]** button or press the Esc key on your keyboard to return to the window where a different test can be selected. (Fig. 78)

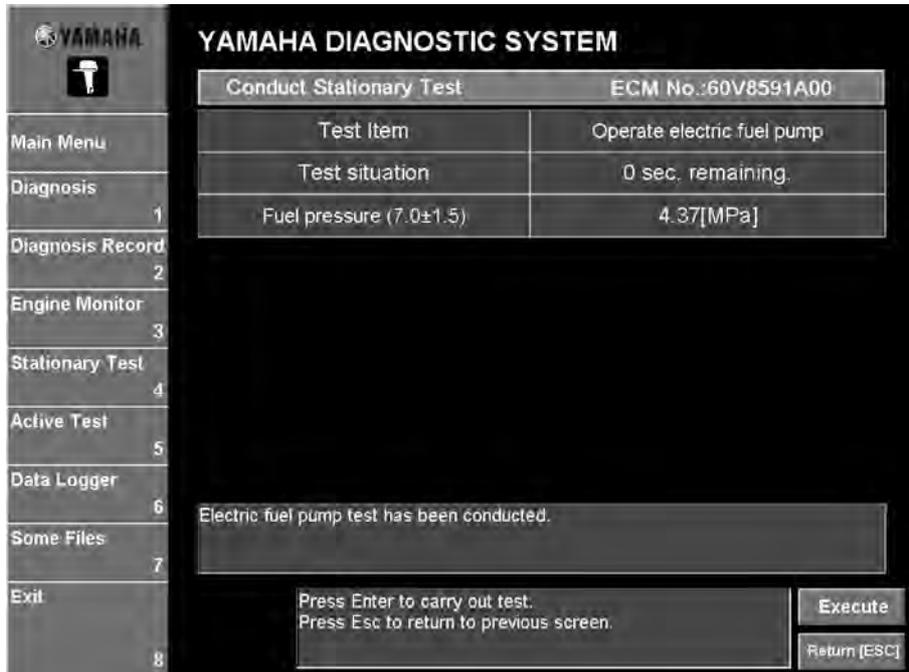


Fig. 78

Operating electric oil pump procedure

The electrical oil pump is operated by a signal sent from the ECM for six seconds. This checks if oil has been spurted out from the electrical oil pump.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 79)

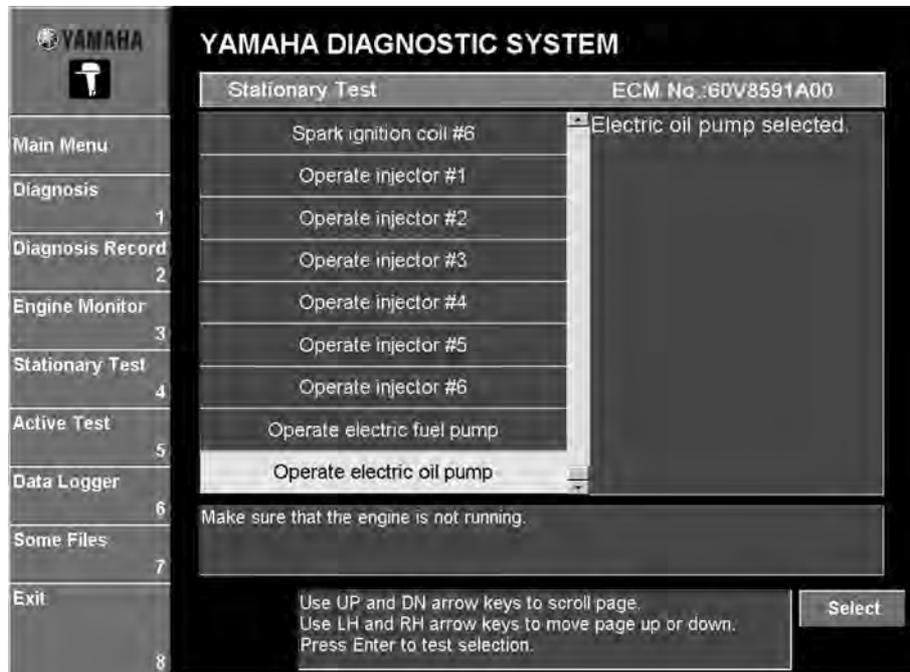


Fig. 79

NOTE:

- Make sure that the engine is not running.
- The selected item is highlighted in light blue.
- The details of the selected test are displayed in the column on the right, and the items that must be either checked or performed before the test can start are displayed below the table.
- Only one item can be selected at one time.

2. Remove the oil hose ① from the vapor separator inlet ②. (Fig. 80)

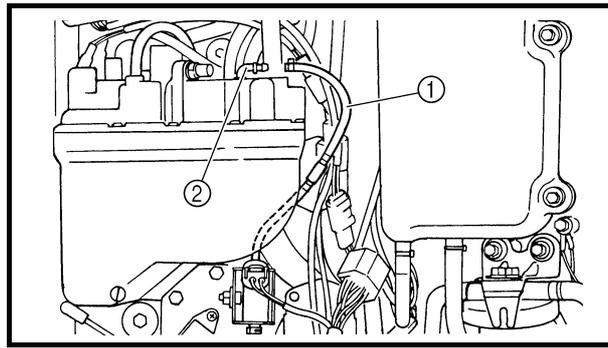


Fig. 80

CAUTION:

Do not allow any air to enter the oil hose during the test.

3. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 81)

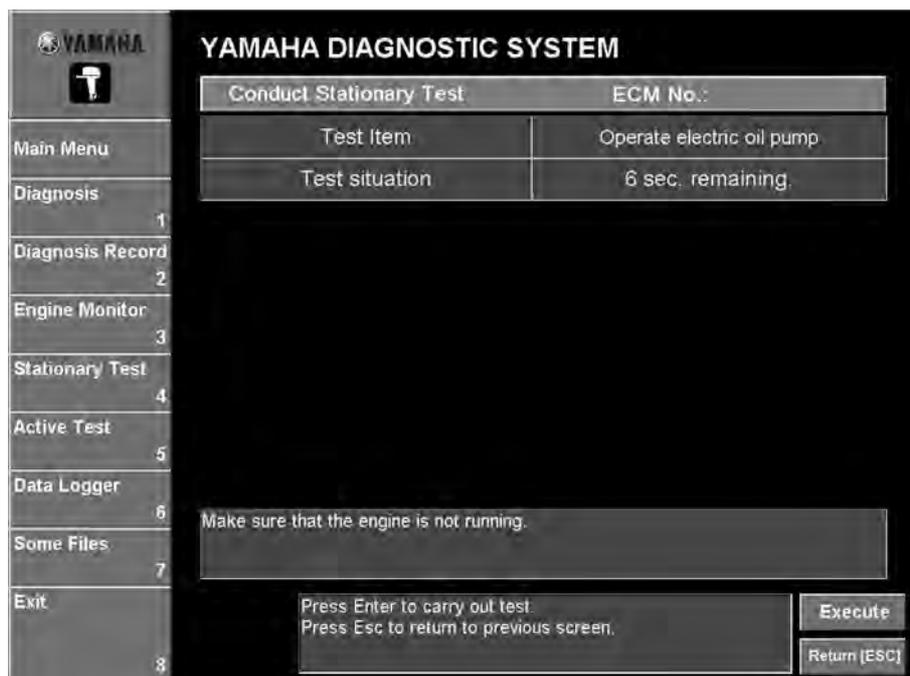


Fig. 81

NOTE:

If an error occurs while the test is being performed, an error message is displayed. Follow the instructions that appear.

4. Check that oil flows from the electric oil pump hose end. (Fig. 82)

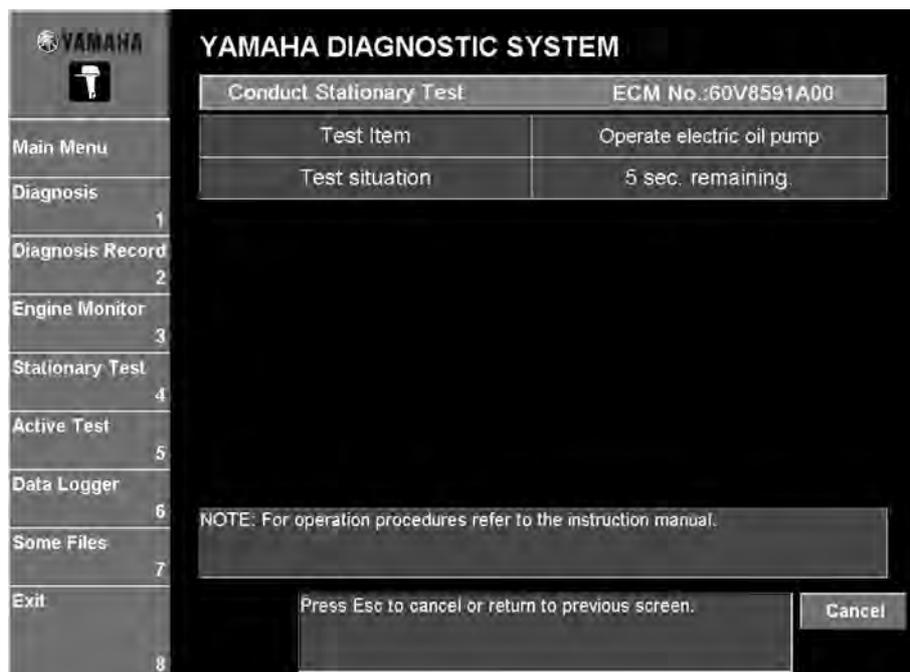


Fig. 82

5. To perform the test again click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return [ESC]** button or press the Esc key on your keyboard to return to the window where a different test can be selected.

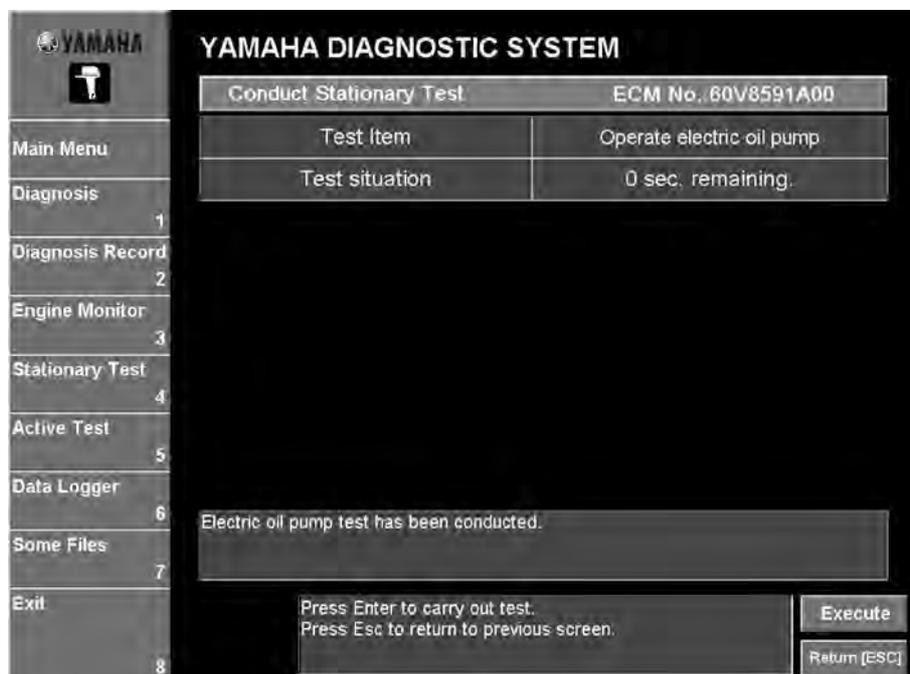


Fig. 83

6. After the test is finished, install the oil hose.

NOTE: _____
 Make sure that there is no air in the oil hose.

Operating the electric fuel feed pump

Operate the fuel feed pump (low-pressure pump) and listen to its operating sound. The operating time is ten seconds.

NOTE: _____
 Carry out this test after priming the engine. If the fuel pump is not supplied with fuel when it is operated, the pump may be burned.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 84)

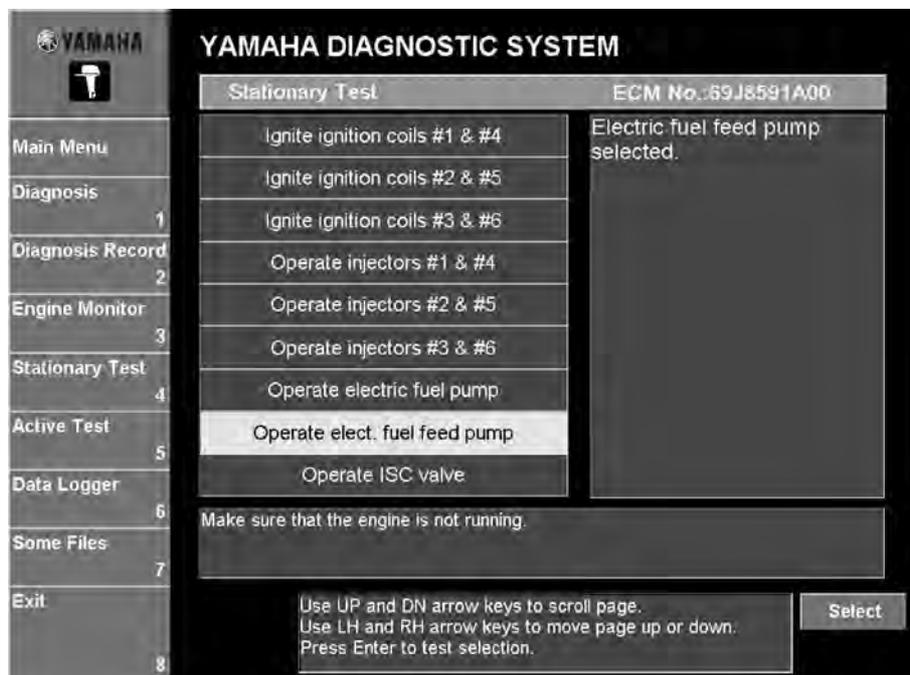


Fig. 84

2. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 85)

