APPENDIX G

: USER'S MANUAL

Automotive Diagnostic Scan Tool

Multiscan

Operator's Manual and Reference Book

Automotive Diagnostic Solutions
Hanatech Co.,Ltd.

CHAPTER 1   SAFETY AND WARRANTY

Chapter 1

Safety and Warranty

About this Manual

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The contents of this manual are the result of contributions by dozens of individuals all who have added their vital expertise and experience to the evolution of the contents of this manual.

The information contained in this manual may contain printing errors and is subject to change without notice according to product upgrade. Hanatech shall not be liable for errors contained herein or for incidental or consequential damage in connection with the furnishing, performance, or use of this material.

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Using this Manual

It is recommended that the user become familiar with the operating procedures, terminologies and information contained within this user's manual. This will help to increase the user's effectiveness with this equipment.

Vehicle system familiarity

While this equipment provides very powerful functions with extensive vehicle coverage, it cannot replace knowledge and skill. To get the most out of this equipment, a full understanding of vehicle systems is required. It is recommended that the equipment be used in conjunction with the original service manual for the vehicle being tested.

The equipment is designed for use by trained service personnel and this manual assumes that the service technician who is going to use this equipment has a familiarity with vehicle electronic control systems, however, the latest service manuals and bulletins should always be referenced before using this equipment.

I. SAFETY INSTRUCITONS ----------------

Thank you for purchasing Multiscan. To get the maximum performance of the equipment, please carefully read this manual first, and keep it at hand.

On delivery inspection

When the equipment is delivered, a check should be made for any damaged or missing components. If the unit is damaged or fails to operate according to the specifications, contact your local distributor or the manufacturer, Hanatech Co., Ltd., Hana bldg., 80-1 Songjung-dong, Gumi-shi, Kyung-buk Republic of Korea 730-090. In the unlikely event the equipment requires shipping back to the manufacturer, please use the original packing material.

Safety symbols

The following symbols are used throughout this manual:

⚠ DANGER	This mark means that dangerous consequences may arise, with the possibility of death or serious injury to the user, if the machine is handled incorrectly.
⚠ WARNING	This mark means dangerous consequences may arise, with the possibility of somewhat serious injury to the user and or damage to the machine and facilities, if the equipment is handheld incorrectly.

SYMBOL	Description
⚠	This symbol is affixed to locations on the equipment where the operator should consult corresponding topics in this manual (which are also marked with the ⚠ symbol) before using relevant functions of the equipment. In the manual, this symbol indicates explanations that are particularly important that the user is expected to read the manual before using the equipment.
▬▬ ▬ ▬ ▬	This symbol represents DC (Direct Current)

Safety guideline

In order to ensure proper operation and satisfactory performance, observe the cautions listed below.

⚠ DANGER
This equipment is designed to comply with IEC 61010-1 safety standards, and has been tested for safety prior to shipment. Excessive high voltage measurement or improper operation could result in personal injury, as well as damage to the equipment or the vehicle. Please read this manual carefully and be sure that you understand its contents before using the equipment. The manufacturer disclaims all responsibility for any accident except for that resulting due to defect in its product.

⚠ WARNING	
⚡	For safety reasons, this equipment should not be used to measure circuits carrying more than 30Vrms or 42.4V peak. To avoid electrical accident that could result in injury or death, do not measure voltage in excess of these limitations. Maximum rated measurable voltage is 30Vrms or 42.4V peak.

II. SAFETY PRECAUTIONS ----—-------------

DANGER

When an engine is running, keep the workshop area WELL VENTILATED or attach a building exhaust removal system to the engine exhaust system. Engines produce carbon monoxide, an odorless and poisonous gas that causes slower reaction time and may lead to serious injury or death.

WARNING

Brakes and wheel blocks

Apply the hand brake and block the wheels before using the test equipment. It is highly recommended to block the wheels on front-wheel drive vehicles because the hand brake does not hold the driving wheels.

Drive Test

Do not drive the vehicle and operate the test equipment at the same time. Any distraction may cause an accident. Have one person operate the test equipment while the other person drives the vehicle.

Never place the test equipment in front of you when driving the vehicle because the test equipment may hit your body and cause serious injury when the air bag inflates.

Do not try to test the SRS air bag system while driving the vehicle as unintended air bag inflation may result.

Engine Compartment

Maintain sufficient clearance between moving components or belts while using the test equipment in the engine compartment. Moving components and belts may catch loose clothing, test cables or a part of your body and cause damage or personal injury.

Electrical Components

Always turn the ignition key OFF when connecting or disconnecting electrical components unless otherwise instructed.

Vehicle Battery

Multiscan is designed to prevent damage from reverse polarity battery cable connection, however, it is always highly recommended to always ensure correct polarity terminal connection.

Never lay the test equipment on vehicle battery. You may short the terminals and may cause damage to your body, the test equipment or the battery.

To avoid damaging the test equipment or displaying false data, make sure the vehicle battery is fully charged and the connections to the electronic control module are clean and tight.

The warning messages above and the safety messages contained hereinafter cover situations Hanatech is aware of. Hanatech cannot know, evaluate or advise you as to all of the possible hazards. You must make sure that any conditions or service procedures encountered do not jeopardize your personal safety.

III. WARRANTY SERVICE ----------------------

Warranty Period

In principle, Multiscan is warranted to the consumer to be free of defects in material and workmanship for the period of 3 years after the date of purchase.
If the product is found defective during this period, the product can be returned to Hanatech and will be repaired or replaced free of charge.

Freight and repair Cost

For the repair of head unit, Hanatech covers the freight cost for the service during one year from the date of purchase, and you can send the troubled unit to your local distributor without having to pay the freight cost.   You should consult with your local distributor about the validity of remaining warranty period before sending the unit.
For the remaining two years, you are liable for any international cost incurred.   Repair or replacement will be provided free of charge.
When the warranty period is expired after three years, the customer must pay the round trip freight and the repair or replacement cost.

Upon delivery

Hanatech inspects all the ordered product parts and components are included in the package before shipment, and includes the original copy of pre-shipment inspection report in the box.   As soon as the product is delivered to you, please ensure everything you ordered is properly checked and included referring to the pre-shipment inspection report.   If there is anything missing or damaged, you must notify the local distributor immediately within 3 working days from the delivery date for free of charge replacement of the parts.

In case of trouble

If you encounter any malfunction or trouble with the equipment, please refer to the Trouble Shooting chapter in this manual.   If the problem cannot be solved, please contact your local distributor for assistance.   For early identification of a fault or error,

your local distributor will require the following details:

1. Symptom of problem you are experiencing

2. Serial number of the head unit

3. Vehicle information: Which specific car were you testing when the problem occurred – Model name, Model year and system ID number if available (for Mitsubishi, Subaru and Suzuki only: Refer to Japanese car chapter for details)

Warranty Void

Even in the effective warranty period, if the problem is found to be caused by any of the followings, Hanatech charges the cost for round trip freight and actual cost for the service to the customer, and the shipment back to the customer will be suspended until the customer's payment is duly made

1. Evidence of improper use or application of the product ignoring the cautions and warnings stipulated in the user's manual

2. Intentional damage or modifications to the product or user's attempt to repair without proper authorization

3. Any damage caused by Force Majeure including war and natural disaster

4. Loss of time, inconvenience and other consequential damage or loss

Warranty void seal

In addition to the above mentioned warranty void conditions, warranty service is not provided in case the warranty void seal is broken or removed.

If you remove the head unit safety boot, you will see a yellow round sticker covering one of the screw holes in the back. Please be careful not to break this seal and never try to open the head unit without direct authorization from the manufacturer.

Bought in other countries

Only the products properly supplied by the contracted authorized local distributors are recognizable for free of charge warranty service. Any equipment bought outside the contracted national territory of your local distributor will be charged for service.

FCC RF INTERFERENCE STATEMET

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does not cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

CAUTION

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE. AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

CHAPTER 2 | SPECIFICATION AND PARTS

Specification and Parts

I.　Specification ------------------------------------

A.　Hardware

CPU: 16bit, 33MHz

RAM: 1 Mbyte (SRAM)

Program Cartridge Memory: 128Mbytes built-in Flash Memory

Display: 320×240 Monochrome Graphic LCD with Back Light

Key Pad: 20 membrane keys, embossing type

Com Port: USB and RS232

Printer: General PC printer

Power: DC 8~18V, 600mA or higher

B.　Environmental Specification

Indoor use only

Operating temperature: Max 50℃ /122℉

Maximum relative humidity: 80% (up to 31℃/88℉) and 50% (40℃/104℉ or higher)

Installation overvoltage categories: CATⅡ

Maximum measurable voltage: DC 30V Max

Pollution degree 2

Max. Altitude: Up to 2000m

C. Mechanical Dimensions

Length: 222㎜ / 9 "

Width: 187㎜ / 7.5"

Height: 51㎜ / 2 "

Weight: 950g / 2.1 lb (head unit only)

Body Color: Dark Grey

Safety Boot Color: Yellow / Blue / Red

All specifications are subject to change without notice for the purpose of product and quality improvement.

II. Part List --------------------------------------

A. Head unit and basic supplies

1. Head Unit (P/N.   )
- Made of strong ABS resin, each unit has passed internal impact test before shipment. .

2. Safety Boot (P/N.   )
- Flexible plastic cover that protects the head unit from physical, chemical and electrical damage
- Basic color is blue, however, it can be changed according to the distributor's demand.

3. Carry Case (P/N.   )

Provides convenient transportation and the protection of the head unit and other components from outer physical impact during the transportation and storage. Carry case is provided when purchasing the head unit and at least one software package together. Includes keys and dial lock

4. Main Data Link Cable (P/N. 3001-0001)

− Connects vehicle side DLC and Multiscan head unit for data transmission.

− Connecting parts on both ends are exactly same, therefore, simply put any one end to the head unit, and then hook the other end to the vehicle side DLC after connecting an appropriate adaptor

5. Power Cable 1 – Cigarette Lighter (P/N. 3000-0004)

− Supplies power to the head unit from the cigarette lighter socket. Used when DLC is located near the driver or passenger seat and power is not supplied through DLC.

- LED lights on both ends turn ON when power is properly supplied.

- The metal plunger part in the end of cigarette lighter connector is removable by unscrewing for the fuse replacement. It may become loose over repeated use, therefore, it is highly recommended to check if it is tightly screwed frequently. A set of plunger parts are included in the basic supplies. Refer to spare parts section hereinafter.

- The rated voltage and current for this power cable are 12V and less than 2A.

6. Power cable 2 – Vehicle Battery (P/N. 3000-0005)

- Supplies power from the vehicle battery when the DLC is located in the engine bay or when using the oscilloscope or multi-meter functions

- Connect each of the two alligator clips to the battery terminal of the correct polarity with caution.

- Must be used together with the Power Cable 1. Insert the cigarette lighter adaptor of the Power Cable 1 into the socket, and connect the other end to the head unit.

- Red LED light turns ON when power is properly supplied from the vehicle battery.

B. Diagnostic Adapters

Diagnostic adapters are sold separately, therefore check if all the adapters you ordered are included in the package upon delivery.

There are two types of adapters: capsulated and wired types.

Most of Multiscan DLC adapters are capsulated for better durability and storage, however, sometimes it is difficult or almost impossible to connect the capsulated adapter to vehicle side DLC when it is located deep inside beneath the dashboard. We use wire type adapters for the cars such as Hyundai and Kia that we were reported to have such connecting difficulties.

Capsule type	Wire type

1. OBD2 Standard Adapter

(P/N. 3001-0010)

Used for all OBD generation 2 and EOBD compatible vehicles. Vehicle side DLC is generally located near the driver's seat and most frequently found beneath the dash panel.

2. Toyota / Lexus 17Pin Rectangular Adapter (P/N. 3001-0011)

Used for the diagnosis of Toyota and Lexus of OBD generation 1. Vehicle side DLC of this type is generally located in the engine compartment.

3. Toyota/Lexus 17Pin Semi-circular Adapter (P/N. 3001-0012)

Also used for the diagnosis of Toyota and Lexus of OBD generation 1.

The vehicle side DLC is generally found beneath the dashboard.

Refer to the following warning message.

⚠️ **WARNING**

The appearances of this adapter and **MAZDA 17Pin adapter** are exactly same, however, the internal wiring and circuit are different. Check the **engraved name** and the **body color** of the adapter carefully before use. **Improper adapter connection may result in serious malfunction of either control system and Multiscan head unit.**

4. Honda 3 Pin Adapter and 2 Pin Jump Wire

(P/N. 3-pin: 3001-0014, 2-pin wire: 3001-0023)

3-pin adapter is used for the diagnosis of Honda cars of OBD generation 1 that support DTC read and erase as well as data stream.

Older Honda cars have 2-pin DLC that supports DTC read only. The jump wire is used for these older cars to bridge the 2-pin DLC terminals.

The vehicle side DLC is generally located under the dashboard or the glove box.

5. Mitsubishi and Hyundai 12 Pin Adapter (P/N. 3001-0001)

Used for the communication with Mitsubishi and Hyundai cars of OBD generation 1.

A wire type adapter is provided as the connecting difficulties of capsule type adapter in quite a few Hyundai cars were reported.

6. Mitsubishi 12+16pin dual headed adapter (P/N: 3001-0030)

Used for the communication with Mitsubishi cars with both of 12-pin OBD1 and 16-pin OBD2 adapters on-board.

Refer to the Mitsubishi section, Chapter 6 for details.

7. Nissan and Samsung 14 Pin Adapter (P/N. 3001-0006)

Used for the communication with Nissan cars of OBD generation 1 and all Samsung passenger cars.

Vehicle side DLC is generally found under the dash or inside the fuse box.

8. Mazda 17 Pin Adapter (P/N. 3001-0013)

Used for the communication with Mazda cars of OBD generation 1.

Vehicle side DLC is generally located in the engine compartment.

Refer to the warning message in the next page:

⚠   WARNING

The appearances of this adapter and **Toyota 17Pin SEMI-CIRCULAR adapter** are exactly same, however, the internal wiring and circuit are different.   Check the **engraved name** and the **body color** of the adapter carefully before use. **Improper adapter connection may result in serious malfunction of either control system and Multiscan head unit**

9. Subaru 9Pin Adapter (P/N. 3001-00)

Used for the communication with Subaru cars of OBD generation 1.

The vehicle side DLC is generally located beneath the dashboard.

10. GM Daewoo 12Pin Adapter

(P/N. 3001-00)

Used for the communication with Daewoo cars of OBD generation 1.

The vehicle side DLC is generally located beneath the glove box, door side.

11. Kia 6Pin Adapter (P/N. 3001-0003)

Used for the communication with old Kia cars of OBD generation 1. Only the Diagnostic Trouble Code reading function is available for the cars with this type of adapter as only the slow pulse signal is transmitted through the vehicle side DLC.

The split wire of the adapter is to be connected to the ground terminal of the vehicle side DLC.

12. Kia 20Pin Adapter (P/N. 3001-0004)

Used for the communication with Kia cars of OBD generation 1.

DTC read & erase and data stream functions are available for the cars with this type of adapter.

Refer to the following warning message.

⚠ WARNING

The appearances of **Kia 20Pin adapter** and **Ssangyong 20Pin Rectangular adapter** are exactly same, however, the internal wiring and circuit are different. Check the **engraved name** and the **body color** of the adapter carefully before use. **Improper adapter connection may result in serious malfunction of either control system and Multiscan head unit**

13. Ssangyong 20Pin Rectangular Adapter (P/N. 3001-0005)

Used for Ssangyong cars of OBD generation 1.

Vehicle side DLC is located in the engine compartment.

Refer to the warning above.

14. Ssangyong 14Pin Circular Adapter
(P/N. 3001-0007)

Used for old Ssangyong cars of OBD generation 1.

Vehicle side DLC is located in the engine compartment.

15. Holden 6 Pin Adapter(P/N. 3001-0023)

Used for Australian Holden of OBD generation 1.

Japanese cars such as Toyota and Nissan assembled in Australia with Holden built engines may have this type of adapter, too. Vehicle side DLC is generally located beneath the glove box to the center facia.

16. GM Opel 10Pin Adapter (P/N. 3001-0019)

Used for the communication with Opel cars of OBD generation 1.

Also available with Multiscan Australian Holden, South American Opel and European Vauxhall software packages.

Vehicle side DLC is generally located in the fuse box beneath the dashboard or near the parking brake.

17. Ford 20 Pin Adapter(P/N. 3001-0020)

Used for the communication with Ford cars of OBD generation 1, including Australian and British Fords.

Vehicle side DLC is generally located in the fuse box beneath the dashboard.

18. Upgrade cable (P/N. 3000-0010)

To be connected to main data link cable for updating your Multiscan software by downloading updated codes from your PC. Refer to the related chapter in this manual.

C. Spare Parts

- **Extra fuses** (P/N. 3008-0003)

    For the replacement of the fuse located inside the cigarette lighter power cable. You can also replace it with a fuse of which rated current is 2 Ampere or less.

- **Spare cigarette lighter power cable plunger parts**

    A set of spare parts for replacement when the original parts are lost.

D. Optional Supplies

1. Printer Cable (P/N. 3000-0009)

To be connected between head unit RS232 port and printer to enable direct interface with a PC printer.

Compatible with the printers that support PCL mode, and Hewlett Packard ® is highly recommended.

