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Introduction

X-431 is a newly developed automobile diagnostic computer. It is based on the technology of open diagnostic platform, the most advanced automobile diagnostic technology brought forward by LAUNCH.

The open diagnostic platform represents the highest level of automobile diagnostic technology, and is the developing trend of this field in the future.

Features

Convenient to Update

- The function of software update via Internet makes it easy for customer to get the latest diagnostic program and keep pace with the development of automotive technology.
- Multilanguage display makes operation convenient in different countries and areas.

Advanced

X-431 is the most advanced automobile diagnostic unit in the world at present. It is compactly designed and with large LCD touch screen. Demountable printer makes the operation easy.

The product is a combination of the automobile industry and the communication technology, which starts the new development trend in the automobile diagnosis field. This product not only provides a new way of automotive diagnosis for vehicle service station, but also becomes a favorable choice for "DIYers".

Open

- Open operating system. That is, X-431 is an open automobile diagnostic platform with multifunction and multi-language based on LINUX operating system.
- X-431 provides open interface to support the third party's development.

Integrative

X-431 has all functions of PDA.

Handwriting input, personal database, vast vocabulary English-Chinese dictionary. The super capacity database can realize multi-purpose management of user's information.

Flexible

X-431 has a fire-new modern design. Each function can be combined with others at will or used independently.

- The main unit and the diagnostic box can be used independently.
- The main unit itself is equal to a PDA, which has the functions of personal database, etc.
- The SMARTBOX can be connected to PC to perform automobile diagnosis when it is demounted from the main unit. The diagnostic software used by PC can even be downloaded on the LAUNCH website. That is, the SMARTBOX can be sold independently. This is the important feature of X-431.
- A standard RS232 interface is used to connect the SMARTBOX and its upper unit. So more BOXes can be designed to increase functions, such as SENSORBOX, REMOTEBOX, etc. This feature increases the value of X-431.
- MINIPRINTER is detachable. User can use it to print out data.

As described above, the independent use of the main unit and the SMARTBOX (or other diagnostic box) is the extraordinary and creative feature of X-431.

Precaution on Operation

- The X-431 is equipped with a leather cover for protecting the machine and firmly combining the main unit, SMARTBOX and MINIPRINTER together. Do not remove the leather cover during operation. Try your best to keep the screen facing upward and leveled.

- Be careful when plugging and unplugging the main cable and diagnostic connector. Tighten the screw before operation so as to avoid unexpected disconnecting and/or damage to the port.
- Hold the X-431 main unit during operation. Do not hold the SMARTBOX or MINIPRINTER so as to prevent the SMARTBOX and MINIPRINTER from being disconnected.
- Firmly hold the main unit when connecting or disconnecting MINIPRINTER or SMARTBOX to avoid dropping down.
- Do not insert and pull out CF card too frequently. Press ejector button before pulling out the CF card. Insert the CF card into the CF card slot, *keep the face labeled "UPSIDE" upward*, and make sure the card is fully seated.
- Handle with care. Avoid hitting. Unplug the power after operation.
- Put the stylus into the hole at back of X-431 main unit after operation. And put the cables, connectors and other accessories into box.
- When it is necessary to remove the leather cover, pull out the CF card first and push in the ejector button to avoid scratching the leather cover.
- Hold the connector when plug or unplug it. Do not pull the cable for unplugging.

Maintenance

Storage

- Store the X-431 on a flat and dry place with suitable temperature.
- Never put the X-431 in direct sunlight or near the heating source.
- Prevent smoke, water and oil from

entering the X-431.

- Avoid shock, dust, moisture and extremely high temperature.
- Do not disassemble the main unit. Clean the outside surface and screen with soft cloth that is dipped with a little water if the main unit is dirty. This should be done after the machine is turned off and the power cable is removed.
- Periodically turn on the X-431 main unit if it is not operated for long time to avoid moisture.

Take Care of the Screen

- Turn off the power if it is expected not to operate the X-431 for a long while. It can extend the life of screen and save energy.
- Do not put anything on the main unit to avoid damage to the internal parts.
- Use the equipped stylus to click the screen. Do not use fingernail or other sharp object to touch the screen.
- Dust may be accumulated on the LCD screen owing to electrostatic. It is suggested to buy the special LCD screen wiper to clean the screen gently. Do not wipe the screen with bare finger.
- Never use chemicals to clean the screen.

Maintenance of CF card

- Do not pull out the CF card when the X-431 main unit is working.
- Pull out the CF card and store it in the place without magnetic field after the machine is turned off. Do not turn on/off the X-431 main unit too frequently.
- CF card reader/writer may be used when doing updating. The CF card must not be pulled out when the CF card reader/writer is being used. Otherwise, the data in the CF card will be lost. Procedure for pulling

out the CF card is as follows:

On the desktop of Windows, open the window of "My computer". Click the right mouse button on "Removable disk" to pop up a menu. Select "Ejector (J)" in the menu. Then pull out the CF card. The written data may be lost if the CF card is pulled out discretionarily. When you want to use the CF card again, put it in.

- In case X-431 CF card is damaged and the program in the card can not be used, please use the following procedure to remake the CF card:
 - ◇ Log onto the website "www.X431.com". Enter your username and password to log in. Select the SMARTBOX No., and then download the X-431 UPDATE TOOLS, DISPLAY PROGRAM, SYSTEM DATA and necessary diagnostic program into your computer.
 - ◇ Install the X-431 UPDATE TOOLS into computer.
 - ◇ Format the X-431 CF card.
 - ◇ Run the X-431 UPDATE TOOLS and write the display program, system data and diagnostic programs onto CF card.

Consumption Material

Printing paper.

Refer to the section "Printer Operation" for paper installation.

Outline of X-431



Figure 1-01

Figure 1-01 shows the main parts of X-431. They are: X-431 main unit, SMARTBOX and MINIPRINTER. Each of the three parts has independent function. They may work separately or be connected together according to different requirement of configuration.

For easy operation, the three parts are usually connected together and enclosed in a leather cover for preventing looseness or damage. Additional parts, such as main cable, power cable, power adapter, CF card, CF card reader/writer, diagnostic connectors and so on, are equipped for vehicle diagnosis.

Function of the Three Main Parts

X-431 Main Unit

The X-431 main unit is like a PDA when it is used independently. It has all functions of a standard PDA, including personal information management, control panel, game, etc.

Smartbox

SMARTBOX is the main part for vehicle diagnosis. It can be connected to PC for vehicle diagnosis if the X-431 main unit is not connected. So the SMARTBOX can be sold independently and be used with PC that has

relevant software. The software is available on our website at [http:// www. X431. com](http://www.X431.com). This is an important feature of the product.

SMARTBOX is designed elaborately for future update.

The interface for connecting SMARTBOX and its upper unit is RS232. More BOXes can be developed to increase the function of the product, such as SENSORBOX, REMOTEBOX, etc. It makes the product more and more valuable.

Miniprinter

It is connected with X-431 main unit via a standard parallel port for printing out the test result. Thermal printer paper (size: Φ30×57mm, bore diameter:Φ7mm) is used.

Specifications

- Operating system: LINUX
- RAM: 16M
- CF card: 64M
- Main unit I/O: standard serial/parallel port
- Main unit power source: DC12V
- Main unit power: about 9W
- Printer: high-speed thermal mini printer
- Printer port: standard parallel port
- Screen: 240*320 LCD touch screen with back light
- Configuration: Main unit, Smartbox and miniprinter

Hardware Configuration

For vehicle diagnosis, some accessories (e.g. connectors and cables) should be used to connect the X-431 main parts to the vehicle diagnostic socket.

X-431 configuration is as shown in Figure 1-02.

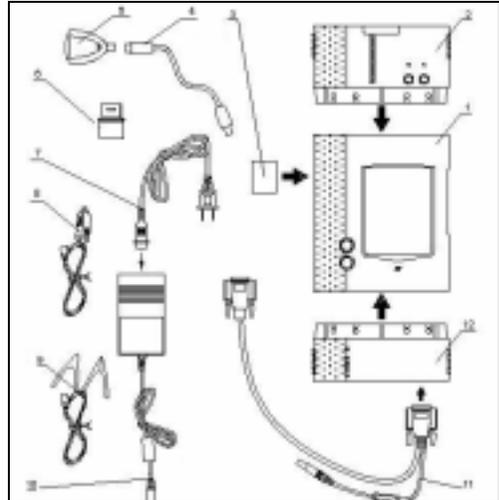


Figure 1-02

Item	Name	Descriptions
1	X-431 main unit	To display operation buttons, test result, help information, etc.
2	MINIPRINTER	To print test result. (optional)
3	CF card	To store diagnostic software and data
4	USB cable	To connect CF card reader/writer and computer
5	CF card reader/writer	To read or write data on the CF card
6	Diagnostic connector	Dozens of connectors are equipped for various vehicles. Here shows a typical one.
7	Power cord	To connect the AC 100-240V (50-60Hz) outlet and the power adapter.
8	Cigarette lighter cable	To get power from the vehicle cigarette lighter
9	Battery cable w/two clips	To get power from the vehicle battery
10	Power adapter	To convert 100-240V AC power into 12V DC power.
11	Main cable	To connect the diagnostic connector and SMARTBOX
12	SMARTBOX	To perform vehicle diagnosis

Layout of Three Main Parts

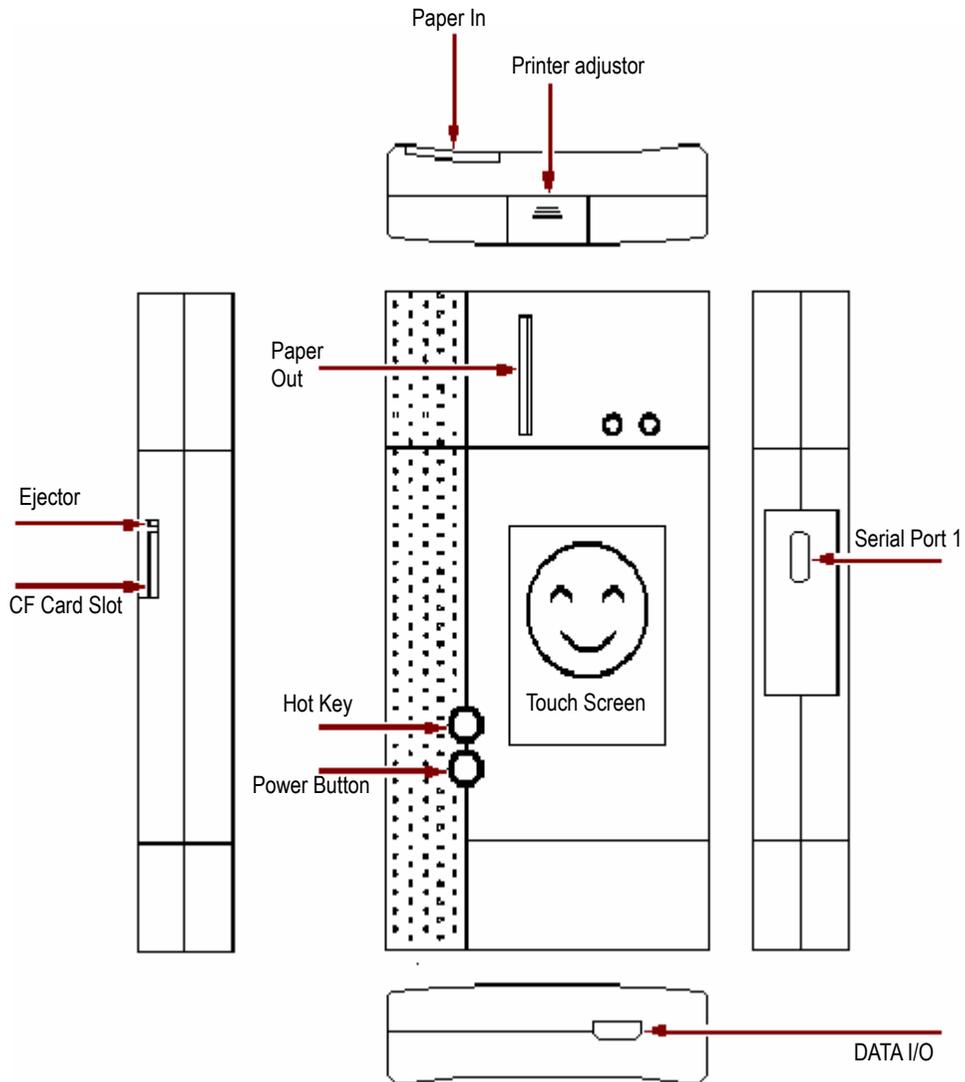


Figure 1-03

Working Principle of X-431

X-431 combines the technology of automobile and computer. It uses computer technology to scan the trouble code in various systems of automobile. The test result is displayed on the LCD screen in forms of characters, digits, waveforms, etc, or is printed out. User can

know the trouble type, cause, location and troubleshooting solutions on vehicle according to the displayed information. X-431 can also clear the trouble code after vehicle is repaired.

X-431 is based on Linux operating system and adopts SMARTBOX for vehicle diagnosis. It can diagnose vehicles made by different manufacturers. The test can be automatized

and computerized.

X-431 features high automation, powerful function, large database, multi-language, compact structure and easy operation.

All advantages are realized by the following techniques:

- Advanced main unit circuit. It includes CPU, LCD, keypad, EPROM, re-programmable data memory, universal interface, some supplementary circuits.
- Various diagnostic circuits. One end is connected to the main unit and the other is to vehicle diagnostic socket for diagnosing different vehicle model.
- Specific diagnostic program for specific vehicle.
- Splendid programming. Programs, font database and information are loaded from PC to X-431 via communication.

Block Diagram of X-431 Hardware

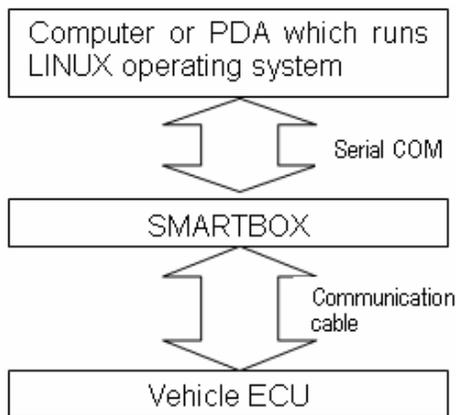


Figure 1-04

As shown in Figure 1-04. The upper unit is a computer with Linux operating system which can run diagnostic program. The lower unit is SMARTBOX which matches the voltage, baudrate and other signal logic. The upper unit and lower unit are connected via serial port. The SMARTBOX is connected to vehicle ECU through cable and connectors.

Working Procedure of X-431

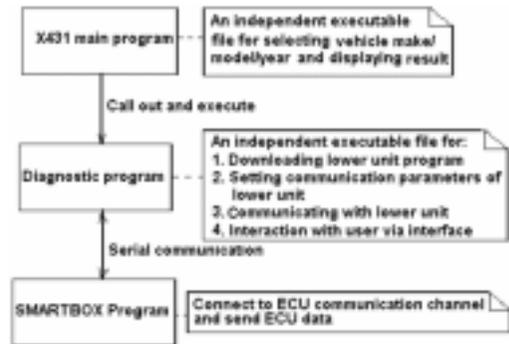


Figure 1-05

Figure 1-05 shows the working procedure of X-431. In the "X-431 main program", after user select vehicle make and diagnostic program, "X-431 main program" downloads the SMARTBOX program for the vehicle to the SMARTBOX and makes the SMARTBOX run the program; then creates the diagnostic procedure and calls out the "Diagnostic program" so that the "Diagnostic program" and the SMARTBOX program perform the whole process of diagnosis. "X-431 main program" is to display the diagnostic result and interact with user.

Ports and Indicators

See Figure 1-06 for X-431 connection ports and indicators

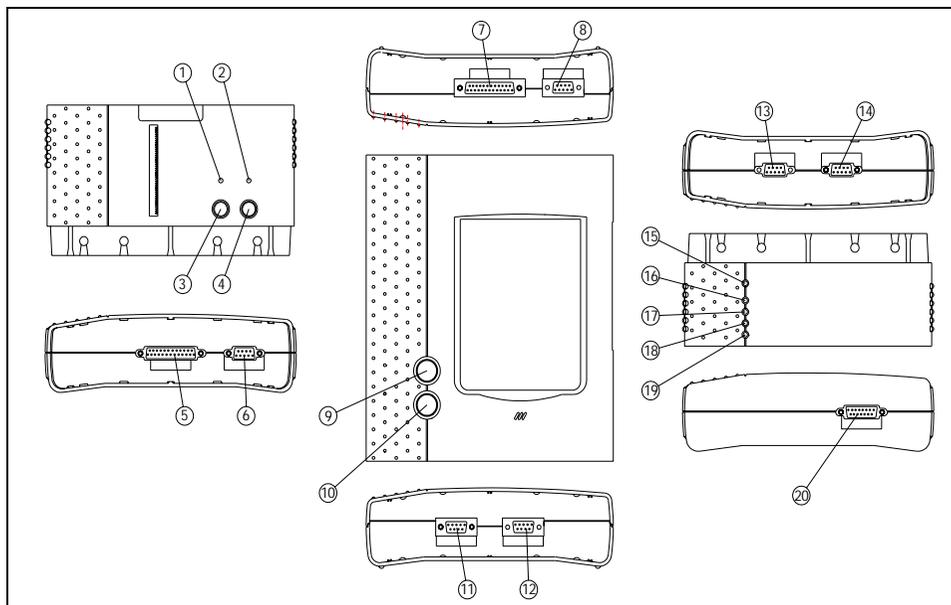


Figure 1-06

1	Printer SEL indicator (printer readiness)
2	Printer power indicator
3	Printer SEL button (printer readiness)
4	Printer FL button (paper feed)
5	Parallel communication port for connecting printer to main unit
6	Power input for printer
7	Parallel communication port for connecting main unit to printer
8	Power output of main unit.
9	Hotkey of main unit
10	Power switch of the main unit.
11	Power input of main unit
12	Serial communication port of main unit
13	Power output of SMARTBOX
14	Serial communication port of SMARTBOX
15	SMARTBOX power indicator
16	Indicator to show SMARTBOX sending data to the main unit
17	Indicator to show SMARTBOX receiving data from the main unit
18	Indicator to show SMARTBOX sending data to ECU

19	Indicator to show SMARTBOX receiving data from ECU
20	SMARTBOX data port

Printer Operation

Mounting Paper

MINIPRINTER uses heat sensitive paper with size of 30 × 57mm (internal hole 7mm). Refer to Figure 1-07a to Figure 1-07d for mounting the paper.

1. Open the paper lid on the back of the printer. See Figure 1-07a.



Figure 1-07a

2. Take out the spindle and mount the paper scroll onto the spindle. See Figure 1-07b.



Figure 1-07b

3. Put the paper spindle into the printer with correct direction. The paper may not be fed if the direction is wrong. See Figure 1-07b and Figure 1-07c.



Figure 1-07c

4. Open the side plate, pull up the pressing rod and lead the paper into slot. Turn the feed knob clockwise until the paper comes out of the outlet. See Figure 1-07d.



Figure 1-07d

5. Push down the pressing rod, mount the side plate, attach the paper lid, and then connect the printer to the X-431 main unit.