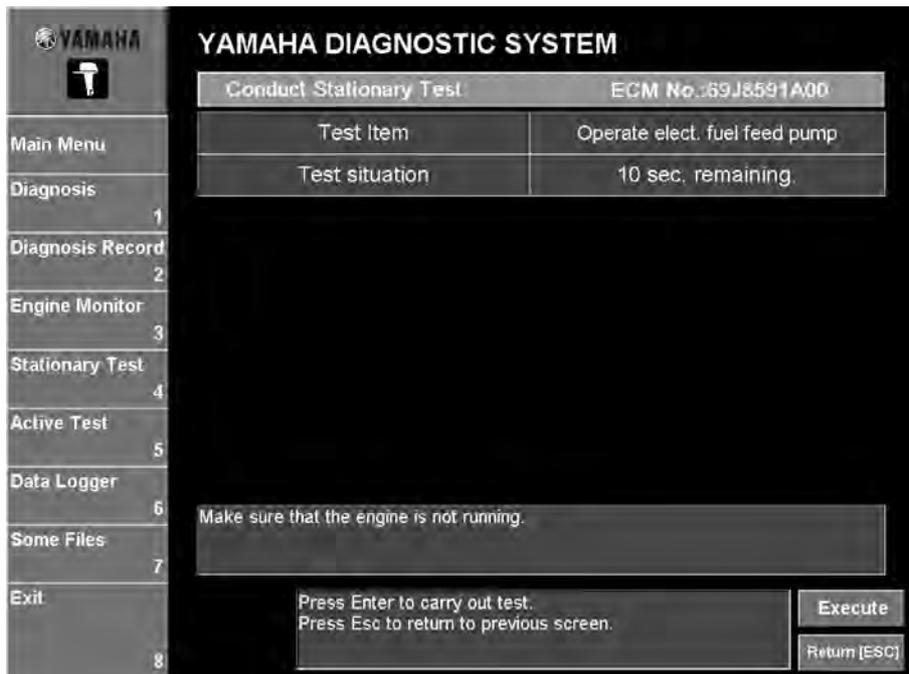


Fig. 85

3. Listen to the operating sound of the fuel feed pump.

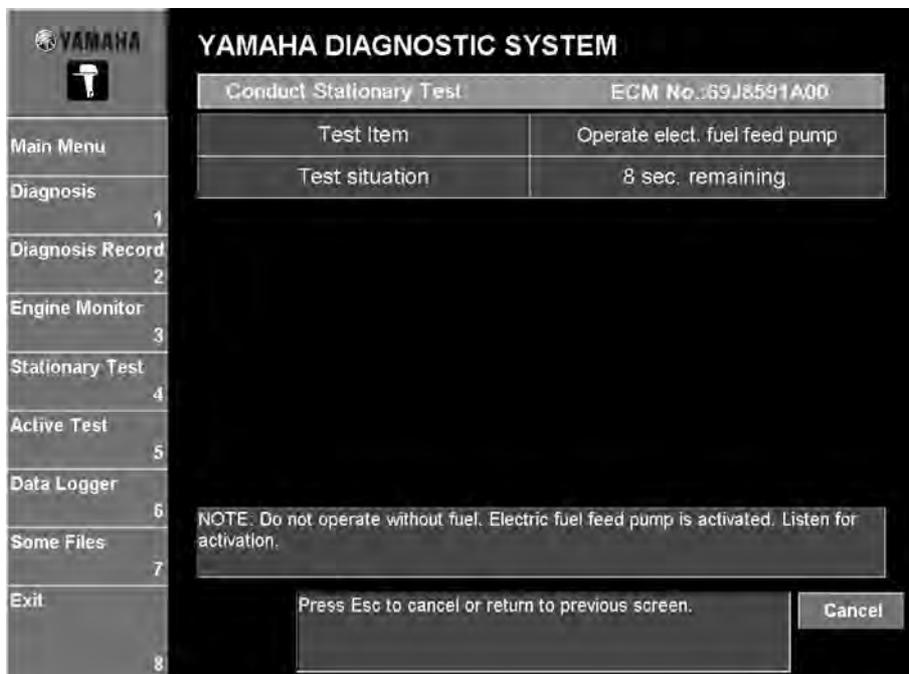


Fig. 86

4. To test again, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return** button or return to the test selection menu or press the Esc key on your keyboard.

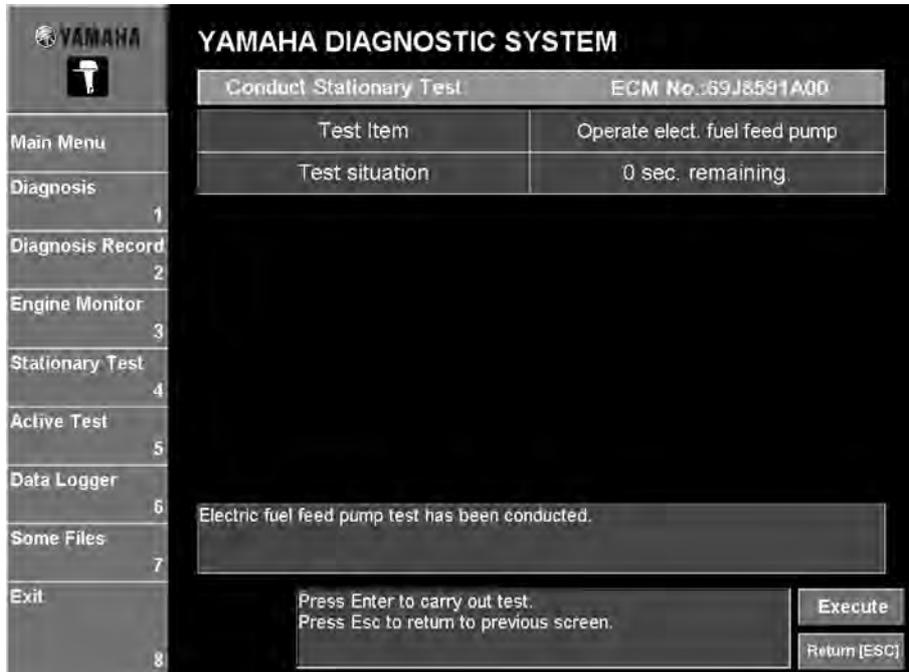


Fig. 87

Operating the ISC valve

Operate the ISC valve and listen to its operating sound. The operating time is three seconds.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard. (Fig. 88)

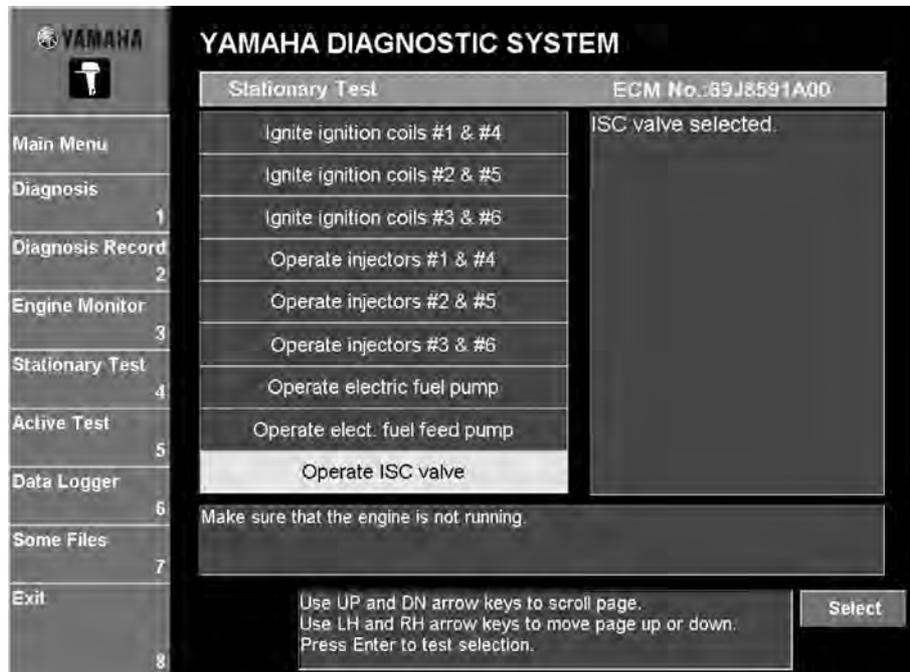


Fig. 88

2. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 89)

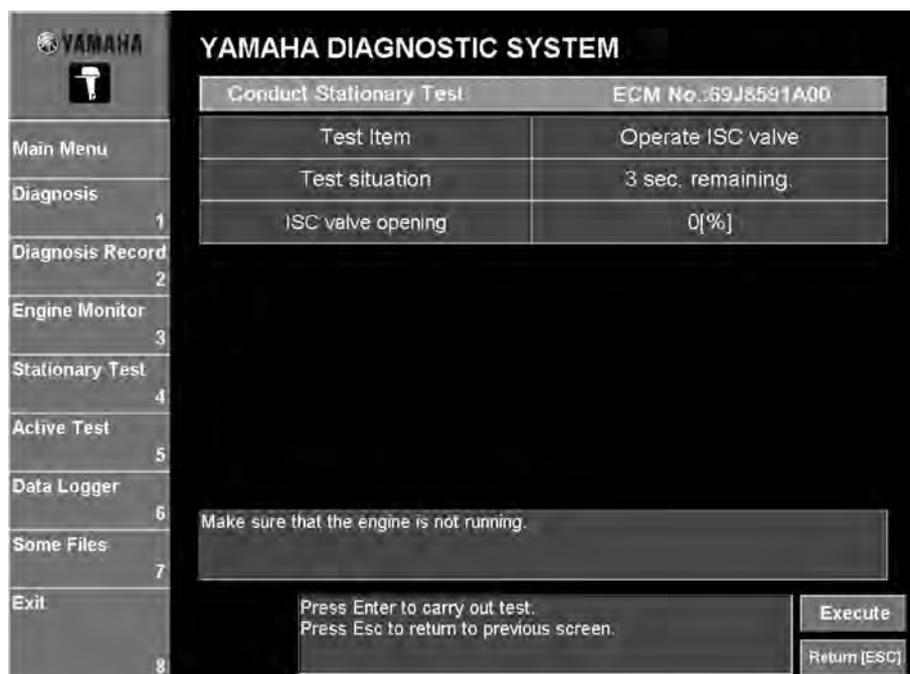


Fig. 89

- Listen to the operating sound of the ISC valve.

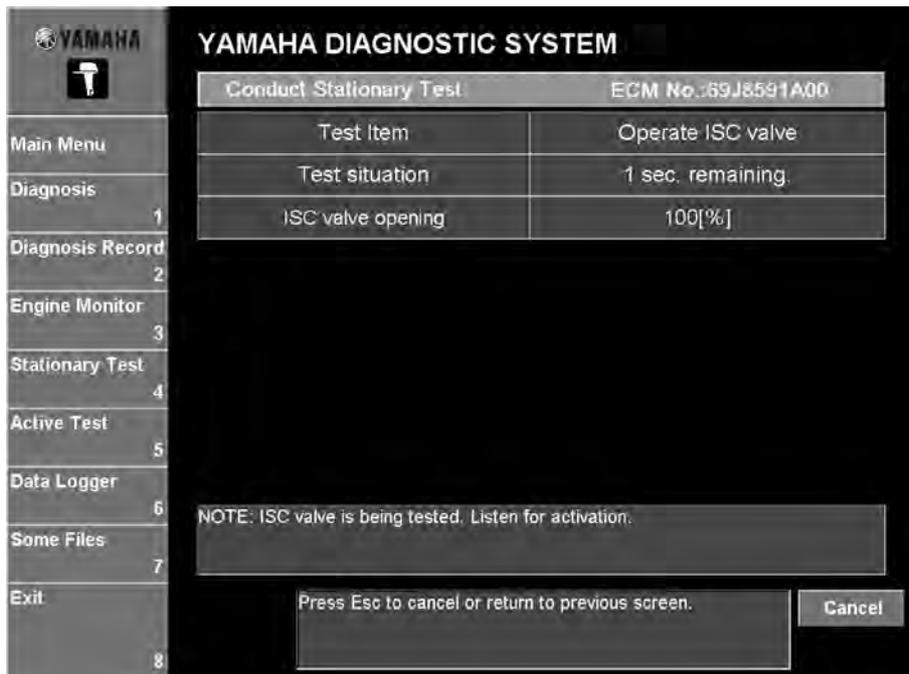


Fig. 90

- To test again, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return** button to return to the test selection menu or press the Esc key on your keyboard.

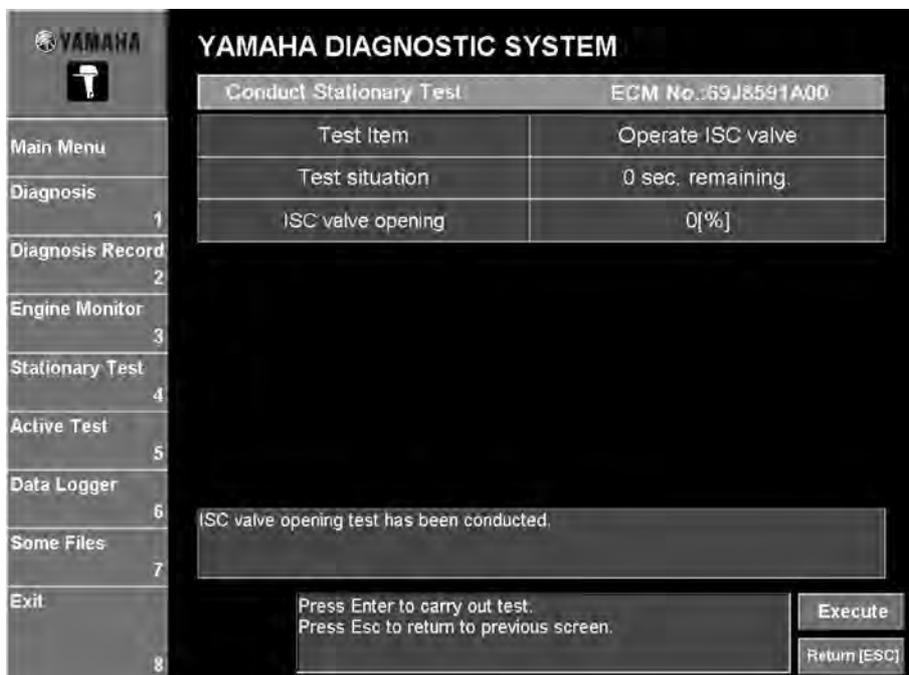


Fig. 91

Operating the oil control valve

Operate the oil control valve and listen to its operating sound. The oil control valve operates ten times.