CHAPTER 3   OPERATING Multiscan

Operating Multiscan

I. Getting Started-----------------------------—-

A. Head Unit
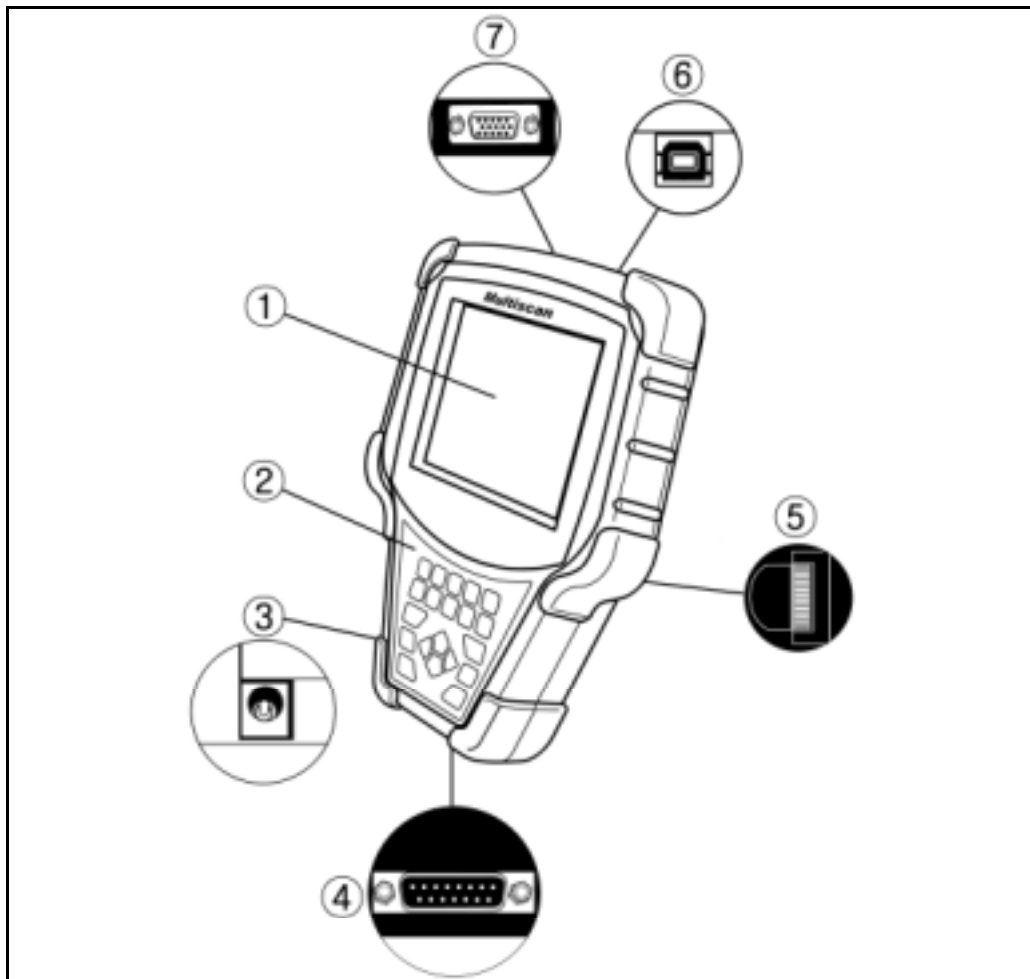
①. LCD Display

②. Key Pad (may be designed differently)

③. 12V Power Jack Connection

④. 15-pin Main DLC Cable Connection

⑤. LCD Contrast Adjustment Dial

⑥. USB Communication port

⑦. RS232C Serial Communication Port

B. Main DLC Cable

1. Connection to the head unit

a. The male connectors in both ends of the main DLC cable are exactly same and you can connect any of them to the head unit.

b. Press the main DLC cable connector into the head unit 15 pin female connector, and tighten up the two screws for firm connection.
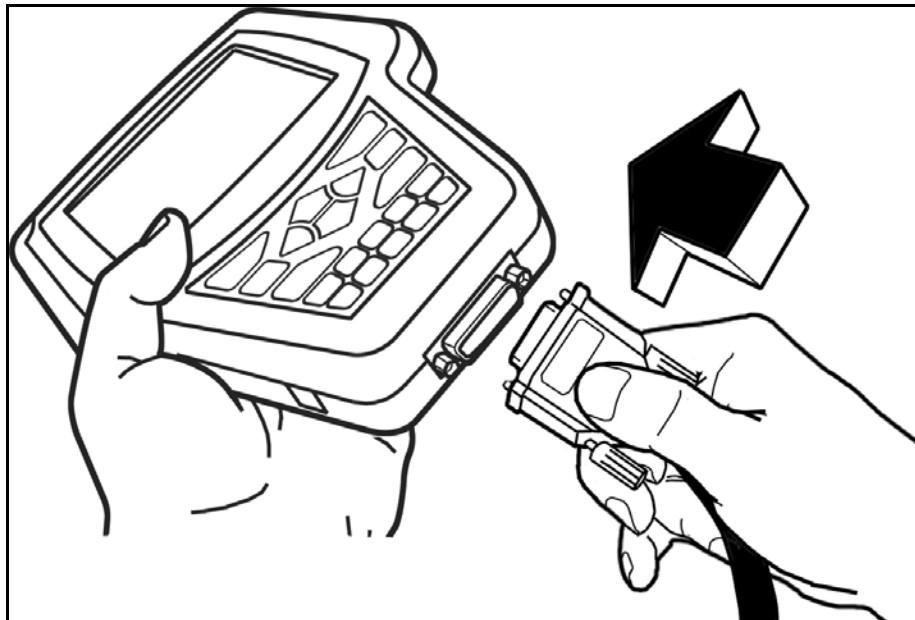
2. Connecting the DLC adapters

Locate the vehicle side adapter and connect the corresponding DLC adapter to the remaining male connector of the main DLC cable

⚠ **CAUTION**

It is recommended to keep the main DLC cable connected and screwed to the head unit. Frequent connection and removal of the main DLC cable may loose the fastening parts and bend the connecting pins.

C. Power supply

1. Power supplied through DLC adapter

12V battery power is supplied through most of the DLC adapters except GM/Daewoo 10Pin and Mitsubishi/Hyundai 12Pin adapters

2. Cigarette lighter

a. Use the cigarette lighter cable when power is not supplied through the DLC adapter.

b. Insert the cigarette lighter connector into the socket, and check if the red LEDs in both ends of the cable are ON.

c. Insert the power jack into the head unit power socket.
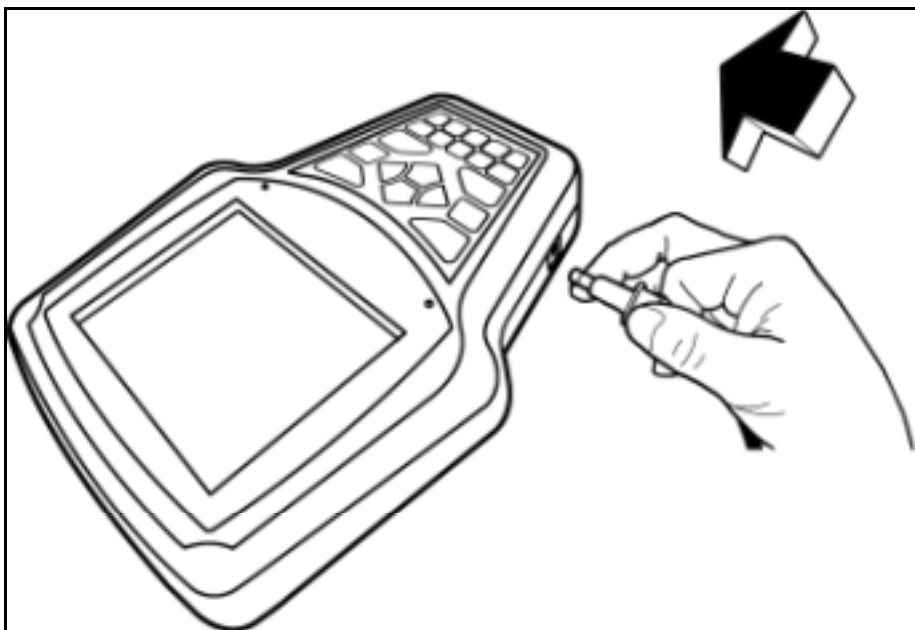
3. Vehicle battery

a. Sometimes it is necessary to put the head unit in the engine compartment when testing OBD1 generation vehicles with the diagnostic adapters located near the engine, such as Toyota, Mazda, Kia, Ssangyong, BMW, Mercedes Benz, etc.

b. In case power is not supplied through the diagnostic adapter, connect the alligator clips of the battery power cable to the battery terminals of correct polarity. Check the red LED on the round socket turns ON.

c. Connect the cigarette lighter power cable connector into the battery power cable socket.
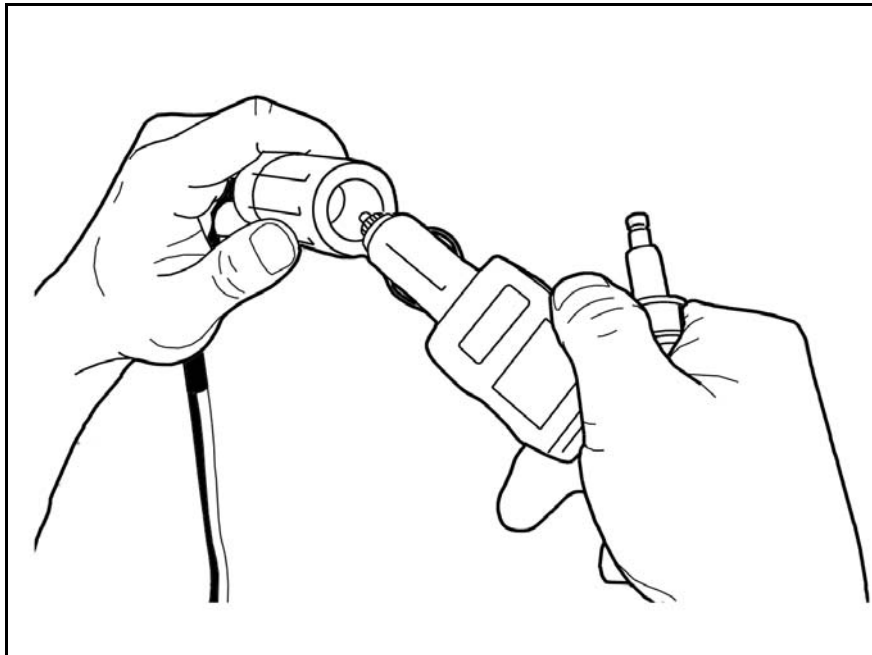
4. Power ON

Multiscan automatically turns on when power is supplied properly..

D. Contrast

a. The LCD display is sensitive to the temperature.
It may become too faint when it is cold and too dark when it is hot.

b. If the screen is too faint or too dark to read, you can adjust the contrast by turning the contrast dial in the right side of the head unit.

c. In case of any trouble with the display, please refer to the Trouble Shooting chapter in this manual.

II. Control Keys --------------------------------

A. Keypad

The keypad is made of chemistry proofing PVC material that prevents contamination and damage from hazardous oily workshop environment.

The membrane keypad is designed and tested to maintain its normal operation over a million keystroke for each.
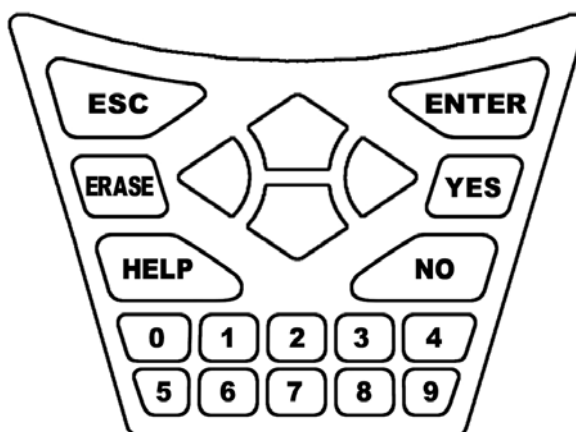
Each key is raised for better tactile feel. The keypad has total of 20 keys.

B. Making selection in the menu

1. Numeric Keypad in the bottom

Simply press the corresponding number when making selection from a menu. This is available only when you are selecting an item of which number is 9 or less.   For more than 10, you should locate the highlighted bar on the desired item and press the [ENTER] key.

2. Arrow keys in the middle
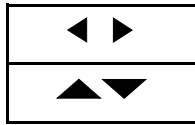
◀ ▶	Page Up/Down
▲ ▼	Scroll Up/Down

a. Scroll up and down the highlighted bar in the menu by pressing Up/Down arrow keys and press the [ENTER] key to confirm the selection.

b. If the menu has more than 12 items, you may have to move between the pages to make selection. You do not have to pound on Up/Down arrow keys to scroll the whole page. Simply pressing the Left or Right arrow key will shift page to page. Move the highlighted bar by pressing the up/down keys when the desired item appears on the screen, and press the [ENTER] key.

c. If differently defined, key instructions will be given in the bottom of the screen.

C. Function keys

1. ESC

Used to abort an operation of Multiscan or to return to the upper level menu.
If differently defined, key instructions will be given in the bottom of the screen.

2. HELP

a. DTC Read

- When a trouble code is detected, you can press this key to view the detailed information of the DTC.
- DTC definition, DTC registration conditions and check points are provided (For Korean and Malaysian cars only as of May, 2003)

b. Service Data (Live Data Stream)

- While live data is being displayed on the screen, select a live data item by moving the highlighted bar, and press this key to view the detailed information about the selected item.

- Standard value and technical explanations are provided. (For Korean and Malaysian cars only as of March, 2004)

3. ERASE

When one or more DTC(s) are found, you can press this button to erase the DTC. A query to confirm your intention to erase the DTC will follow.

4. ENTER

a. To confirm the selection after locating the highlight bar on a desired item in the menu.

b. To proceed to the next step when the instruction or pop-up message appears.

c. To freeze the live data parameter in the top of the screen. Refer to the freeze data function in the following chapter.

d. If differently defined, key instructions will be given in the bottom of the screen.

III. Configuration --------——-------------------

Press the [3] key from the initial function menu to proceed to the configuration menu. You can check the version numbers of the software packages contained in the built-in 128MB memory, test the keypad and LCD, set up sound and language options and download software updates in the configuration menu.


```
                           Configuration
                    1. SOFTWARE INFORMATION
                    2. SPECIAL FUNCTION


                         System Information

             Serial No......   86000-000
             Model..........   DCN-PRO
             Language.......   ENGLISH
             Memory Card....   128 MBytes
             Bootstrap Code.   Ver.401 [2004.3.12]
             Operating Code.   Ver.401 [2004.3.12]

                                          [CUSTOMER]
```
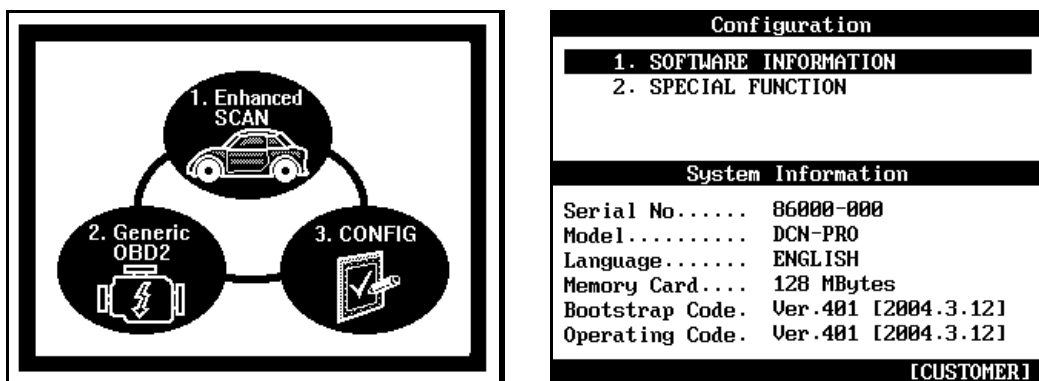
A. Software Information

When you select [1. SOFTWARE INFORMATION] in the configuration menu, a list of software packages contained in the built-in memory will appear as below:

```
                    Software Information
        SYSTEM TESTING   V.401    2004.4.10
        HYUNDAI-DOMESTICV.555    2004.2.13
        HYUNDAI (NON USAV.152    2004.2.13
        HYUNDAI (USA)    V.151    2004.2.13
        KIA-DOMESTICS    V.555    2004.2.13
        KIA (NON USA)    V.151    2004.2.13
        KIA (USA)        V.150    2004.2.13
        DAEWOO           V.555    2004.2.13
        SSANGYONG        V.555    2004.3.5
        SAMSUNG          V.555    2004.2.13
        TOYOTA/LEXUS     V.270    2004.2.26
        TOYOTA/LEXUS USAV.250    2004.2.26
          Press [Enter] key to continue.
```

Should you get any update files from your local distributor or from Hanatech website, please compare the version number and last update date to check if the update is necessary.

B. Special functions

```
1. DOWNLOAD SOFTWARE
2. LANGUAGE
3. SOUND
4. SAVE CONFIGURATION




                              1/4
```

1. Download software

- You can download the software updates from your PC when you select [1. DOWNLOAD SOFTWARE].

- Instructions will be given separately whenever an update is available. Contact your local distributor for the availability of update frequently and keep posted of such events.

2. Language

- You can select provided language.   English and Spanish languages are available for selection as of March 2004.

3. Sound

- You can toggle ON and OFF the key sound.

4. Save Configuration

- If you have made any change in this [Special Function] menu, you have to save the configuration to make such changes effective.

- Press the [4] key to save the changes in configuration

CHAPTER 4 — FUNCTIONS

Multiscan Functions

The functions you can choose when all the test vehicle details are selected properly are explained in this chapter of the manual. The actual list of available functions may be different according to the vehicle you want to test.