Printing Test Result

There are two indicators on the printer:

1. [SEL] :to show the readiness of the printer.
2. [POWER] : the power indicator of the printer.

If the [SEL] indicator is not lit, you can press the [SEL] button to turn it on and make the printer ready.

When the [SEL] indicator is lit, it shows that the printer is ready. Click the [PRINT] button (if it appears) on the screen of X-431 main unit to print the test result.

Explanation of Buttons

[POWER]	Power button
[HOTKEY]	Hot key. Press it to calibrate the screen after the machine is turned on. Or press it to enter the vehicle diagnosis interface after X-431 is started.
[SEL]	To select the printer. When [SEL] indicator is lit, the printer is ready to print. If [SEL] indicator is not lit, the printer is not able to print.
[FL]	Paper-feed button.

Vehicle Diagnosis

Button Descriptions

The main buttons on the operation interface and their functions are as follows:

[BACK]: to return to the previous interface.

[START]: to do the next operation.

[EXIT]: to exit the diagnostic program.

[OK]: to confirm and execute.

[CANCEL]: to cancel present operation and return to the previous interface.

[PAGE UP]: to display the previous page. It is inactive if the current page is the first page.

[PAGE DOWN]: to display the next page. It is inactive if the current page is the last page.

[HOME]: return to the main interface.

[PRINT]: to print the test result.

[BOX INFO]: to show the version information of SMARTBOX.

[HELP]: to display the help information.

[RETRY]: to do the unfinished operation once again.

Conditions for Test

- Turn on the key.
- The voltage of vehicle battery should be 11-14V. The rated voltage of the X-431 is 12V.
- The throttle should be in the closed position.
- X-431 can be operated in the temperature of 0-50 . (30 minutes of warming-up may be necessary when the ambient temperature is 5).

Select Diagnostic connector

Various diagnostic connectors are supplied with X-431. Select a specific connector according to the tested vehicle.

Let's take Volkswagen vehicle as example to describe the test procedure.

Note:

The test procedure for different vehicle make is similar. Please refer to the

described procedure and the screen prompts when diagnosing other vehicle.

Volkswagen vehicle is usually equipped with 4PIN or 16PIN diagnostic socket.

Please select the [Audi-4] diagnostic connector for 4PIN diagnostic socket or [Smart OBDII] diagnostic connector for 16PIN diagnostic socket.

Diagnostic Socket Location

The diagnostic socket of Volkswagen vehicle is located in the cab under the instrument at the driver side.

Pin Definitions

4PIN Diagnostic Socket

The 4PIN diagnostic socket is as shown in Figure 2-01.

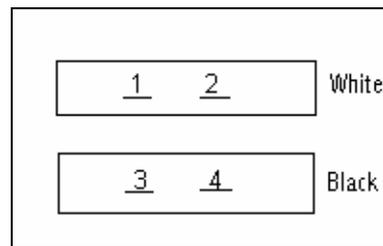


Figure 2-01

PIN definition of 4PIN diagnostic socket

PIN	Definition
1	L line
2	K line
3	Grounding
4	Power

16PIN Diagnostic Socket

The 16PIN diagnostic socket is as shown in Figure 2-02.

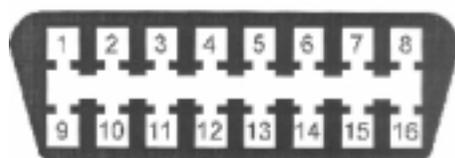


Figure 2-02

PIN definition of 16PIN diagnostic socket

PIN	Definition
2	BUS+
4	Grounding
5	Grounding
7	K line
10	BUS-
15	L line
16	Power +12V

Connection

- Insert the CF card into the CF card slot, *keep the face labeled "UPSIDE" upward, and make sure the card is fully seated.*
- Insert one end of the main cable into the diagnostic socket on SMARTBOX.
- Connect the other end of the main cable to the diagnostic connector.
- Connect the other end of the diagnostic connector to the vehicle diagnostic socket.

Note:

If the power supply on vehicle diagnostic socket is insufficient or the power pin is damaged, you can get power in the following ways:

- ◆ *From cigarette lighter: insert one end of the cigarette lighter cable into the lighter socket in vehicle and connect the other end to the power connector of X-431 main cable.*
- ◆ *From battery: clamp the two clips of battery cable on the positive and negative poles of battery and insert another end of the cable into the power connector of X-431 main cable.*
- ◆ *From power adapter: connect the power adapter to the 100-240V AC outlet with power cord. Insert the 12V DC plug of power adapter into the power connector of X-431 main cable*

Operation

Entering Function Menu

After connection, press [POWER] key to start X-431.

After starting the main unit, press [HOTKEY] (or click [Start] button on the main menu, and select [GAG] [GD Scan] on the pop-up menu), the screen will display the home page of vehicle diagnosis as shown in Figure 2-03.



Figure 2-03

Button descriptions:

- ◆ *[QUIT]: to exit the diagnostic program.*
- ◆ *[BOX INFO.]: to display hardware and software version of SMARTBOX.*
- ◆ *[HELP]: to display help information.*
- ◆ *[START]: to start the diagnosis.*

Click [START] button, the screen will display the vehicle make menu as shown in Figure 2-04.



Figure 2-04

Button descriptions:

- ◆ [BACK]: to return to the previous interface.
- ◆ [PAGE UP]: to display the previous page, it is inactive if the current page is the first page.
- ◆ [PAGE DOWN]: to display the next page, it is inactive if the current page is the last page.
- ◆ [HELP]: to display the help information.

Click the icon of Volkswagen on the vehicle make menu. The screen will be displayed as shown in Figure 2-05.

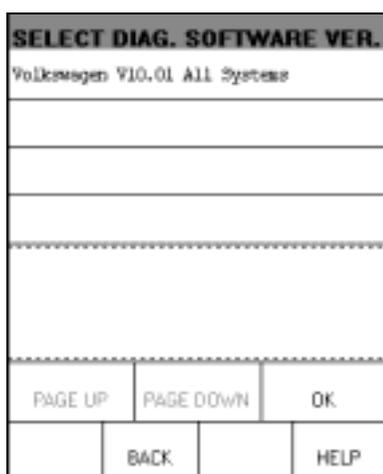


Figure 2-05

Button descriptions:

- ◆ [BACK]: to return to the previous interface.
- ◆ [HELP]: to display the help information.

Click [Volkswagen V10.01 All Systems]. The display will be as shown in Figure 2-06.



Figure 2-06

The software can diagnose the electronic control systems of Volkswagen up to 2002. The operation is the same as that of the original scan tool.

Click [OK] button, X-431 begins reset and check the SMARTBOX, and download the diagnostic program from the CF cartridge. After download, the screen will be displayed as shown in Figure 2-07.



Figure 2-07

Button descriptions:
[OK]: to go on the test.

Click [OK] button, the screen will display the information as shown in Figure 2-08.



Figure 2-08

- Button descriptions:**
- ◆ **[HOME]:** to return to the homepage of vehicle diagnosis.
 - ◆ **[BACK]:** to return to the previous interface.
 - ◆ **[HELP]:** to display the help information.

Click [Rapid Data Transfer]. The screen displays the menu of test systems as shown in Figure 2-09.

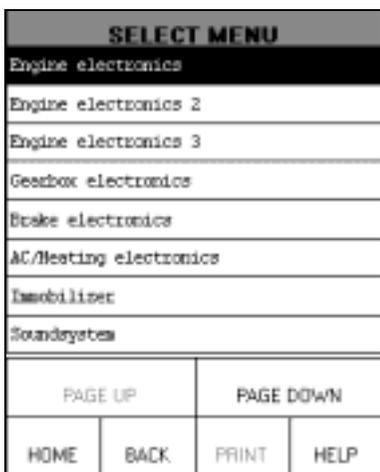


Figure 2-09

There are several pages for the menu. Click [PAGE DOWN] to see the next page.

Note:
The test operation for different systems is similar. Here we take [Engine electronics] as an example to describe.

- Button descriptions:**
- ◆ **[PAGE DOWN]:** to display the next page.
 - ◆ **[HOME]:** to return to the homepage of vehicle diagnosis.
 - ◆ **[BACK]:** to return to the previous interface.
 - ◆ **[HELP]:** to display the help information.

Click [Engine electronics]. If the communication is successful, the screen will display the information on vehicle ECU, as shown in Figure 2-10.

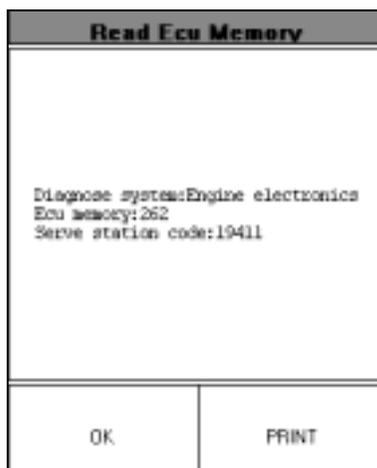


Figure 2-10

Note:
The information is from the vehicle ECU. If you have any question during test, don't hesitate to contact LAUNCH to get answer as soon as possible.

- Button descriptions:**
- ◆ **[OK]:** to go on the test.
 - ◆ **[PRINT]:** to print the displayed information.

Figure 2-11 shows an example of printed report.

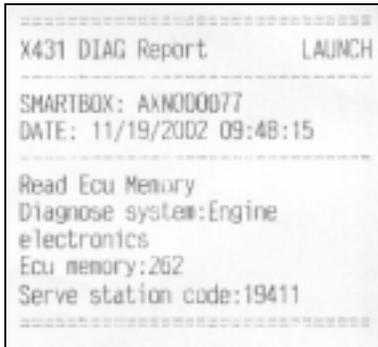


Figure 2-11

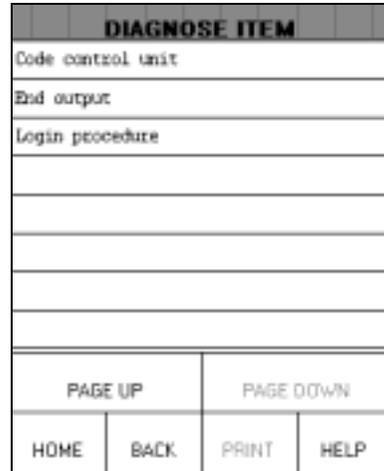


Figure 2-13

Click [OK] button. The screen will display the function menu as shown in Figure 2-12.



Figure 2-12

Button descriptions:

- ◆ [HOME]: to return to the homepage of vehicle diagnosis.
- ◆ [BACK]: to return to the previous interface.
- ◆ [HELP]: to display the help information.
- ◆ [PAGE DOWN]: to display the next page.

Click [PAGE DOWN] button to display the second page of the function menu as shown in Figure 2-13.

Read ECU Memory

Click [Read ECU Memory] in the function menu. The screen will display the information on ECU of the tested system. See Figure 2-14.

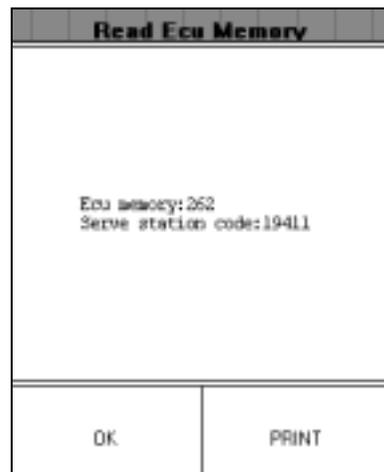


Figure 2-14

Note:

The information is from the vehicle ECU. If you have any question during test, don't hesitate to contact LAUNCH to get answer as soon as possible.

Click [OK] button to return to the function menu.

Read Fault Memory

Click [Read Fault Memory] in the function

menu. X-431 starts to test the fault code. The screen will display the test result when the test is finished. Figure 2-15 is an example of a test.

DTC CODE			
00768 R.heat exchanger temp. Signal at sender-G154			
00771 Fuel gauge sender-G			
PAGE UP		PAGE DOWN	
HOME	BACK	PRINT	HELP

Figure 2-15

Button descriptions:

- ◆ [HOME]: to return to the homepage of vehicle diagnosis.
- ◆ [BACK]: to return to the previous interface.
- ◆ [PRINT]: to print the test result.

Click [PRINT] to print out the test result. Figure 2-16 shows an example of printed report.

```

=====
X431 DIAG Report      LAUNCH
=====
SMARTBOX: AXN000077
DATE: 11/19/2002 09:48:20
=====
Total codes: 002
CODE001:
00768 R.heat exchanger Signal at
temp.sender- positive
G154
CODE002:
00771 Fuel gauge
sender-G
=====
    
```

Figure 2-16

If there is no fault code in the tested system, the display will be as shown in Figure 2-17.

Fault Code	
No fault code.	
OK	

Figure 2-17

Click [OK] button to return to the function menu.

Erase Fault Memory

Click [Erase Fault Memory] in the function menu. X-431 starts to erase the fault code. The screen will display the residual fault code after erasing. Figure 2-18 shows an example of the result after erasing.

DTC CODE			
00768 R.heat exchanger temp. Signal at sender-G154			
00771 Fuel gauge sender-G			
PAGE UP		PAGE DOWN	
HOME	BACK	PRINT	HELP

Figure 2-18

Button descriptions:

- ◆ [HOME]: to return to the homepage of vehicle diagnosis.
- ◆ [BACK]: to return to the previous interface.
- ◆ [PRINT]: to print the test result.

Click [PRINT] to print out the test result. Figure 2-19 shows an example of printed report.



Figure 2-19

If all fault codes are erased or there is no fault code in the tested system, the screen will be displayed as shown in Figure 2-20.

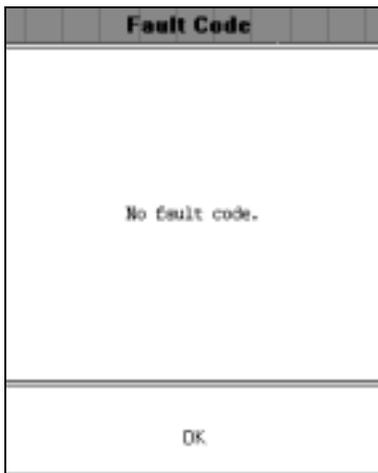


Figure 2-20

Click [OK] button to return to the function menu.

Diagnose Final Control

Click [Diag Final Ctrl] in the function menu. The screen will display the information as shown in Figure 2-21.



Figure 2-21

Button descriptions:

- ◆ *[YES]: to perform the test for next component.*
- ◆ *[NO]: to quit the test and return to the function menu.*

When the test for all actuators is finished, the screen will display the information as shown in Figure 2-22.



Figure 2-22

Click [OK] button to return to the function menu.

Basic Setting

Basic setting is necessary for some systems after service is done.

Click [Basic Setting] in the function menu. The display will be as shown in Figure 2-23.



Figure 2-23

X-431 prompts user to input the channel No. Click the number button to input the group No. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one. After the correct channel No. is inputted, click [OK] button to perform the basic setting for the system.

Read Measuring Value

Click [Read Measuring Value] in the function menu. The screen will be displayed as shown in Figure 2-24.

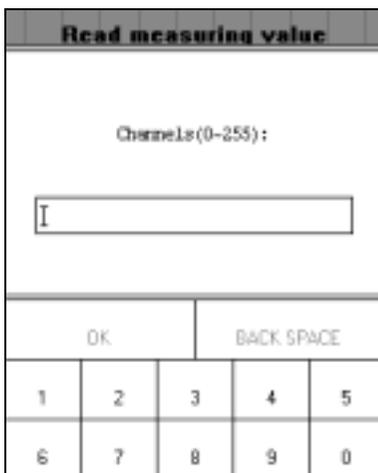


Figure 2-24

X-431 prompts user to input the channel No. of data stream. Click the number button to input the group No. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one. After the correct channel No. is inputted, click [OK] button to perform the function of "read measuring value".

For example, when "1" is inputted for the channel No., the screen will display the live value of data stream of the channel. See Figure 2-25.

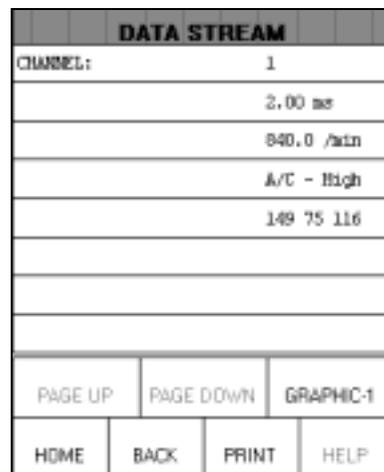


Figure 2-25

For seeing the waveform of an item, click the item and then click [GRAPHIC-1]. Figure 2-26 shows an example of the waveform.

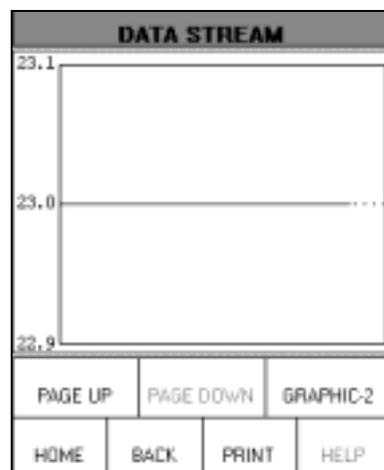


Figure 2-26

Click [GRAPHIC-2] to display the waveforms of 2 data stream items. See Figure 2-27. It is convenient for the user to make live comparison between two correlative data stream items.

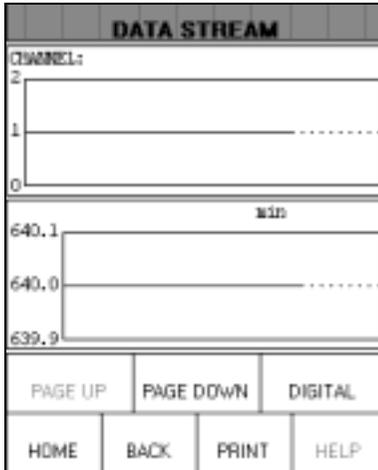


Figure 2-27

Note:

- ◆ The screen will display the live value of data stream again if the [DIGITAL] button is clicked in the interface.
- ◆ The three display modes -- [DIGITAL], [GRAPHIC-1] and [GRAPHIC-2] can be switched in turn.

Read Individual Measuring Value

Click [Read Individual Measuring Value] in the function menu. The screen will be displayed as shown in Figure 2-28.

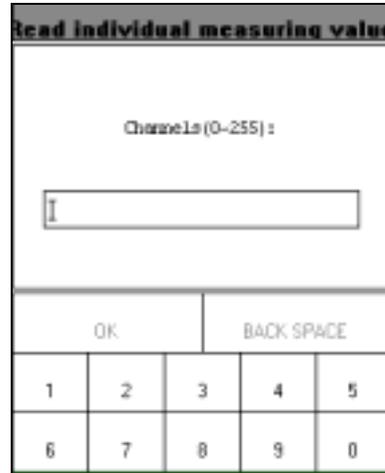


Figure 2-28

X-431 prompts user to input the channel No. of data stream. Click the number button to input the group No. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one. After the correct channel No. is inputted, click [OK] button to perform the function of "read individual measuring value".

For example, when "1" is inputted for the channel No., the screen will display the live value of the channel. See Figure 2-29.