1. Select the test to carry out, and then click the **Select** button or press the Enter key on your keyboard.

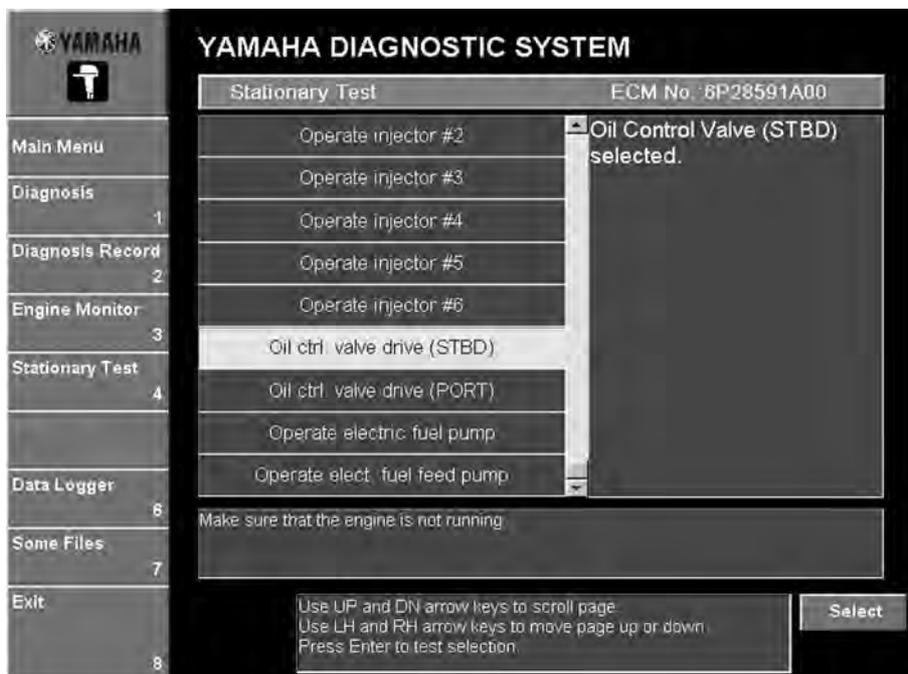


Fig. 92

2. Click the **Execute** button or press the Enter key on your keyboard.

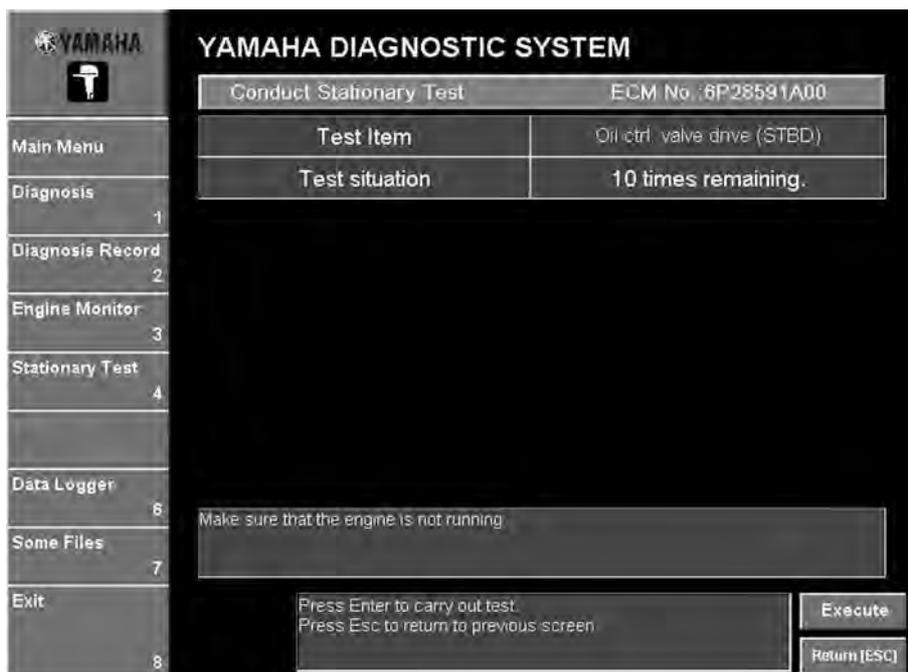


Fig. 93

- Listen to the operating sound of the oil control valve.

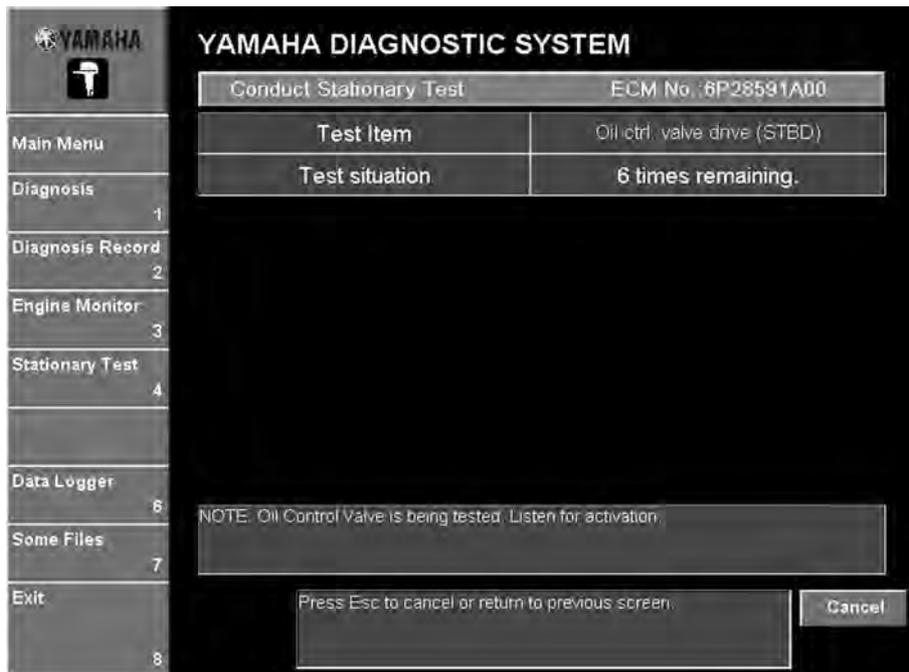


Fig. 94

- To perform the test again, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return [Esc]** button or press the Esc key on your keyboard to return to the previous menu.

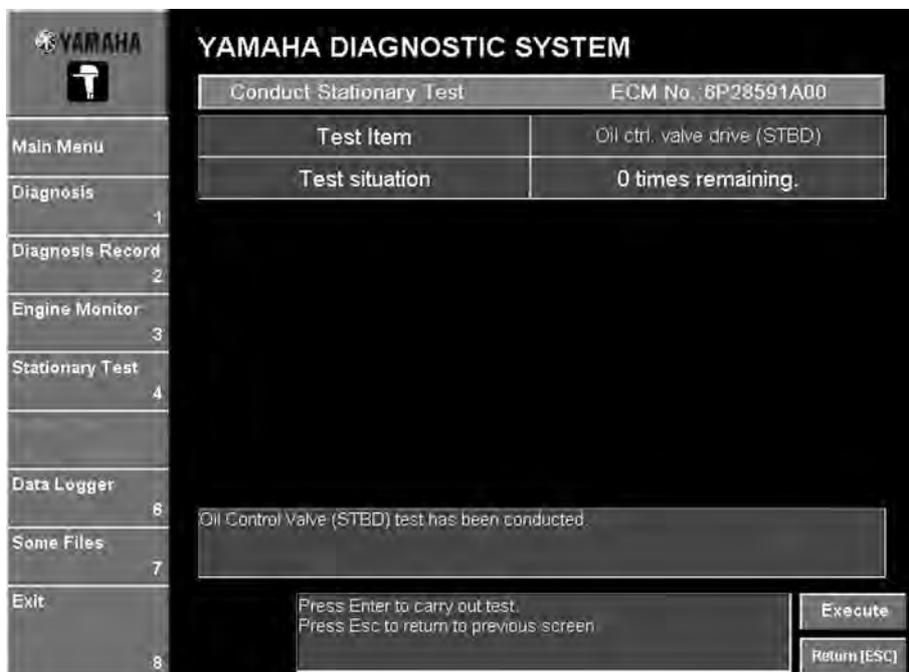


Fig. 95

ACTIVE TEST

Selecting this command displays a window where active tests can be selected.

List of active test items

Item
Angle of ISC valve opening
Drop cylinder
Fully open ISC valve

⚠ WARNING

Avoid clicking the Execute and Cancel buttons repeatedly, otherwise the ECM or PC may not work properly and they may be damaged.

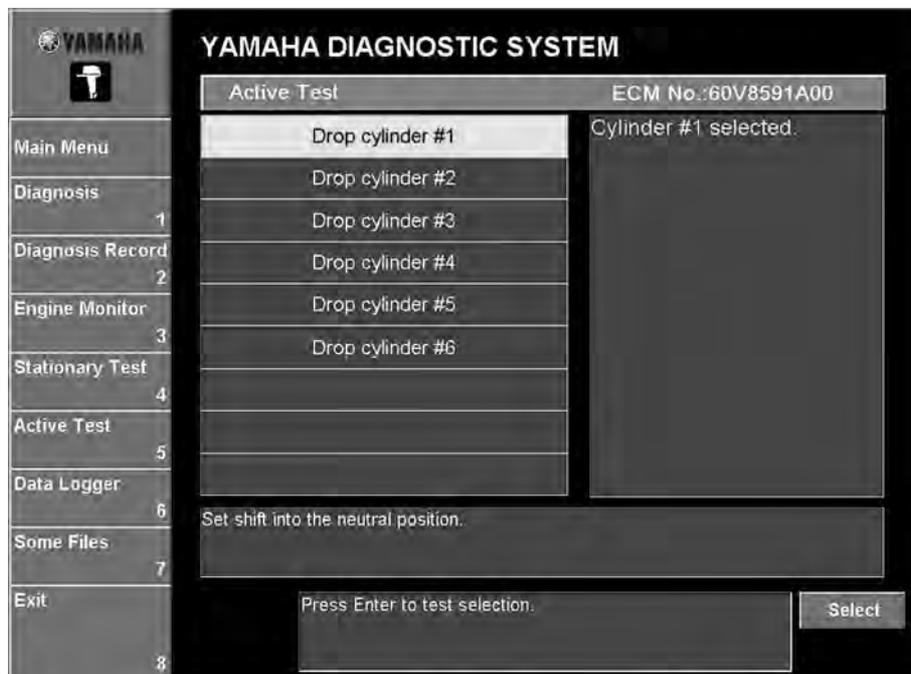


Fig. 96

NOTE:

The test can be carried out while the engine is running and the shift is in the neutral position. It is not possible to carry out the test while the boat is running.

Dropping a cylinder

Start the engine and observe the changes in engine speed for 20 seconds.

For the first ten seconds operate all cylinders, and then stop one cylinder for five seconds. For the last five seconds operate all cylinders.

A screen that allows you to select which ignition and fuel to cut is displayed.

1. Select which ignition and fuel you wish to cut by either clicking it or pressing the up or down arrow keys on your keyboard. (Fig. 96)

NOTE:

- Set the shift into the neutral position.
- The selected item is highlighted in light blue.
- The details of the selected test are displayed in the column on the right, and the items that must be either checked or performed before the test can start are displayed below the table.
- Only one item can be selected at one time.

2. Click the **Select** button or press the Enter key on your keyboard. (Fig. 96)
3. Start the engine.
4. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 97)

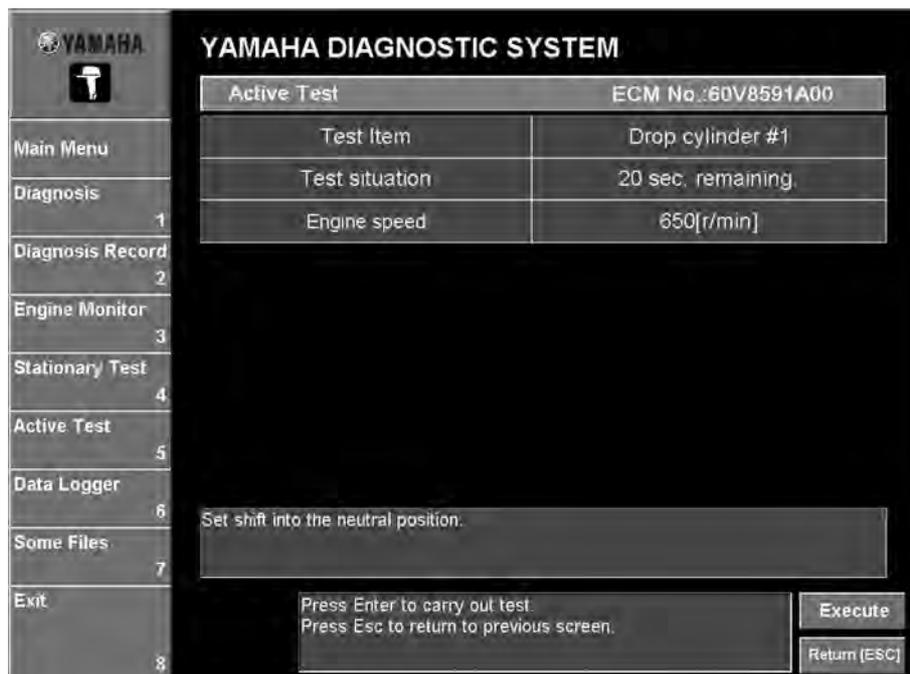


Fig. 97

NOTE:

If the engine is not running, an error message is displayed. Follow the instructions that appear. (Fig. 98)

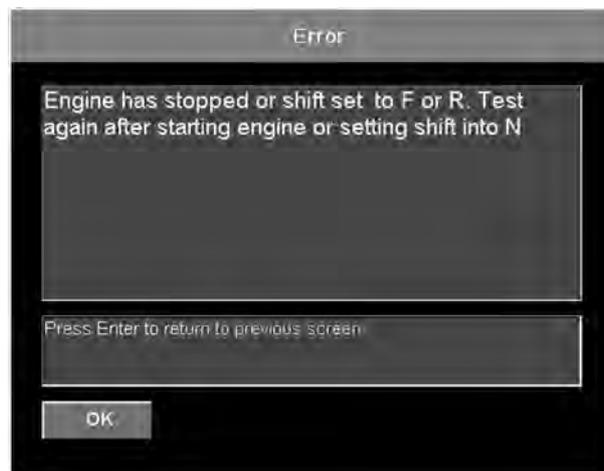


Fig. 98

5. While checking the information that appears beside **Test situation** and **Engine Speed**, follow the test instructions in the messages that are displayed. (Fig. 97)

NOTE:

If an error occurs while the test is being performed, an error message is displayed. Follow the instructions that appear. (Fig. 99)



Fig. 99

6. To perform the test again on the same cylinder, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return [ESC]** button or press the Esc key on your keyboard to return to the window where a different test can be selected.