I.   Diagnostic Trouble Code----------------------

A. DTC Read

1. Pulse signal type

a. Many of old Toyota, Honda, Mazda, Hyundai and Kia cars until early 90's support slow pulse signal output for the DTC reading function.
As shown below, Multiscan shows the pulse signal being received through the DLC adapter in the top and the received DTC numbers.

```
15. IGNITION SIGNAL (1GF2)
16. AT CONTROL SIGNAL




        DTC : 2 ITEM
```
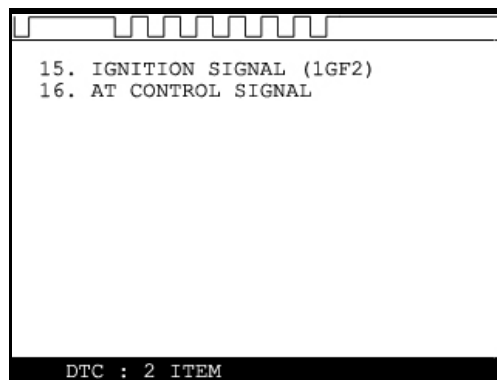
b. Manual input
-   Even older cars such as Honda with 2-pin adapter have no signal output terminal for DTC in the DLC adapter. In this case, Multiscan shows the following message as there is no signal input through the adapter.

```
Read Flash Code as below:

1. Insert Diagnostic Connector.
2. Turn Vehicle Ignition ON.
3. Read Dash Light Flashing.
   - No DTC: May be no blinking
                or blinking fast
4. Input 2 digit DTC code

   TO CONTINUE, PRESS [ENTER]


DTC :   ITEM
```
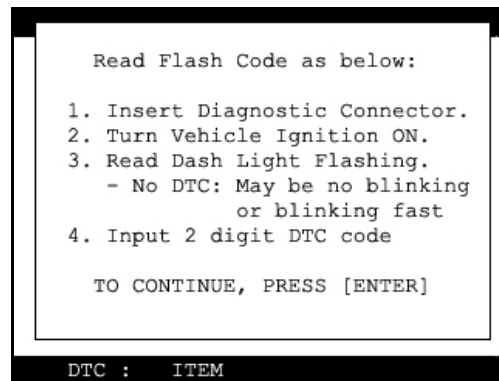
- You have to count the MIL flashing on the dashboard and manually input the DTC number to Multiscan to view the details as below:

```
INPUT DTC NUMBER : 15

15. IGNITION SIGNAL (1GF2)


DTC : 1 ITEM
```
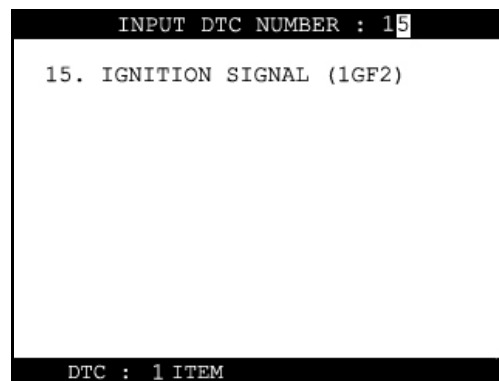
- Long flash signals count for tens and short signals for ones. Input two digits for tens and ones in sequence using the numeric keypad. A flash signal for a code is followed by another if there are multiple trouble codes. Blinking signals for all trouble codes flash in sequence, and repeat after a pause.

```
Long signal: X10    Short signal: X1


     ON           ON    ON


                              DTC No. 12
```
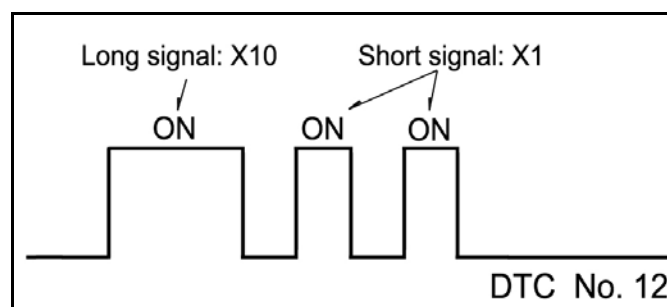
c. Others

- Generally Multiscan reads DTC pulse signal from the diagnostic

adapter and shows the DTC number, title and details automatically.

2. Serial Communication type

a. Most of the cars built in 1990's or later support serial communication with a scanner, and the DTC is read by bi-directional communication.

b. Multiscan sends a command to the control module to reply with the DTC numbers stored in memory, and the control module replies thereupon.

B. DTC Erase (Clear fault code)

1. Pulse signal type

a. Pulse signal type does not support bi-directional serial communication, therefore, a scanner is unable to send a command to the control module to erase the DTC information from memory.
These old cars require you to remove battery terminal to clean up diagnostic information from control module memory.
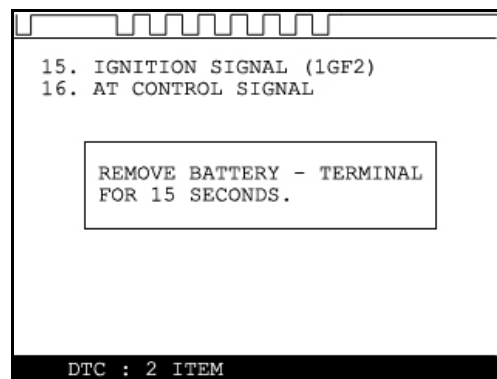
```
 ___ _ _ _ _ _ _ _ _
|   |_| |_| |_| |_| |_|
 15. IGNITION SIGNAL (1GF2)
 16. AT CONTROL SIGNAL

    +--------------------------+
    | REMOVE BATTERY - TERMINAL|
    | FOR 15 SECONDS.          |
    +--------------------------+



 DTC : 2 ITEM
```

Removing the battery terminal will get rid of all information contained in the car stereo and other electronic devices. And it may not effectively erase the fault codes in some cars. Refer to the original repair manual for further information.
Check if DTC information is properly removed by reading the trouble code again after erasing the code.

2. Serial communication type

a. Multiscan sends a command to the control module to erase DTC information stored in memory, and the control module replies thereupon.

b. Check if DTC information is properly removed by reading the trouble code again after erasing the code

C. DTC Help tips

a. Help tips are provided when you press the [HELP] key after locating the highlighted bar on one of the detected trouble code(s). This function is available when Multiscan detects one or more trouble code(s)

b. Help tips including trouble code definition, conditions and check points are provided for all Korean cars and Malaysian cars as of May 2003. Wiring diagrams are also provided for Korean cars of 2000 model-year or older.

```
DIAGNOSTIC TROUBLE CODE
D.T.C. No.:  (P0336)
DTC conditions :
 When IG key ON, cranking is possible
 but the reference mark is not within
 standard range when more than 200RPM
Failsafe: Feedback control suspends
 Idle speed adaptation control stops
 (Refers to the actual value)
 Uses mean value instead of idle speed
characteristic curve.
 Using adapted target air volume is
prohibited(Refers to the actual value)
```

c. Press the [ESC] key to return to DTC list.

II.　Current Data --------------------------------------

(= Data Stream, Live Data, Service Data)

A. Pulse Signal Type

a. Data stream is not generally supported for this type of old cars because the speed of pulse signal communication is too slow to read the data stream variables.

b. Some of old Toyota cars using 17-pin rectangular adapter exceptionally support data readings as the system supports relatively high speed pulse signal communication.

B. Serial Communication Type

a. Most of control systems with serial communication support data stream function.　Select [Current data] from the menu, then the data readings follow.

b. Some systems like SRS or ABS may be designed not to support data stream on purpose by the car manufacturer while the other systems are supported. A scanner is a passive tool that reads information from the control system, and it is unable to actively generate information that the system does not provide.

c. Some old OBD1 generation Korean and European cars equipped with Bosch control system that communicates in ISO9141 protocol provide relatively slower communication speed.　Data sampling may seem slow with these cars

C. Data Freeze

The [Data Freeze] function places the selected data stream variable on top of the LCD screen so that the user can check and compare desired sensor values continually without having to scroll up and down.

This is different from 'Freeze Frame Data' function of Generic OBD2.

1) Step One

Select a desired sensor using the [◀][▶] and the [▲][▼] keys.

2) Step Two

Press the [ENTER] key to freeze the selected sensor.

i.e., when O2 sensor and MAP sensor are selected and frozen, these sensor values will be placed at the top of the display as below :

```
          SERVICE DATA
 O2 SENSOR ------------    58mV
 MAP SENSOR -----------     946
 O2 SENSOR ------------    58mV
 MAP SENSOR -----------     946
 AIR TEMP SENSOR -------   34°C
 TPS SENSROR -----------   19mV
 STEP MOTOR ------------   39.5%
 BATTERY VOLTAGE -------   13.2V
 IGNITION SIGNAL -------     OFF
 COOLANT TEMP SENSOR ---   82°C
 ENGINE RPM -----------  760rpm
 SHORT TERM FUEL TRIM --     104
  1: GRAPH  2: FULL  ENTER : FIX
```

3) Step Three

Up to five sensors may be frozen at a time. For example, if the Injection Time, which can be shown when scrolled down, is selected and frozen, Injection Time value will be placed below the previously frozen O2 and MAP sensor.

```
                SERVICE DATA
    O2 SENSOR ------------      58mV
    MAP SENSOR ------------      946
    INJECTION TIME --------    0.2mS

    ENGINE RPM ------------   760rpm
    SHORT TERM FUEL TRIM --      104
    LONG TERM FUEL TRIM ---       86
    IDLE SWITCH -----------      OFF
    POWER STEERING SWITCH -      OFF
    AIR CONDITINER SWITCH -      OFF
    INJECTION TIME --------    0.2mS
    BTDC -----------------         5
    AIr CONDITIONER RELAY -      OFF

     1: GRAPH   2: FULL   ENTER : FIX
```

D. Data Graph

Multiscan provides the [Data Graph] function for more efficient data analysis.

a   When you press the [1] key after locating the highlight bar on the desired sensor, the sensor data graph will be displayed as shown below.

b   You can display up to 3 graphs in a screen by choosing the sensors as previously explained [Data Freeze] procedure - Press the [Enter] key after locating the highlight bar on the desired sensor, and then press the [1] key. When more than 4 sensors are selected, the graphs of upper three sensors will be displayed.

```
    O2 SENSOR ............    615 mV



    THROTTLE POSITION SENSOR .  425 mV



    ENGINE RPM ............    827 rpm



     1 : LINE / DOT    PAGE:  1~317
```
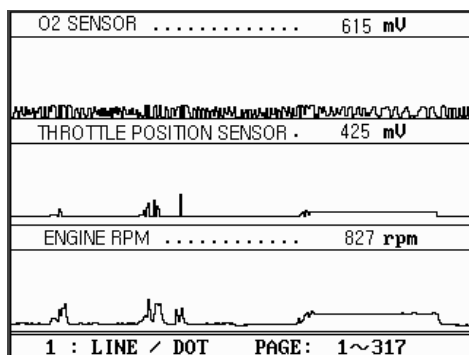
c   For each sensor data graph, the name of the sensor and its current value will be simultaneously displayed together.

d   To change the sensor, go back to the previous Service Data display by pressing the [Esc] key, and then choose other sensors.

e   To halt the graph output, press the [ENTER] key.   It will resume when you press the [ENTER] key again.

E. Help tips

a   When you press the [HELP] key after locating the highlight bar on a certain data stream variable, the help message will be displayed. This works the same for detected Trouble Codes in [Self Diagnosis] function.

b   Detailed information including conditional standard range on the selected sensor will be displayed as shown below.

```
O2 SENSOR -------------    523mV

Idling right after engine start
 (OPEN LOOP):Approx.450mV~950mV

Idling after warm-up(CLOSED LOOP)
 : Changes between 100mV ~ 950mV
```

c   Press the [ESC] key to go back to the data stream display.

III. Actuation Test ----------------------------————

- The actuation test is a very helpful function that temporarily activates or stops a certain actuator such as an injector, a motor or a solenoid by force, so that the user can evaluate the system's condition or the part's normal operation by observing its reaction

- Signals from various sensors are input to a control unit, and the actions are taken by controlling to actuators. Sensors and actuators are causes and effects in a control system.

- While the data stream function is useful to observe if the sensors are working properly and the control unit is collecting correct data from the sensors without problem, the actuator test is helpful to examine if the actuators are working in normal conditions and the control unit is commanding proper control over the system.

- Some of the cars such as Nissan or Toyota provide even more advanced actuation tests by letting the user observe the reaction of overall control system when manually adjusting the sensor input values.

A. Menu Selection

    a   Choose [ACTUATION TEST] from the function Selection Menu

    b   The name of the actuator to be tested, test method and the test condition are shown in the display. Available actuators, test methods and conditions may differ in each vehicle.

B. Test Start

1. Selecting Test Item

    a   Choose an actuator to test from the menu by using the [▲] and [▼] keys.

    b   Check the test conditions and press the [ENTER] key when all the conditions are met.

```
                  ACTUATION TEST


          ┌─────────────────────────────┐
          │ ACTUATOR : #1 INJECTOR       │
          └─────────────────────────────┘

          ┌──────────┬──────────────────┐
          │ METHODS  │ STOP FOR 6 SECONDS│
          ├──────────┼──────────────────┤
          │ CONDITION│ KEY ON, ENGINE RUN│
          └──────────┴──────────────────┘




         ENTER: START TEST   ↕:   SELECT ITEM
```

2. Testing

    a   [TESTING...] message will be displayed during the actuation test
Test method means how the actuation test will be performed. Check the actual reaction of the actuator

    b   In the example below, the injector will stop injecting fuel for 6 seconds

while engine is idling, and it will make engine stall or unstable.

c   Testing a fan or an injector is easy to check the proper reaction as it generates distinctive changes in vehicle condition such as fan whining or unstable idling.   However, valves or motors are generally tested while engine is stopped and all you can hear may be a small and unclear electric buzzing sound.   Test in a quite place and observe the test results carefully.

```
              ACTUATION TEST


       ┌─────────────────────────────┐
       │  ACTUATOR : #1 INJECTOR      │
       └─────────────────────────────┘
       ┌──────────┬──────────────────┐
       │ METHODS  │ STOP FOR 6 SECONDS│
       ├──────────┼──────────────────┤
       │CONDITION │ KEY ON, ENGINE RUN│
       └──────────┴──────────────────┘
       ┌─────────────────────────────┐
       │           TESTING....        │
       └─────────────────────────────┘


  ENTER: START TEST   ↕:   SELECT ITEM
```

```
              ACTUATION TEST


       ┌─────────────────────────────┐
       │  ACTUATOR : #1 INJECTOR      │
       └─────────────────────────────┘
       ┌──────────┬──────────────────┐
       │ METHODS  │ STOP FOR 6 SECONDS│
       ├──────────┼──────────────────┤
       │CONDITION │ KEY ON, ENGINE RUN│
       └──────────┴──────────────────┘
       ┌─────────────────────────────┐
       │         TEST COMPLETE        │
       └─────────────────────────────┘


  ENTER: START TEST   ↕:   SELECT ITEM
```

d   When the test is completed, the [TEST COMPLETE] message will be displayed.   You can choose other actuators by using the [▲] and [▼] keys. Press the [ESC] key to quit test mode.

IV. Black Box --

　　　　Just like the 'Black Box' or a 'flight recorder' of an aircraft, Multiscan can 'record' data stream during the vehicle drive test and the recorded data can be 'retrieved' later for intensive analysis of vehicle's condition.

A. Function selection

　　　　Choose [#. Black Box Data] from the [Function Selection Menu] after selecting Origin, Car Manufacturer, Model name and system to test.

```
        SELECT VEHICLE MODEL



      1. HYUNDAI MOTORS
      2. BLACK BOX RECORD LOAD/ERASE
      3. CONNECTOR LOCATIONS



   ↕ ↔: MOVE      ENTER : SELECT
```

```
        SELECT VEHICLE MODEL          ↕

      11. AVANTE (EXP.ELANTRA)
      12. MARCIA
      13. SANTAMO
      14. DYNASTY
      15. NEW DYNASTY
      16. TIBURON (EXP.COUPE)
      17. ATOS
      18. EF SONATA (EXP.SONATA)
      19. NEW EF SONATA (EXP.SONATA)
      20. TAXI

   ↕ ↔: MOVE      ENTER : SELECT
```

```
        EF SONATA (EXP.SONATA)

      1. ENGINE CONTROL DOHC
      2. ENGINE CONTROL V6 DOHC
      3. ENGINE CONTROL LPG
      4. AUTO TRANSMISSION
      5. ANTI SKID BRAKE
      6. AIR BAG
      7. E.C.S
      8. T.C.L


   ↕ ↔: MOVE      ENTER : SELECT
```

```
        ENGINE CONTROL V6 DOHC

      1. SELF DIAGNOSIS
      2. CURRENT DATA
      3. ACTUATION TEST
      4. CONFIGURATION DELETE
      5. AUTOTRANS CONFIG DEL
      6. TCS CONFIG DELETE
      7. BLACK BOX RECORD TEST


   ↕ ↔: MOVE      ENTER : SELECT
```

B. Capacity

a   During a normal test, the [Data Stream] frames pass by in rapid succession, and cannot be recalled unless the data has been saved. Thanks to its extensive internal memory, Multiscan can record up to 2040 frames of Data Stream for multiple cars.

b   By loading the recorded data, you can diagnose sensor data frame to frame without missing a single critical moment.