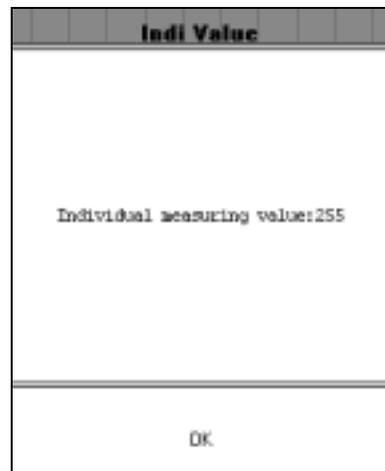


Figure 2-29

Adaptation

Click [Adaptation] in the function menu. The screen will be displayed as shown in Figure

2-30.



Figure 2-30

X-431 prompts user to input the channel No. of data stream. Click the number button to input the group No. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one.

After the correct channel No. is inputted, click [OK] button. X-431 prompts user to input the service station code. See Figure 2-31.

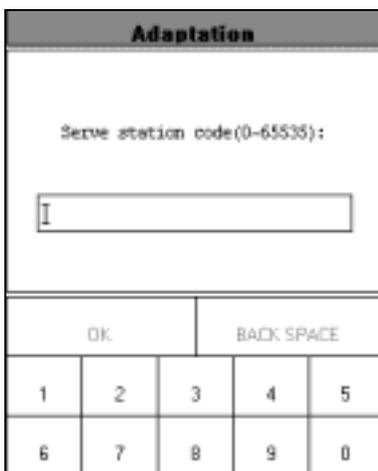


Figure 2-31

After the code is inputted, click [OK] button. X-431 prompts user to input the matched data. See Figure 2-32.



Figure 2-32

After the correct channel No. is inputted, click [OK] button to perform the function of "adaptation".

When the adaptation is successful, the screen will be displayed as shown in Figure 2-33.



Figure 2-33

Code Control Unit

Click [Code Control Unit] in the function menu. The screen will be displayed as shown in Figure 2-34.



Figure 2-34

X-431 prompts user to input the service station code. Click the number button to input the service station code. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one.

After the service station code is inputted, click [OK] button. X-431 prompts user to input the control unit code. See Figure 2-35.

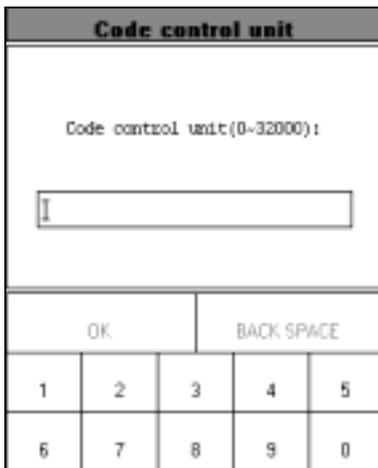


Figure 2-35

Click the number button to input the control unit code. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one.

After the correct control unit is inputted, click [OK] button to perform the function of "code

control unit".

If the control unit can be coded, the screen will be displayed as shown in Figure 2-36.



Figure 2-36

If the control unit can't be coded, the screen will be displayed as shown in Figure 2-37.

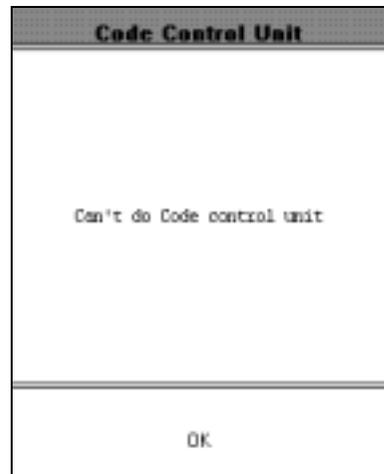


Figure 2-37

End Output

Click [End Output] in the function menu. X-431 will return to the menu of tested systems.

Login Procedure

Note:
 Perform this function first before performing the functions like "code control

unit”, “adaptation”, etc.

Click [Login Procedure] in the function menu. The screen will be displayed as shown in Figure 2-38.



Figure 2-38

X-431 prompts user to input the service station code. Click the number button to input the service station code. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one.

After the service station code is inputted, click [OK] button. X-431 prompts user to input the password. See Figure 2-39.



Figure 2-39

Click the number button to input the login

password. If wrong number is inputted, click [BACK SPACE] to delete the wrong number and input the correct one.

After the login password is inputted, click [OK] button. X-431 starts to log in. When the login is successful, the screen will display the information as shown in Figure 2-40.



Figure 2-40

Click [OK] button to return to the function menu.

Update of Diagnostic Software

The Internet update function of X-431 provides user with a convenient and quick way to download the software from our website for update.

LAUNCH put the latest version of software to www.X431.com and display the message on the news page. User can use computer to visit the Website in any part of the world. After registration, the latest version of software can be downloaded. Then user can update his X-431 by unzipping and installing the software.

Hardware Requirement

Necessary hardware:

1. A computer that can access the Internet.
2. A CF card reader/writer and a CF card that need to be updated.

See Figure 3-01 for hardware connection.

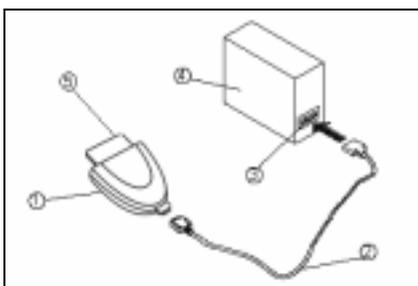


Figure 3-01

- | | |
|-------------------------|-------------|
| 1-CF card reader/writer | 2-USB cable |
| 3-USB Port | 4-Computer |
| | 5-CF card |

- Insert the CF card into the CF card reader/writer.
- Connect one end of the USB cable to the port of the CF card reader/writer, and the other end to the USB port of the computer.

User Registration

Log on www.X431.com. Select the favorite language on the pull-down menu at the upper left of the interface to enter the homepage. See Fig.3-02.



Fig 3-02

Click "Register" in the interface as shown in fig. 3-02 to open the window as shown in fig 3-03.



Fig 3-03

Note:

When the member purchases one or more products after registration, he should log onto the member area, and then click "product control" to register the newly purchased product. Refer to the section "Member login".

The terms of service is shown in the screen. After reading and fully understand it, click "I accept" button to enter the interface as shown in Fig 3-04.

Fill in Product Information

Fill in the serial No. of X-431 smartbox, registration No. and dealer code in the interface as shown in Fig 3-04.



Fig 3-04

The serial No. is marked on the back of smartbox. The registration No. is in an envelope delivered with the product (the number must be kept confidential). The dealer code is attached on the last page of the user's manual.

After the information is filled, click "Next step" to enter the next interface as shown in Fig 3-05.

Note:

1. *When a product is sold, the dealer will log onto www.X431.com and enter the dealer code in the "Dealer administration" area so that the user can do effective registration later. User should contact the dealer if registration can not be done effectively.*
2. *If the filled serial No. or registration No. is invalid, the screen will display the message as shown in fig. below. Click "OK" button to return to the previous interface to re-fill the correct numbers.*



Fill User Information



Fig 3-05

After information is filled in the interface shown in Fig 3-05(The red textbox must be filled. After registration, we will send the confidential information to your registered e-mail, so please make sure that your e-mail is valid.), click "Next step", and then the screen will display the interface shown as fig 3-06. Click "OK" then the registration is completed.



Fig 3-06

Note:

Only the registered user can download and update the software.

Software Update

Member Login

The user becomes the registered member after registration. Member can log in the website by filling username, password and user type in the interface as shown in Fig 3-02.

Note: when choosing the user type, the common users may choose the customer. If the dealer and the branch want to log in the website, please use the user information given by LAUNCH head office.

After log successfully, the screen will display the interface as shown in fig 3-07(The default interface is download center interface).



Fig 3-07

[Download Center]: Refer to “software download”.

[Purchase Center]& [Update center]: Refer to “software purchase and update”.

[Member Information]: Display and renew the current member information.

[Product Registration]: Register newly purchased product.

[Order Information]: Check or cancel the unpaid order.

[Renew Password]: After entering the right old password, then can renew the password.

[Awarded for complaint] If users meet some trouble during the operation, he can feedback to LAUNCH. Effective complaint will be awarded by LAUNCH

[Logout]: Users exit the registration.

Software Download

After log successfully, the screen will enter the [download center] interface. (See fig.3-09) Registered user can download the software that installed in the download center.

Before download, users had better set up a new folder named [X-431 update] on the computer desktop and put the download file to the[X-431 update] according the next steps.

Note:

1. *Software update of free charge will be provided by LAUNCH for one year. The free period is from the registration date on the website, not the purchase date. That is, during one year after the registration, users can free download the corresponding software.*
2. *If there is not the latest version in the download center, users can buy the version in the purchase center or in the update center. In the purchase center, users can buy the*

software that doesn't install in the download center. In the update center, users can buy the software that is beyond the free download period. After purchase successfully, the purchased software will be automatically added to the download center list.

Update Tool Download

Before update, users must download the update tools. On the drop-down menu, users select the language then click [download]. The screen will display the interface as shown in fig 3-10.

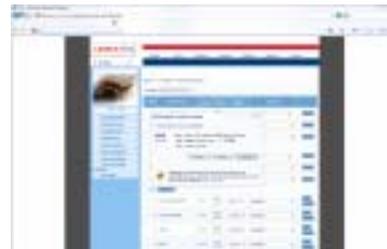


Fig 3-10

Click [save] to put it into the[X-431 update].

Display Program Download

When downloading the diagnostic program, users can also download the display program. On the drop-down menu, users select the language then click [down].Click [save] on the pop-up menu to put the program into the[X-431 update].

Diagnostic Program Download

On the drop-down menu, select the language and the version (The default version is the latest version). Click [down] icon, then click [save] on the pop-up menu to save the file.

Click [view] to learn the detailed information of the version.

Users can down the diagnostic program into the [X-431 update]. Up to now, the software that is for update is downloaded completely.



3-11

Software Update

Open the "X-431 update" folder, and double click the icon . Then install the update tool according to the prompts on the screen. When the installation is complete, the "X-431 update tool" icon will appear on the desktop. Double click the "X-431 update tool" icon to run the program. The program will automatically check the downloaded update files, including the diagnostic program and the display program. See Fig 3-12



Fig 3-12

Select the module for update in the interface shown in Fig 3-12, and click "Update" icon to update. When the update is completed, prompts will appear to notify successful update.

Software Purchase and Update

If users can't find the software that he needed, at this time users should buy the software in the purchase center. Log on the www.X431.com then enter the interface as shown in fig 3-13.



Fig 3-13

Click [purchase center] to choose the serial number, and then tick in front of the serial number.



Fig 3-14

Take the Transporter& V Class as an example, click the [view] that is in the same line with the Transporter& V Class. The screen will display the concrete information about the Transporter&V Class diagnostic software.

A new page will appear when user clicks "Download" button. The pop up window will show the description for updating the downloaded software.



Fig 3-15

Click 'order' to add the selected software to shopping chart. (See fig. 3-15).



Fig 3-16

Click 'pay' to buy the software. The bought software will be automatically added to the user's download center.

Click 'clear' to clear all the software in the shopping cart.

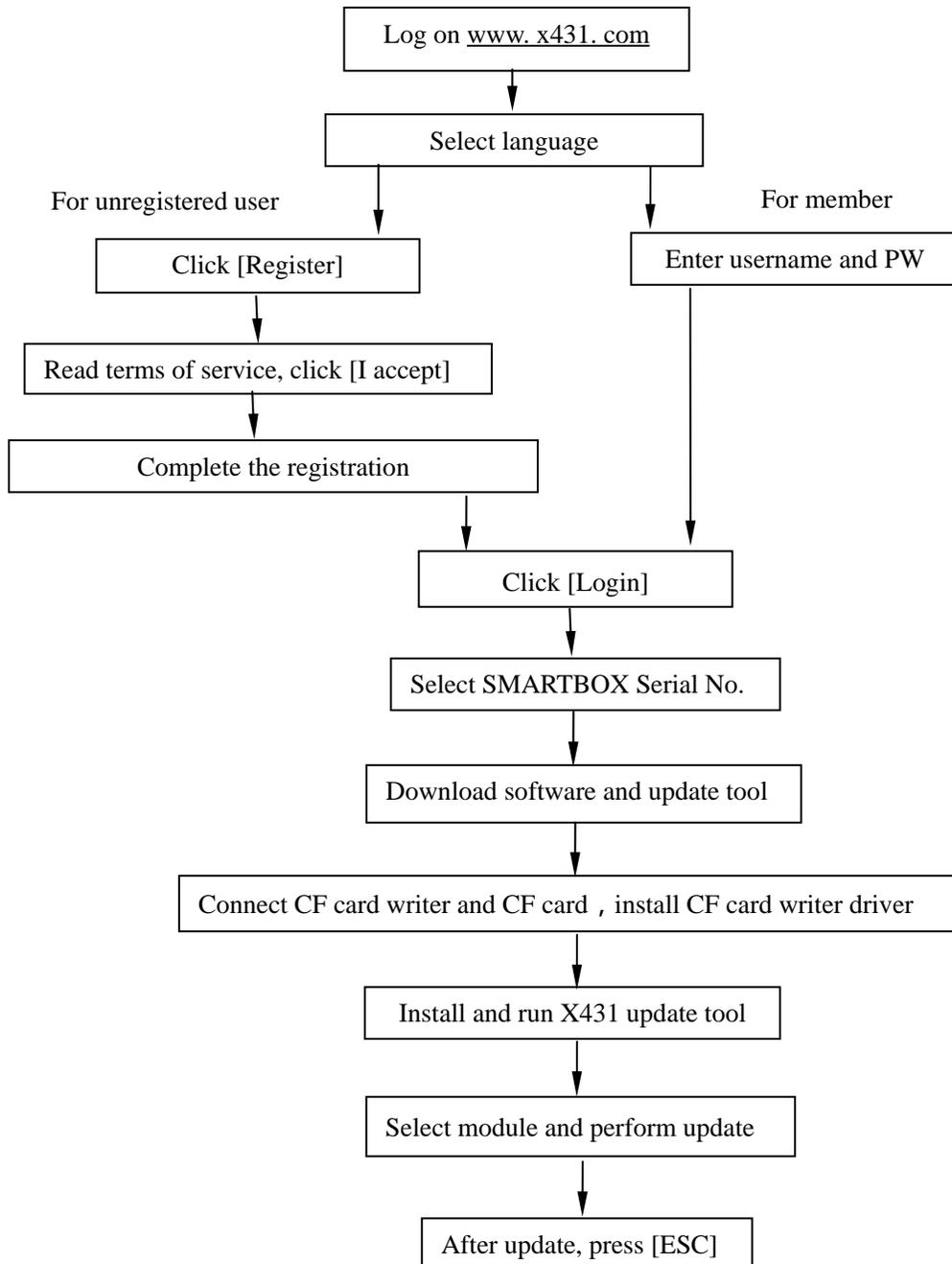
Click 'purchase other' to buy other software. (See fig 3-16).

Note:

The operation for update center is the same as for the purchase center.

Select the programs that can be deleted and click "Delete" button to make some more space available.

Flow Chart of X-431 Update for New User



Main Unit

Introduction

Interface

Turn on the power source, and then press [Power] key on the machine. The screen will display the prompts about touch screen calibration. Press [Hot] key (refer to the section "Calibrate Touch screen" for detailed steps) if you want to make calibration, otherwise, you can wait until it displays the start interface as shown in Figure 4-01.



Figure 4-01

Note:

An interface for User Register will be displayed when the machine is started at first time. Refer to the section "User Register" for detailed steps.

When you want to turn off the machine, press and hold [Power] key for at least 2 seconds.

[Start] button: Its function is the same as that in Windows. Click it to pop up the start menu. The items and their respective functions in the menu are shown in the following table.

[] Active Taskbar Icon: Click it by stylus to display and switch the executed programs.

[] Back Light Icon: Click it to turn on/off back light.

[] Soft Keyboard Icon: Click it to activate the soft keyboard. Then you have two ways to choose:

1. Input by soft keyboard;
2. Input by writing board.

Functions:

PIM (Personal Information Management)	Memo	To record all kinds of important information and ideas, and make corresponding classification.
	Address	To store the detailed information of relative, friends, colleagues and business partners, which can be easily edited, retrieved and searched.
	To Do	It is convenient for user to record the business to do or being done, to delete or add task records, to arrange the priority of tasks, and to browse the classified tasks.
	Schedule	To arrange the appointments, journeys and meetings in a whole day; to check time schedule on business daily, weekly, monthly and/or annually; and to describe the place, time and other details for each schedule record.

Tools	Calculator	Both simple and scientific calculators are available.
	World Time	The time of many big cities in the world are offered. It is a helpful assistant for your travel.
	Mini Dictionary	An English-Chinese dictionary embodies a large number of words, which cover all fields to overcome your inconvenience in language.
	Picture View	To enjoy all kinds of pictures which can be zoomed in/out.
	Run	To start executable applications which are based on the operating system of the unit.
Game	FIR	It is a kind of chess.
	Reversi	To play for a while in your leisure time.
Control Panel	Application	To link the application with the 'Start' menu, or delete it from the 'Start' menu.
	Power Management	To preset the use of power to save on electricity as possible.
	Clock Set	To set the system time.
	Contrast	To adjust the contrast of display.
	Language Set	To select language to be used.
Vehicle maintenance	Vehicle diagnosis	Professional function of vehicle diagnosis.
	Sensor test and simulation	To test the sensor on vehicle and simulate the output signal from the sensor.

Input

Note: To input data, please activate Soft Keyboard with stylus and use the stylus in the subsequent operations.

Using the Soft Keyboard

Activate and Hide

You can click Soft Keyboard icon on the bottom of the touch screen to activate the soft keyboard, and click again to hide it.

Input by Soft Keyboard

You have two ways to choose. One is to input by Soft Keyboard just like normal keyboard, but with stylus instead of finger. The other is to input by writing board.

Click [En] button, it will switch from normal keyboard to writing board [Hw]. And click [Hw] button, it will switch back.

The Function Key

There are four function keys on the upper-right of the Soft Keyboard. SBC/DBC case, punctuations, Keyboard/Writing board, and the Soft Keyboard position can be determined by clicking one of the four keys for each of the functions from left to right. (Refer to Figure 4-02)

The four function keys at the upper-middle position are for moving the cursor leftward, rightward, upward or downward.



Figure 4-02

In keyboard mode, the key at the bottom left of the keyboard is [Shift] key. Click it to change the lowercase letter into the uppercase letter, and the numeral key into special symbol (same as the special characters corresponding to the numeral keys in normal keyboard). The white

key at the bottom right of the Soft Keyboard is space key.

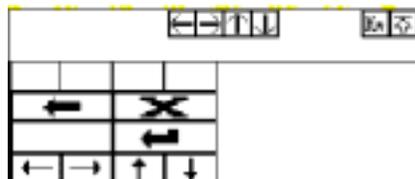


Figure 4-03

In writing board mode (refer to Figure 4-03), there are eight function keys at the lower left of the soft keyboard. The four ones on the bottom implement the function: to move the cursor leftward, rightward, upward or downward. The other four functions are (from left to right): to delete the first character before the current cursor, clear the hand-writing section, space and return.