Fully opening the ISC valve

When the shift is in the neutral position and the engine is idling, fully open the ISC valve, and then check that the engine speed increases and that the intake valves are normal. The ISC valve operates for two seconds during this test.

⚠ WARNING

When the ISC valve is fully open the engine speed will increase, therefore do not put the shift into gear.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard.

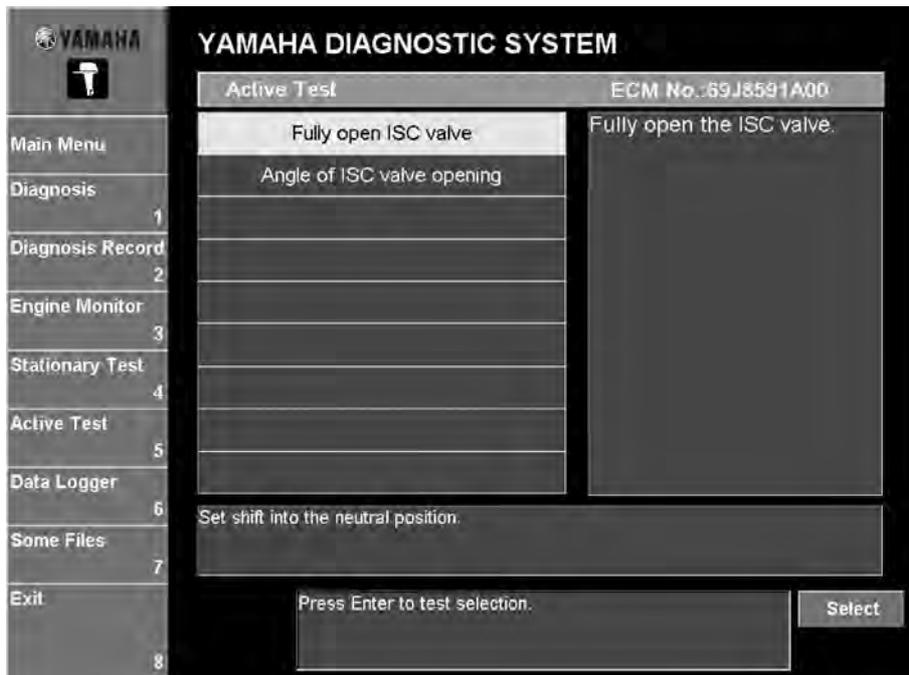


Fig. 100

2. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 101)

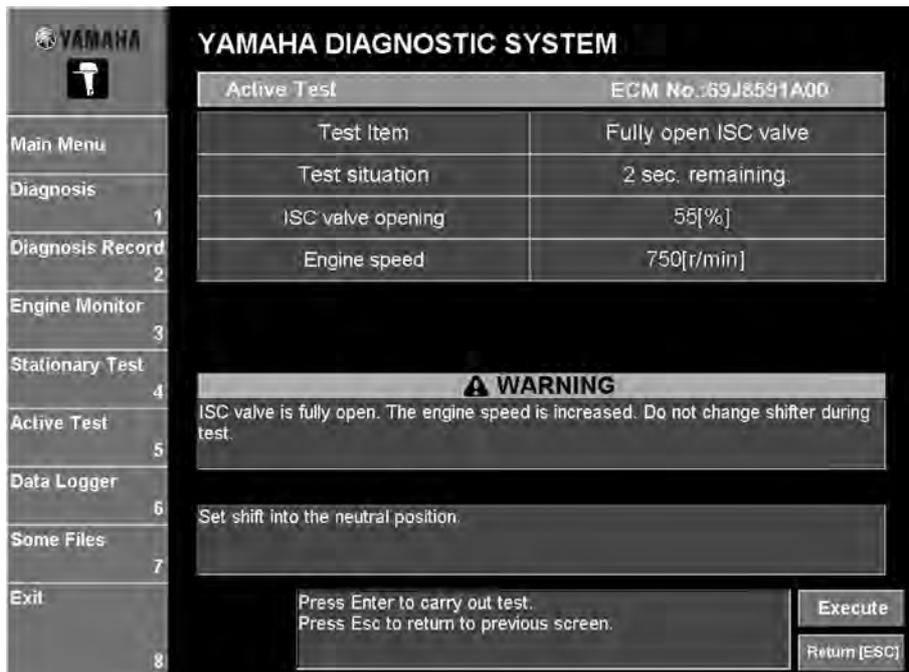


Fig. 101

3. The ISC valve is fully open. Check that the engine speed increases.

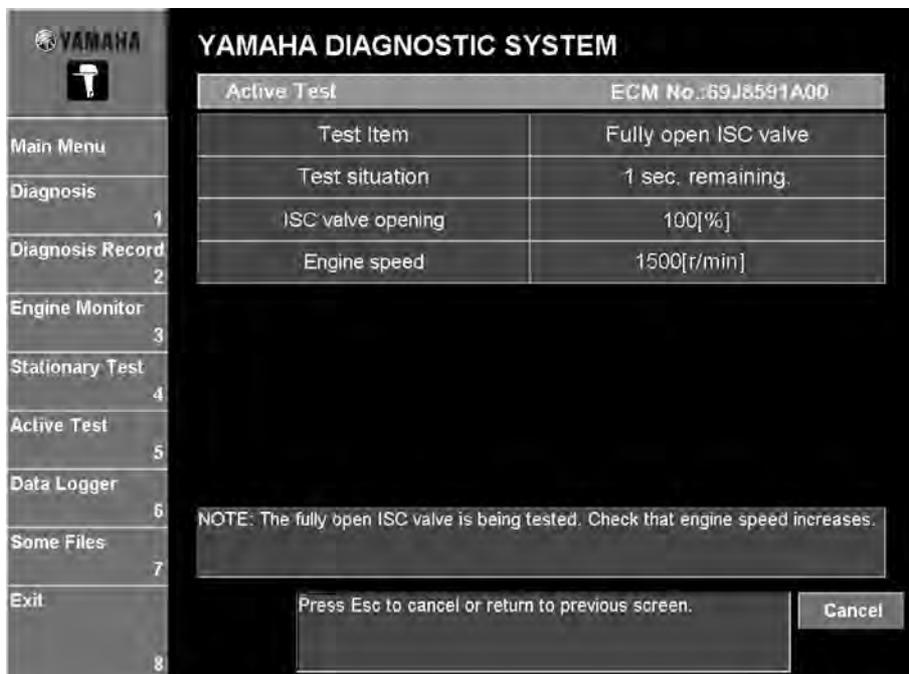


Fig. 102

4. To test again, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return** button to return to the test selection menu or press the Esc key on your keyboard.

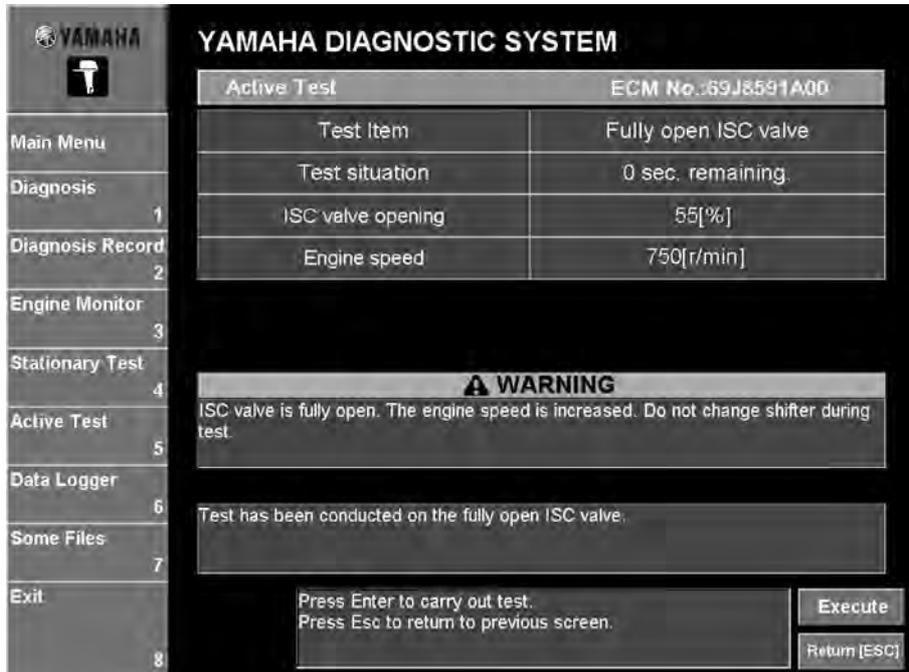


Fig. 103

Opening the ISC valve angle

Set the opening angle of the ISC valve, and adjust the air volume when the engine is idling. The operating time is 30 minutes.

Before testing warm the engine up.

1. Select the test to be performed, and then click the **Select** button or press the Enter key on your keyboard.

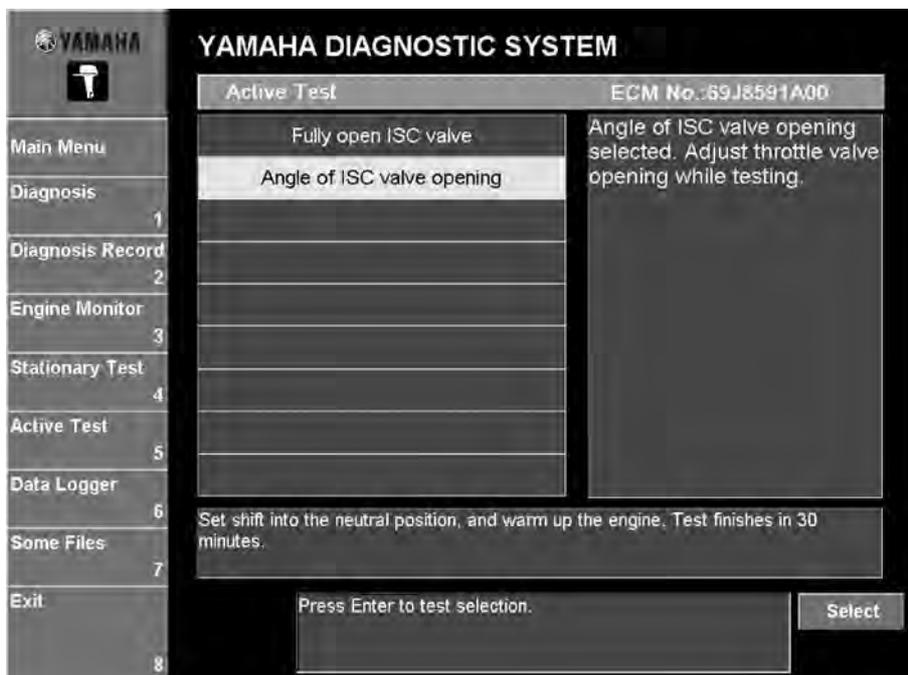


Fig. 104

2. Click the **Execute** button or press the Enter key on your keyboard. (Fig. 105)

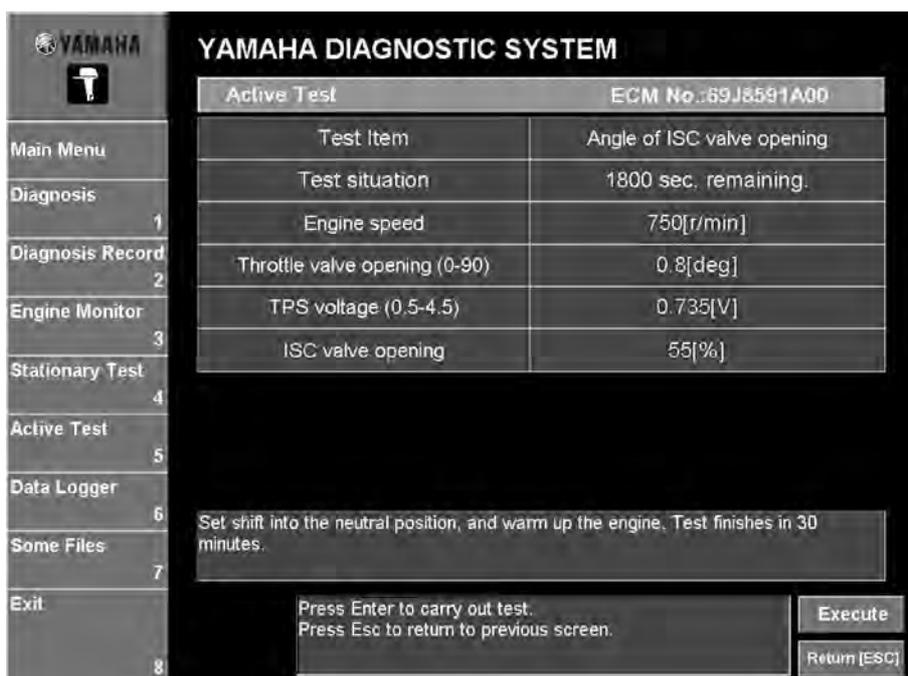


Fig. 105

3. Check the opening angle of the ISC valve is set. Refer to the service manual for adjusting procedures. After 30 minutes have passed, the test will end automatically.