B. Memory Check

a.   Multiscan checks its internal memory before it starts recording Black Box data. If there is no sufficient free memory space available, Multiscan will suggest deleting one or more of previous record(s).

```
               ENGINE CONTROL SOHC

      INSUFFICIENT MEMORY SPACE TO
      ADD NEW RECORD DATA.
      YOU HAVE TO ERASE ONE OR MORE
      OF THE PREVIOUS RECORD DATA.
      DO YOU WANT TO ERASE?
      (YES:ERASE       NO:EXIT )



      ↕ ↔ : MOVE        ENTER : SELECT
```
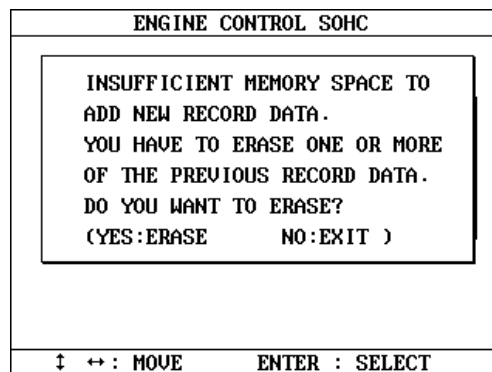
b.   Press the [ERASE] key to proceed, then a list of saved data will follow. Locate the highlight bar on data to delete, and press the [ENTER] key. A query for your confirmation will follow.   Press the [YES] key to erase otherwise press the [NO] key.

```
  BLACK BOX RECORD REPLAY/ERASE  2/ 4
   1. EF SONATA (EXP.SONATA)
        2004-04-10
   2. EXCEL 1.5 SOHC
   *    2004-02-04
   3. SONATA III
        2004-03-10
   4. SCOUPE α 92-94
        2004-02-25



  ↕ ↔ : MOVE       ENTER : ERASE
```

```
  BLACK BOX RECORD REPLAY/ERASE  2/ 4
   1. EF SONATA (EXP.SONATA)
        2004-04-10
   2  EXCEL 1 5 SOHC
    DO YOU WANT TO ERASE?
    (YES:ERASE       NO:EXIT )

   4. SCOUPE α 92-94
        2004-02-25



  ↕ ↔ : MOVE       ENTER : ERASE
```
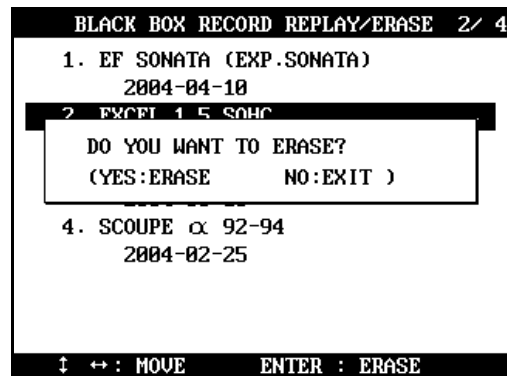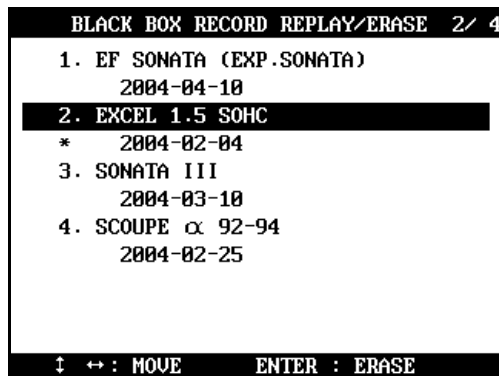
C. PID(Live data parameter) selection

a   You are required to select the parameters to record.

```
┌─────────────────────────────────────┐
│        SELECT RECORD DATA ITEM       │
│ O2 SENSOR..............      mV      │
│ ┌─────────────────────────────────┐ │
│ │ you can select upto 40 data     │ │
│ │ parameters by locating the      │ │
│ │ highlight bar and pressing      │ │
│ │ the [ENTER] key.                │ │
│ │ (Press any key to continue.)    │ │
│ └─────────────────────────────────┘ │
│ ENGINE            rpm                │
│ AIR PRESSURE SENSOR....      mmhg    │
│ IDLE SWITCH...........               │
│ POWER STEERING SWITCH..              │
│   ENTER : SELECT     ESC : START     │
└─────────────────────────────────────┘
```
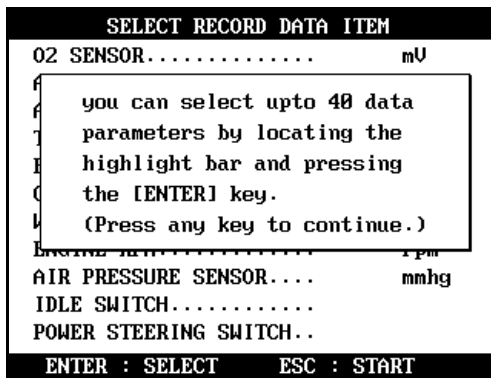
b   Multiscan will show you the whole live data parameters available in the control system you selected. Locate the highlight bar on the desired parameter and press the [ENTER] key.

Selected parameter will be marked star(*).

You can also deselect the parameter by repeating the procedure.

```
┌────────────────────────────────────┐  ┌────────────────────────────────────┐
│  SELECT RECORD DATA ITEM    11/ 29 │  │  SELECT RECORD DATA ITEM     9/ 29 │
│* O2 SENSOR..............     mV    │  │* O2 SENSOR..............     mV    │
│* O2 DUTY...............      %     │  │* O2 DUTY...............      %     │
│* O2 CONTROL.............           │  │* O2 CONTROL.............           │
│* THROTTLE ANGLE.........     °     │  │* THROTTLE ANGLE.........     °     │
│* ADAPT TPS.............      °     │  │* ADAPT TPS.............      °     │
│* BATTERY VOLTAGE........     V     │  │* BATTERY VOLTAGE........     V     │
│* AIR TEMPERATURE SENSOR.     ° C   │  │  AIR TEMPERATURE SENSOR.     ° C   │
│* WATER TEMPERATURE SNSR.     ° C   │  │* WATER TEMPERATURE SNSR.     ° C   │
│* AIR FLOW SENSOR........     kg/h  │  │*▐AIR FLOW SENSOR........     kg/h▌ │
│* ENGINE RPM.............     rpm   │  │* ENGINE RPM.............     rpm   │
│*▐VEHICLE SPEED SENSOR...     Km/h▌ │  │* VEHICLE SPEED SENSOR...     Km/h  │
│  ENTER : SELECT    ESC : START     │  │  ENTER : SELECT    ESC : START     │
└────────────────────────────────────┘  └────────────────────────────────────┘
```

c   You can select up to 40 PIDs to record. Press the [ESC] key when the selection is completed, then Multiscan will start recording data.

D. Trigger Modes

There are three trigger modes in the black box function.

```
         SELECT TRIGGER MODE



    ┌─────────────────────────────────┐
    │ 1. CONTINUOUS RECORD MODE        │
    │ 2. AUTO TRIGGER MODE (By DTC)    │
    │ 3. MANUAL TRIGGER MODE           │
    └─────────────────────────────────┘




  ↕ ↔ : MOVE        ENTER : SELECT
```
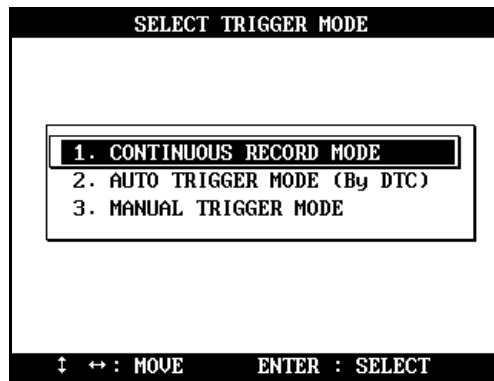
a   Continuous Record Mode (No trigger mode)

- Multiscan will record live data of selected parameters up to 2040 frames or until you press the [ESC] key.

- Percentile memory usage and sampling time(frequency) will appear in the center of the screen while recording data, and the actual live data values will remain unchanged.

```
   RECORDING BLACK BOX DATA  1/  8
O2 SENSOR..............   19  mV
AIR FLOW SENSOR........    0  Hz
THROTTLE POSITION SNSR.   19  mV
┌───────────────────────────────┐
│  RECORDING    :   0.4    %     │
│  SAMPLING TIME : 00:03:024 ms  │
└───────────────────────────────┘
AIR PRESSURE SENSOR....    0  mmhg
IDLE SWITCH............   OFF


BEFORE:  0 AFTER :   9 RECORDING...
  ESC: STOP         ENTER : Select
```
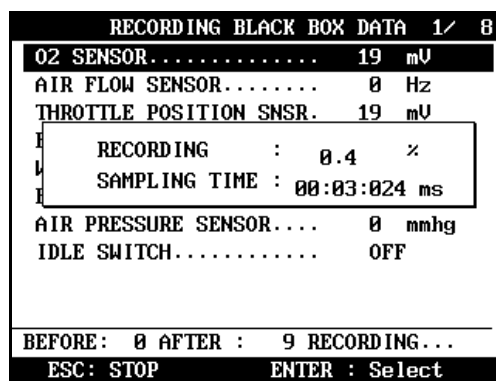
- Since no DTC trigger is applied in this mode, number of "Before DTC" frames will remain 0, and the "After DTC" will keep increasing as the more frames are recorded.

b   Automatic Trigger Mode (Triggered by DTC)

- Multiscan will keep recording live data of selected parameters up to 128 frames.

- Once a DTC is detected or the [ESC] key is pressed by the user, it will proceed with recording remaining frames up to 2,040 or until you abort.

- This function will let you have a set of data stream before and after the ECM's DTC recognition when you perform the test drive.

```
          SELECT TRIGGER MODE


      1. CONTINUOUS RECORD MODE
      2. AUTO TRIGGER MODE (By DTC)
      3. MANUAL TRIGGER MODE




   ↕ ↔ : MOVE        ENTER : SELECT
```
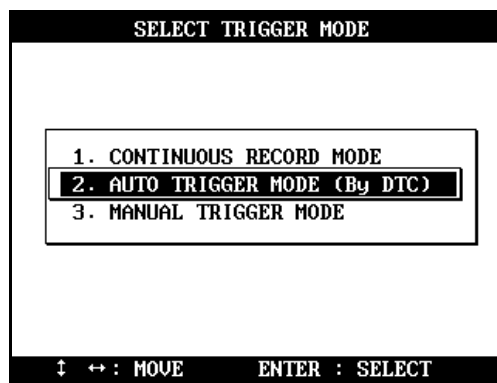
- Before DTC, you will see the Live Data of the selected parameters keep refreshing, however, once triggered by DTC or [ESC] key stroke, only the percentile process information and sampling frequency will be displayed.

```
RECORDING BLACK BOX DATA  4/  9
O2 SENSOR..............    19   mV
AIR TEMPERATURE SENSOR.  -38   ° C
THROTTLE POSITION SNSR.   19   mV
BATTERY VOLTAGE........ 10.9   V
CRANK SIGNAL...........        OFF
WATER TEMPERATURE SNSR.  -29   ° C
ENGINE RPM.............    0   rpm
AIR PRESSURE SENSOR....    0   mmhg
IDLE SWITCH............        OFF

BEFORE: 128AFTER :    0
  ESC: STOP        ENTER : Select
```

```
RECORDING BLACK BOX DATA  1/ 10
O2 SENSOR............. 4882   mV
O2 DUTY...............   2.3   %
O2 CONTROL............   0.9
   ┌─────────────────────────┐
   │  RECORDING    :   1.9    %│
   │  SAMPLING TIME : 00:23:216 ms│
   └─────────────────────────┘
WATER TEMPERATURE SNSR.   60   ° C
AIR FLOW SENSOR........   0.0  kg/h
ENGINE RPM.............    0   rpm
VEHICLE SPEED SENSOR...    0   Km/h
BEFORE:  0 AFTER :   39 DTC NUM  6
  ESC: STOP        ENTER : Select
```

c   **Manual Trigger Mode**

- Multiscan will keep recording live data of selected parameters up to 128 frames, and once the [ESC] key is pressed by the user, it will proceed with recording remaining frames up to 2040.

- The screen display is the same as when selecting the Auto Trigger Mode.

```
╔══════════════════════════════════════╗
║         SELECT TRIGGER MODE          ║
╠══════════════════════════════════════╣
║                                      ║
║                                      ║
║   ┌────────────────────────────┐     ║
║   │ 1. CONTINUOUS RECORD MODE   │     ║
║   │ 2. AUTO TRIGGER MODE (By DTC)│    ║
║   │ 3. MANUAL TRIGGER MODE      │     ║
║   └────────────────────────────┘     ║
║                                      ║
║                                      ║
║                                      ║
║  ↕ ↔ : MOVE      ENTER : SELECT      ║
╚══════════════════════════════════════╝
```
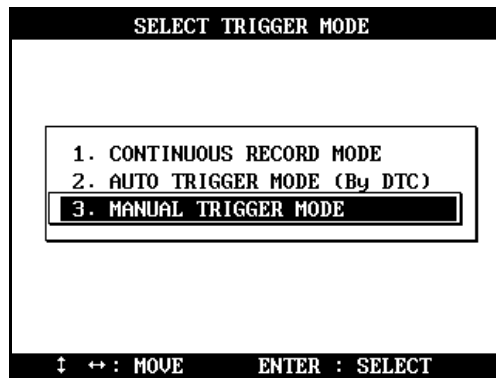
E. Saving the recorded data

a   When the total frame number reaches 2040 or when you press the [ESC] key to abort, a query asking you if you would like to save recorded data or to discard it.   Press [YES] to save or [NO] to cancel.

```
RECORDING BLACK BOX DATA  1/ 10
O2 SENSOR.............. 4882  mV
O2 DUTY................ 2.3  %
( ============================
T DO YOU WANT TO SAVE THIS DATA
A ? (YES:SAVE NO:CANCEL)
E
W ============================
AIR FLOW SENSOR........   0.0  kg/h
ENGINE RPM.............     0  rpm
VEHICLE SPEED SENSOR...     0  Km/h
BEFORE:  0 AFTER :1741 DTC NUM  6
  ESC: STOP          ENTER : Select
```
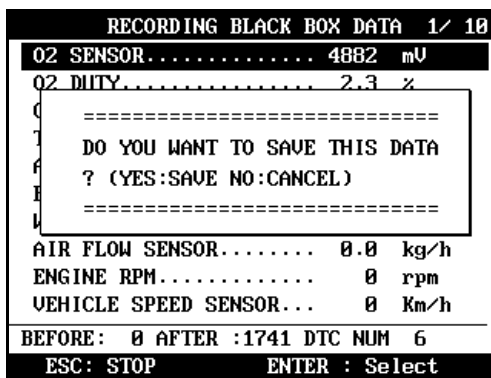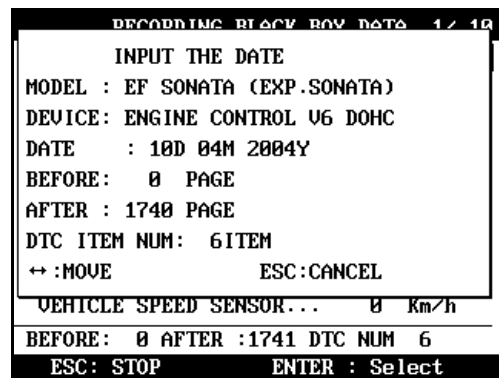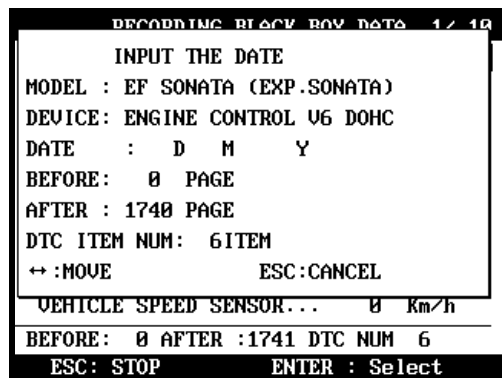
b   When pressed [YES], a dialog box follows and asks you to input the test date.   Enter the date and press the [ENTER] key to save the recorded data to Multiscan memory.

Pressing the [ESC] key cancels saving data.

Date format is DD-MM-YYYY(D-day, M-month, Y-year), and only numeric values are available.

```
RECORDING BLACK BOX DATA  1/ 10
     INPUT THE DATE
MODEL : EF SONATA (EXP.SONATA)
DEVICE: ENGINE CONTROL V6 DOHC
DATE     :  D   M    Y
BEFORE:   0  PAGE
AFTER : 1740 PAGE
DTC ITEM NUM:  6ITEM
↔:MOVE           ESC:CANCEL
VEHICLE SPEED SENSOR...    0  Km/h
BEFORE:  0 AFTER :1741 DTC NUM  6
  ESC: STOP          ENTER : Select
```
```
RECORDING BLACK BOX DATA  1/ 10
     INPUT THE DATE
MODEL : EF SONATA (EXP.SONATA)
DEVICE: ENGINE CONTROL V6 DOHC
DATE     : 10D 04M 2004Y
BEFORE:   0  PAGE
AFTER : 1740 PAGE
DTC ITEM NUM:  6ITEM
↔:MOVE           ESC:CANCEL
VEHICLE SPEED SENSOR...    0  Km/h
BEFORE:  0 AFTER :1741 DTC NUM  6
  ESC: STOP          ENTER : Select
```

c   Tested Vehicle model name and control system will be saved as well as the date stamp for future retrieval.