Input by Keyboard

- 1) Open an interface, such as User information.
- 2) Click Soft Keyboard Icon in the tool bar to activate Soft Keyboard.
- 3) Click the characters on Soft Keyboard to enter data. (Refer to Figure 4-04)

Input by Writing Board

- 1) Open an interface, such as Memo.
- 2) Click [New] button.
- 3) Click the function key to switch to Writing Board. (Refer to the section "Use for Soft Keyboard").
- 4) Write on the white board to the right of the Soft Keyboard. Enter the information by function key operation.



Figure 4-04



Figure 4-06

Control of App

Check Box



Figure 4-05

Click the check box to select the function. When the function is selected, 'X' will be marked in the check box and the function description will be displayed on the right of the check box. You can select several functions at the same time. (Refer to Figure 4-05)

Scrolling Bar

Scrolling Bar is usually at the right side of the touch screen. You can click or drag it to operate. If the content can't be displayed completely in one page, moving the Scrolling Bar can turn to next page. (Refer to Figure 4-06)

Common Button

[X] Button at top right corner of the interface: After clicking it, current interface will be closed. When editing is being done, clicking of the button will be treated as quitting the editing.

[?] Button at top right corner of the interface : After clicking it, the help information will be shown.

[Cancel] Button in the interface: After clicking it, current interface will be closed.

Help

Click [?] button at the top right corner of the interface to get helpful tips for current interface.

Tool and Game

Tools



Figure 4-07

- 1) Click [Start] button.
- 2) Select 'Tools' in the pop-up menu.
- 3) Select the function needed in the pop-up submenu. (Refer to Figure 4-07)

Calculator

This calculator can perform not only common calculations as a simple calculator, such as addition and subtraction, but also the function operations as a scientific calculator, such as logarithm and factorial. (Refer to Figure 4-09).

- 1) In the pop-up menu of 'Tools', select 'Calculator' to open the Calculator interface.
- 2) Click the square overlap icon on upper left of the screen to switch between scientific calculator and simple calculator.
- 3) Click 'Unit Conversion' button to switch between unit conversion calculator and simple calculator.



Figure 4-08



Figure 4-09

Common Calculator (Refer to Figure 4-08):

- 1) Click numeral keys on the screen to input.
- 2) Or activate Soft Keyboard, and click numeral key on Soft Keyboard to input.
- 3) The operation is the same as that for normal calculator.

Unit Conversion Calculator (Refer to Figure 4-10):

- 1) Click 'Unit type' button at the top right corner to select unit type.

- 2) Input the number to be converted in the blank next to the unit name, and then you will see the conversion result.
- 3) If you want to return to simple calculator, please click 'X' button at the top right corner to close the current interface.



Figure 4-10

World Time



Figure 4-11

- 1) In the pop-up menu of 'Tools', select 'world time' to open the world time

interface.

- 2) Click the button under the 'Home Time' icon to select region.
- 3) Click the button under the 'World Time' icon to select region.
- 4) Then you can see the time directly. (See Figure 4-11).

Dictionary

- 1) In the pop-up menu of 'Tools', select 'Dictionary' to open the Dictionary interface. (See Figure 4-12)
- 2) Activate Soft Keyboard, and input words.
- 3) Select the word from the list on the left.
- 4) Click the word, and then you can find the translation in the right list.

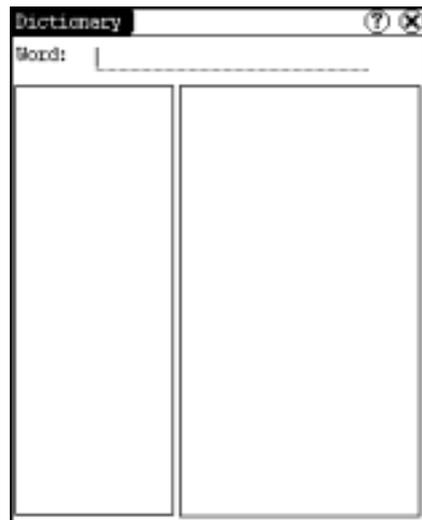


Figure 4-12

Picture View

- 1) Click [Start] button.
- 2) Select 'Tools' in the pop-up menu. (See Figure 4-13)
- 3) In the pop-up 'Tools' list, select 'Picview' to open the Picture interface.
- 4) In the Picture interface, click  icon in the toolbar on the top. (See Figure 4-14)
- 5) Select directory from the left list interface.
- 6) Select file from the right list interface.
- 7) Click [Parent Dir] button, and you can see the directory of current directory's parent.
- 8) You can see the directory of the picture at the right side of 'Path'.

- 9) You can see the file name of the picture at the right side of 'File'.
- 10) Click [OK] button to open the picture.



Figure 4-13

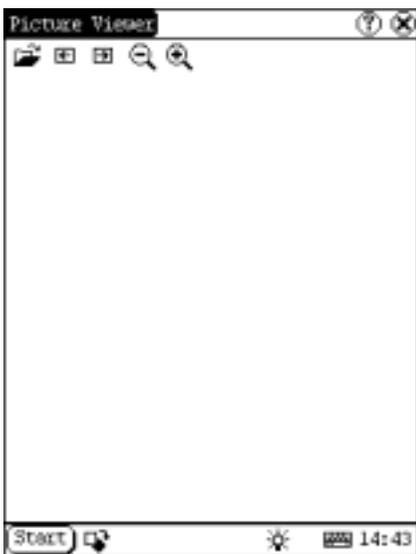


Figure 4-14

Browse the pictures in current directory

- 1) In the Picture interface, click  icon on the top to browse the previous picture.
- 2) In the Picture interface, click  icon on the top to browse the next picture.

Note:

This operation is needed only when more

than one picture has been stored.

Zoom in and zoom out:

In the Picture interface, click  or  icon on the top, then you can zoom in or zoom out the current picture at will.

Game

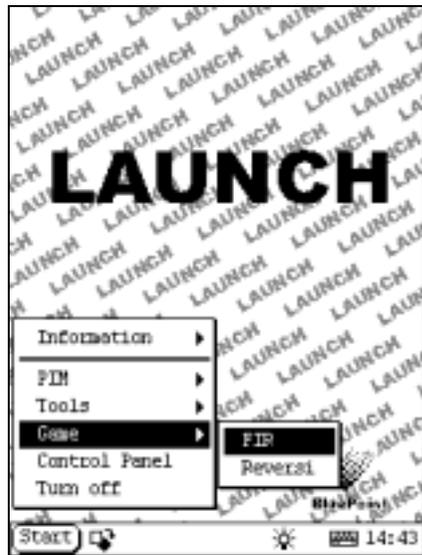


Figure 4-15

- 1) Click [Start] button.
- 2) Select 'Game' in the pop-up menu.
- 3) Select the function in the pop-up submenu. (See Figure 4-15)

FIR

- 1) In the pop-up submenu of 'Game', select 'FIR' to open the Chess Board.
- 2) Click black or white chessman to begin the game. The one who select the black chessman will start first. (See Figure 4-16)

Rules for the game:

You must try to make your five chessmen line up and prevent your adversary from achieving this goal in the process. The one whose 5 chessmen are lined up first is winner. You can choose the black or white chessman at the bottom of the Chess Board before starting playing.

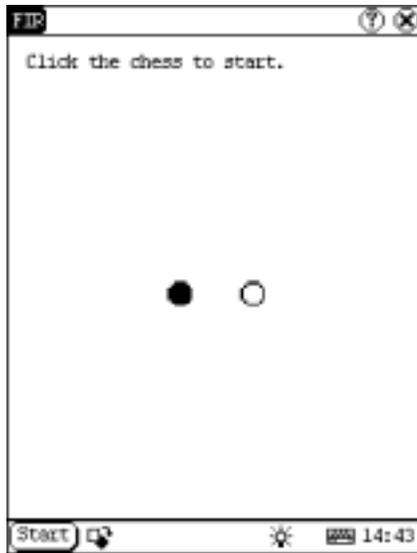


Figure 4-16

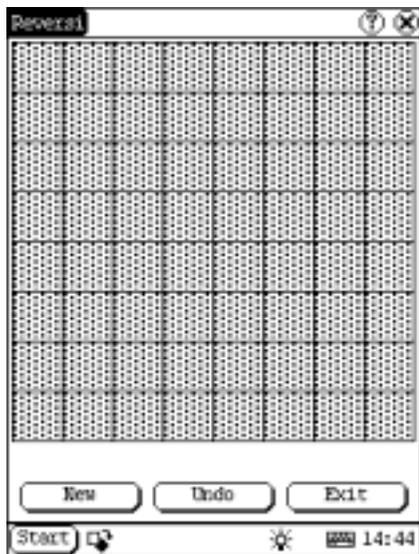


Figure 4-17

Reversi

- 1) In the pop-up menu of 'Game', select 'Reversi' to open the Chess Board. (See Figure 4-17)
- 2) Click [New Game] button to start.
- 3) Click [Undo] button for pull back.
- 4) Click [Close] button to close the Chess Board.

Rule:

The one who chooses white chessman can play

first. All black chessmen between two white chessmen will turn to white ones and all white chessmen between two black chessmen will turn to black ones. So the player should be able to reverse adversary's chessmen in each step. When the chessboard is full of chessmen, the number of the chessmen for each color should be counted. The one who conserve more chessmen on the chessboard is winner.

PIM

- 1) Click [Start] button.
- 2) Select 'PIM' in the pop-up menu.
- 3) Select the function needed in the pop-up list. See Figure 4-18.

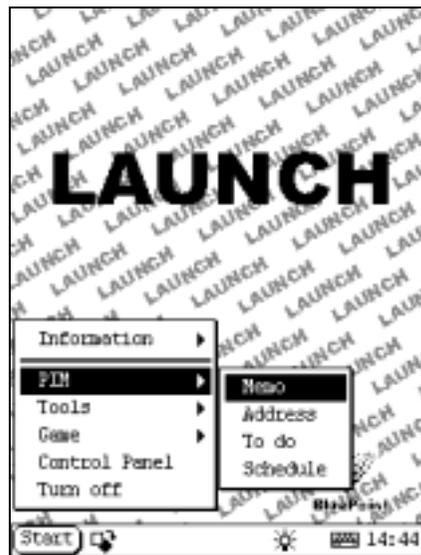


Figure 4-18

Memo

The basic functions of Memo include: add new memo, view memo, delete memo, browse by types, etc.

- 1) In the pop-up 'PIM' list, select 'Memo' to open the Memo interface. (See Figure 4-19)
- 2) After you click the [] button on top right corner, the type list will pop up. Then you can select the type of the memo.
- 3) You can also select the Edit Group in the type list to open the Edit Group interface.
- 4) The memo list of corresponding type will

be displayed in the list box on the midst of the Memo interface.

- 5) Click one memo in the memo list to open the Memo Edit interface.
- 6) Click [New] button to open the New Memo interface.



Figure 4-19

Add New Memo

- 1) In the Memo interface, click [New] button to open the New Memo interface.
- 2) Activate Soft Keyboard, and fill the subject and contents.
- 3) Click the button on top right corner, then select the type in the pop-up list
- 4) Click [OK] button to save and close the New Memo interface.
- 5) Then you can see the new memo in the list box of the Memo interface.

View Memo

- 1) In the list box of the Memo interface, click the memo that you want to view.
- 2) Then you can view the contents of the memo in the opened Memo Edit interface.
- 3) Click [OK] button to close the Memo Edit interface.

Edit Memo

- 1) In the list box of the Memo interface, click the memo that you want to edit.
- 2) Then you can edit the contents of the

memo in the opened Memo Edit interface. See Figure 4-20.

- 3) After editing, click [OK] button to save the edited contents and close the Memo Edit interface.



Figure 4-20

Delete Memo

- 1) In the list box of the Memo interface, click the memo that you want to delete.
- 2) Then you can delete the memo in the opened Memo Edit interface.
- 3) Click [Delete] button to delete the memo and close the Memo Edit interface.

Edit Type

- 1) Click the [] button on the top right of the interface so that the type list pops up.
- 2) In the type list, select the Edit Group to open the Edit Group interface.
- 3) In the Edit Group interface, activate Soft Keyboard.
- 4) In the text box at the bottom of the interface, input the name of the type.
- 5) Click [Add] button to add a new type and it will be displayed in the list box of the Edit Group interface. (See Figure 4-21)
- 6) Select one type in the list box, and then click [Delete] button to delete it.
- 7) Click [Close] button to close the Edit Group interface.

The interface ④ : It represents the Memo Interface, the New Memo interface and the Memo Edit interface.



Figure 4-21

Browse By Types

- 1) Click the [] button on the top right of the Memo interface so that the type list pops up.
- 2) Select the type in the list.
- 3) Then you can see the memo belonging to the type in the list box.

Note: Only the memo belonging to the type can be displayed here. If you want to browse all memos, please select 'All' in the steps 1 and 2.

Address

The basic functions of Address Book include: add new address, view address, delete address, to search address, etc.

- 1) In the pop-up 'PIM' list, select 'Address' to open the Address Book interface.
- 2) It lists the name of persons whose communication information has been stored.
- 3) Click [New] button to open the Address New interface. (See Figure 4-22)
- 4) Click [Find] button to pop up the Find

People interface.

The operation guide for each function is described below:



Figure 4-22

Add New Address

- 1) In the Address Book interface, click [New] button to open the Address New interface. (See Figure 4-23)
- 2) Activate Soft Keyboard, and fill the detailed information on relatives and friends.
- 3) Click [OK] button to save and close the Address New interface.
- 4) Then the added name will be displayed in the list box of the Address Book interface.

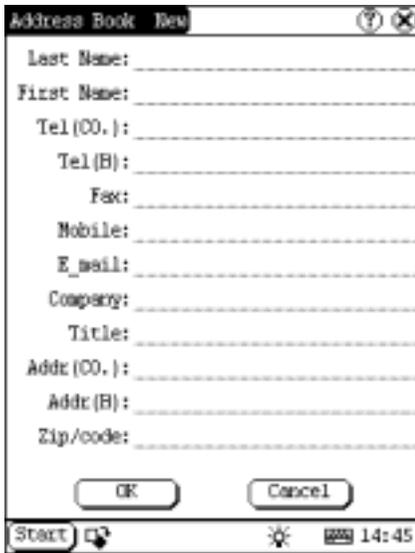


Figure 4-23

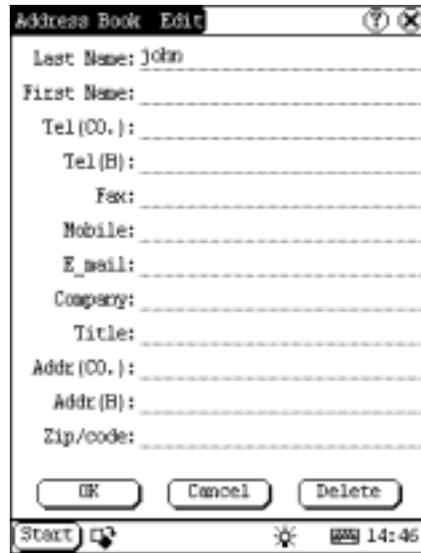


Figure 4-24

View Address

- 1) In the list box of the Address Book interface, click the name that you want to view.
- 2) Then the detailed information about the person will be shown in the opened Address Edit interface.
- 3) Click [OK] button to close the Address Edit interface.

Edit Address

- 1) In the list box of the Address Book interface, click the name that you want to edit.
- 2) Then the information about the person can be edited in the opened Address Edit interface. See Figure 4-24.
- 3) After editing, click [OK] button to save the edited contents and close the Address Edit interface.

Delete Address

- 1) In the list box of the Address Book interface, click the name that you want to delete.
- 2) Then the information about the person will be shown in the opened Address Edit interface.
- 3) Click [Delete] button to delete the person's information and close the Address Edit interface.

Search Address

- 1) In the Address Book interface, click [Find] button to pop up the Find People interface. See Figure 4-25.
- 2) Activate Soft Keyboard, and input the name you want to search.
- 3) Click [OK] button, and then you will see that the name you search is highlighted in the list box.



Figure 4-25

To Do

The basic functions of To Do include: add new To Do, view To Do, delete To Do and set To Do, etc.



Figure 4-26

- 1) In the pop-up 'PIM' list, select 'To Do' item to open the To Do interface.
- 2) The To Do list of corresponding items will be displayed in the list box on the midst of the Memo interface.
- 3) Click [Options] button to open the To Do

- 4) Display interface. (See Figure 4-26)
- 4) Click [New] button to open the To Do New interface.

Add New To Do



Figure 4-27

- 1) In the To Do interface, click [New] button to open the To Do New interface. See Figure 4-27.
- 2) Activate Soft Keyboard, and fill in the subject and contents.
- 3) Click [Detail] button to open the To Do Detail interface. See Figure 4-28.
- 4) In the To Do Detail interface, click the button to the right of 'Group' to pop up the type list.
- 5) Click the button to the right of 'Expired', and select the data in the pop-up list.
- 6) Click the number to the right of 'Priority' to set the priority of the To Do.
- 7) If the To Do has been finished, please click the box to the right of 'Finished'. When the function is selected, 'X' will be marked in the box,.
- 8) Click [OK] button to save and close the To Do Detail interface.
- 9) In the To Do Detail interface, click [OK] button to save and close the To Do New interface.

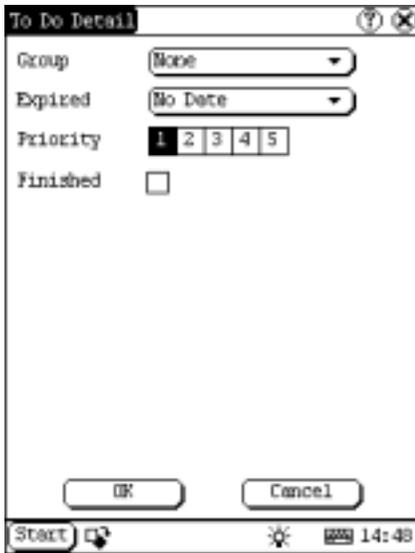


Figure 4-28

View To Do

- 1) In the list box of the To Do interface, click the to do that you want to view.
- 2) Then the contents of the To Do will be shown in the opened To Do Edit interface.
- 3) Click [OK] button to close the To Do Edit interface.

Edit To Do

- 1) In the list box of the To Do interface, click the memo that you want to edit.
- 2) Then the contents of the memo will be shown in the opened To Do Edit interface.
- 3) Click [Detail] button to open the To Do Detail interface, please refer to step 4~8 in the section "Add New To Do".
- 4) After editing, click [OK] button to save the edited contents and close the To Do Edit interface.

Delete To Do

- 1) In the list box of the To Do interface, click the to do that you want to delete.
- 2) Then the contents will be shown in the opened To Do Edit interface.
- 3) Click [Delete] button to delete the To Do and close the To Do Edit interface.

Edit Type

- 1) Click the [] button to the right of 'Group'

in the interface ③ so that the type list pops up.

- 2) In the type list, select 'Edit Group' to open the Edit Group interface. See Figure 4-29.
- 3) In the Edit Group interface, activate Soft Keyboard.
- 4) In the text box at the bottom of the interface, input the name of the type.
- 5) Click [New] button to add a new type and it will be displayed in the list box of the Edit Group interface.
- 6) Select one type in the list box, and then click [Delete] button to delete it.
- 7) Click [Close] button to close the Edit Group interface.