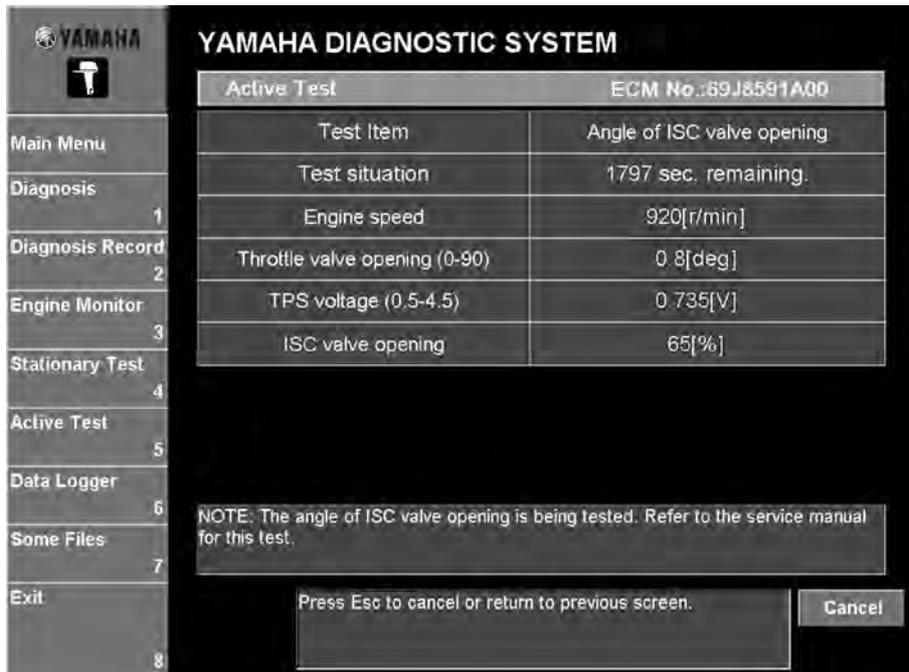


Fig. 106

4. To test again, click the **Execute** button or press the Enter key on your keyboard. To perform a different test, click the **Return** button to return to the test selection menu or press the Esc key on your keyboard.

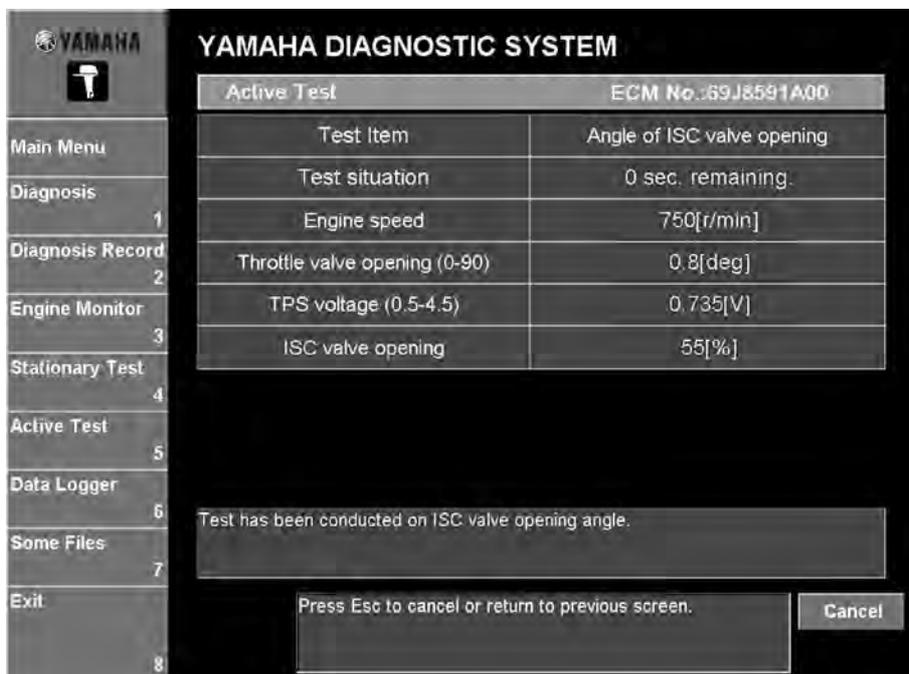


Fig. 107

DATA LOGGER

Data Logger item selection

A window that allows you to select the **Data comparison graph**, **Engine operating hours according to engine speed**, or **ECM record data graph** window appears.

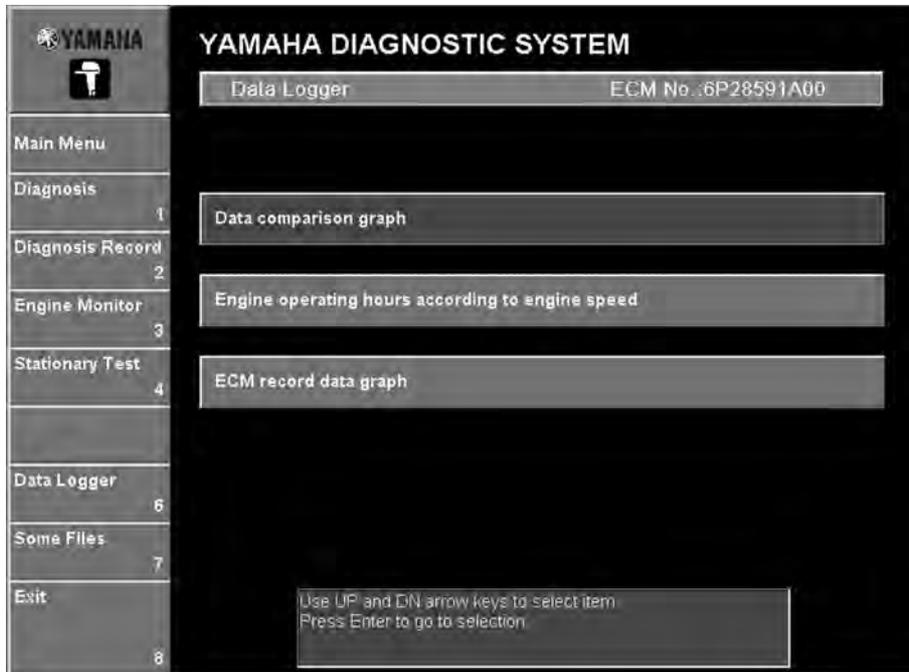


Fig. 108

Data comparison graph

1. Click the **Data comparison graph** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 108)
2. Select the desired items by either clicking them or pressing the up or down arrow keys on your keyboard, and then press the space bar. (Fig. 109)

A window that allows you to select the items ① that will be graphed. No more than two items can be displayed.

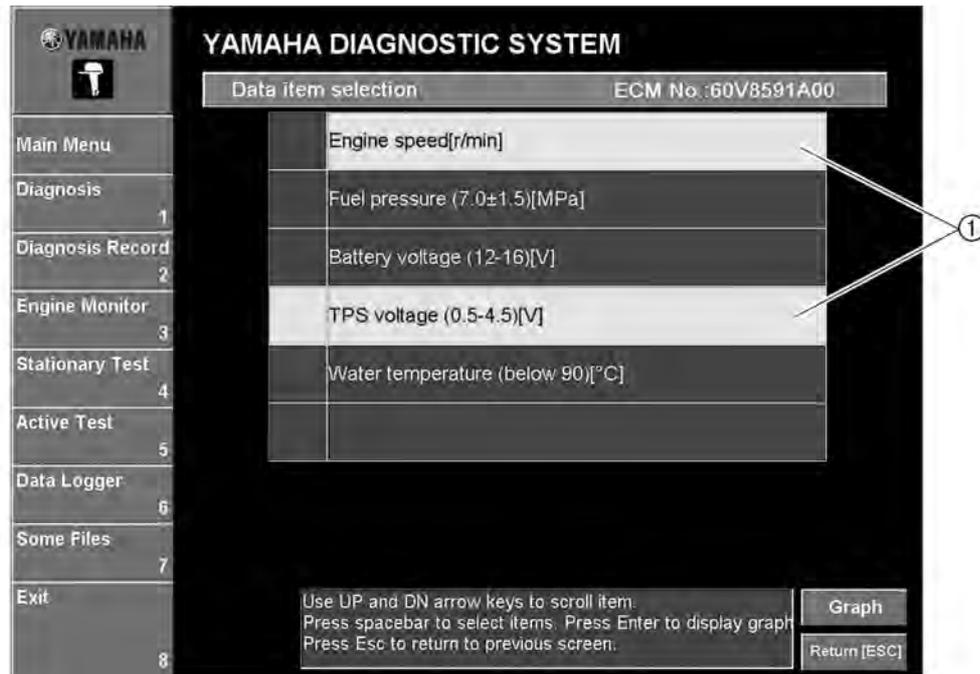


Fig. 109

List of data comparison graph items

Item
Battery voltage
Engine speed
Engine temperature
Fuel pressure
Intake pressure
Oil press switch

Item
Oil pressure
Oxygen sensor voltage
Throttle position sensor
TPS voltage
Water temperature

NOTE:

- Selected items have a light blue background. Items that are not selected have a blue background.
- At initialization, **Engine speed [r/min]** is selected.
- Some items may not be available depending on the model of the outboard motor.

3. Click the **Graph** button or press the Enter key on your keyboard. (See fig. 109.) The **Data comparison** window is displayed. (Fig. 110)

NOTE:

A line graph appears with the items selected in the **Data item selection** window on the vertical axes and the **Time before engine stop** on the horizontal axis. (Fig. 110)

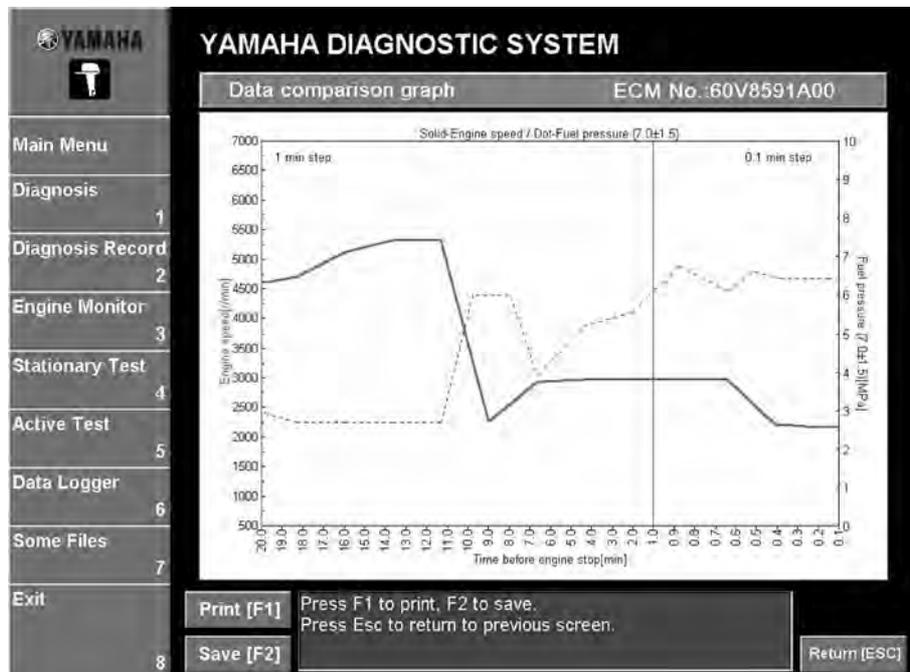


Fig. 110

NOTE:

- The item on the left vertical axis is graphed with a solid line and the item on the right vertical axis is graphed with a dotted line.
- Although the engine is running, the graphed lines do not show the present engine conditions. The graphed lines only display the values recorded up until the time the Enter key on your keyboard was pressed in the **Data Logger item selection**.

Engine operating hours according to engine speed

1. Click the **Engine operating hours according to engine speed** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 108)
2. The operating hours as compared to the engine speed and the total operating hours are displayed. (Fig. 111)

The screenshot shows the Yamaha Diagnostic System interface. At the top, it says 'YAMAHA DIAGNOSTIC SYSTEM' and 'Engine operating hours according to engine speed ECM No.:60V8591A00'. On the left is a menu with options: Main Menu, Diagnosis (1), Diagnosis Record (2), Engine Monitor (3), Stationary Test (4), Active Test (5), Data Logger (6), Some Files (7), and Exit (8). The main display area shows a table with two columns: 'Engine speed' and 'Time[h]'. The table lists engine speed ranges and their corresponding operating hours. At the bottom, there are buttons for 'Print [F1]', 'Save [F2]', and 'Return [ESC]', along with instructions: 'Press F1 to print, F2 to save. Press Esc to return to previous screen.'

Engine speed	Time[h]
- 1000 r/min	1.4
1000 - 2000 r/min	2.0
2000 - 3000 r/min	2.0
3000 - 4000 r/min	3.0
4000 - 5000 r/min	3.0
5000 - 6000 r/min	0.5
6000 - 7000 r/min	0.5
Total hours of operation	12

Fig. 111

A window is displayed showing the number of hours that the engine was operated at each engine speed range and the total hours of operation.

NOTE:

- Although the engine is running, the current operating time is not included in the displayed time. The displayed time only shows the total hours until the time the Enter key on your keyboard was pressed in the **Data Logger** item selection.
- The sum of the **Engine operating hours according to engine speed** is not equal to the total hours of operation since the hours are rounded to one decimal.

ECM record data graph

Four seconds of record data stored in the ECM, two seconds before and two seconds after malfunctions occurred, can be displayed in a graph.

ECM record data can be saved and reviewed when the computer is connected to the ECM using the communication cable.

The saved ECM record data can even be recalled and reviewed offline.

NOTE:

This function may not be available depending on the model of the outboard motor.

When **Display pattern 1**, **Display pattern 2**, or **Display pattern 3** is used, the displayed monitor items have been fixed in the software. When **Display item selection** is used, you can select the monitor items that you wish to display.