F. Black Box Data Load

a   You can load saved data by choosing [BLACKBOX RECORD LOAD / ERASE] from the [Car Manufacturer Selection] menu as shown below:

```
        SELECT VEHICLE MODEL



    1. HYUNDAI MOTORS
    2. BLACK BOX RECORD LOAD/ERASE
    3. CONNECTOR LOCATIONS




  ↕ ↔ : MOVE      ENTER : SELECT
```
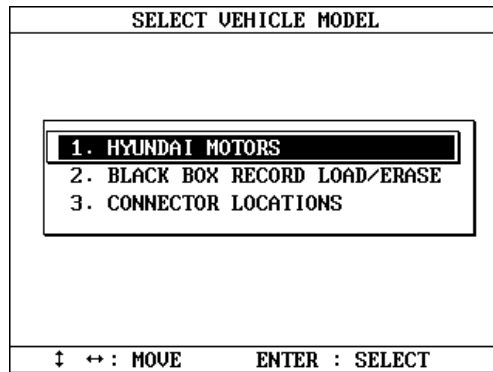
b   A list of recorded Black Box Data will follow for your selection

Up to 4 back box data can be stored in the memory per car manufacturer, therefore, up to 4 saved black box data can be listed in the menu.

```
BLACK BOX RECORD REPLAY/ERASE  1/ 1
1. EF SONATA (EXP.SONATA)
*    2004-04-10







  ↕ ↔ : MOVE      ENTER : SELECT
```
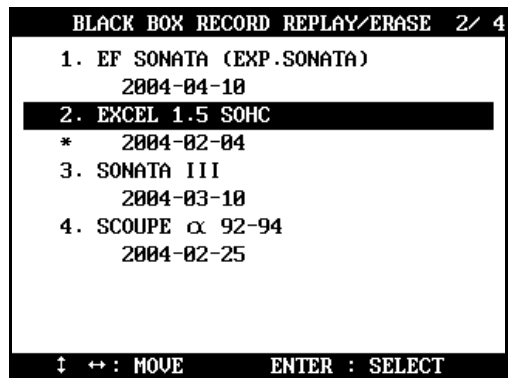
```
BLACK BOX RECORD REPLAY/ERASE  2/ 4
1. EF SONATA (EXP.SONATA)
     2004-04-10
2. EXCEL 1.5 SOHC
*    2004-02-04
3. SONATA III
     2004-03-10
4. SCOUPE α 92-94
     2004-02-25

  ↕ ↔ : MOVE      ENTER : SELECT
```

c   The details of recorded data will be displayed for confirmation.   If the record is correct, press the [ENTER] key.   Press the [ESC] key to abort.

d   If you want to erase any of these saved data, locate the highlight bar and press the erase key.

G. Loaded Blackbox data

Loaded black box data has basically the same format as the [Service Data (Live Data Stream)].   See the illustration below.

1. Data format

In the lower part of the display, the total number of recorded frames, frame number before and after the DTC(Diagnostic Trouble Code), and the number of DTC detected is displayed.   In the example below, you can see that a total of 458 frames were recorded, and data stream currently shown in the main window is of the 336th frame from the beginning.   It also tells you that the current frame is the 80th after 2 trouble codes were detected.

```
 BLACK BOX RECORD REPLAY/ERA  1/ 10
 O2 SENSOR.............. 4882  mV
 O2 DUTY................   2.3  %
 O2 CONTROL.............   0.9
 THROTTLE ANGLE.........   0.0    °
 ADAPT TPS..............  29.9   °
 BATTERY VOLTAGE........  10.8  V
 WATER TEMPERATURE SNSR.   60   ° C
 AIR FLOW SENSOR........   0.0  kg/h
 ENGINE RPM.............     0  rpm
 VEHICLE SPEED SENSOR...     0  Km/h
 TIME :  00:00:000ms    YES : REPLAY
 1:Graph 2.DTC  ↔: PAGE     1/1740
```

The live data values may not be realistic as the screen was
captured while the scan tool was linked to a simulator.

2. Data Replay

a. Press the [YES] key then the saved blackbox data will start replying Multiscan preserves the refresh time intervals of Black Box data. Therefore, Black Box data is replayed at the same speed as when it was originally recorded.

b. If you want to go forward or backward faster, press the [◀] or [▶] key while replaying. Replay speed will restore to the original speed when the key is released.

```
   BLACK BOX RECORD REPLAY/ERA  5/ 10
 O2 SENSOR.............. 4882  mV
 O2 DUTY...............   2.3  %
 O2 CONTROL............   0.9
 THROTTLE ANGLE........   0.0     °
 ADAPT TPS.............  29.9   °
 BATTERY VOLTAGE.......  10.8   V
 WATER TEMPERATURE SNSR.   60   ° C
 AIR FLOW SENSOR.......   0.0   kg/h
 ENGINE RPM............     0   rpm
 VEHICLE SPEED SENSOR...    0   Km/h
 TIME :  00:34:452ms   YES : PAUSE
 NO:STOP REPLAY ↔: PAGE   117/1740
```

c. Pressing the [YES] key will pause the replay. You can resume replaying from the frame where it was paused by pressing the [YES] key again.

```
   BLACK BOX RECORD REPLAY/ERA  5/ 10
 O2 SENSOR.............. 4882  mV
 O2 DUTY...............   2.3  %
 O2 CONTROL............   0.9
 THROTTLE ANGLE........   0.0     °
 ADAPT TPS.............  29.9   °
 BATTERY VOLTAGE.......  10.8   V
 WATER TEMPERATURE SNSR.   60   ° C
 AIR FLOW SENSOR.......   0.0   kg/h
 ENGINE RPM............     0   rpm
 VEHICLE SPEED SENSOR...    0   Km/h
 TIME :  00:46:332ms   YES : REPLAY
 NO:STOP REPLAY ↔: PAGE   157/1740
```

d. Pressing the [NO] key will stop replaying. You can restart replay by pressing the [YES] key again, but it will start from the first frame.

```
   BLACK BOX RECORD REPLAY/ERA  5/ 10
 O2 SENSOR.............. 4882  mV
 O2 DUTY...............   2.3  %
 O2 CONTROL............   0.9
 THROTTLE ANGLE........   0.0     °
 ADAPT TPS.............  29.9   °
 BATTERY VOLTAGE.......  10.8   V
 WATER TEMPERATURE SNSR.   60   ° C
 AIR FLOW SENSOR.......   0.0   kg/h
 ENGINE RPM............     0   rpm
 VEHICLE SPEED SENSOR...    0   Km/h
 TIME :  02:18:402ms   YES : REPLAY
 1:Graph 2.DTC  ↔: PAGE   467/1740
```

3. Graph

a   As previously explained in section [3. Service Data], data from up to three selected parameter data can be graphed.

b   Make sure that the Black Box data replay is stopped.   If it is being replayed or paused, press the [NO] key to stop replaying completely.

c   Choose the parameter by locating the highlight bar and pressing the [ENTER] key.   The selected parameter will be marked with a triangle as shown below:

```
   BLACK BOX RECORD REPLAY/ERA   9/ 10
▶ O2 SENSOR.............. 4882  mV
  O2 DUTY................  2.3  %
  O2 CONTROL.............  0.9
▶ THROTTLE ANGLE.........  0.0   °
  ADAPT TPS.............. 29.9   °
  BATTERY VOLTAGE........ 10.8  V
  WATER TEMPERATURE SNSR.  60   ° C
  AIR FLOW SENSOR........  0.0  kg/h
▶ ENGINE RPM.............    0  rpm
  VEHICLE SPEED SENSOR...    0  Km/h
 TIME :  00:00:000ms    YES : REPLAY
 1:Graph 2.DTC  ↔: PAGE    1/1740
```

d   Then press the [1] key to view the data in graph format.

```
  O2 SENSOR.............. 4882  mV



  THROTTLE ANGLE.........  0.0   °



  ENGINE RPM.............  0.0  rpm



 -00:00:000ms↔ ↕:MOVE PAGE:   1/1740
```

The line graphs are flat as it is not based on
data recorded from the active vehicle.

e   Up to 316 frames can be displayed on a single page.

If recorded data has more than 316 frames, you can shift to next or previous page by using the [▲] and [▼] keys.

f   The dotted line indicates from which frame the live data parameter values are being displayed.   You can move it left and right with the [◀] and [▶] keys.

```
O2 SENSOR.............. 4882   mV


THROTTLE ANGLE........  0.0    °


ENGINE RPM............  0.0   rpm


00:43:362ms↔ ↕:MOVE PAGE: 147/1740
```

g   Elapsed time and frame number are indicated in the bottom.
-    *Continuous Record (No trigger) Mode*: Elapsed time and number of frames from the first frame
-    *Automatic / Manual Trigger (Triggered by DTC or user) Mode:* Elapsed time and number of frames from the trigger point (DTC detection or [ESC] key stroke by the user).   Before the trigger point will be marked in negative values.

h   To return to the Black Box Data Display, press the [ESC] key.

4. DTC

a   You can check the DTC(s) found during recording Black Box Data.

b   Make sure that the Black Box data replay is stopped.   If it is being replayed or paused, press the [NO] key to stop replaying completely.

c   Press the [2] key then the list of DTC(s) will appear as below:

```
              D. T. C
P0120.T.P.S ERROR
P0115.WATER TEMP SENSOR ERROR
P0230.FUELPUMP PRIM CIRCUIT ERROR
P1624.RADIATOR FAN
P1625.AIR CONDITIONER FAN
P0130.02(B1,S1)ERROR




DTC        : 6   ITEM
```
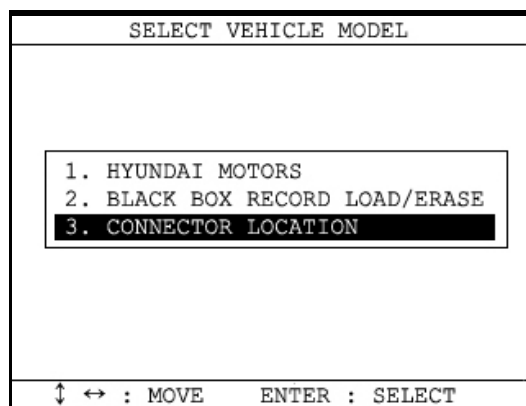
d   Because Black Box Data is not live or active, you cannot erase DTC(s).

V. Connector Location ---------------------------

    a   The vehicle side OBD2 adapter is easy to find as the location is quite regular – under the dash, however, the old vehicle side DLC adapters of OBD generation 1 are located quite randomly and sometimes it is very difficult to find.

Multiscan has the vehicle side adapter location maps for each car make to aid the user in locating the adapters.

The locations suggested in this function are purely from Hanatech's experience, therefore, it may contain incorrect information. It is always highly recommended to refer to the original repair manual published by the car manufacturers for correct information.

```
        SELECT VEHICLE MODEL



   1. HYUNDAI MOTORS
   2. BLACK BOX RECORD LOAD/ERASE
   3. CONNECTOR LOCATION




 ↕ ↔ : MOVE     ENTER : SELECT
```

   b   Select [CONNECTOR LOCATION] from the vehicle selection menu if the adapter is not found in the place where it is supposed to be.

A drawing indicating the location of the vehicle side adapter follows. In the right bottom of the display, the total number of location maps for the selected car make is indicated. The example below is when Hyundai motors is selected, and it tells there are total 5 maps.

```
↑:PAGE UP   ↓:PAGE DOWN        1/5
```
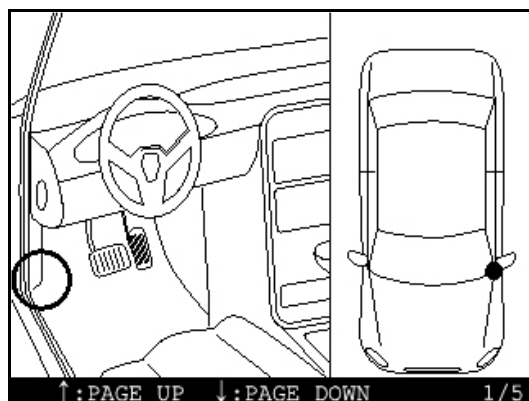
c   The maps are provided in the order of most frequently found location. Press Up or Down key to view the next or previous map. Press the [ESC] key to return to vehicle selection menu.


```
↑:PAGE UP   ↓:PAGE DOWN        2/5
```
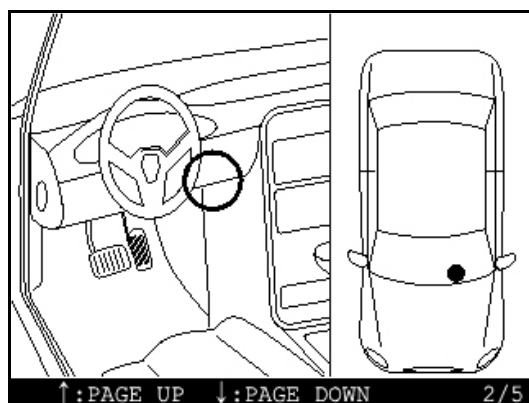
d   Location maps for Korean cars are based on Left Hand Drive vehicles, and the others such as Japanese, Australian and Malaysian cars are based on Right Hand Drive cars. You may have to consider reversed image according to your local practice.

Refer to each car make section in this manual for further information.

CHAPTER 5 — GENERIC OBD2

Generic OBD2

I.   Literal definition of OBD and OBD2-------

OBD is an abbreviation for On Board Diagnostics. OBD-1 is in reference to Title 13 California Code 1968 titled "Malfunction and Diagnostic System for 1988 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles with Three-Way Catalyst Systems and Feedback Control." filed on 11-15-85. This required cars sold in California to have an on-board computer processor for on-board self-diagnostics of computer sensed emission related components, fuel metering device and EGR (exhaust gas recalculation system). A partial or total malfunction that exceeded exhaust emission standard would illuminate a MIL (malfunction indicator light) and provide on-board identification of the malfunction location. To provide malfunction location information, codes are stored in on-board computer memory. To read codes manufactures use methods, such as flashing MIL light or various serial data protocols.

OBD-2 is in reference to Title 13 California Code 1968.1 titled "Malfunction and Diagnostic System Requirements-1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines. Filed on 8-27-90 to Air Resouce Board (ARB)
This requires a standard electrical connector, open source standardized diagnostic trouble codes (DTC), data, and communication protocol with more specific self-diagnostic on-board monitoring of emission malfunctions.

II. More practical notes ----——----------------

A. Technical meaning of OBD2

1. Standardization

a   For the technicians and scan tool engineers, OBD2 has its technical meaning as bringing the standardized methods of vehicle diagnosis to the chaotic aftermarket where dozens of car make use different diagnostic adapters and communication protocols of their own.

b   The 16-pin trapezoid diagnostic adapter and a few of most influential communication protocols including ISO9141-2, KWP2000, and SAE J1850 VPW and PWM form the standard OBD2 specifications.

c   Trouble codes and Data stream variables were also standardized and opened to public, so that all the scanners that support aforementioned standard communication protocols through the 16-pin OBD2 adapter can always get the same readouts.

2. Purpose of OBD and OBD2

a.   OBD and OBD2 are the names of regulation that were legislated in USA for the emission control.

b.   On board diagnostics was implemented to monitor malfunction or failure of the emission related parts and components to minimize the possibility of excessive exhaust gas emission by letting the driver know that the car has a problem and the technician immediately perceive what is the problem when any trouble is detected in the emission control system. And OBD2 became effective later to increase the efficiency of OBD by standardization.

B. Generic OBD2 and Enhanced OBD2

1. Generic OBD2

    a. OBD2 was implemented for the emission control. Therefore, the standardization is limited to powertrain system that is directly related to emission control. It is not mandatory for the other systems such as ABS and SRS

    b. Not all the trouble codes and data stream variables are standardized, also. A list of trouble codes and data stream variables that are closely related to emission control are defined as OBD2 standards, however, it also allows more codes and variables reserved for car make's own definition and usage. These standardized parts of trouble codes and data stream variables are so called Generic OBD2. Generic OBD2 application is limited to emission related systems and so is the diagnostic readouts

2. Enhanced OBD2

    a. Generic OBD2 has limited availability for overall diagnosis, however, an actual car has a lot more than this. The control systems other than powertrain are not included in the mandatory OBD2 regulations, and each car make has different trouble code and data stream definitions for the reserved non-standard fields of powertrain system.

    b. The scope of on board diagnostic system that OBD2 standard features do not cover is called Enhanced OBD2.

3. Manufacturer's OBD

    a. Many of Non-USA cars of 1996 model-year or later have an OBD2 16Pin adapter, however the communication with scanners does not follow standardized OBD2 protocols.

    b. These car makes maintain their own communication features that are not

much different from OBD generation 1 but only the appearance of diagnostic adapter. This is so called MOBD or manufacturer's OBD.

c. With Multiscan, MOBD communication is supported for all car makes that are included in the coverage list.