The interface ③ : It represents the To Do Detail Interface (Refer to step 1-3 in the section "Add New To Do" and "Edit To Do"), and the To Do Display interface (Refer to step 1 in the section "The Set of Display").



Figure 4-29

The Set of display

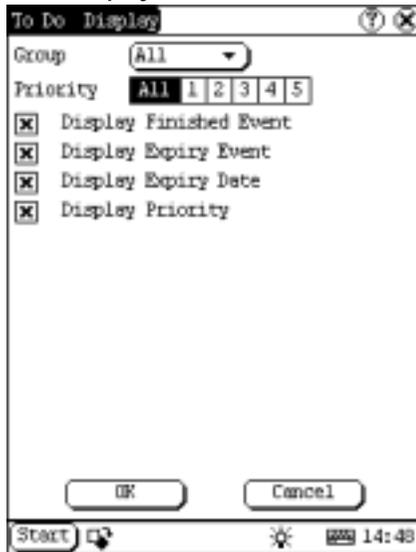


Figure 4-30

- 1) In the To Do interface, click [Options] button to open the To Do Display interface.
- 2) In the To Do Display interface, click the button to the right of 'Group' to pop up type list, and select the type in the pop-up list.
- 3) Click the button to the right of 'Expired', and select the data in the pop-up list.
- 4) Click the number or 'All' to the right of 'Priority' to set the priority of the displayed To Do.
- 5) Click the box to the right of each function. When 'X' is displayed in the box, the function is selected. (See Figure 4-30)
- 6) Click [OK] button to close the To Do Display interface.
- 7) Then you can see the corresponding To Do in the list box of the To Do interface.

Schedule

The basic functions of Schedule include: add new schedule, view schedule, delete schedule, etc.



Figure 4-31

- 1) In the pop-up list of 'PIM', select 'Schedule' to open the Schedule interface.
- 2) Click the Date button on the upper left of the interface to open the Select Date interface.
- 3) In the list box in the middle of the interface, all schedules on that day corresponding to the Date button will be displayed. (See Figure 4-31)
- 4) Click [New] button, and then the cycle list pops up. You may select 'Common', 'Daily', 'Weekly', 'Monthly' and 'Annual'.
- 5) In the cycle list, select one item to open the Schedule New interface.

Add New Schedule

Set the date of the schedule:

- 1) In the Schedule interface, click the Date button on the upper left to open the Select Date interface.
- 2) In the Select Date interface, click [◀] icon to the left of the month or year to select the previous month or year.
- 3) Click the [▶] icon to the right of the month or year to select the next month or year. (See Figure 4-32)
- 4) Click to select the date in the current month. When it is highlighted, it is selected.
- 5) Or click [Today] button to display the

- 6) current year, month and date directly.
- 6) Click [OK] button to save the date setting and close the Select Date interface.
- 7) You may see the date you set on the button on the top right of the Schedule interface.



Figure 4-32

Set the cycle of the schedule:

- 1) In the Schedule interface, click [New] button so that the Cycle list pops up. See Figure 4-33.
- 2) In the Cycle list, select 'Common' if it is done on the selected date.
- 3) Select 'Daily' if it is done every day.
- 4) Select 'Weekly' if it is done on a fixed day every week.
- 5) Select 'Monthly' if it is done on a fixed day every month.
- 6) Select 'Annual' if it is done on a fixed day every year.
- 7) After selecting, open the New Schedule interface.



Figure 4-33

Set the content of the schedule:

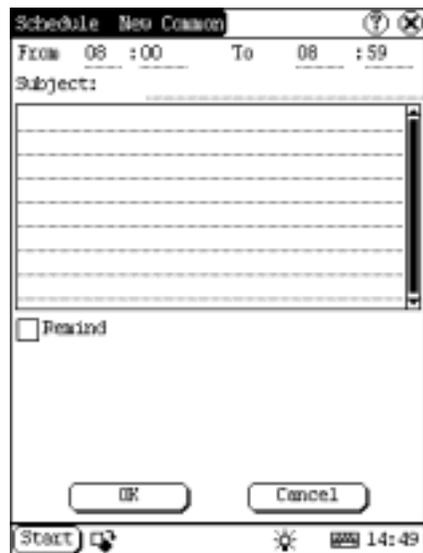


Figure 4-34

- 1) In the Schedule New interface, activate Soft Keyboard, and fill the subject and contents.
- 2) In the textbox on the top of the interface, fill the time of the schedule.
- 3) If the selected cycle is 'Daily', 'Weekly', 'Monthly' or 'Annual', you can input the repeat time in the textbox on the bottom of the interface. See Figure 4-34.

- 4) "Remind" function can be selected and the reminding time can be set in the interface. The "Remind" function will not be available when the machine is turned off.
- 5) Click [OK] button to save and close the Schedule New interface

View Schedule

- 1) In the Schedule interface, select the date that has been scheduled. (Refer to the section "Add New Schedule → Set the date of the schedule")
- 2) In the list box of the Schedule interface, click Scrolling Bar to turn to next page, and click the schedule you want to view.
- 3) Then the contents of the schedule will be shown in the opened Schedule View interface.
- 4) Click [OK] button to close the Schedule View interface.

Edit Schedule

- 1) In the Schedule interface, select the date that has been scheduled. (Refer to the section "Add New Schedule → Set the date of the schedule")
- 2) In the list box of the Schedule interface, click Scrolling Bar to turn to next page, and click the schedule you want to edit.
- 3) Then the contents of the schedule will be shown in the opened Schedule View interface.
- 4) If the edited affair is 'Daily', 'Weekly', 'Monthly' or 'Annual', you can edit the repeat time in the textbox on the bottom of the interface.
- 5) After editing, click [OK] button to save the edited contents and close the Schedule View interface.

Delete Schedule

- 1) In the Schedule interface, select the date that has been scheduled. (Refer to the section "Add New Schedule → Set the date of the schedule")
- 2) In the list box of the Schedule interface, click Scrolling Bar to turn to next page, and click the schedule you want to edit.
- 3) Then the schedule will be shown in the

opened Schedule View interface. See Figure 4-35.

- 4) Click [Delete] button to delete it and close the Schedule View interface.



Figure 4-35

System

Control Panel

The control panel includes all interrelated software and hardware configurations. It makes the software more custom-built for you by configuring.

- 1) Click [Start] button.
- 2) Select 'Control Panel' in the pop-up menu.
- 3) Open the Control Panel interface. (See Figure 4-36)



Figure 4-36

Application

It displays the application information contained in the 'Start' menu, including the group name, the submenu, etc.



Figure 4-37

- 1) In the Control Panel interface, click 'App' icon to open the Application Manager interface.
- 2) Then you can see the corresponding information in the list box of the interface. (See Figure 4-37)

- 3) Insert a new group:
Click [Insert] button and input the item name. Then choose "Start" as its parent and click [OK] button.



Figure 4-38

- 4) Insert a new submenu:
Click [Insert] button and input the item name and the file path. Then choose a group as its parent and click [OK] button.
The path can be inputted directly or found out in a dialogue box after clicking [Browser] button. See Figure 4-38 and Figure 4-39. Click [OK] button after selecting an item in the list. Then the selected file will be automatically copied to the edit box.

The submenu should be linked to a present group instead of the "Start" item or another submenu.

- 5) Delete a group or a submenu:
Select a group or a submenu and then click [Delete] button. When a group is deleted, all of its submenus will be deleted.
- 6) Modify a group or a submenu:
Click [Modify] button and then select the group or submenu from the list. Now you can modify the item name, file path and so

on followed by clicking [OK] button.

- 7) Save the information:
After editing the application, click [OK] button. The modified information will be saved in the corresponding file. If you want to quit the modification, click [Cancel] button.

Note:

Quit all other applications before saving the modification.



Figure 4-39

Power Management

In the Power Manager interface, you can see the condition of memory, and set the standby time. (See Figure 4-40)

- 1) In the Control Panel interface, click 'Power' icon to open the Power Manager interface.
- 2) Click the button to the right of 'Standby time', and select the time or 'None' in the pop-up list.
- 3) Click [OK] button to save the setting and close the Power Manager interface.

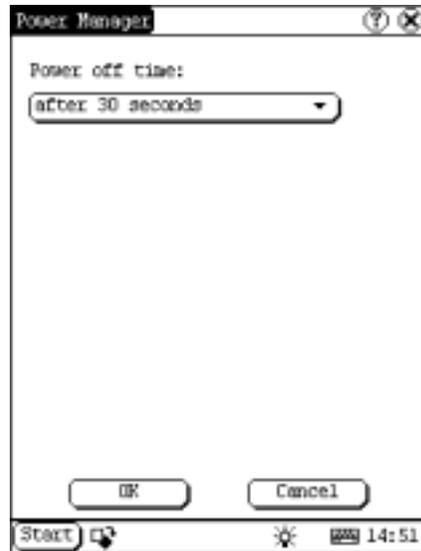


Figure 4-40

Clock

User can set the time and the time zone of the system.



Figure 4-41

Set Time:

- 1) In the Control Panel interface, click 'Clock' icon to open the Date/Time interface as shown in Figure 4-41.
- 2) In the Date/Time interface, click [Set Time] button to open the Set Time interface as shown in Figure 4-42.
- 3) Click the characters to the right of 'Day' to

set AM and PM, the selected one will be highlighted.

- 4) Activate Soft Keyboard, and then you can set 'Hours', 'Minutes' and 'Seconds' directly.
- 5) Click [OK] button to save and close the Set Time interface.

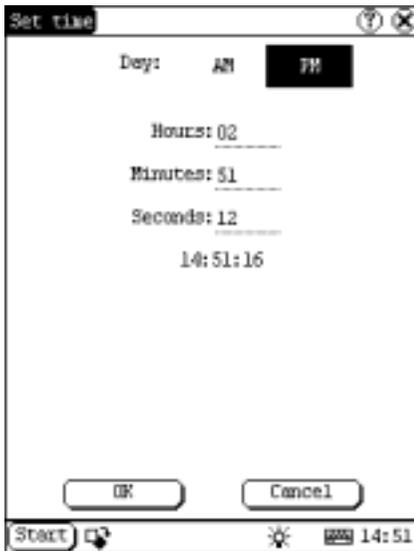


Figure 4-42

Set Date:

- 1) In the Date/Time interface, you can set date directly.
- 2) Click [◀] icon to the left of the month or year to select the previous month or year.
- 3) Click the [▶] icon to the right of the month or year to select the next month or year. (See Figure 4-41)
- 4) Click the date in the current month. It will be highlighted when it is selected.
- 5) Click [Set Time] button to save the setting.
- 6) Click [Quit] button to exit.

Set Time Zone

- 1) In the Date/Time interface, click [Set Time zone] button to open the Set Zone interface as shown in Figure 4-43.
- 2) Click Scrolling Bar to turn to next page of the list, and select your zone. It will be highlighted when it is selected.
- 3) Click [OK] button to save and close the Set Zone interface.



Figure 4-43

After finishing all settings, click [OK] button in the Date/Time interface to exit and close the interface.

Contrast

It is for adjusting the contrast of the screen to make the interface clearer.

- 1) In the Control Panel interface, click 'Contrast' icon to open the Contrast interface. See Figure 4-44.
- 2) In the Contrast interface, click the position you want, and then you can set it.

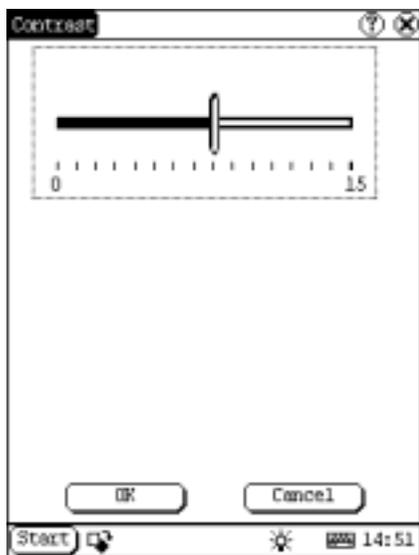


Figure 4-44

Language

You can make selection among several languages for convenient operation of the system.



Figure 4-45

- 1) In the Control Panel interface, click 'Language' icon to open the Language interface. See Figure 4-45.
- 2) Select the language you want to use.
- 3) Click [OK] button to confirm the selection and close the language interface and the Control Panel interface.

Note: Before selecting language, be sure to quit all applications.

System Information

Calibrate Touch screen

It is for getting the desired accuracy of the touch screen. Calibrating of touch screen can be divided into two steps. The first step is to detect noise automatically. If you click the touch screen at this step, the noise value would be affected. After detecting the noise, the system will come to the calibration step. Then the cross cursor will be displayed.

- 1) After switching on the machine, follow the tips to press the hot key. The calibration interface will be opened.
- 2) Click the cross cursor on the screen accurately, and wait until it changes. Then one step of calibration is finished.
- 3) After calibration is finished for all corners, the system will automatically return to the start-up main interface.

Note:

- ◆ *Do not click the touch screen before the cross cursor appears.*
- ◆ *In the calibration step, if you fail to click the cross cursor accurately, the cross cursor will be displayed on the screen again and again until the calibration is finished completely.*

User Register

The user's right can be well protected after registration.

- 1) Click [Start] button.
- 2) Select 'Information' in the pop-up menu.
- 3) Select 'User' in the pop-up list to open the User Information interface. (See Figure 4-46)
- 4) In the User Information interface, activate Soft Keyboard, and input the user information. (See Figure 4-47)
- 5) Click [OK] button to save the information and close the User Information interface.



Figure 4-46



Figure 4-48



Figure 4-47

Shut Down

Click “Shut Down” in the Start menu when you attempt to turn off the machine.

About

In ‘Information’ list, click ‘About’ to display the information on system software and hardware, then click [OK] button to close it. (See Figure 4-48)

FAQ

X431 is a hi-tech product. With the development of modern automotive industry, more and more new technology will be adopted and there may be questions during operation. Read the user's manual to get the answer whenever you have any question, or contact our Customer Service Center for help.

Here we list some frequently asked questions and answers relating to X431.

About Update via Internet

Question: "Removable Disk" icon does not appear in the catalogue of "My computer" after the CF card reader/writer is connected to the USB port of computer. Why?

Answer:

Possible cause: there may not be driver for CF card reader/writer in the computer. The default driver is with the operating systems like Windows Me/2000/XP, Mac OS 9.x/Mac OS X and Linux 2.4.X. However, there is no such default driver with Windows 98.

Solution: Check if there is the driver for CF card reader/writer in the computer. If the computer uses Windows 98 operating system, it is necessary to install the driver into computer by using the CD-ROM provided with CF card reader/writer.

When the CF card reader/writer driver is installed successfully, a "Removable disk" icon will appear in the catalogue of "My computer". Usually it is listed after original disk drive. For example, if there were drives A, B, C and D originally, the removable disk will be "E". If there were drives A, B, C, D and E originally, the removable disk will be "F". The rest may be deduced by analogy.

Question: Some downloaded diagnostic program is not listed in the update tool, what is the reason?

Answer: There are two possible causes:

1. The downloaded diagnostic program is not put in the same folder as other diagnostic programs. Please move it to the same folder as others.
2. The diagnostic program is not fully downloaded. Please download the program again.

Question: When the updated software is used in vehicle diagnosis, some diagnostic program can not be downloaded successfully from the CF card. Why?

Answer: possible causes and solutions:

1. The Display Program may have not been updated. Please update the Display Program.
2. The diagnostic program for the vehicle make is damaged. Please re-download the diagnostic program and update.

Question: Why can't the main unit recognize the replaced CF card?

Answer: There are two possible causes:

1. The original 32M CF card has not been fully copied. Please delete the incomplete file and copy again.
2. The CF card reader/writer is not compatible with the CF card. Monofunctional CF card reader/writer is better in such situation.

Question: How to make a new X431 CF card when the data in old one is lost or damaged?

Answer: In case X431 CF card is damaged and the program in the card can not be used, please use the following procedure to make a new CF card:

1. Log onto the website "www. X431. com". Enter your username and password to log in.

Select the SMARTBOX No., and then download the following programs into your computer:

- 1) Necessary programs for making CF card:

- X431 UPDATE TOOLS---- for writing the program from computer to CF card when doing X431 update
 - DISPLAY PROGRAM---- for displaying the X431 diagnostic information and managing the X431 diagnostic programs
 - SYSTEM DATA---- system data used by X431 system
- 2) Optional programs that can be selected according to user's demand:
Diagnostic program for various vehicles
2. Install the X431 UPDATE TOOLS into computer.
 3. Format the X431 CF card.
 4. Run the X431 UPDATE TOOLS and write the display program, system data and diagnostic programs onto CF card.

About Hardware

Question: After X431 downloads the diagnostic program from the CF card, it prompts "Please contact your local dealer". What is the reason?

Answer: It is because the license No. in CF card does not match the SMARTBOX. It can be solved in the following way:

1. Download the software that is corresponding to the SMARTBOX so that the CF card can match the SMARTBOX.
2. Use the UPDATE TOOL that is provided on <http://www.X431.com> for update. Never use WINZIP or other decompressing tool for update.

Question: Why does the LCD screen respond so slowly?

Answer: It is because the ambient temperature is close to the lower limit of operating temperature range (0-50). In this situation, it is necessary to warm up the machine for 20 minutes before test.

Question: Power can not be turned on with the power button on the main unit after the machine

is connected to vehicle diagnostic socket through cables and connectors. What can I do?

Answer: Check the power pin of vehicle diagnostic socket with multimeter for power. The power pin in diagnostic socket varies from one vehicle to another. Please refer to the User's Manual of specific vehicle diagnostic program to find the power pin. If there is no power supply from the diagnostic socket, please get power in other ways, such as from battery or cigarette lighter.

Question: There is no character on the backlit screen. What should I do?

Answer: Check if the power is well connected. Turn off the machine, unplug the power connector and re-plug it. Turn on the machine after it has been connected to the power for 1 second.

Question: Printer does not respond or its printed result is incomplete. What should I do?

Answer: Check if the printer is well connected with the main unit. Unplug the printer connector and re-plug it again to check the printed result.

Question: Why can't the diagnostic program be downloaded to SMARTBOX?

Answer: Please make sure that the SMARTBOX is well connected with X431 main unit.

Question: Why does X431 fail in communication with ECU?

Answer: Please make sure that the diagnostic connector and diagnostic program are matching vehicle make.

Question: The screen keeps blank after flashing when the machine is turned on. What should I do?

Answer: Take out the CF card and re-start the machine to see if there is normal display. If the display is normal when the CF card is taken out,

the CF card should be replaced. If the screen is still blank, please contact the local service engineer.

Question: Why does the system prompt that no CF card is found when the machine is turned on?

Answer: The possible cause is that no CF card is in the machine, or CF card is inserted improperly or damaged. If it is damaged, it is necessary to make a new one.

Question: What should I do if I can't get into the diagnostic interface during test?

Answer: The possible cause is that no CF card is in the machine, or CF card is inserted improperly or damaged. If it is damaged, it is necessary to make a new one.

Question: Program is not run or screen is confused after glints. What should I do?

Answer: Unplug the 9-pin connector on the main unit and re-plug it.