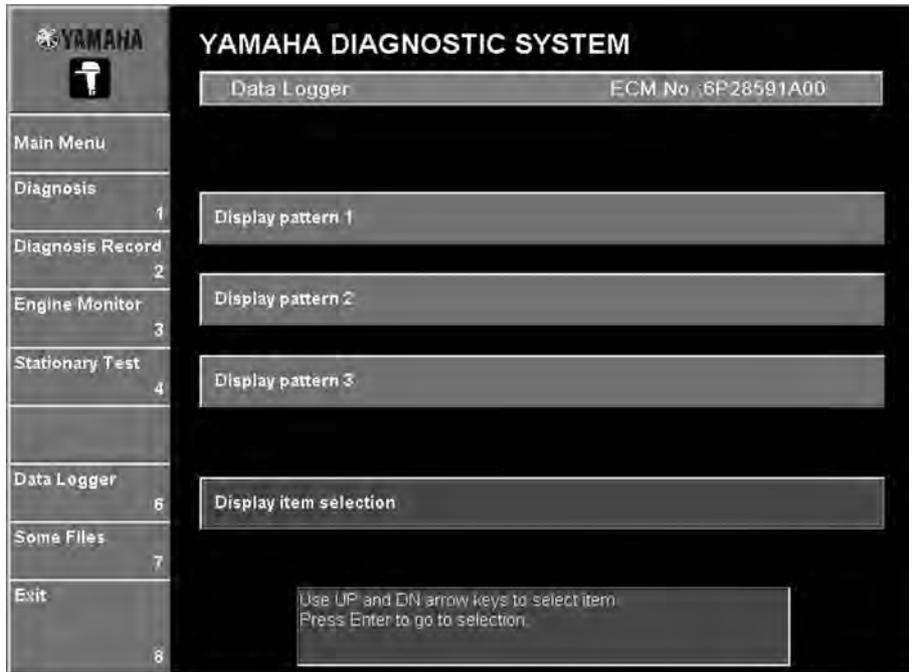


Fig. 112

Items graphed using Display pattern 1

Item
Engine speed
Accelerator position sensor 1
Throttle position sensor 1
Target TPS voltage*1

Items graphed using Display pattern 2

Item
Accelerator position sensor 1
Accelerator position sensor 2
Throttle position sensor 1
Throttle position sensor 2

Items graphed using Display pattern 3

Item
Engine speed
Target TPS voltage*1
Target TPS voltage for ISC*4

Items that can be graphed using Display item selection

Item
Engine speed
Accelerator position sensor 1
Accelerator position sensor 2
Throttle position sensor 1
Throttle position sensor 2
Intake pressure
Battery voltage
Target TPS voltage ^{*1}
Ref. TPS voltage ^{*2}
Ref. acc. pos. sensor voltage ^{*3}

Item
Target TPS voltage for ISC ^{*4}
Engine stop mode
Engine start mode
Engine stop mode with SW
Engine stop lanyard switch
Main relay
Electronic throttle relay
Overheat warning
Low oil pressure
Engine hours

- *1: "Target TPS voltage" stands for "Target Throttle Position Sensor voltage". This item shows the target output voltage of TPS. This value means that ECM should control to open throttle valve to get the goal open degree.
- *2: "Ref. TPS voltage" stands for "Reference Throttle Position Sensor voltage". This item shows the criterion output voltage of TPS. This value is used to detect the TPS output voltage during engine operation.
- *3: "Ref. acc. pos. sensor voltage" stands for "Reference accelerator position sensor voltage". This item shows the criterion output voltage of Accelerator position sensor. This value is used to detect the Accelerator position sensor output voltage when the remote control throttle lever opens.
- *4: "Target TPS voltage for ISC" stands for "Target Throttle Position Sensor voltage for Idle Speed Control". ECM controls the engine idle speed by using throttle valve attached TPS. This target voltage is used by ECM to achieve the goal open degree of the throttle valve at idle speed.

Graphing using Display patterns 1, 2, and 3 (when computer is connected to ECM using communication cable)

1. Click the **ECM record data graph** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 108)
2. Select the disk and folder where the data will be saved and specify its file name. (Fig. 113)

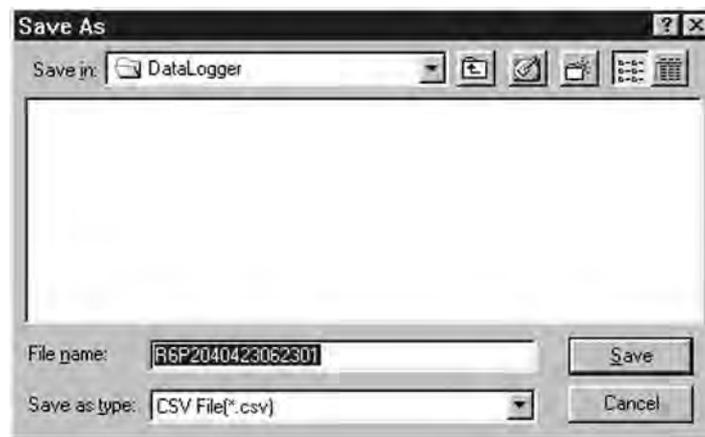


Fig. 113

NOTE:

The default file name is assigned as shown below.

Example: R 6P2 04 04 23 0623 XX .csv
 ID code Model Year Month Day Time File serial number

NOTE:

If there is no record data stored in the ECM, the **Command Confirmation** window is displayed. Follow the instructions that appear. (Fig. 114)



Fig. 114

3. Select the display pattern by either clicking the **Display pattern 1**, **Display pattern 2**, or **Display pattern 3** button or pressing the up or down arrow key on your keyboard and pressing the Enter key. (Fig. 115)

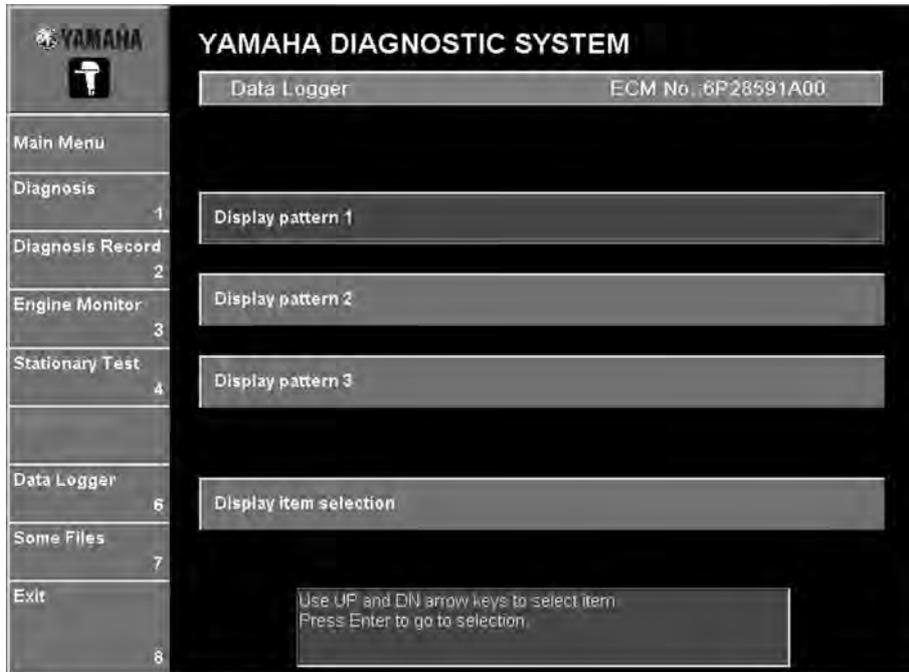


Fig. 115

4. The selected graph data is displayed.
Display pattern 1

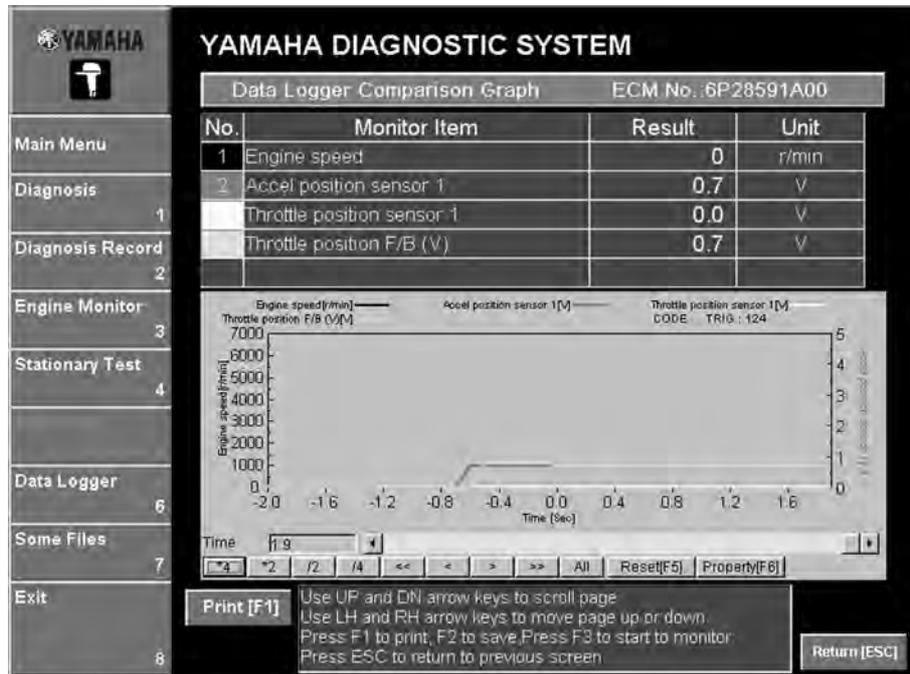


Fig. 116

Display pattern 2

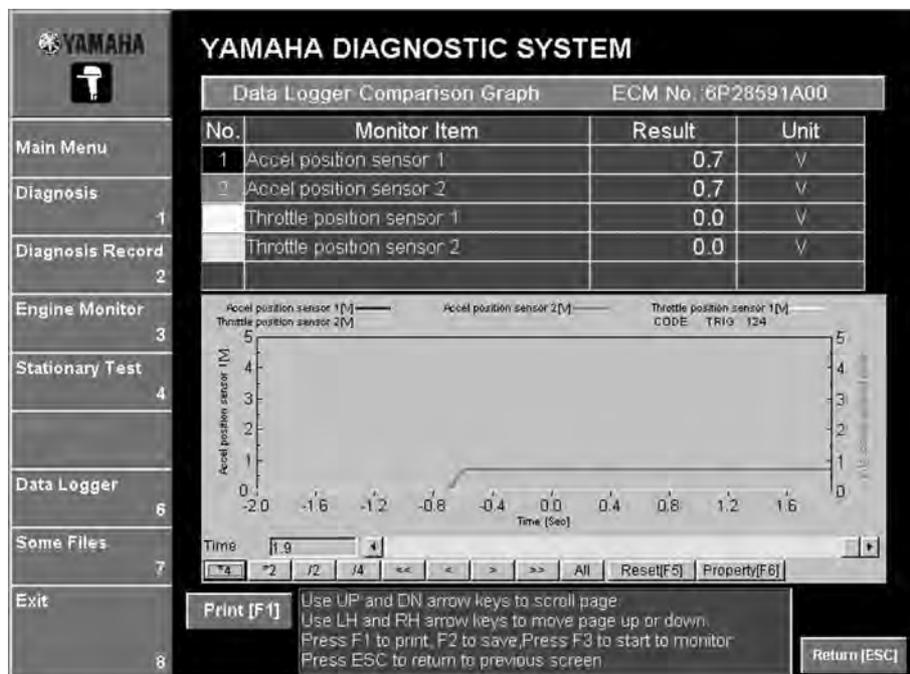


Fig. 117

Display pattern 3

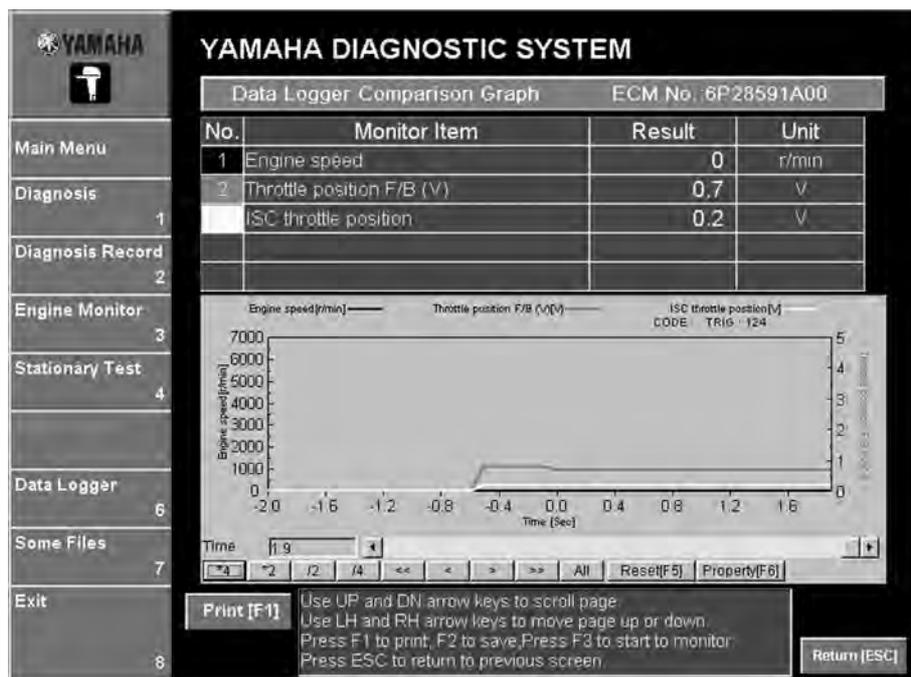


Fig. 118

Graph window controls (keys and buttons)

Keyboard	Button	Operation	Remarks
← →	 	Moves cursor in indicated direction (by one sample increment).	Disabled when monitoring.
Shift + ← →	 	Moves cursor in indicated direction (by ten sample increments).	Disabled when monitoring.
Ctrl + ← →	None	Moves cursor in indicated direction (by 100 increments).	Disabled when monitoring.
Insert		Zooms in on time axis (2x zoom, centered on cursor).	Disabled when monitoring.
Delete		Zooms out on time axis (1/2 zoom, centered on cursor).	Disabled when monitoring.
PageUp		Zooms in on time axis (4x zoom, centered on cursor).	Disabled when monitoring.
PageDown		Zooms out on time axis (1/4 zoom, centered on cursor).	Disabled when monitoring.
Space		Returns graph display settings to their defaults.	Disabled when monitoring.
F5		Deletes currently saved data and returns graph display settings to their defaults. (This feature is disabled during offline operation.)	Disabled when monitoring.
F6		Displays the graph properties window. (Note that the Logging settings are disabled during offline operation.)	Disabled when monitoring.