III. Multiscan and OBD2 ----------————-------------

A. Generic OBD2 in Multiscan

1. General OBD2

a   You will find General OBD2 category in the initial menu.
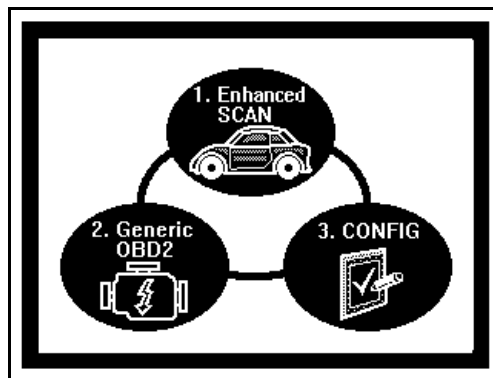
b   Selecting [2. Generic OBD2] will be followed by the diagnostic adapter suggestion.   Press the [ENTER] key to proceed.

c   Multiscan then automatically tries to establish communication with the powertrain control module using standard OBD2 communication protocols in turn.

```
┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│        OBD II DIAGNOSTICS       │   │        OBD II DIAGNOSTICS       │
│                                 │   │                                 │
│  ┌───────────────────────────┐  │   │  ┌───────────────────────────┐  │
│  │  TEST J1850 41.6Kbps PWM  │  │   │  │  TEST J1850 10.4Kbps VPW  │  │
│  └───────────────────────────┘  │   │  └───────────────────────────┘  │
│                                 │   │                                 │
│ DETERMINE COMMUNICATION INTERFACE│   │ DETERMINE COMMUNICATION INTERFACE│
└─────────────────────────────────┘   └─────────────────────────────────┘

┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│        OBD II DIAGNOSTICS       │   │        OBD II DIAGNOSTICS       │
│                                 │   │                                 │
│  ┌───────────────────────────┐  │   │  ┌───────────────────────────┐  │
│  │      TEST ISO 9141-2      │  │   │  │       TEST KW 2000        │  │
│  └───────────────────────────┘  │   │  └───────────────────────────┘  │
│                                 │   │                                 │
│ DETERMINE COMMUNICATION INTERFACE│   │ DETERMINE COMMUNICATION INTERFACE│
└─────────────────────────────────┘   └─────────────────────────────────┘
```
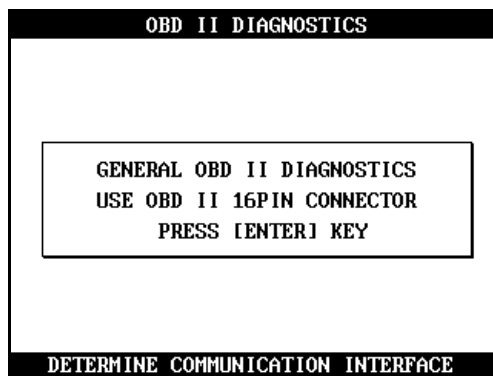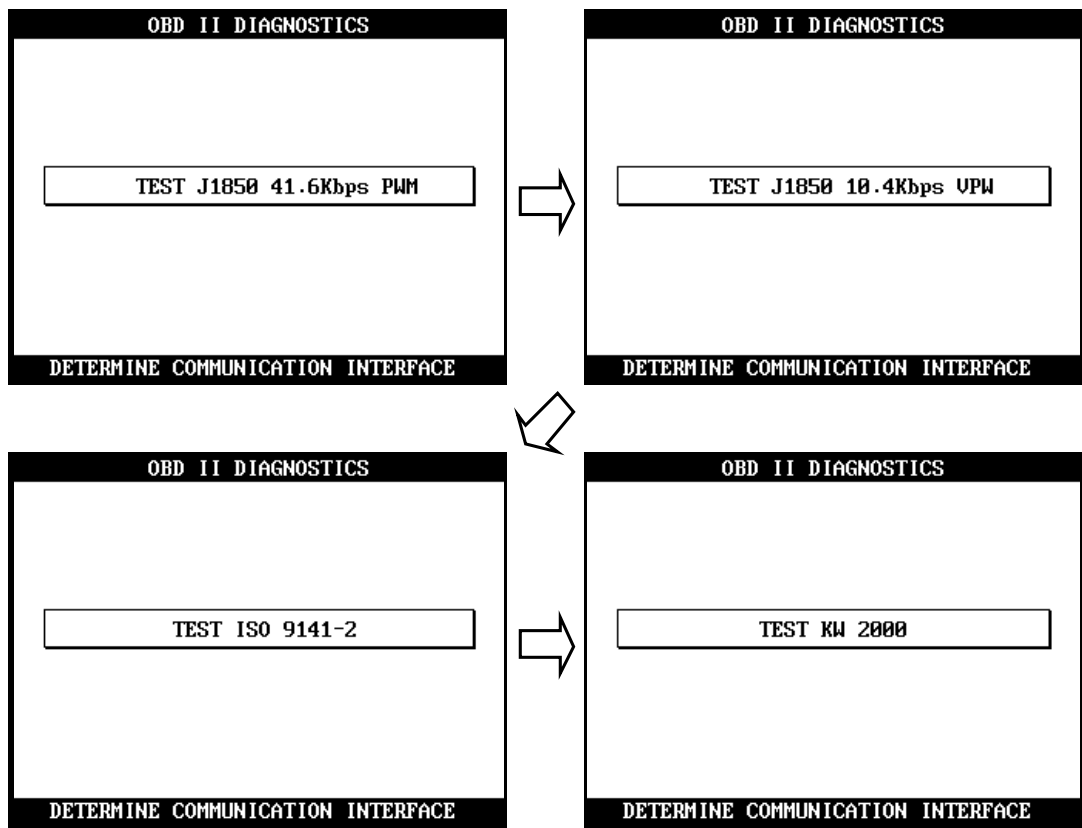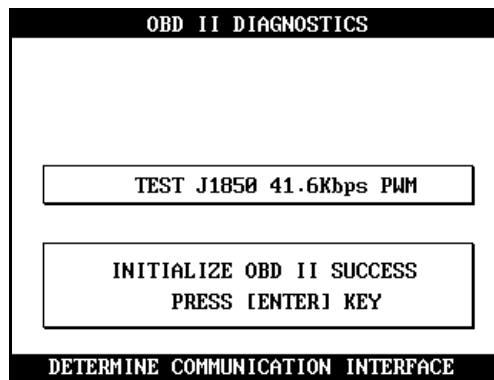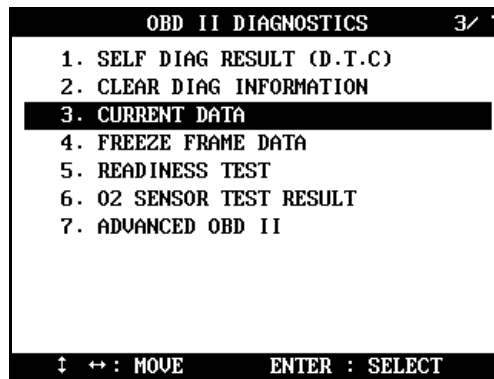
d   When succeeded in communicating with the control module with any of these 4 standard protocols, Multiscan reports the successful establishment of communication and waits for your command to commence generic OBD2 diagnosis as below:

```
┌─────────────────────────────────┐
│        OBD II DIAGNOSTICS       │
│                                 │
│  ┌───────────────────────────┐  │
│  │  TEST J1850 41.6Kbps PWM  │  │
│  └───────────────────────────┘  │
│                                 │
│  ┌───────────────────────────┐  │
│  │  INITIALIZE OBD II SUCCESS │  │
│  │     PRESS [ENTER] KEY     │  │
│  └───────────────────────────┘  │
│ DETERMINE COMMUNICATION INTERFACE│
└─────────────────────────────────┘
```

e   Available functions for the generic OBD2 system is listed as shown below:

```
         OBD II DIAGNOSTICS       3/ 7
      1. SELF DIAG RESULT (D.T.C)
      2. CLEAR DIAG INFORMATION
      3. CURRENT DATA
      4. FREEZE FRAME DATA
      5. READINESS TEST
      6. O2 SENSOR TEST RESULT
      7. ADVANCED OBD II



      ↕ ↔ : MOVE        ENTER : SELECT
```

f   In case the control module does not respond after trying all OBD2 standard protocols, Multiscan shows the failure report and check points as below:

```
         OBD II DIAGNOSTICS
   ┌─────────────────────────────────┐
   │ !! Communication Test Failed !! │
   │ 1. Verify that the ignition is ON. │
   │ 2. Check the Emission Label or ve- │
   │    hicle service information that │
   │    the vehicle is OBD II equipped. │
   │ 3. Check that the Tool is connect- │
   │    ed to the vehicle correctly.  │
   │                                 │
   │     Do you want try again ?     │
   │        ( Yes / No )             │
   └─────────────────────────────────┘
   DETERMINE COMMUNICATION INTERFACE
```
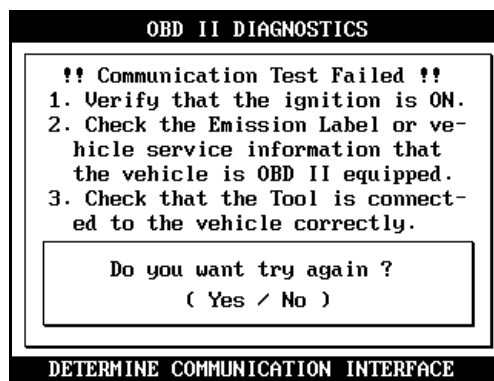
2. When to select

You may select this General OBD2 when you are sure that the test vehicle is OBD2 compliant but not included in the vehicle coverage list.

3. EOBD

a   Even though Multiscan does not include many European cars in its coverage as of May, 2003, it is frequently reported that General OBD2 of Multiscan works well with EOBD vehicles.

b   In Europe, EOBD has become mandatory from January 1, 2001, and all the cars built in Europe since then on must have been generic OBD2 compliant.

c   You may select General OBD2 of Multiscan for the diagnosis of these brand new European cars for the powertrain system.

CHAPTER 6   JAPANESE CARS

Japanese Cars

- Multiscan software package for Japanese cars is provided as a part of 128MB built-in flash memory.

- The Japanese car package contains a set of software comprising of the following software groups.

  - ✓ TOYOTA/ LEXUS USA
  - ✓ HONDA
  - ✓ NISSAN
  - ✓ MITSUBISHI
  - ✓ MAZDA
  - ✓ SUBARU
  - ✓ SUZUKI
  - ✓ ISUZU
  - ✓ Generic OBD2

- Loading software

  Select [1.SCAN] from the initial function selection, select Japanese cars, then the list of Japanese car makes will follow. The detailed menu selection queries will guide you to the correct diagnostic readouts.
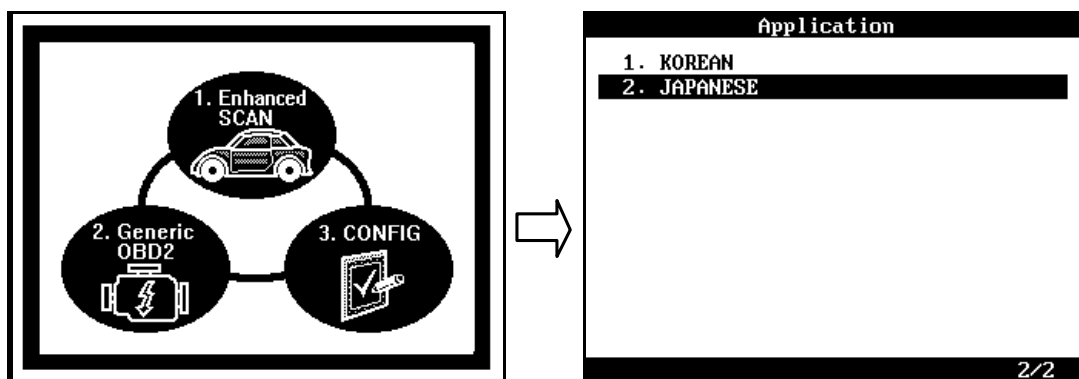
I.   TOYOTA and LEXUS ----------------------

Toyota and Lexus cars share the same scanner communication methods from a scanner's viewpoint.

Multiscan does not separate Toyota and Lexus in the car make menu because the detailed menu selection procedure and other features are exactly same for both marques. You can select either Toyota or Lexus in the next step.
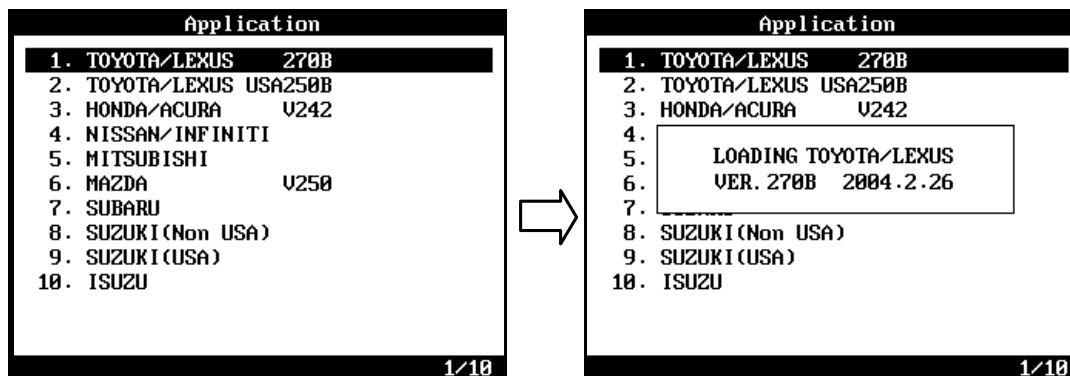
This chapter covers Toyota cars. You can also refer to this section for diagnosing Lexus cars.

A. Menu Selection

Toyota software of Multiscan follows the exactly same menu selection procedure as the manufacturer's original equipment.
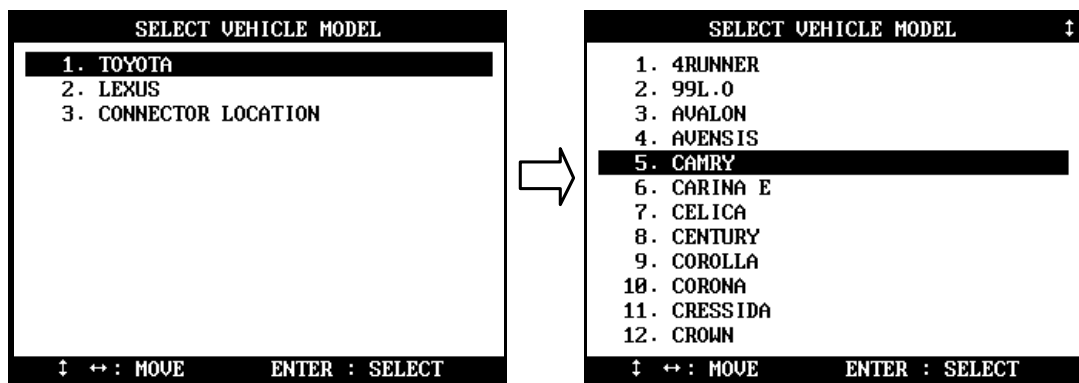
1. Select TOYOTA/LEXUS

Select TOYOTA / LEXUS from the car make menu.

```
         Application                      Application
1. TOYOTA/LEXUS    270B         1. TOYOTA/LEXUS    270B
2. TOYOTA/LEXUS USA250B         2. TOYOTA/LEXUS USA250B
3. HONDA/ACURA    V242          3. HONDA/ACURA    V242
4. NISSAN/INFINITI              4.
5. MITSUBISHI                   5.   LOADING TOYOTA/LEXUS
6. MAZDA          V250          6.   VER. 270B  2004.2.26
7. SUBARU                       7.
8. SUZUKI(Non USA)              8. SUZUKI(Non USA)
9. SUZUKI(USA)                  9. SUZUKI(USA)
10. ISUZU                       10. ISUZU


                    1/10                             1/10
```

2. Select Model Name

You can select between Toyota and Lexus at this stage.
Toyota non-USA version is applicable to all Toyota cars outside North America. It covers 32 different model variants.

```
SELECT VEHICLE MODEL
1. TOYOTA
2. LEXUS
3. CONNECTOR LOCATION




↕  ↔ : MOVE      ENTER : SELECT
```

```
SELECT VEHICLE MODEL          ↕
1. 4RUNNER
2. 99L.0
3. AVALON
4. AVENSIS
5. CAMRY
6. CARINA E
7. CELICA
8. CENTURY
9. COROLLA
10. CORONA
11. CRESSIDA
12. CROWN
↕  ↔ : MOVE      ENTER : SELECT
```
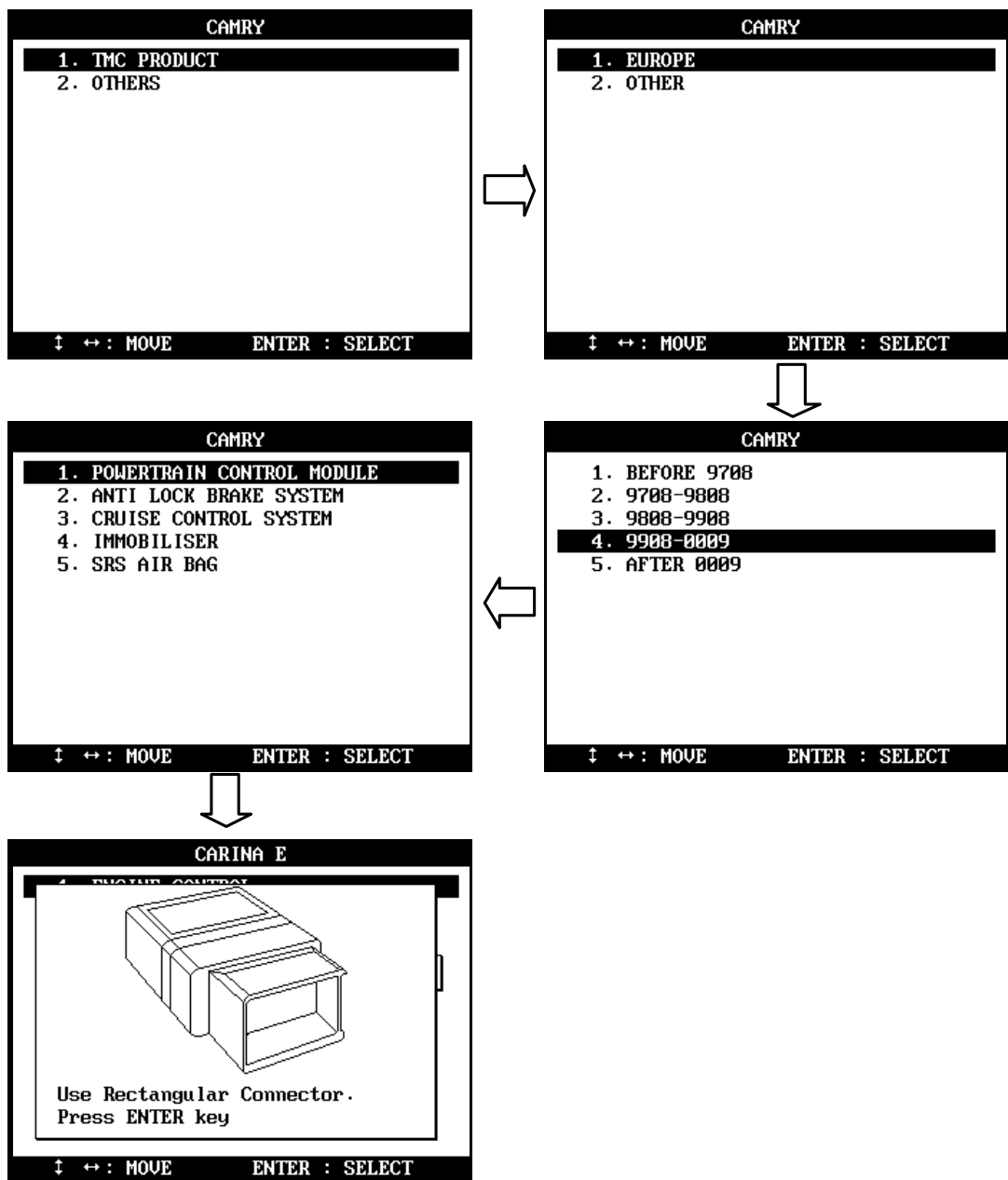
3. Select model code