Question: What can I do if the system halts or fails during self-detection?

Answer: Please make sure that cables and CF card are well connected.

Question: Why can't the data be inputted after Soft Keyboard is activated?

Answer: The position where the cursor lies can't be edited. Or you have not activated the cursor on the input position. Please use the stylus to click the part to edit. When the cursor twinkles, you can input the data.

Question: The screen is inactive after the cross cursor appears on the screen. Why?

Answer: The system is calibrating the touch screen. The machine will work after the screen is calibrated. Refer to the section "Calibrate Touch Screen" in User's Manual".

Question: Why does the saved data disappear?

Answer: There are two possible causes:

1. Your CF card is damaged.
2. You've changed language and the data is related to language. You may find the data after switching back to the former language.

Question: How to know what applications (interfaces) are opened.

Answer: Click the active taskbar icon, then the pop-up list will display the applications (interfaces) opened.

Question: Why can't I do operation in current interface?

Answer: There are two possible causes:

1. Your current interface has exited illegally. In this situation, you may not see the name of the application (interface) in the pop-up list when you click the active taskbar icon.
2. The system is busy, please wait patiently, or click the active taskbar icon to switch to another application.

Question: The listed icons of vehicle make occupy more than one page of screen. I may have to turn several pages to find a specific icon of vehicle make. How can it be simplified?

Answer: X431 can test many vehicle makes and the vehicle makes are still increasing. We have considered the convenience when designing the software. The system will count the clicks and move the icon with more clicks forward.

About System Setting

Question: The screen is too white and characters can not be seen. What is the reason and what should I do?

Answer: It may be caused by improper contrast. Please refer to the section "Contrast" to adjust the contrast.

Question: The screen is inactive after the cross cursor appears on the screen. Why?

Answer: The system is calibrating the touch screen. The machine will work after the screen is calibrated. Refer to the section "Calibrate Touch Screen" in User's Manual".

Question: The screen does not respond or responds wrongly when I click it with stylus. What should I do?

Answer: It is necessary to calibrate the screen. Please refer to the section "Calibrate Touch Screen" in User's Manual.

Question: The time displayed in the lower right corner of the screen is incorrect. How to adjust it?

Answer: It is because the time was set incorrectly. Please refer to the section "Clock" in the User's Manual to set correct time.

About Operation

Question: System halts when reading data stream. What is the reason?

Answer: It may be caused by a slackened connector. Please turn off the machine, firmly connect the connector, and switch on the machine again.

Question: Why is the screen inactive when the cross cursor is clicked during screen calibration?

Answer: You may have touched the screen when the system is detecting noise before the cross cursor appears. Please turn off the machine and then turn on. Calibrate the screen after the cross cursor appears.

Question: Why is the machine automatically powered off during standby?

Answer: It is because the machine has been set for energy saving. Automatic shutdown will take place if the machine is not operated for a

specified period of time. Refer to the section "Power management" in User's Manual to set the "Power off time" to "None" or select a longer standby time.

Question: Why can't the tested result be printed out?

Answer: There may be no paper in the printer or the printer is not well connected. Please mount a roll of new paper. See the section "Printer Operation" in the User's Manual.

Question: Why is there no character in the printed paper?

Answer: The paper is mounted reversely. Please take out the paper and mount it again. See the section "Printer Operation" in the User's Manual.

Question: The displayed information can not be seen clearly when the ambient light is not good. What should I do?

Answer: There is a [] icon at the lower right corner of the screen. Click it to turn on the back light so as to see the displayed information clearly. Click the icon again for turning off the backlight.

Question: Why can't I input data after activating Soft Keyboard?

Answer: The position where the cursor lies can't be edited. Or you have not activated the cursor on the input position. Use the stylus to click the part to edit. When the cursor twinkles, you can input the data.

Question: What should I do if I am not able to switch from Active Taskbar to the running application interface?

Answer: Please close interfaces related to the application, such as the Help or Detail.

Question: Why does the saved data disappear?

Answer: There are two possible causes:

1. Your CF card is damaged. It is necessary to make a new CF card.
2. You've changed language and the data is related to language. You may find the data after switching back to the former language.

Question: What can I do when the screen is confused?

Answer: Please quit the current application (interface), and run it again. If the problem still exists, please restart the system.

Question: How to know what applications (interfaces) are opened.

Answer: Click the active taskbar icon, then the pop-up list will display the applications (interfaces) opened.

Question: Why can't I do operation in current interface?

Answer: There are two possible causes:

1. Your current interface has exited illegally. In this situation, you may not see the name of the application (interface) in the pop-up list when you click the active taskbar icon.
2. The system is busy, please wait patiently, or click the active taskbar icon to switch to another application.

Questions Related to Vehicle

Question: Why does the screen flickers during engine starting?

Answer: It is caused by the electromagnetic interference. No problem with X431.

Question: Why is operation interrupted during diagnosis?

Answer: It may be caused by electromagnetic interference or incorrect connection of connector.

Question: Why is there no response from vehicle ECU at communication?

Answer: Make sure that the voltage of vehicle battery, ignition timer and idle speed are in standard range; the throttle is in the closed position; and all electric devices, such as A/C, headlight, stereos etc, are turned off. Refer to the section "Conditions for Test".

Question: Some systems can not be diagnosed. Why?

Answer: The diagnostic socket for the system on some early vehicle may be separated. Refer to the vehicle instruction manual.

Question: No trouble code is found. Why?

Answer: It may be caused by the shared circuit. Find the nearest trouble code and circuit for analysis.

Question: Why are there too many trouble codes?

Answer: It may be caused by poor contact or poor grounding. Make sure that the vehicle model/year is selected correctly and the vehicle is equipped with the system.

About ECU

In the last two decades, we have seen more and more extensive application of IT and electronic technologies in modern vehicles. Many vehicle control systems, typically EFI (Electronic Fuel Injection), ABS (Anti-block Braking System), SRS (Air Bag), TC (Traction Control), AT (Automatic Transmission), etc., are computerized. Computerization makes the control precisely, quickly, effectively and safely. Consequently, a significant progress in vehicle driveability, fuel economy, power performance, comfortability, emissions, safety and so on has been made.

Composition and Working Principle of Computer-Control System

The Computer Control System consists of the on-board computer, and several related control devices (sensors, switches, and actuators). Most on-board computers are located inside the vehicle behind the dashboard, under the passenger's or driver's seat, or behind the right kick panel. Some manufacturers may still position it in the engine compartment. The sensors, switches, and actuators are devices such as oxygen sensors, coolant temperature sensors, throttle position sensors, fuel injectors, etc., that are located throughout the engine, and are connected by electrical wiring to the on-board computer. As an example, the diagram of engine control system is shown in Figure 6-01.

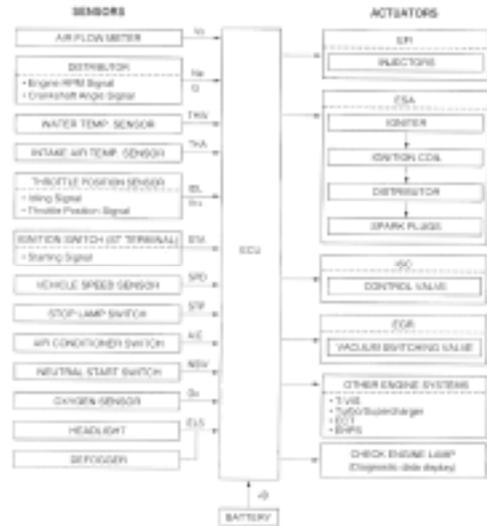


Figure 6-01

Sensor

It is a device that converts non-electric variable into electric signal. More than 50 types of sensor are used in modern vehicles, most of which are found in powertrain, chassis control systems, body control system, safety system, etc.

According to the physical variables controlled, sensors are sorted into following types: temperature sensor, pressure sensor, air flow sensor, position/angular sensor, gas concentration sensor, rotary speed sensor, acceleration sensor, vibration sensor, light sensor, distance sensor, electrical current sensor, angular speed sensor, shaft sensor, liquid level sensor, etc.

The commonly-used sensors in corresponding control systems of vehicle are:

- 1) In engine management system: intake air pressure (or air flow), air/fuel ratio, crankshaft position, knock, RPM, intake air temperature, coolant temperature and O₂ sensors.
- 2) In transmission system: vehicle speed, throttle position, RPM, A/T output shaft speed, torque, oil pressure/temperature, shift position sensors.

- 3) In braking system: vehicle speed, wheel speed, deceleration, sliding rate, braking pedal force, braking pedal position sensors, etc.
- 4) In steering control system: steering, vehicle acceleration, vehicle speed sensors, etc.
- 5) In suspension system: vehicle speed, vehicle height, steering angle, throttle position, braking force sensors, etc.
- 6) In A/C system: external temperature, internal temperature, sunshine, coolant temperature, refrigerant pressure and humidity sensors, etc.
- 7) In instrument, alarm and diagnosis systems: remaining fuel, coolant temperature, oil pressure, oil status, intake air pressure, windshield washer fluid level, battery liquid level, door lock, braking fluid level sensors.

into electrical parameter.

- 2) A/D converter: it converts the analogue signal from the sensor into digital signal. Then the digital signal can get into SMC.
- 3) SMC: it consists of I/O interface, CPU, RAM/ROM, etc. The received digital signal is computed here with the pre-programmed parameters from ROM. The computed result is transmitted through I/O interface to the output circuit, and then to the corresponding actuators.

The data in ROM is written by manufacturer and will not be lost when power is off. However, the data in RAM will be lost when power is off.

- 4) Output circuit: it is to amplify the signal from SMC. The weak current from SMC is not able to activate the actuator. So it has to be amplified.

ECU

The electronic control unit is composed of input circuit, A/D converter, SMC, output circuit, etc. See Figure 6-02.

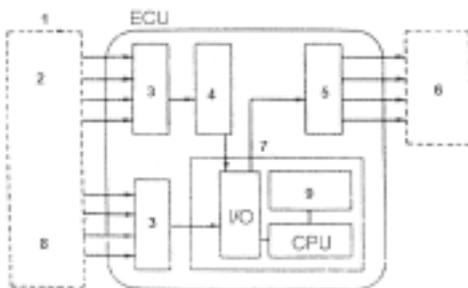


Figure 6-02

- | | | |
|------------------|-------------------|-------------------|
| 1- Sensor | 4- A/D converter | 7- SMC |
| 2- Analog signal | 5- output circuit | 8- Digital signal |
| 3- Input circuit | 6- Actuator | 9- ROM/RAM |

- 1) Input circuit: digital signal from sensor will enter the CPU directly. However, the analogue signal will be treated in the A/D converter before getting into CPU. The input circuit filters out the noise, converts sine wave into rectangular wave and then

Actuator

Actuator is to convert the electrical signal into force or displacement. The popular actuators are listed below:

- 1) Solenoid valve: This actuator is to convert electrical signal into linear movement. Two types of solenoid valves are used in the vehicle. One is directly driven with linkage, e.g. the magnetic switch of starter motor. The other is for controlling pressure and flow by transferring the movement to relevant valves. For example, in engine intake air control, electronically controlled automatic transmission, suspension control, etc.
- 2) Motor: DC motor is the most popular actuator used in automobile. It can be divided into two types according to its use. One is rotated by power, e.g. windshield wiper, seat adjuster, etc. The other is used in servo mechanism. In this situation, external force makes the rotor rotate around the stator, e.g. the servo motor for

damper.

Besides the two types listed above, there are other types, such as relay, electronic switch, etc.

Self-diagnosis of Electronic Control System

All modern cars are controlled by an Electronic Control Unit (ECU). The main purpose of the electronic control system is to provide maximum engine performance with the least amount of air pollution and the best fuel efficiency possible. However, the complexity of the system may increase the difficulty for its troubleshooting. The function of self-diagnosis is for solving such problem with electronic control system.

Working Principle of Self-diagnosis

The composition of self-diagnosis system is similar to electronic control system. The basic component is electronic control unit. The main purpose of self-diagnosis system is to diagnose the sensors, actuators, circuits and ECU in vehicle.

The computer assigns a numeric code for each specific problem that it detects, and stores these codes in its memory for later retrieval, and turns on the fault indicator on the dash panel to warn the driver. The problem detected may be: inputted/outputted signal exceeds the specified range, or some circuit is short-circuited or open.

Now let's take gasoline injection control system as an example to describe the working principle of the self-diagnosis system. When problem occurs, the process of diagnosis and treatment will be as follows:

1) For sensor

If the output signal from the sensor is out of the specified range of voltage when engine is running, it will be deemed as fault. For example, the normal output voltage from coolant temperature sensor should be in the range of

0.3-0.4V. If not, the situation will be deemed as fault and fault code will be stored in memory. Self-diagnosis system can detect damaged sensor, or short/open circuit, but it can not appraise the performance of sensor. Occasional occurrence of abnormal signal will not be deemed as fault immediately. For not being interrupted by the sensor fault, the engine will be controlled by the pre-stored normal coolant temperature (e.g. 80 °C) from the self-diagnosis system.

2) For actuator

When the engine is running, ECU sends commands to actuators according to the practical situation. If the actuator can not work normally, the monitoring circuit will transmit the message to the ECU. ECU can make the message displayed and take measures to ensure the safe running of engine. For example, when the power tube in engine ignition system is out of order, the ignition monitoring circuit sends feedback to the ECU. ECU emits warning signal and sends commands to actuator for stopping injection so as to prevent the unburnt mixture from damaging the catalytic converter of exhaust system.

3) For ECU

There is no monitoring circuit, but a monitoring clock in the ECU for resetting ECU regularly. If ECU is out of order, its program will not be run and the clock will not reset the ECU so that overflow may occur. This situation is deemed as fault for displaying.

For preventing unexpected stopping of vehicle caused by problem with ECU, there is a backup circuit in ECU. When the backup circuit receives the signal of abnormality from the monitoring circuit, a spare control program will be started for keeping the engine running as pre-programmed.

Readout of Fault Code in Automotive Self-diagnosis System

The fault in vehicle electronic system is stored in KAM of ECU as fault code. The fault code can be read out by the on board diagnostic

system or external scan tool.

The on board diagnostic system in different vehicle may indicate the fault in different way. In general, the following ways are popular:

- 1) Blinking of fault indicators on the instrument panel
- 2) Swing of multimeter index
- 3) Blinking of red/green LED on ECU
- 4) Shown by a special device

The more intuitionistic way for showing the fault is by external scan tool.

The diagnostic system of modern cars is equipped with diagnostic socket or DLC (data link connector). Fault code in vehicle ECU can be read out by connecting a scan tool to the diagnostic socket. In early time, each vehicle system had its own type of diagnostic socket. Since 1996, SAE has specified a uniform system called OBDII on board diagnostic system. Each vehicle that is made in accordance with the system may have the same diagnostic socket, same definition of pin and same description of fault code. The control units of every system are connected to bus, so only one diagnostic socket is needed for readout of fault code. OBD provides the possibility of reading data stream and displaying working status of switches and actuators. Moreover, external scan tool can send commands to activate the actuators.

X-431 is such an external scan tool for vehicle diagnosis. It not only has the diagnostic function like reading fault code, reading data stream, actuation test, displaying sensor waveform, coding control unit, etc., but also has PDA function.

Basic Knowledge of ECU

Composition of Vehicle ECU

Vehicle ECU consists of ALU, CPU, power source and memory.

1. ALU

It converts the electronic signal from each

sensor into digital signal needed by CPU.

2. CPU

The digital signal is transferred to CPU for computation and logical operation so that correct air/fuel mixture can be obtained. CPU can also compute ignition timing and idle speed, and control exhaust, fuel and diagnostic systems.

3. Power source

The reference output signal (5V) of ECU and the 12V voltage for control module are from vehicle battery. Memory is also dependent on the power supplied by the battery.

4. Memory

ECU contains three types of memory: ROM, RAM and PROM (or EEPROM).

1) ROM

ROM stores the programming information that can only be read by ECU. The program in ROM is not editable. Power cut will not damage the data in ROM.

2) RAM

It is for temporarily storing the inputted data, fault code and computed result. Power cut will make all information in RAM erased.

3) PROM

Its program is made by manufacturer to suit the application of transmission, engine, exhaust control, driveability, rear axle ratio, etc. PROM is can be detached from ECU and power cut will not damage the data in it.

4) EEPROM

Its function is similar to PROM. The difference between EEPROM and PROM is that EEPROM can be re-programmed by manufacturer with a special device.

Precautions Related to ECU

The circuit inside the ECU is very accurate and may be easily damaged by overvoltage, static electricity and/or magnetic fields. Pay more attention when diagnosing the devices that is

connected to ECU because most ECU's are operated under low voltage (about 5V).

Whenever you work in the vicinity of ECU or engine control system, please obey the following precautions:

1. Never damage the lead or connector. Prevent them from being grounded or contacting with an unexpected power source.
2. Never use the electrical test tool that is powered by 6V battery or over. Strong current may cause the element in ECU broken or shorted. For checking the engine control circuit, only the multimeter with large internal impedance (over 10M Ω) can be used.
3. Never try to disassemble or repair ECU if there are not necessary tools and information. Any mistake may damage the component or increase the difficulty for service station.
4. The spark plug wire must be at least 25.4mm from any sensor circuit or control circuit. Some unexpected fault in ECU circuit is caused by magnetic fields that transmit wrong signal to ECU. High tension wire or transformer may interfere with ECU, but the most common cause for such problem is that the spark plug is too close to ECU harness.
5. Be careful when moving ECU or working around ECU. Remember that static electricity may cause strong electrical shock and damage ECU.

Appendix 1: about VIN

VIN is the abbreviation of Vehicle Identification Numbers.

A car's vehicle identification number (VIN) is the identifying code for your SPECIFIC automobile. It is your car's fingerprint.

It sets your vehicles apart from the millions of vehicles out there. Recently the VIN is reflected by 17 digit characters. It displays a car's uniqueness and manufacturer and provides a method to trace your car from the factory to the junk yard.

Each character or digit has a particular purpose. They are as follows:

- First vehicle identification number digit identifies the country from which the vehicle was manufactured. For example, U.S.A.(1 or 4), Canada (2), Mexico (3), Japan (J), Korea (K), England (S), Germany (W), Italy (Z).
- Second vehicle identification number digit specifies the manufacturer. Audi (A), BMW (B), Buick (4), Cadillac (6), Chevrolet (1), Chrysler (C), Dodge (B), Ford (F), GM Canada (7), General Motors (G), Honda (H), Jaguar (A), Lincoln (L), Mercedes Benz (D), Mercury (M), Nissan (N), Oldsmobile (3), Pontiac (2 or 5), Plymouth (P), Saturn (8), Toyota (T), Volvo (V).
- Third vehicle identification number digit indicates the vehicle type or manufacturing division.
- Fourth through eighth vehicle identification number digit reveals the vehicle features such as body style, engine type, model, series, etc.
- The ninth vehicle identification number digit is a VIN accuracy check digit, verifying the previous VIN numbers. This is how the check digit works:

◆ STEP 1

Assign to each number in the VIN its actual mathematical value and assign to each letter the value specified for it in the following chart:

ASSIGNED VALUES:

A=1 G=7 P=7 X=7
 B=2 H=8 R=9 Y=8
 C=3 J=1 S=2 Z=9
 D=4 K=2 T=3
 E=5 M=3 U=4
 F=6 N=4 V=5

◆ STEP 2

Multiply the assigned value for each character in the VIN by the position weight factor specified in the following chart:

VIN POSITION AND WEIGHT FACTOR:

1st = 8 10th = 9
 2nd = 7 11th = 8
 3rd = 6 12th = 7
 4th = 5 13th = 6
 5th = 4 14th = 5
 6th = 3 15th = 4
 7th = 2 16th = 3
 8th = 10 17th = 2
 9th = check digit

◆ STEP 3

Add the products from steps 1 and 2 and divide the total by 11.