Graphing using Display item selection (when computer is connected to ECM using communication cable)

1. Click the **ECM record data graph** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 108)
2. Select the disk and folder where the data will be saved and specify its file name. (Fig. 119)

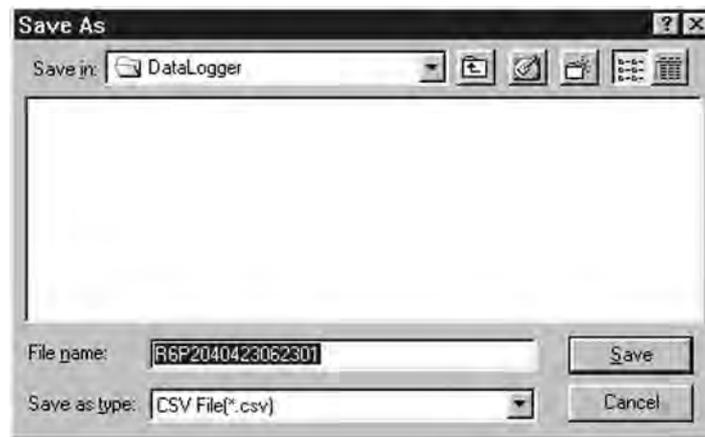


Fig. 119

NOTE:

The default file name is assigned as shown below.

Example: R 6P2 04 04 23 0623 XX .csv
 ID code Model Year Month Day Time File serial number

NOTE:

If there is no record data stored in the ECM, the **Command Confirmation** window is displayed. Follow the instructions that appear. (Fig. 120)



Fig. 120

3. To select the graph items, click the **Display item selection** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 121)

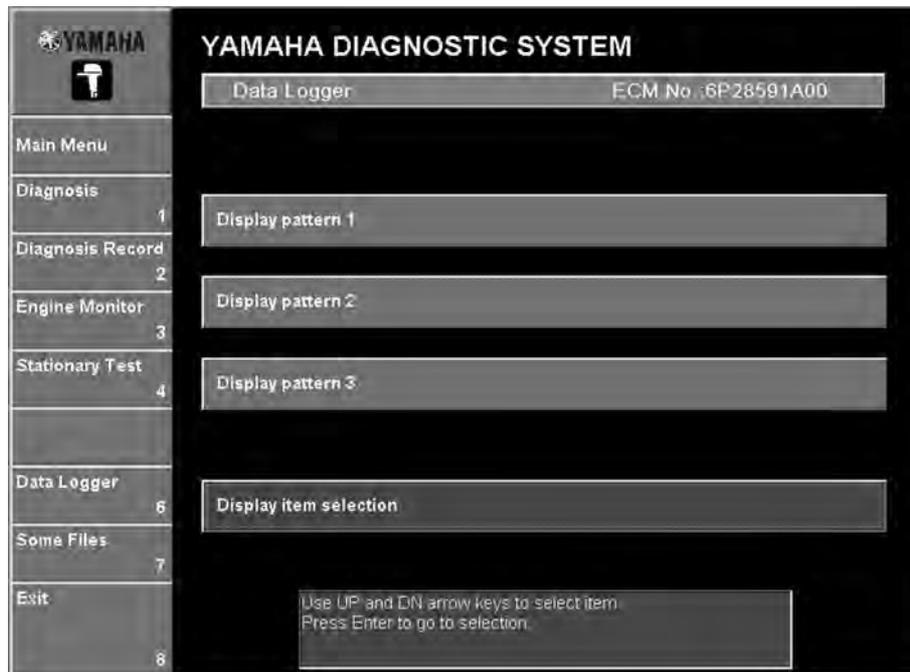


Fig. 121

4. Select an item by either clicking it or pressing the up or down arrow keys on your keyboard, and then press the space bar. (Fig. 122) For a list of the items that can be selected, refer to “Items that can be graphed using Display item selection”.

NOTE:

- Selected items have a light blue background. Items that are not selected have a blue background.
- Up to five items can be selected.

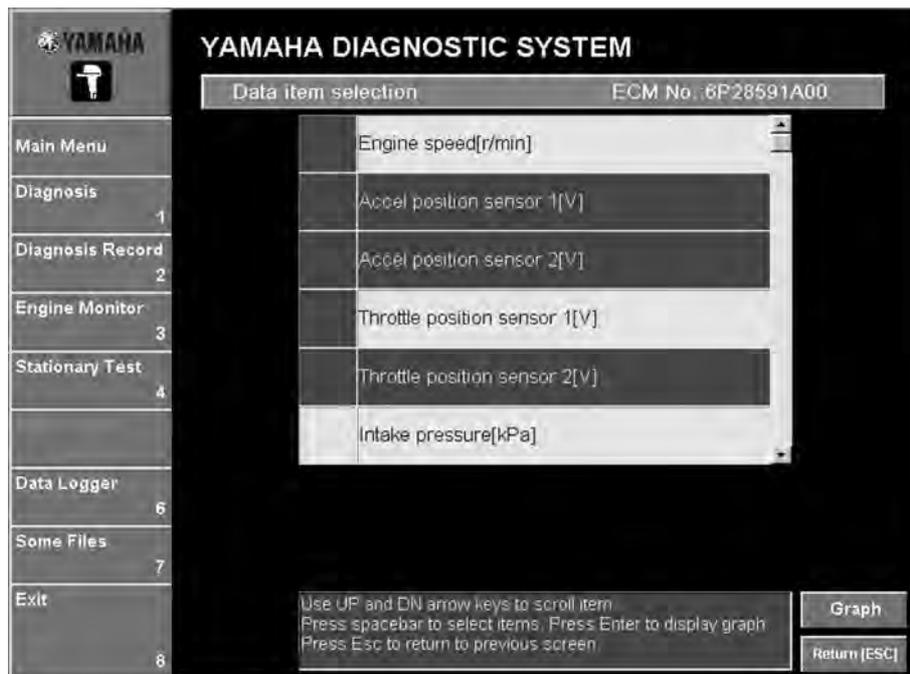


Fig. 122

5. Click the **Graph** button. (See fig. 122.) The window is displayed. (Fig. 123) For information on the buttons that appear below the graph, refer to “Graph window controls (keys and buttons)”.

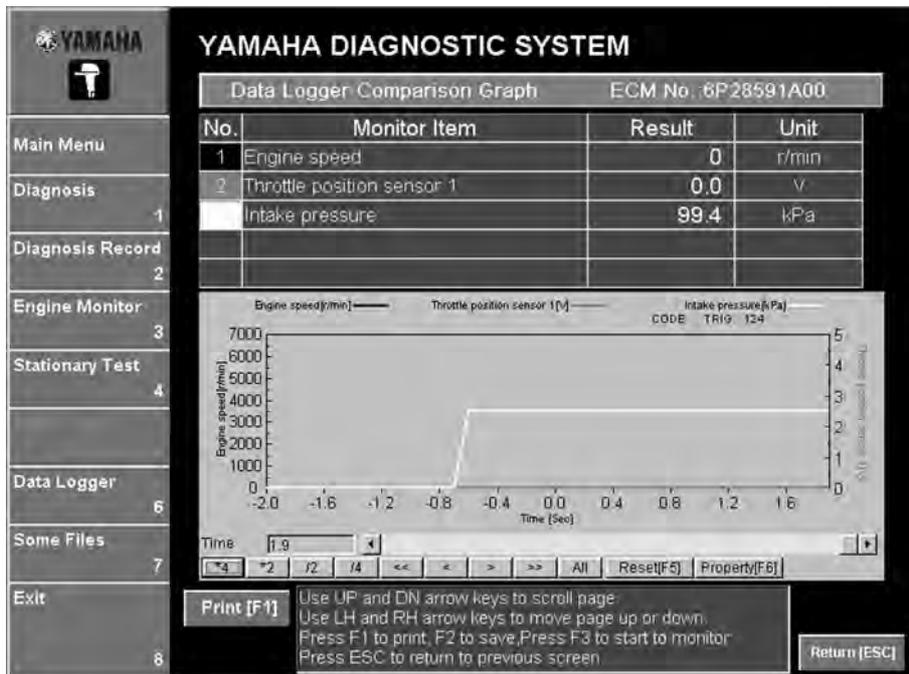


Fig. 123

Graphing (when computer is not connected to ECM)

1. Click the **ECM record data graph** button or press the up or down arrow key on your keyboard to select it and press the Enter key. (Fig. 124)

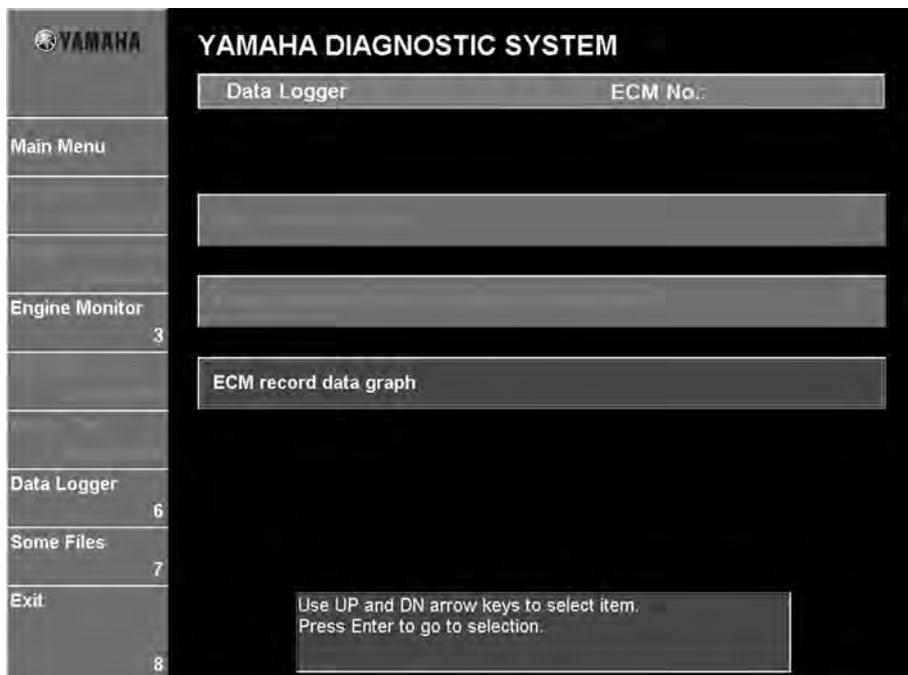


Fig. 124

2. Select the file containing the saved graph data that you want to view, and then click the **Open** button. (Fig. 125)



Fig. 125

3. The following window is displayed. (Fig. 126) Proceed to step 3 in the applicable graphing procedures.

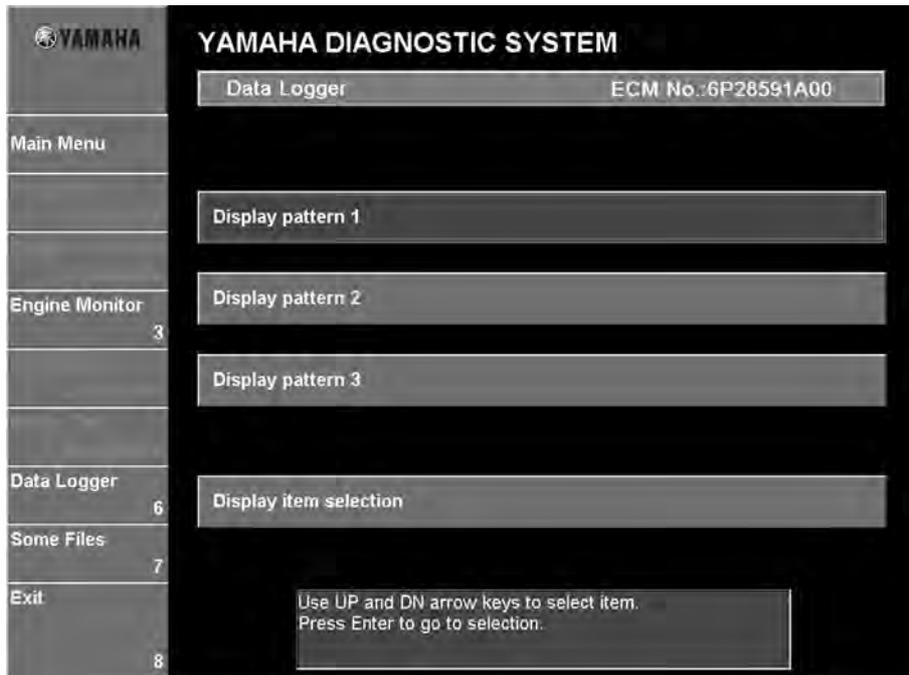


Fig. 126

NOTE:

- For **Display pattern 1**, **Display pattern 2**, and **Display pattern 3**, proceed to step 3 in “Graphing using Display patterns 1, 2, and 3 (when computer is connected to ECM using communication cable)”.
- For **Display item selection**, proceed to step 3 in “Graphing using Display item selection (when computer is connected to ECM using communication cable)”.

SOME FILES

This feature lets you select and run other applications while continuing to run the diagnostic system.



Fig. 127

NOTE:

This program may not work correctly on some computer configurations (on some OS/hardware combinations).

EXIT

The program is exited.