You have to select the exact model code of the vehicle model (i.e. MCV10, MCV20, SXV10 and SXV11 for Camry)
Each model code represents a significant difference in overall system from other model codes.

```
CAMRY
1. MCV10
2. MCV20
3. SXV10
4. SXV11
5. SXV20
6. VCV10




↕  ↔ : MOVE      ENTER : SELECT
```
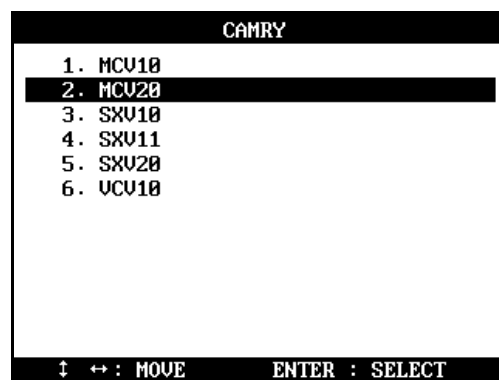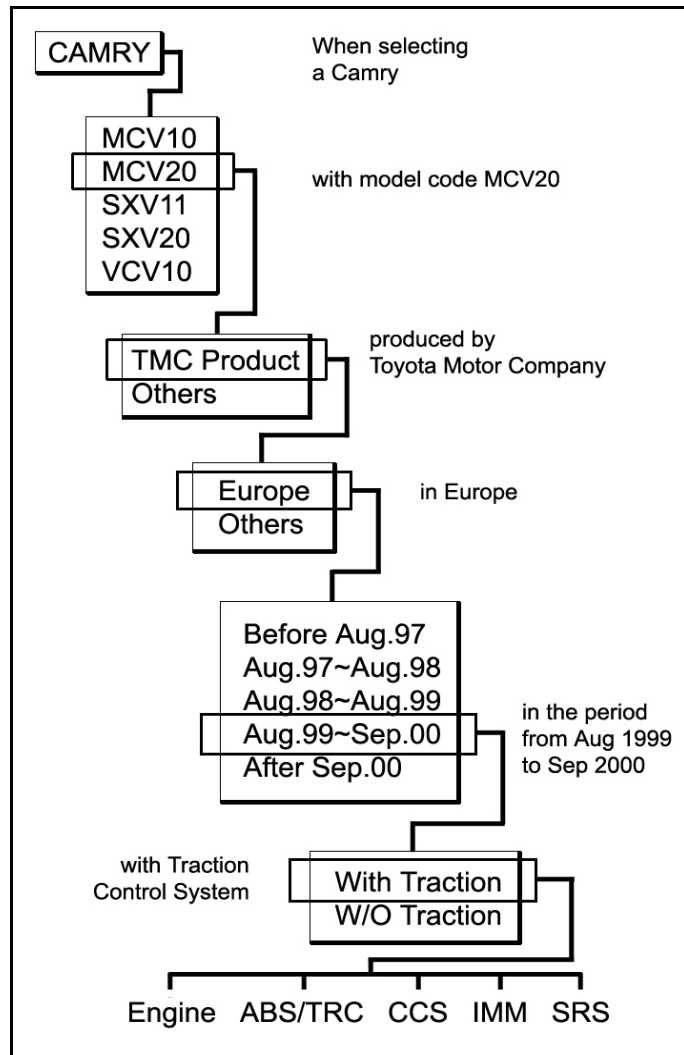
4. Select model year and other detailed model specifications

Multiscan may ask for your selection for a few more steps including model year, manufacturing plant and the existence of O2 sensor or immobilizer system to specify the exact vehicle details for precise and accurate results.

```
            CAMRY
  1. TMC PRODUCT
  2. OTHERS




  ↕ ↔ : MOVE        ENTER : SELECT
```

```
            CAMRY
  1. EUROPE
  2. OTHER




  ↕ ↔ : MOVE        ENTER : SELECT
```

```
            CAMRY
  1. POWERTRAIN CONTROL MODULE
  2. ANTI LOCK BRAKE SYSTEM
  3. CRUISE CONTROL SYSTEM
  4. IMMOBILISER
  5. SRS AIR BAG



  ↕ ↔ : MOVE        ENTER : SELECT
```

```
            CAMRY
  1. BEFORE 9708
  2. 9708-9808
  3. 9808-9908
  4. 9908-0009
  5. AFTER 0009


  ↕ ↔ : MOVE        ENTER : SELECT
```

```
            CARINA E


  Use Rectangular Connector.
  Press ENTER key

  ↕ ↔ : MOVE        ENTER : SELECT
```

B. Why so complicated

The flow chart shows the menu selection procedure presented above for Camry as an example.

Many of aftermarket scanners have a very simple selection procedure for Toyota cars by only selecting the diagnostic adapter type. Indonesian Tamaraw and Lexus RX300 are considered same for these scanners.

However, the Toyota OE tool has a very detailed vehicle selection procedure up to 5 or 6 steps. The selection procedure of Multiscan is also designed to provide reliable and diversified diagnosis at OE tool level for each specific vehicle.

1. The difference of Toyota from the other Japanese cars

Japanese cars with the exception of Toyota and Nissan have ID check system. A scanner communicates with an ECM to get the ECM ID number to identify the test vehicle. Then automatically determines the appropriate communication protocol accordingly.

However, Toyota has no such ID check system. To get the correct response, it is absolutely necessary to let the scanner know which car it is going to talk to.
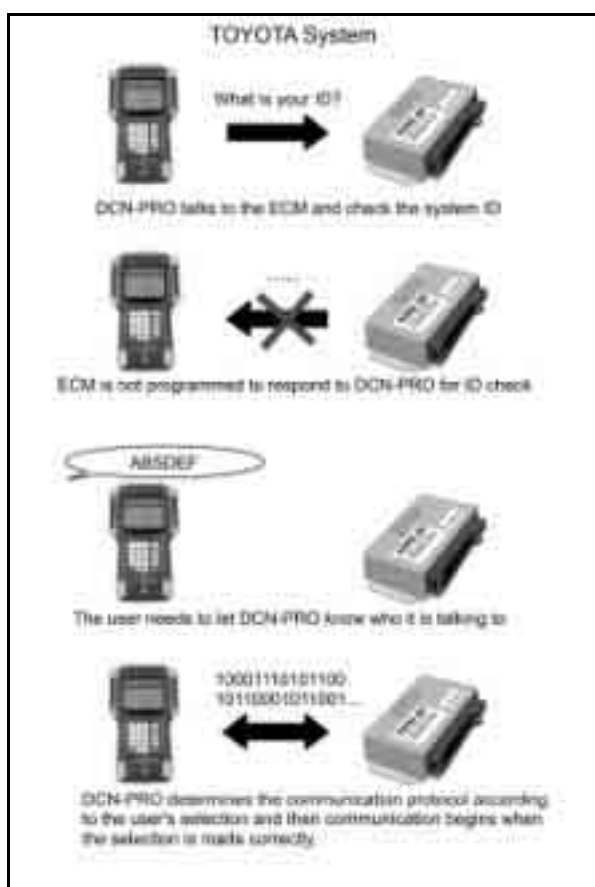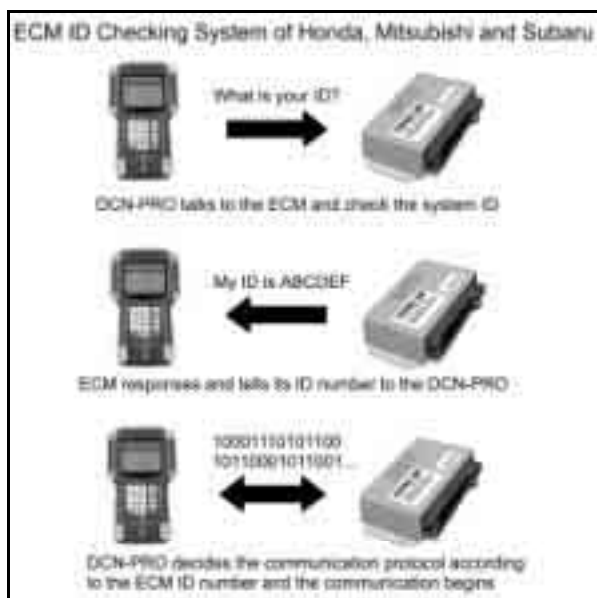
Each vehicle model code has different types of engine and control system. Even the number of sensors is different. To get full information that the vehicle ECM transmits, the model selection must be as specific as possible.

If a scanner starts communicating with the ECM after simply selecting the adapter, the best result you can get is limited data for the generic items that are commonly found in all Toyota cars.

2. How to get the detailed specifications

a   Model Code (Chassis number)

Open the engine hood and find the model code stamped into the vehicle specification tag, attached to firewall on the driver's side.

b   Model year and manufacturing plant

Model year and manufacturing plant information is contained in the Vehicle Identification Number. Refer to the manufacturer's manual book for the details of VIN translation

c   Equipped System

Some models may require you to confirm the existence of a certain system like immobilizer or traction control. You can check this from the warning lamps displayed in the dash panel right after turning the ignition key ON.

3. [33. Others]

You will find this category in the end of the Toyota vehicle model list. You may select this when you cannot find the model name in the list or when you do not want to make selections for all the details.

Only the adapter type selection menu will follow, and then Multiscan will begin to communicate with the ECM.

As mentioned above, it will work just like an ordinary aftermarket tool does, and limited data for the common generic items will be available in this mode.

4. Incorrect Adapter

a   No match in the list

Despite detailed vehicle selection procedure of Multiscan, you may encounter a situation where you cannot find the correct vehicle details in the list.   If you select a similar vehicle model code or other details from the menu, an incorrect adapter may be suggested.

For example, when you select AB-CD1 model code while the actual vehicle is AB-CD2 which is not included in the list, Multiscan may ask you to use 17 pin rectangular adapter even though the vehicle has the 17 pin semi-circular adapter.

The communication may fail in this case.   You are recommended to select [33. Others] to test the car in generic mode.

b   Multiple adapters

If Multiscan suggests to use a diagnostic adapter that is different from the one that you found in the car, the suggested adapter may be found elsewhere in the car.

Some Japanese cars have multiple DLC adapters, and generally each of them covers different systems.

Refer to the adapter location maps below, and check the car for the suggested adapter.

C. Functions

1. 17 Pin Rectangular and Semi-Circular Adapter

a   Diagnostic Trouble Code

- DTC readout is provided in Flash code pulse signals for all systems when using this adapter.

- This old communication type does not allow bi-directional communication between the scanner and the ECM. ECM simply transmits the slow pulse signal when the appropriate DLC terminal is grounded.

b   DTC Erase

- Fault code erase by a scanner is not available for the pulse signal type communication.

- You must remove the (-) battery terminal to clear the fault codes. Removing the battery terminal will get rid of all information contained in the car stereo and other electronic devices. And it may not effectively erase the fault codes in some cars. Refer to the original repair manual for further information.

c   Data Stream

- Data Stream / Service Data / Live Data is supported for Engine only for this type of adapter.

d   Supported systems

-    Rectangular Adapter: Generally only Engine and SRS systems are supported with this type of adapter.
     For the other systems such as ABS, TCS and Cruise Control, only the flash code manual reading is available by counting the relevant Malfunction Indication Lamp blinking when the adapter is connected to the vehicle side DLC.

-    Semi-Circular Adapter: When the vehicle has 17 Pin Semi-Circular adapter, all systems including Engine and SRS are supported through this adapter.

2. 16 Pin OBD2 Adapter

a   Diagnostic Trouble Code

-    Fault code read and erase are both available when using the OBD2 adapter

-    Neither manual flash code reading nor battery terminal removal is necessary for code read and erase.

b   Data Stream

-    Service data / Data stream / Live data is available for most systems

-    Suspension and Cruise control systems of a few models may support DTC pulse signal only.   Data stream is not available for these exceptional models.
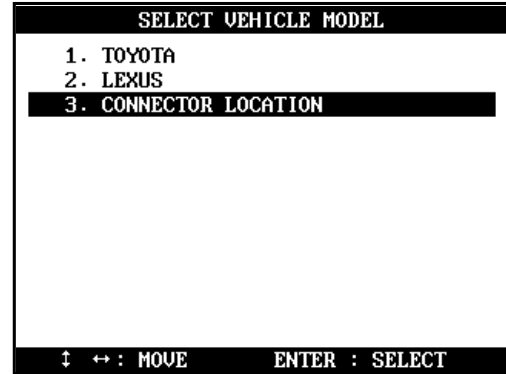
c   Actuation test

-    Actuation test is available for various systems when using this adapter.

D. Diagnostic Adapter Location

The DLC adapter location drawings are purely from the experience of Hanatech and provided for your reference only.

The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

```
      SELECT VEHICLE MODEL
  1. TOYOTA
  2. LEXUS
  3. CONNECTOR LOCATION




  ↕ ↔ : MOVE        ENTER : SELECT
```
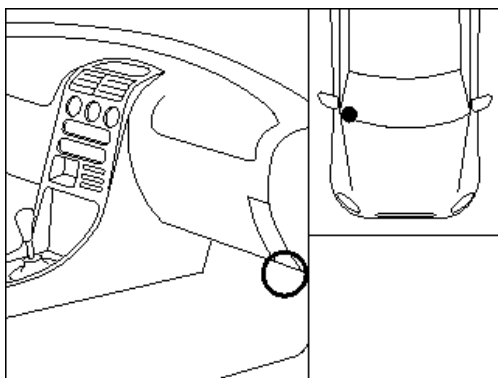
You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [2. Toyota / Lexus] from the car make list.
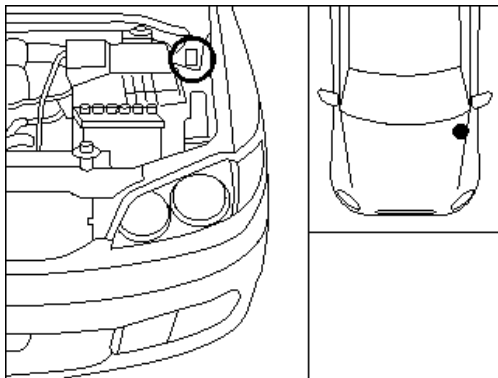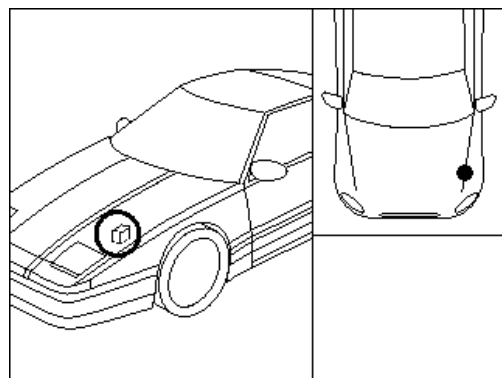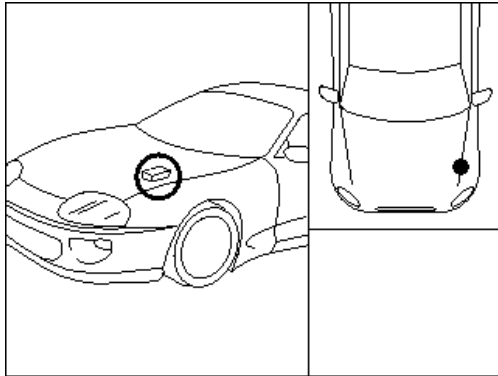

17 Pin Rectangular Adapter
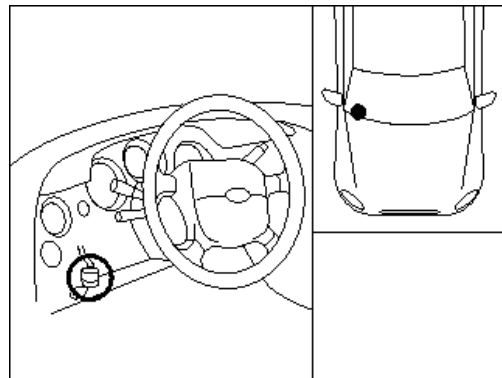
17P Semi-Circular Adapter

16 Pin OBD2 Adapter

17 Pin Rectangular Adapter

17 Pin Rectangular Adapter
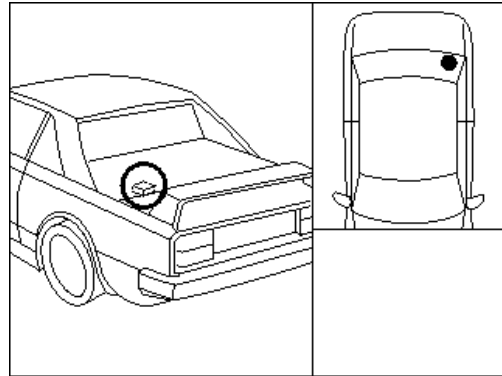
17 Pin Rectangular Adapter
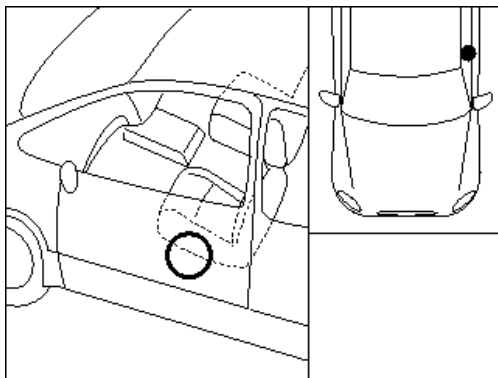
17 Pin Rectangular Adapter
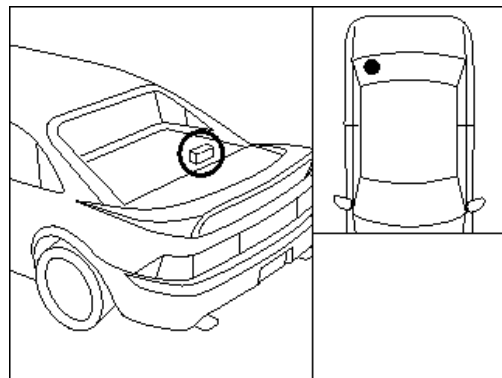
17 Pin Rectangular Adapter

E. Vehicle Coverage

Refer to the following coverage list.