◆ STEP 4

The numerical remainder is the check digit which would appear in the 9th position in the VIN. If the remainder is 10, then the letter "X" is used for the check digit.

- Tenth vehicle identification number digit tells the model year. 1988 (J), 1989 (K), 1990 (L), 1991 (M), 1992 (N), 1993 (P), 1994 (R), 1995 (S), 1996 (T), 1997 (V), 1998 (W), 1999 (X), 2000 (Y)-----2001(1), 2002 (2), 2003 (3)

- Eleventh vehicle identification number digit reveals the assembly plant for the vehicle.
- The twelfth to seventeenth vehicle identification number digits indicate the sequence of the vehicle for production as it rolled off the manufacturers' assembly line.

Your VIN can be used to track recalls, registrations, warranty claims, thefts and insurance coverage.

Common locations of the vehicle identification number (VIN) vary but the following are places to look:

- Firewall of the vehicle
- Left hand inner wheel arch
- Steering column
- Radiator Support Bracket
- Dash by windshield
- Drivers door or post on passenger side
- Guarantee & Maintenance Book *Vehicle documents
- Machined Pad on front of engine
- Component parts as listed above -eg- engine, frame, etc.

Later model years - most common areas of VIN:

- Left instrumentation/dash panel by window
- Drivers door or post
- Firewall

Appendix II: Block and Parameter Definition of Volkswagen Vehicle

Passat B5 Engine Data Stream Block Table

Display	Definition
Block 00 1. 170...204 2. 17...44 3. 82...99 4. 142...206 5. 0...12 6. 123...133 7. 120...136 8. 77...179 9. 115...141 10. 117...138	1- coolant temperature 2- engine load 3- engine speed 4- ECM voltage supply 5- throttle angle 6- idle regulator 7- idle stable adaption value 8- O2 excessive regulator 9- mixture adaption value 10- mixture adaption value
Block 01 1. 820...900rpm 2. 1.00...2.50ms 3. 0...5 ° 4. 5.25...4.25°VOT	1- engine speed 2- engine load (injection duration per revolution) 3- throttle angle 4- ignition angle
Block 02 1. 820...900 rpm 2. 1.00...2.50ms 3. 2.00...5.00ms 4. 2.0...4.0g/s	1- engine speed 2- engine load (injection duration per revolution) 3- engine injection duration per cycle 4- intake air volume
Block 03 1. 820...900rpm 2. 10...14.5V 3. 80...105 4. 90	1- engine speed (idle speed) 2- ECM voltage supply 3- coolant temperature 4- intake air temperature
Block 04 1. 0...5 ° 2. -1.70...1.70g/s 3. -1.70...1.70g/s 4.	1- throttle angle(acceleration pedal depressed to the end75...95 °) 2- idle air mass adaption value (N gear) 3- idle air mass adaption value (drive gear) 4-working condition Idling idle Teillast part load

	Vollast full load Schub rich Anreicherung O/D
Block 05 1. 820...900rpm 2. 860rpm 3. -10.0...10.0% 4. 2.0...4.0g/s	1- idle speed (idle speed) 2- idle speed (rated, M/T) 3- idle intake air regulation (idle regulator) 4- intake air volume
Block 06 1. 0...2550 2. -10.0...10.0% 3. -10.0...10.0% 4. -10...+45 °	1- engine speed 2- idle intake air regulation (idle regulator) 3-λ regulator 4- ignition angle
Block 07 1. -10.0...10.0% 2. 0...1.100V 3. 0...99% 4. 0.30...1.10	1-λ regulator control 2-λ sensor voltage (higher than 0.45V denote rich, less than 0.45V denote lean) 3- canister solenoid valve 1 duty ratio 4-λ trim with EVAP
Block 08 1. 2.00...5.00ms 2. -10.0...10.0% 3. -8.0...8.0% 4.	1- injection time (per cycle) 2- idle λ adaption value(add) 3- part load λ adaption (multiply) 4- EVAP mode TE active: canister solenoid active TE not active: canister solenoid inactive λ adaption: canister solenoid inactive, λ regulator active
Block 09 1. 820...900rpm 2. -10.0...10.0% 3. 0...1.100V 4. -10.0...10.0%	1- engine speed (idle rpm) 2-λ regulator 3-λ sensor voltage 4- idle λ adaption value (add)
Block 10 1. 0.00...0.30 2. -3...32 3. 0.30...1.20 4. 0...99%	1- canister solenoid valve 1 duty ratio 2-λmodification when the EVAP is active 3- canister charge rate 4- EVAP purge rate
Block 11 1. 820...920rpm 2. 2.00...5.00ms 3. 0 km/h 4. 0.5...1.50 l/h	1- engine speed (idle rpm) 2- engine load 3- vehicle speed 4- fuel consumption

<p>Block 14</p> <p>1. 820...920rpm 2. 1.00...2.50ms 3. 0...15.0 °KW 4. 0...15.0 °KW</p>	<p>1- engine speed (idle rpm) 2- engine load 3- ignition delay of cylinder 1 due to the knock control 4- ignition delay of cylinder 2 due to the knock control</p>
<p>Block 15</p> <p>1. 820...920rpm 2. 1.00...2.50ms 3. 0...15.0 °KW 4. 0...15.0 °KW</p>	<p>1- engine speed 2- engine load 3- ignition delay of cylinder 3 due to the knock control 4- ignition delay of cylinder 4 due to the knock control</p>
<p>Block 16</p> <p>1. 0.300...1.400V 2. 0.300...1.400V 3. 0.300...1.400V 4. 0.300...1.400V</p>	<p>1- cylinder 1 knock sensor signal voltage 2- cylinder 2 knock sensor signal voltage 3- cylinder 3 knock sensor signal voltage 4- cylinder 4 knock sensor signal voltage</p>
<p>Block 18</p> <p>1. 820...920rpm 2. 1.00...2.50ms 3. 4. -30.0...25.0%</p>	<p>1- engine speed (idle rpm) 2- engine load (without altitude regulation) 3- engine load, throttle angle 4- altitude regulation factor</p>
<p>Block 19</p> <p>1. 820...920rpm 2. 1.00...2.50ms 3. 4. 12 °</p>	<p>1- engine speed (idle rpm) 2- engine load 3- working condition ×1×=without ignition delay, ×0×=with ignition delay 4- ignition angle</p>
<p>Block 20</p> <p>1. 820...920rpm 2. 3. 4.</p>	<p>1- engine speed (idle rpm) 2- shift signal (P/N, 2, 3, 4, R, D) 3- AC mode 4- compressor mode on/off</p>
<p>Block 21</p> <p>1. 820...920rpm 2. 1.00...2.50ms 3. 80...105 4.</p>	<p>1- engine speed (idle rpm) 2- engine load 3- coolant temperature 4-λmodification mode off/on</p>
<p>Block 23</p> <p>1. 2. 72.0...95.0%</p>	<p>1-adaption requirement the first digit: 1=adaption normally finished, 0=adaption required the third to sixth digit: 1=adaption not finished and abnormal, 0=adaption</p>

3. 67.0...83.0% 4. 18.0...54.0%	finished, normal the second and seventh digit: not use 2- minimal stop position of throttle regulator 3- urgency operation stop position of throttle regulator 4- maximal stop position of throttle regulator
Block 24 1. 0...6800/mm 2. 0...10.00ms 3. -20...40 ° 4. 0...72.0°KW	1- engine speed 2- engine load 3- ignition angle 4- cylinder 1...4 ignition retard angle
Block 25 1. 2. -30...30°KW 3. 4. -3...21°KW	1- engine working condition 2- regulation error of Hall sensor 3- working condition (intake air manifold switch over/camshaft regulation)(second digit by count down 1=long intake air path, last digit denote camshaft regulation (1=advance) 4- enable the camshaft regulation
Block 26 1. 0...6800/mm 2. 0...10.00ms 3. 4. -3...21°KW	1- engine speed 2- engine load 3- working condition (intake air manifold switch over/camshaft regulation) 4- enable the camshaft regulation
Block 95 1. 820...920rpm 2. 1.00...2.50ms 3. 12 ° 4. 80...105	1- engine speed (idle rpm) 2- engine load 3- ignition angle 4- coolant temperature
Block 98 1. 0.5...4.9V 2. 0.5...4.9V 3. 4.	1- throttle potentiometer voltage (G69) 2- throttle regulator sensor voltage (G127) 3- engine mode: idle/part load 4- regulation mode: adapting adaption finished adaption error
Block 99 1. 820...920rpm 2. 80...105 3. -10...10% 4.	1- engine speed 2- coolant temperature 3-λ regulation 4-λ control mode: off/on

Passat B5 AT System Data Stream Block Table

Display	Definition
001 1. 2. 3. 4.	1- shift position (P/R/N/D/3/2/1) 2- throttle potentiometer voltage (idle 156...0.8V, throttle wide open 3.5...4.680V) 3- acceleration pedal (idle 0...1%, wide open throttle 99...100%) 4- wide open throttle position (the first digit: 1=pedal depressed, 2=pedal released. The second digit: 1=TCS enabled, 0=TCS disabled. The third digit: not use. The fourth digit: 1=kickdown switch enabled, 0=kickdown switch disabled. The fifth digit: for multifunction switch F125, R, N, D, 3, 2 is 1;P, 1 is 0). The sixth digit: for multifunction switch F125, P, R, 2, 1 is 1; N, D, 3 is 0. The seventh digit: for multifunction switch F125, R, N, D, P is 1; 3, 2, 1 is 0. The eighth digit: for multifunction switch F125, R, N, P is 1; N, D, 3, 2, 1 is 0.
002 1. 2. 3. 4.	1- solenoid valve 6-N93 rating current (neutral, wide open throttle 0.0A, idle maximal 1.1A) 2- solenoid valve 6-N93 rating current (neutral, wide open throttle 0.0A, idle maximal 1.1A) 3- battery voltage (10.8...16) 4- VSS-G68 voltage (stop, .20...2.52V)
003 1. 2. 3. 4.	1- vehicle speed 2- engine speed 3- gear (neutral=0, reverse=R, gear 1 hydraulic=1H, gear 1 mechanical =1M, gear 2 hydraulic =2H, gear 2 mechanical=2M, gear 3 hydraulic =3H, gear 3 mechanical=3M, gear 4 hydraulic =4H, gear 4 mechanical =4M,) 4- acceleration pedal (idle 0...1%, wide open throttle 99...100%)
004 1. 2. 3. 4.	1- solenoid (solenoid 1-N88=1, solenoid 2-N89=2, solenoid 3-N90=3, solenoid 4-N91=4, solenoid 5-N92=5, solenoid 7- N94=6.) Shift position: P=1010000; R=0010000; N=1010000; D, 3, 2, 1(1H, 1M)=0010000; D, 3, 2 (2H, 2M)=0110000; D, 3 (3H, 3M)=0000001; D (4H, 4M)=1100001.) 2- gear (same as block 003) 3- gear (P/R/N/D/3/2/1) 4- vehicle speed

005	1- ATF temperature 2- shift output (the first and second digit: ignition timing regulation ON=1, OFF=0; the third digit: shift lever lockup solenoid -N110 ON=1, OFF=0; the fourth digit: kickdown solenoid ON=1, OFF=0; the fifth digit: CCS ON=1, OFF=0; the sixth digit: AC ON=1, OFF=0; the seventh digit: P/N signal, P, N=1, R=0, D, 3, 2, 1=1/0.) 3- gear (same as 003) 4- engine speed
006	May be ignored
007	1- gear (same as block 003, "+" or "-" depend on display area 2) 2- lockup clutch slip 3- engine speed 4- acceleration pedal (same as block 001)
008	May be ignored

Passat B5 ABS Data Stream Block Table

Block	Definition
001	1- FL rpm sensor wheel speed 2- FR rpm sensor wheel speed 3- RL rpm sensor wheel speed 4- RR rpm sensor wheel speed
002	1- brake light switch (1: brake pedal depressed=0, released=1) 2- pump generator voltage (1: with voltage, abnormal; 0: without voltage, normal) 3- solenoid relay (1: enabled; 0: disabled) 4- not use
003	1- engine speed (with ASR) 2- engine torque (with ASR) (0% engine at thrust stage, 20%...30% engine idle, 100% maximal engine torque) 3- ASR button (with ASR) (1: button pressed; 0: button not pressed) 4- not use
004	1- stop time 2- EDS disconnected by too high braking temperature (0: EDS does not disconnect during 20 times ignition; 1: EDS disconnect during 20 times ignition) 3- EDS/ASR disconnect (0: EDS/ASR normal; 1: EDS/ASR abnormal) 4- not use

Jetta Engine System Data Stream Block Table

Display	Definition
00 1. 170...210 2. 26...50 3. 80...88 4. 176...212 5. 4...12 6. 118...138 7. 112...114 8. 78...178 9. 2242...255bzw (or) 0...13 10. 118...138	1- coolant temperature (about 80...110 °C) 2- engine load (about 1.3...2.5ms) 3- engine speed (about 800...880rpm) 4- battery voltage (about 12...14.5V) 5- throttle angle (about 2...5 °) 6- idle air flow regulation (idle regulator) (about -2.5...+2.5kg/h) 7- idle air flow adaption (about -4...+4kg/h) 8-λ regulation (about -10...+10%) 9-λ regulation adaption (add) (about -0.64...+0.64ms) 10-λ regulation adaption (subtract) (about - 8...+8%)
01 1. 800...880 rpm 2. 1.3...2.5ms 3. 2...5 ° 4. 6...12°VOT	1- idle rpm changes one time each 40 steps 2- engine load 3- throttle angle fuel pedal fully depressed: 80...90 ° when any throttle fault is detected: 35 ° 4- ignition angle
02 1. 800...880 rpm 2. 1.3...2.5ms 3. 2.0...5.0ms 4. 2.0...5.0g/s	1- idle speed changes one time each 40 steps 2- theoretic fuel injection time per revolution of the crankshaft 3- the calibrated injection time of each working cycle 4- intake air volume
03 1. 800...880rpm 2. 12...15V 3. 80...110 4. ...	1- engine speed changes one time each 40 steps 2- battery voltage 3- coolant temperature 4- intake air temperature
04 1. 2...5 ° 2. -1.7...+1.7g/s 3. 0.00g/s 4. idle	1- throttle angle 2- idle air flow adaption 3- always display "0" for M/T 4- working mode (idle, part load, full load, acceleration, O/D cut off)
05 1. 800...880rpm 2. 840rpm 3. -10...+10% 4. 2.0...5.0 g/s	1- engine speed (practical) changes one time each 10 steps: maximal 2550 rpm. 2- engine speed (set) changes one time each 10 steps 3- idle regulator 4- air flow

<p>06</p> <ol style="list-style-type: none"> 1. 800...880rpm 2. -10...+10% 3. -10...+10% 4. 6...12°VOT 	<ol style="list-style-type: none"> 1- idle speed changes one time each 10 steps 2- idle regulator 3-λ regulator 4- ignition angle
<p>07</p> <ol style="list-style-type: none"> 1. -10...+10% 2. 0...1V 3. 0...99% 4. 0.3...1.1 	<ol style="list-style-type: none"> 1-λ regulator 2-λ sensor voltage 3- canister N80 solenoid valve 1 duty ratio: 0= N80 closed, 99= N80 full open 4-λ calibration coefficient of EVAP
<p>08</p> <ol style="list-style-type: none"> 1. 2.0...5.0ms 2. -10...+10% 3. -8...+8% 4. TE active or TE inactive 	<ol style="list-style-type: none"> 1- injection time 2-λ adaption at idle (add) 3-λ adaption at full load (subtract) 4-"TE active" denote the canister solenoid valve 1 on and off according to the time (6 to 16 minutes)."TE inactive" denote the canister solenoid valve 1 always closed (1 minute)
<p>09</p> <ol style="list-style-type: none"> 1. rpm 2. -10...+10% 3. 0...1.0V 4. -10...+10% 	<ol style="list-style-type: none"> 1- engine speed changes one time each 10 steps 2-λ regulator 3-λ sensor voltage 4- idle λ adaption (add)
<p>10</p> <ol style="list-style-type: none"> 1. 0...99% 2. 0.3...1.2 3. -3...+32 4. 0.00...0.30 	<ol style="list-style-type: none"> 1- canister (AKF) solenoid duty ratio 2- EVAPλcalibration coefficient 3- canister charging grade, -3 denote no fuel smoke in canister; +32 denote the canister is full of fuel smoke 4- canister filter purging grade (AKF) : 000 = AKF input; 0.30 =30% of intake air comes from AKF
<p>11</p> <ol style="list-style-type: none"> 1. 800...880rpm 2. 1.3...2.5ms 3. 0km/h 4. 0.5...1.5 l/h 	<ol style="list-style-type: none"> 1- engine speed changes one time each 40 steps 2- engine load 3- vehicle speed 4- fuel consumption: the all displayed values are applicable to the idle mode without extra load (AC, engine, power steering).
<p>13</p> <ol style="list-style-type: none"> 1. 0...15°kw 2. 0...15°kw 3. 0...15°kw 4. 0...15°kw 	<ol style="list-style-type: none"> 1- reduce ignition angle of cylinder 1 by knock regulation 2- reduce ignition angle of cylinder 2 by knock regulation 3- reduce ignition angle of cylinder 3 by knock regulation 4- reduce ignition angle of cylinder 4 by knock regulation
<p>14</p> <ol style="list-style-type: none"> 1. rpm 2. ms 3. 0...15°kw 4. 0...15°kw 	<ol style="list-style-type: none"> 1- engine speed changes one time each 40 steps 2- engine load (injection time per revolution) 3- ignition angle reduction of cylinder 1 by knock regulation 4- ignition angle reduction of cylinder 2 by knock regulation