Operating procedure

1. Click the **Exit** button.

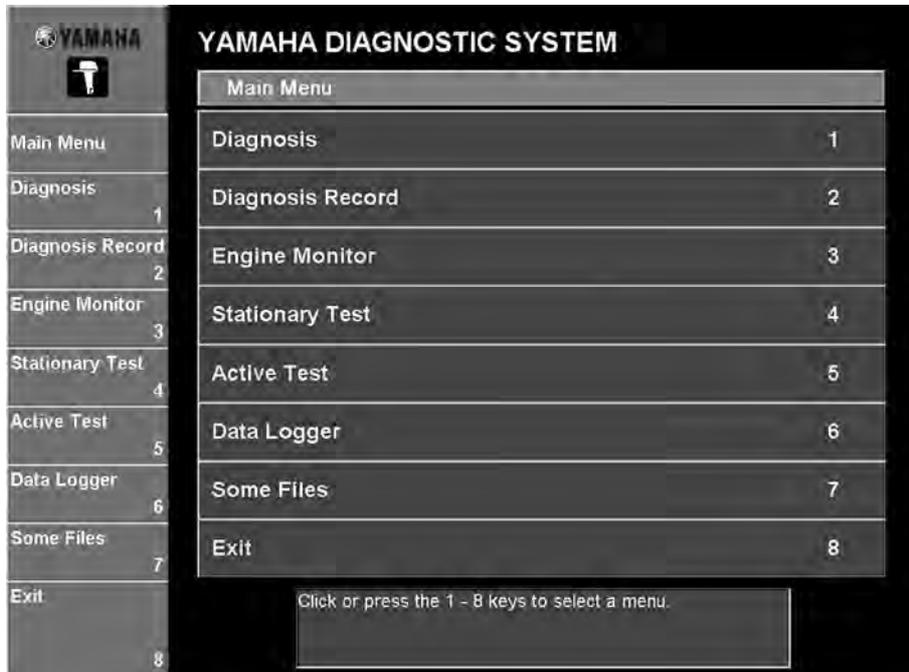


Fig. 128

2. Click the **OK** button or press the Enter key on your keyboard to exit the program. To cancel exiting the program, click the **Cancel** button or press the Esc key on your keyboard. (Fig. 129)

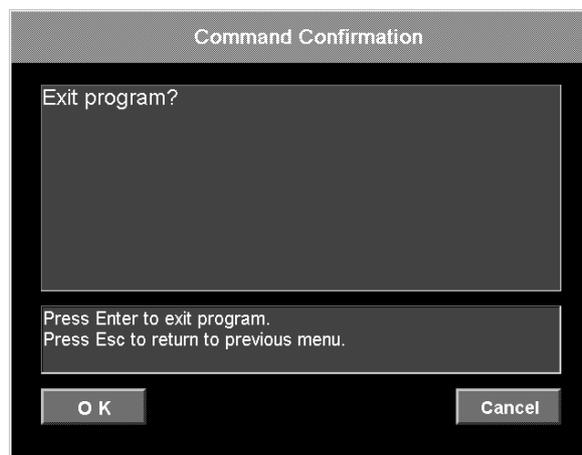


Fig. 129

TROUBLESHOOTING

Error content	Cause	Action
Communication cable related error occurs	Main switch is turned OFF.	Turn the main switch to ON.
	Communication cable is disconnected.	Connect communication cable between the laptop computer's communication port and 3-pin communication coupler of the outboard motor.
	Battery is disconnected from the outboard motor.	Connect battery to outboard motor.
	The battery voltage is below 12 V.	Connect battery of 12 V or higher.
	The USB driver has not been installed.	Install the USB driver.
Application does not start	The hardware does not meet the requirements to operate this application.	Use a computer that meets the specified hardware requirements.
	YDS.exe is not installed in application directory.	If YDS.exe is not found in the application directory, install the application again.
	Other application (Service tool) is already in operation.	Quit the application in operation, since two applications (Service tool) cannot be operated simultaneously.
Application related error occurs	Error message "Program file or Database file is not installed properly. Please install again." is displayed.	Install program file or database file again.
Database related error occurs	Error message "Database files are not installed properly. Please update again." is displayed.	Update database again.
	Error message "System file not found #####.###." is displayed.	The database is not applicable to communication with ECM. Update database to correspond to ECM.
Incorrect fonts on screen	The computer language does not correspond to the application.	Use a computer that operates the required operating system.
When executing the stationary test or active test the test cannot be ended even if the Cancel is clicked.	Execute and Cancel buttons have been clicked more than necessary, and the ECM or PC does not operate properly.	Turn off your PC. Turn the main switch to OFF and reset the ECM.

APPENDIX

SETTING THE DESKTOP AREA

Use the following procedure to set the Yamaha Diagnostic System desktop area.

Compatible with SVGA (800 × 600 pixels) or more

1. From the taskbar at the bottom of your computer screen, click the **Start** button, point to **Settings**, and then open the **Control Panel**.
2. In the Control Panel, double-click **Display**. (Fig. 130)



Fig. 130

3. Select **Settings** and slide the Desktop area slider ①. (Fig. 131)

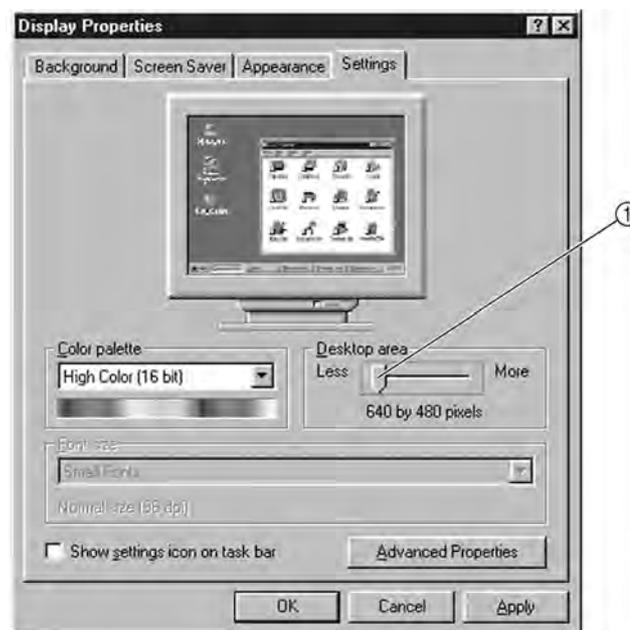


Fig. 131

4. Click the **OK** button in the confirmation window (shown below) to set the display area. To cancel, click the **Cancel** button. (See figs. 132–133.)



Fig. 132

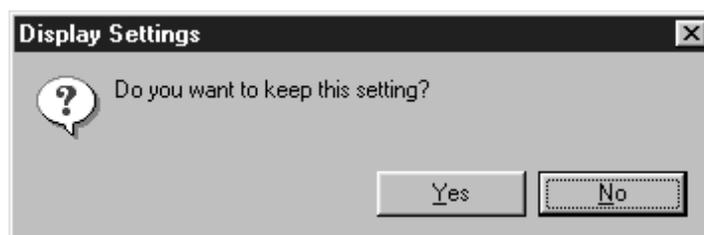


Fig. 133

UNINSTALLING THE YAMAHA DIAGNOSTIC SYSTEM

Use the following procedure to uninstall the Yamaha Diagnostic System.

1. Exit all programs before running the uninstaller.
2. From the taskbar at the bottom of your computer screen, click the **Start** button, point to **Settings**, and then open the **Control Panel**.
3. In the Control Panel dialog box, double-click **Add/Remove Programs**. (Fig. 134)

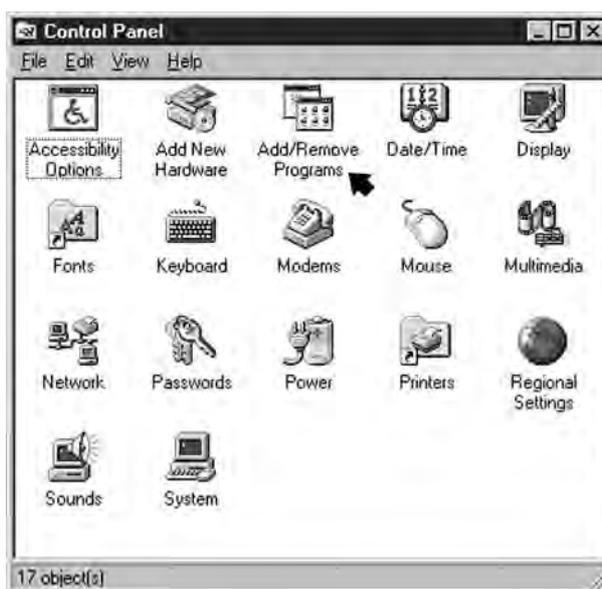


Fig. 134

4. Select **YAMAHA DIAGNOSTIC SYSTEM** and click the **Add/Remove** button. (Fig. 135)

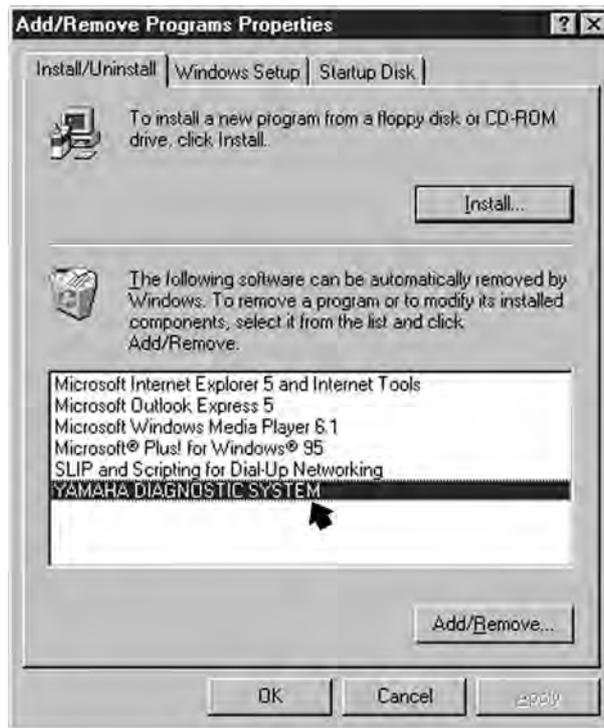


Fig. 135

NOTE:

To cancel the uninstall operation of the utility software, click the **Cancel** button. (See figs. 136–137.)

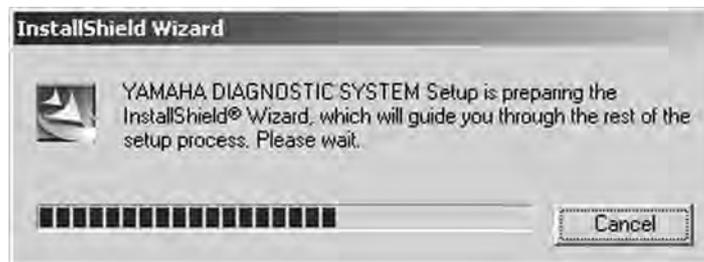


Fig. 136

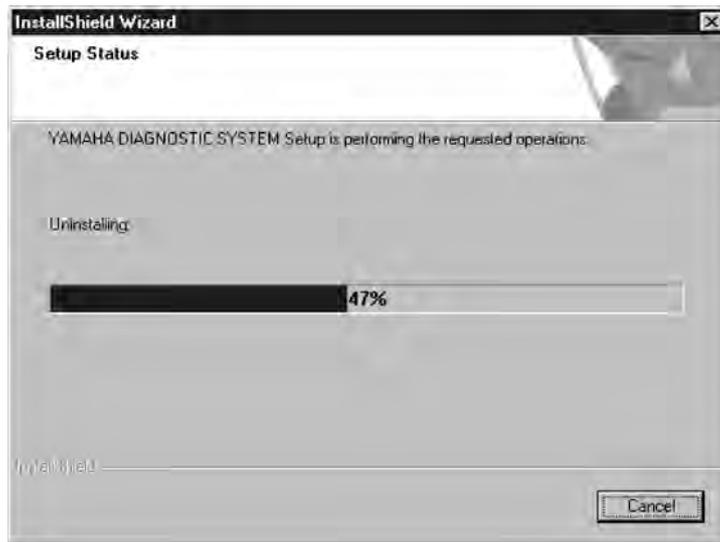


Fig. 137

5. After the uninstall operation is completed, the following dialog box appears. Click the **Finish** button. (Fig. 138)

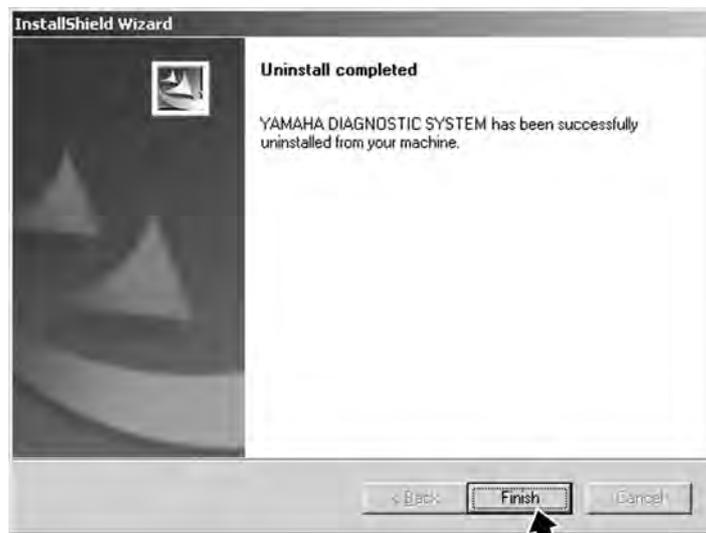


Fig. 138

ABBREVIATIONS

The following abbreviations are used in this instruction manual.

- Angle of ISC valve opening
 - Angle of Idle Speed Control valve opening
- Atmospheric press sensor
 - Atmospheric pressure sensor
- Cam position sensor (EXH)
 - Cam position sensor (EXHAUST)
- Cam position sensor (PORT INT)
 - Cam position sensor (PORT INTAKE)
- Cam position sensor (STBD INT)
 - Cam position sensor (STARBOARD INTAKE)
- Fuel press sensor
 - Fuel pressure sensor
- Fully open ISC valve
 - Fully open Idle Speed Control valve
- Intake cam timing (STBD)
 - Intake cam timing (STARBOARD)
- Intake press sensor
 - Intake pressure sensor
- ISC valve opening
 - Idle Speed Control valve opening
- Oil control valve (STBD)
 - Oil control valve (STARBOARD)
- Oil ctrl. valve drive (PORT)
 - Oil control valve drive (PORT)
- Oil ctrl. valve drive (STBD)
 - Oil control valve drive (STARBOARD)
- Oil press sensor
 - Oil pressure sensor
- Oil press switch
 - Oil pressure switch
- Operate elect. fuel feed pump
 - Operate electric fuel feed pump
- Operate ISC valve
 - Operate Idle Speed Control valve
- Over-rev control release lead
 - Over revolution control release lead

Ref. acc. pos. sensor voltage

Reference accelerator position sensor voltage

Ref. TPS voltage

Reference Throttle Position Sensor voltage

rpm

Revolution per minute

RS232C

Recommended Standard 232 version C

Target TPS voltage

Target Throttle Position Sensor voltage

Target TPS voltage for ISC

Target Throttle Position Sensor voltage for Idle Speed Control

TPS voltage

Throttle Position Sensor voltage

USB

Universal Serial Bus

Variable Cam Timing (STBD)

Variable Cam Timing (STARBOARD)