<p>15</p> <ol style="list-style-type: none"> 1. rpm 2. ms 3. 0...15⁰kw 4. 0...15⁰kw 	<ol style="list-style-type: none"> 1- engine speed changes one time each 40 steps 2- engine load (injection time each revolution) 3- ignition angle reduction of cylinder 3 by knock regulation 4- ignition angle reduction of cylinder 4 by knock regulation
<p>16</p> <ol style="list-style-type: none"> 1. 0.4...2.0V 2. 0.4...2.0V 3. 0.4...2.0V 4. 0.4...2.0V 	<ol style="list-style-type: none"> 1- knock sensor signal of Cyl 1 2- knock sensor signal of Cyl 2 3- knock sensor signal of Cyl 3 4- knock sensor signal of Cyl 4
<p>18</p> <ol style="list-style-type: none"> 1. 800...880rpm 2. 1.3...2.5ms 3. ...ms 4. -50...+25% 	<ol style="list-style-type: none"> 1- engine speed changes one time each 40 steps 2- air flow meter engine load 3- throttle angle engine load 4- altitude calibration coefficient
<p>20</p> <ol style="list-style-type: none"> 1. 800...880rpm 2. 00000100EIN 00000000AUS 3. A/C-high A/C-low 4. Kompr.EIN Kompr.Aus 	<ol style="list-style-type: none"> 1- engine speed changes each 40 steps 2- low octane number switch (if the fuel is poor, screen display as below. 00000100EIN (open)) 3- AC High=large AC power Low=small AC power 4- AC compressor on/off always display "Kompr.Aus" for vehicles without AC
<p>21</p> <ol style="list-style-type: none"> 1. rpm 2. ms 3. 4. λ regulation off λ regulation on 	<ol style="list-style-type: none"> 1- engine speed changes each 40 steps 2- engine load 3- coolant temperature 4-λ regulation off/on
<p>23</p> <ol style="list-style-type: none"> 1. 01000000 2. 73...97% 3. 54...85% 4. 6...43% 	<ol style="list-style-type: none"> 1- adaption requirement 1= not use 2= throttle regulator potentiometer adaption minimal estimate value "0"=adapted, adaption normal, "1"=adaption not performed, adaption abnormal 3= throttle regulator potentiometer adaption maximal compute value "0"=adaption performed, normal; "1"=adaption not performed, abnormal 4= throttle potentiometer G69 adaption minimal compute value "0"=adaption performed, normal; "1"=adaption not performed, abnormal 5= throttle potentiometer G69 adaption maximal compute value "0"=adaption performed, normal; "1"=adaption not performed, abnormal 6=not use

	<p>7= throttle potentiometer G69 compare with the throttle regulator potentiometer, "0"=must compare, "1"= adaption not performed, abnormal;</p> <p>8=not use</p> <p>2- throttle regulator V60 minimal compute value 3- throttle regulator V60 emergency compute value 4- throttle regulator V60 maximal compute value</p>
<p>98</p> <p>1. 0...5V 2. 0...5V 3. idle part load 4. ADP active ADP normal ADP abnormal</p>	<p>1- throttle potentiometer voltage 2- idle regulator potentiometer voltage 3- mode 4- adaption mode ADP=throttle control unit adaption</p>
<p>99</p> <p>1. rpm 2. 3. -10...+10% 4. λ regulation -off λ regulation -on</p>	<p>1- engine speed 2- coolant temperature 3-λ regulator 4-λ regulation off/on System basic setting function: λ regulation off. Read data stream function: λ regulation on</p>

Golf Engine System Data Stream Block Table

Display	Definition
Block 00 1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Used by manufacturer
Block 01 1. about 800 rpm 2. 81...111 3. 0...1.0V 4. XXXX XXXX	1- engine speed 2- coolant temperature 3- O2 sensor voltage 4- engine mode
Block 02 1. about 800 rpm 2. 3. 81...111 4. entiriment temperature	1- engine speed 2- injection pulse width 3- battery voltage 4- intake air temperature
Block 03 1. about 800 rpm 2. 3. 4.	1- engine speed 2- engine load 3- throttle angle 4- ignition timing
Block 04	

1. abou 800 rpm	1- engine speed
2.	2- engine load signal
3. km/h	3- speed signal
4. XXXX XXXX	4- engine mode
Block 05	
1. about 800 rpm	1- engine speed
2.	2- engine load
3.	3- mixture calibrate
4.	4- mixture adaption value

Audi 200 Engine System Data Stream Block Table

Display	Definition
Block 00 1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Used by manufacturer
Block 01 1. 80...820rpm 2. 29...59% 3. not use 4. 18-75steps	1- engine speed 2- intake manifold pressure 3- computed ignition angle 4- N71 steps
Block 02 1. 0...85% 2. not use 3. 81...111 4. environment temperature	1- throttle opening 2- intake air manifold pressure 3- coolant temperature 4-intake air temperature
Block 03 1. 0.75...1.25 2. not use 3. 0.75...1.25 4. not use	1-λ control current adaption value (cylinder 1-3) 0=λ control adaption active (AKF off) 1= engine temperature too low 4= idle rpm too low 5= idle rpm too high 6=λ sensor inactive 7=λ control system inactive 10=the rating adaption value not obtained 11=ignition angle retarded 12=ignition angle advanced 16=λ control system inactive (AKF active) 2-λ-control current adaption value (cylinder 4-6) 3-λ-control (cylinder 1-3) 4-λ-control (cylinder 4-6)
Block 04 1. not use 2. not use 3. 0.75...1.25 4. 0.75...1.25	1-λ-control adaption mode 2- canister filter control current adaption value 3-λ-control (cylinder 1-3) 4-λ-control (cylinder 4-6)
Block 05 1.680...820 rpm	1- engine speed

2. value=60° 3. not use 4. 81...111	2-knock control 3-computed ignition angle 4- coolant temperature
Block 06 1. 10...60 2. 18...75 3. not use 4. not use	1- N71 position 2- idle stable-control current adaption value 3- influence on idle stable control by other signal 4- idle stable control
Block 07 1. 10...60 2. 81...111 3. 0.75...1.25 4. not use	1- N71 position 2- coolant temperature 3-λ-control current adaption value (cylinder 1-3) 4-λ-control current adaption value (cylinder 4-6)
Block 08 1. 10...60 2. 81...111 3. 0.75...1.25 4. not use	1- N71 steps 2- coolant temperature 3-λ-control current adaption value (cylinder 1-3) 4-λ-control current adaption value (cylinder 4-6)
Block 09 1. 81...111 2. 1 or 0 3. not use 4. 680...820rpm	1- coolant temperature 2- idle switch-mode (0=on, 1=off) 3- computed ignition angle 4- engine speed
Block 10 1. 81...111 2. 1 or 0 3. 0.75...1.25 4. not use	1- coolant temperature 2- idle switch -mode (0=on, 1=off) 3-λ-control current adaption value (cylinder 1-3) 4-canister filter-current adaption value
Block 99 1. 2. 3. 4.	1- engine current practical rpm 2- engine current practical load 3- coolant temperature 4-λ regulation off/on System basic setting function: Λ regulation off Read data stream function: λ regulation on

Appendix III: Channel Function Table of Volkswagen Vehicle

Audi 200

Channel	Function
00	idle stable valve
01	idle speed

Audi A6

Channel	Function
02	Reset the service cycle after repair
03	Fuel consumption display adaption
04	Language selection
09	Mileage display
18	Stop heating system adaption
30	Fuel meter sensor characteristic curve adaption
35	rpm restriction adaption
40	Mile adaption after repair
41	Drive time adaption after repair
42	Minimal mile (km) adaption
43	Maximal mile (km) adaption
44	Maximal interval adaption
45	Oil mass adaption
46	Total fuel consumption adaption
21	Immobilizer

Passat B5

Channel	Function
03	Fuel consumption indication calibration
04	Language selection (only applicable to top-grade combination instrument panel)
09	Mileage display match
10	Replace oil service (OEL)-mileage
11	Mileage inspection (INSP)-counter maintenance-interval data
12	Time (unit 10-day interval) inspection (INSP)-maintenance data of the mileage counter
30	Gasoline storage indication match

Appendix IV: Control Unit Code of Popular Volkswagen Vehicles

Audi A6

1. Engine system : 04002
2. Transmission system
 - 1) Vehicle without electronic throttle control

Code	Engine	Tiptronic mode	DSP	Market
00000	Applicable to every combinations of transmission and engine with no electronic throttle control	Old mode or non-Tiptronic mode	DSP effective	Front wheel drive cars or 4 wheel drive cars in USA or areas other than Germany
00010			DSP ineffective (it should be kept ON if possible)	Front wheel drive cars or 4 wheel drive cars in USA or areas other than Germany

Note:

- ◆ *“New” in Tiptronic mode: when the speed selector is in Tiptronic channel, the transmission will automatically accelerate or decelerate before reaching the speed limit so that engine can run between the idle speed and the decelerated speed. The speed can also be slowed down when the accelerator pedal is fully depressed to kickdown;*
- ◆ *“Old” in Tiptronic mode: when the speed selector is in Tiptronic channel, acceleration/deceleration can only be realized by pushing the speed lever forward(+)/backward(-). When the car is stopped after braking, the transmission will be automatically shifted to the first gear of starting.*

- 2) Vehicle with electronic throttle control

Code	Engine	Tiptronic mode	DSP	Market
00000	Match of every transmission and effective engine with electronic throttle control			
00001		New	DSP effective	4WD cars in areas other than Germany
00011		New	DSP ineffective	4WD cars in areas other than Germany
00021		Old	DSP effective	4WD cars in areas other than Germany
00031		Old	DSP ineffective	4WD cars in areas other than Germany
00002		New	DSP effective	4WD cars in USA
00012		New	DSP ineffective	4WD cars in USA
00022		Old	DSP effective	4WD cars in USA
00032		Old	DSP ineffective	4WD cars in USA
00003		New	DSP effective	4WD cars in USA
00013		New	DSP ineffective	4WD cars in USA
00023		Old	DSP effective	4WD cars in USA
00033		Old	DSP ineffective	Other areas in the world
00004		New	DSP effective	Front wheel drive cars in USA

Code	Engine	Tiptronic mode	DSP	Market
00014		New	DSP ineffective	Front wheel drive cars in USA
00024		Old	DSP effective	Front wheel drive cars in USA
00034		Old	DSP ineffective	Front wheel drive cars in USA

Note:

- ◆ *"New" in Tiptronic mode: when the speed selector is in Tiptronic channel, the transmission will automatically accelerate or decelerate before reaching the speed limit so that engine can run between the idle speed and the decelerated speed. The speed can also be slowed down When the accelerator pedal is fully depressed to kickdown;*
- ◆ *"Old" in Tiptronic mode: when the speed selector is in Tiptronic channel, acceleration/deceleration can be realized only by pushing the speed lever forward(+)/backward(-). When the car is stopped after braking, the transmission will be automatically shifted to the first gear of starting.*

3. ABS/ASR system

Engine	Transmission	Data transfer route	ECU spare part No. and index		Code
2.4L, 6 Cylinder, 5 Valve	Manual transmission 012	CAN bus	8E0 614 111	AH AJ	00032
	Manual transmission 01V	CAN bus	8E0 614 111	AH AJ	00031
2.8L, 6 Cylinder, 5 Valve	Manual transmission 012	CAN bus	8E0 614 111	AH AJ	00032
	Manual transmission 01V	CAN bus	8E0 614 111	AH AJ	00031
1.8L 4 Cylinder 5 Valve	Manual transmission 012	Single wire	8E0 614 111	B:F	Can't be coded

4. Air bag system

Air bag system		Code
Air bag 8: there are two front seat air bags, two front seat belt tensioners and two rear seat belt tensioners in the car.		00004
Air bag: there are two front seat air bags, two front side air bags, front seat belt tensioner and two rear seat belt tensioners in the car.		00104
Air bag 8: there are two front seat air bags, two front side air bags, two rear side airbags, front seat belt tensioner and two rear seat belt tensioners in the car.		00204

5. Central door lock system

	Without anti-theft alarm	With anti-theft alarm
Safety device of central door lock (SZV)	4676	4686

Locking of trunk lid (when car is moving)	4688 (without SZV) 4692 (with SZV)	4698 (without SZV) 4702 (with SZV)
Automatic locking of car door when car is travelling at the speed higher than 40km/h	4704 (without SZV) 4708 (with SZV)	4714 (without SZV) 4718 (with SZV)

6. Internal ultrasonic monitoring system

Code	00001
00	Padding bit, insignificance
0	Audi A6
0	Original state: static
1	Four-door sedan
2	Touring car

7. Combined instrument system

ABCDE				The code is a 5-digit number
AB				Select equipment
00				No selectable equipment
01				Brake wear indicator
02				Seat belt warning system
04				Cleaning agent alarm system
16				GPS
	C			Country
	0			Germany (D)
	1			Europe (EU)
	2			USA (US)
	3			Canada (CDN)
	4			Great Britain (GB)
	5			Japan (JP)
	6			Saudi Arabia (SA)
	7			Australia (AUC)
		D		Number of cylinder
		4		4 cylinders
		6		6 cylinders
		8		8 cylinders
			E	Engine type
			0	TDL engine
			2	4-cylinder and 6-cylinder engine
			3	8-cylinder engine

8. Immobilizer : 07602

9. Radio set and telephone

5	4	3	2	1	Position of decimal code displayed on screen		
				7	Type of radio set		
					Antenna	CD	Secondary screen
				1	X	-	-
				3	X	X	-
				5	X	-	X
				7	X	X	X
					"X"=with this part "—"=without this part		
			0		Audio system adjustment		
					Type of adjustment		
				0	Standard (Bose audio)		
				1	Bose audio system		
		2			Number of passive speaker		
					Number and position		
				0	Without passive speaker (Bose audio system)		
				1	1 left passive speaker (Bose with telephone)		
				2	2 front passive speaker and 2 rear active speaker		
				5	2 front passive speaker and no rear active speaker		
	0				Audio match 0=Standard		
0					Country 0= Standard		

10. Auxiliary heating system

1) Control unit-J162 (software version No. is D47 or D48)

Code	Signification
00001	Power cut owing to undervoltage for adaptation when basic setting is reached.
00002	Power cut owing to undervoltage when the inputted voltage for adaptation is reached.

Note:

- ◆ Enter code 00001 only. Code 00002 is entered according to customer's request;
- ◆ For auxiliary heating device of which the spare part No. is 4B0 265 105, index No. is not higher than C and software version No. is D47 or D48, the spare part No. and software version No. can be read out by our scan tool in the function like [Read ECU memory];
- ◆ Power cut will be caused by undervoltage whenever the code is 00001 and the voltage of auxiliary heating device is lower than the battery voltage for adaptation of basic setting;
- ◆ Power cut will be caused by undervoltage whenever the code is 00002 and the voltage of auxiliary heating device is lower than the battery voltage inputted for adaptation.
- ◆ If the fault message like "Power cut owing to undervoltage (constant value)" is displayed for auxiliary heating device (code is 00001), please perform the following steps:
 - 1) Change the code of auxiliary heating device to 00002 and confirm the control unit code;
 - 2) Read out the inputted value (constant value) of undervoltage power cut by means of the

- function [Adaptation] and then perform adaptation;*
- 3) *Alter the constant value by means of the function [Adaptation] (Specified value is below 10.5V);*
 - 4) *Change the code of auxiliary heating device to 00001. Confirm the control unit code.*

2) Control unit-J162 (software version No. is D49 or over)

Code	Signification
00011	With recirculation pump-V55 Power cut owing to undervoltage for adaptation when the basic setting is reached.
00012	With recirculation pump-V55 Power cut owing to uncervoltage when the inputted voltage for adaptation is reached.

Note:

- ◆ *Enter code 00011. Code 00012 is entered only if requested by customer;*
- ◆ *For auxiliary heating device of which the spare part No. is 4B0 265 105, index No. is higher than D and software version No. is D49 or over, the spare part No. and software version No. can be read out by our scan tool in the function like [Read ECU memory];*
- ◆ *Power cut will be caused by undervoltage whenever the code is 00011 and the voltage of auxiliary heating device is lower than the battery voltage for adaptation of basic setting;*
- ◆ *Power cut will be caused by undervoltage whenever the code is 00012 and the voltage of auxiliary heating device is lower than the battery voltage inputted for adaptation;*
- ◆ *If the fault message like "Power cut owing to undervoltage (constant value)" is displayed for auxiliary heating device (code is 00011), please perform the following steps:*
 - 1) *Change the code of auxiliary heating device to 00012 and confirm the control unit code;*
 - 2) *Read out the inputted value (constant value) of uncervoltage power cut by means of the function [Adaptation] and then perform adaptation;*
 - 3) *Alter the constant value by means of the function [Adaptation] (Specified value is below 10.5V);*
 - 4) *Change the code of auxiliary heating device into 00011. Confirm the control unit code.*

Passat B5

1. Engine system

Country/Emission rule	Drive/Additional function	Transmission	Vehicle model
00=	0=front wheel drive without ASR / front wheel drive without ESP	0=5-gear manual transmission	0=
01=	1=	1=	1=grade B, e.g.Passat
02=EC member countries I	2=Four wheel drive without ESP	2=	2=
03=	3=	3=	3=
04= EC member countries II / Engine II without secondary air system II (MVEG-II)	4=	4=	4=
05=	5=	5=A/T 01VTiptronic	5=
06=	6=	6=	6=
07=	7=	7=	7=

2. Air bag system

Equipment	Index	Code
There is air bag at driver side	A	00065
There are air bags for driver/front passenger	B	00066
There are air bags for driver/front passenger (USA)	C	00067
There are air bags for driver/front passenger/side air bag	A	00065
There are air bags for driver/front passenger/side air bag (USA)	B	00066

3. A/C

Code	Vehicle
02000	Other than Japan
02100	Japan
05000	Other than Japan, 98.11
05100	Japan, 98.11

4. Comfort system

Equipment		Code
Centrally controlled lock	One door open	00256
2-Electric window	All doors open	00257
Centrally controlled lock	One door open	00258
2-Electric window and memory	All doors open	00259
Centrally controlled lock	One door open	04096
4-Electric window	All doors open	04097
Centrally controlled lock	One door open	04098
4-Electric window and memory	All doors open	04099
Equipment (Switzerland)		Code
Centrally controlled lock	One door open	00064
2-Electric window	All doors open	00065
Centrally controlled lock	One door open	00066
2-Electric window and memory	All doors open	00067
Centrally controlled lock	One door open	01024
4-Electric window	All doors open	01025
Centrally controlled lock	One door open	01026
4-Electric window and memory	All doors open	01027

5. ABS system

Code	Engine/Transmission
00064	2.8L 6Cylinder/5V engine and manual transmission 012
00067	2.8L 6Cylinder/5V engine and automatic transmission 01V

Jetta

1. Engine system: 04000
2. MK20-I ABS system: 03604

Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE LAUNCH PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

LAUNCH electronic product is warranted against defects in materials and workmanship for one year (12 months) from date of delivery to the user.

This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and LAUNCH shall not be liable for any consequential or incidental damages.

Final determination of defects shall be made by LAUNCH in accordance with procedures established by LAUNCH. No agent, employee, or representative of LAUNCH has any authority to bind LAUNCH to any affirmation, representation, or warranty concerning LAUNCH automotive meters, except as stated herein.

Disclaimer

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Order Information

Replaceable and optional parts can be ordered directly from your LAUNCH authorized tool supplier. Your order should include the following

information:

1. Quantity
2. Part number
3. Item description

Customer Service

If you have any questions on the operation of the unit, please contact us:

Tel: 86-755-84528431/84528822

E-mail: X431@cnlaunch.com

If your unit requires repair service, return it to the manufacturer with a copy of the sales receipt and a note describing the problem. If the unit is determined to be in warranty, it will be repaired or replaced at no charge. If the unit is determined to be out of warranty, it will be repaired for a nominal service charge plus return freight. Send the unit pre-paid to:

Attn: Customer Service Department
LAUNCH TECH. CO., LTD.
Launch Industrial Park,
North of Wuhe Avenue,
Banxuegang, Bantian,
Longgang, Shenzhen, Guangdong
P.R.China, 518112