(In Alphabetic order)

TOYOTA

MODEL	CODE	Supported System
4RUNNER	KZN185 RZN180 RZN185 VZN130 VZN180 VZN185	ENGINE CONTROL SRS AIR BAG ANTI LOCK BRAKE SYSTEM POWERTRAIN CONTROL MODULE IMMOBILISER
99LO	--	SRS AIRBAG
AVALON	MCX10 MCX20	POWERTRAIN CONTROL MODULE ECT ANTI LOCK BRAKE SYSTEM TRACTION CONTROL SYSTEM IMMOBILISER CRUISE CONTROL SYSTEM SRS AIR BAG
AVENSIS	AT200 AT221 CT220 ST220 AZT220 CDT220 ZZT220 ZZT221	POWERTRAIN CONTROL MODULE IMMOBILISER SRS AIR BAG ANTI LOCK BRAKE SYSTEM
CAMRY	MCV10 MCV20 SXV10 SXV11 SXV20 VSV10	POWERTRAIN CONTROL MODULE ECT CRUISE CONTROL SYSTEM, IMMOBILISER, SRS AIR BAG ANTI LOCK BRAKE SYSTEM
CARINA	AT190 AT191 CT190 ST919	ENGINE CONTROL IMMOBILISER SRS AIR BAG

CELICA	AT180 AT200 ST182 ST184 ST185 ST202 ST204 ST205 ZZT230 ZZT231	POWERTRAIN CONTROL MODULE, IMMOBILISER SRS AIR BAG ANTI LOCK BRAKE SYSTEM
CENTURY	GZG50	ENGINE CONTROL AIR SUSPENSION, CRUISE CONTROL SYSTEM IMMOBILISER SRS AIR BAG, BODY CONTROL
COASTER	BB50 BB58 RZB40 RZB50	POWERTRAIN CONTROL ANTI LOCK BRAKE SYSTEM
CONDOR	LF6X,8X RZF80 RXF85	ENGINE CONTROL IMMOBILISER
COROLLA	AE100 AE101 AE102 AE103 AE110 AE111 AE112 AE115 AE92 CE110 EE101 EE104 EE111 CDE110 NZE120 NZE121 WZE110 ZZE111 ZZE112 ZZE121 ZZE122	POWERTRAIN CONTROL MODULE IMMOBILISER SRS AIR BAG ANTI LOCK BRAKE SYSTEM EMPS

CORONA	AT190 AT210 AT220 CT220 ST171 ST191 ST210 ST220	POWERTRAIN CONTROL MODULE ANTI LOCK BRAKE SYSTEM IMMOBILISER SRS AIR BAG
CRESSIDA	--	ENGINE CONTROL ANTI LOCK BRAKE SYSTEM CRUISE CONTROL SYSTEM ECT
CROWN	GS151 JZS133 JZS155 JZS175	POWERTRAIN CONTROL MODULE CRUISE CONTROL SYSTEM ANTI LOCK BRAKE SYSTEM VSC, ECT, SRS AIR BAG AIR CONDITIONING SYSTEM IMMOBILISER BODY1/2/3, D/P DOOR, SLIDE ROOF, TILT & TELESCO, METER, COMBINATION SWITCH
DYNA	RZU100 BU213 BU223 XZU300 XZU320 XZU330 XZU340 XZU342 XZU4XX	POWERTRAIN CONTROL MODULE ANTI LOCK BRAKE SYSTEM

HIACE	LH103 LH 114 LH125 LXH12,22 LXH18,28 RCH12 RCH13 RCH18 RCH19 RCH22 RCH23 RCH28 RZH102 RZH103 RZH105 RZH109 RZH112 RZH113 RZH115 RZH119 RZH125 RZH135 RZH153 LH162 LH172 LH174 LH184 RCH29 RZH155	ENGINE CONTROL, POWERTRAIN CONTROL MODULE, SRS AIR BAG, IMMOBILISER
LAND CRUISER	FZ75 FZJ80 FZJ100 FZJ105 FZJ71,74 FZJ73 HDJ100 HDJ80 HZJ105 HZJ80 KDJ90,95 KJZ90,95 RZJ90 RZJ95 UZJ100 VZJ90,95	POWERTRAIN CONTROL MODULE AHC ANTI LOCK BRAKE SYSTEM IMMOBILISER SRS AIR BAG CRUISE CONTROL SYSTEM BODY POWER SEAT CONTROL SYSTEM TILT & TELESCO MIRROR

HILUX	LN14X LN15X LN16X LN17X LN19X RN106 RN110 RN85 RXN142 RZN144 RZN149 RZN147 RZN148 RZN154 RZN168 RZN169 RZN173 RZN174 RZN193 RZN194 KZN165 KZN190	POWERTRAIN CONTROL MODULE IMMOBILISER SRS AIR BAG
KIJANG	KF72 KF82 RZF71 RZF81	ENGINE CONTROL
LITEACE	CR42 KR42 SR40 YR22,29	POWERTRAIN CONTROL MODULE SRS AIR BAG IMMOBILISER
MR2	SW20 ZZW30	POWERTRAIN CONTROL MODULE SRS AIR BAG IMMOBILISER ANTI LOCK BRAKE SYSTEM EHPS SEQUENTIAL MT
PASEO	EL54	ENGINE CONTROL SRS AIR BAG IMMOBILISER
PICNIC	CXM10 SXM10	POWERTRAIN CONTROL IMMOBILISER SRS AIR BAG
PREVIA	TCR10,11 TCR20,21 ACR30 CLR30	POWERTRAIN CONTROL MODULE SRS AIR BAG IMMOBILISER ANTI LOCK BRAKE SYSTEM CRUISE CONTROL MODULE

|		
PRIUS	--	POWERTRAIN CONTROL MODULE EMPS ANTI LOCK BRAKE SYSTEM SRS AIR BAG CRUISE CONTROL SYSTEM IMMOBILISER
RAV4	SXA10,11 ACA20,21 ZCA25,26	POWERTRAIN CONTROL MODULE SRS AIR BAG ANTI LOCK BRAKE SYSTEM IMMOBILISER
RAV4 EV	--	SRS AIR BAG
SOLUNA(AFC)	AL50	ENGINE CONTROL
SPACIO	AE111	ENGINE CONTROL SRS AIR BAG ANTI LOCK BRAKE SYSTEM
STARLET	EP81 EP82 EP91	ENGINE CONTROL IMMOBILISER SRS AIR BAG
SUPRA	JZA80	ENGINE CONTROL ECT ANTI LOCK BRAKE SYSTEM CRUISE CONTROL SYSTEM SRS AIR BAG TRACTION CONTROL SYSTEM
TAMARAW	KF80 RZF81	ENGINE CONTROL,
TERCEL	EL51 EL53	ENGINE CONTROL SRS AIR BAG
UNSER	--	ENGINE CONTROL
YARIS ECHO	SCP10 NCP10 NCP11 NCP12 NCP13 NCP20 NCP21 NCP22	POWERTRAIN CONTROL SYSTEM EMPS ANTI LOCK BRAKE SYSTEM SRS AIR BAG IMMOBILISER FREE-TRONIC STOP&GO
ZACE	KF60 KF80 RZF84 RZF85	ENGINE CONTROL SRS AIR BAG

LEXUS

MODEL	CODE	Supported Systems
ES300	MCV20 VCV10	POWERTRAINEMS, ABS, CCS, IMM, SRS
GS300	JZS147 JZS160	POWERTRAIN, ABS/VSC, CCS, A/C, IMM, SRS, BODY, BODY2, DOOR (D, P, RR, RL), SEAT, SLIDE ROOF, TILT&TELESCO, METER
GS430	UZS161	POWERTRAIN, ABS/VSC, CCS, A/C, IMM, SRS, BODY, BODY2, DOOR (D, P, RR, RL), SEAT, SLIDE ROOF, TILT, METER, STEERING PAD
IS200	GXE10	POWERTRAIN, ABS, CCS, A/C, IMM, SRS, BODY, METER, TDS
LS400	UCF10 UCF20	POWERTRAIN, ECT, AIR SUS, ABS, TRACTION, CCS, A/C, IMM, SRS, SRS SIDE
LS430	UCF30	POWERTRAIN, AIR SUS, ABS/VSC, CCS, A/C, IMM, SRS, GATEWAY, BODY (1,2,3,4,5), DOOR (D, P, RR, RL), SEAT(D, P, ``RR, RL), REAR SEAT S/W, SLIDE ROOF, TILT, METER, COMBI S/W, STEERING PAD, TDS, CLEARANCE SONAR, RAIN SENSOR
LX470	UZJ100	POWERTRAIN, AHC, ABS/TRACTION/VSC, CCS, IMM, SRS, BODY, SEAT, TILT/TELESCO, MIRROR
RX300	MCU15	POWERTRAIN, ABS/TRAC/VSC, CCS, A/C, IMM, SRS, BODY, DOOR(D, P, RR, RL), SLIDE ROOF, METER, TDS
SC430	UZZ40	POWERTRAIN, TIRE PRESSURE WARNING, ABS/VSC, CCS, A/C, IMM, SRS.GATEWAY, BODY (2, 3, 4, 5), DOOR (D, P), SEAT (D, P), RETRACTABLE HARDTOP, TILT, METER, COMBI S/W, STEERING PAD, TDS

II. HONDA --

A. Features of Honda S/W

1. Communication Start-up

a   Honda has the ECM ID check system.

Complicated menu selection procedure as in Toyota is not necessary for Honda cars.

b   The user is simply required to check the adapter type of the vehicle and to select the adapter and the desired system to test.

c   Then Multiscan automatically begins to talk to the ECM to identify the system ID and determines its communication details according to the response from the ECM.
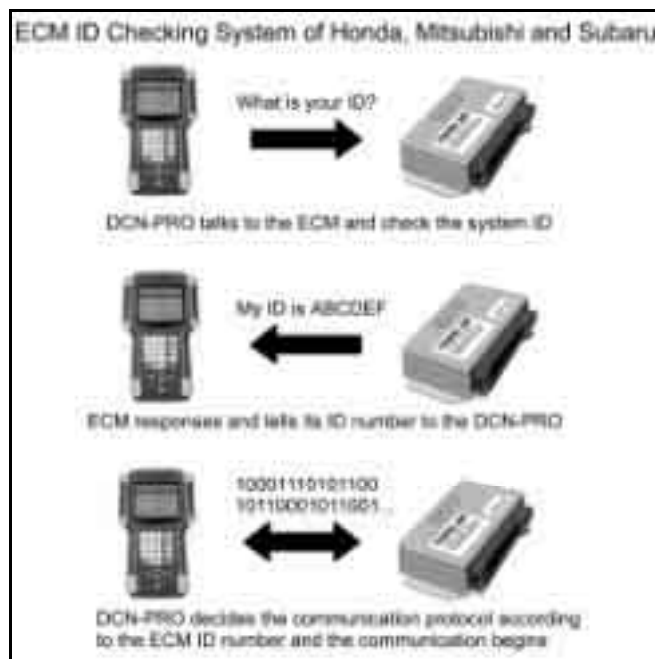
2. Performance

a   Multiscan HONDA software is applicable to all Honda cars regardless of regional market and covers up to 4,000 different system IDs when counting the Engine control system only.   Total 7,000 IDs are included in the database for all Honda car systems.

b   Multiscan Honda software provides original equipment level reliability and accuracy for Honda cars up to 2003 model year.

3. Difference

a   It is very difficult and time consuming to analyze all the system IDs for Honda cars. Most scanners provide only the limited readouts that are commonly available in all Honda cars.   Honda Civic and Acura Legend are considered same for these scanners.

b   Multiscan identifies each ECM version and provides the most optimized and precise diagnostic information of OE tool level.

B. Menu Selection

1. Select HONDA/ACURA

Select HONDA/ACURA from the car make menu.
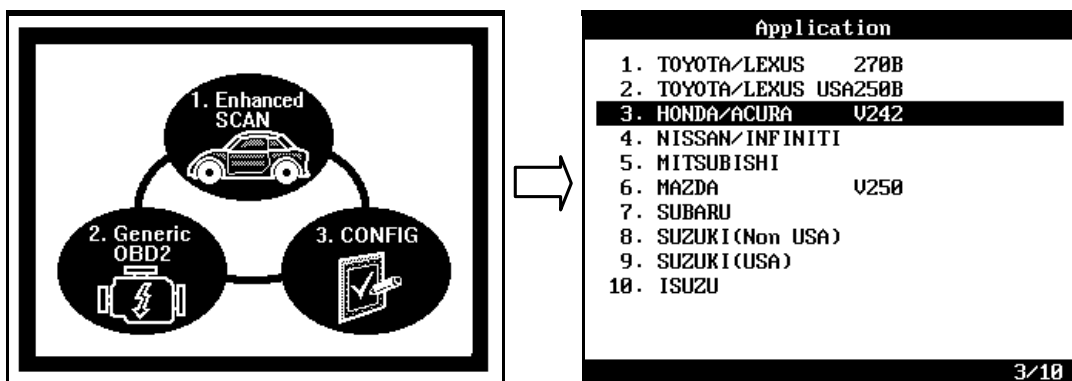
2. Select the adapter type

Search for the diagnostic connector in the car referring to the connector location drawings hereinafter and select the connector type found.

3. Select Test System

Select the system you want to test.
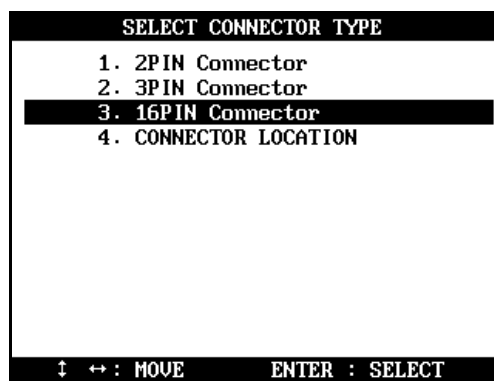
```
┌─────────────────────────────────────┐
│           SELECT DEVICE             │
├─────────────────────────────────────┤
│  1. ENGINE CONTROL                  │
│  2. AUTO TRANSMISSION               │
│  3. SRS AIR BAG                     │
│  4. ANTI LOCK BRAKE SYSTEM          │
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
│  ↕ ↔ : MOVE        ENTER : SELECT   │
└─────────────────────────────────────┘
```
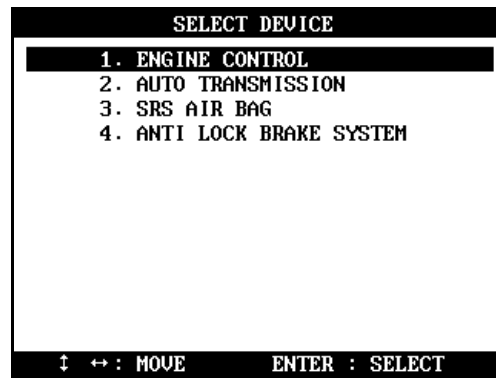
C. Adapters

1. 2-Pin Connector

a   2-pin adapter is generally found together with the 3-pin adapter, however, some old cars may have this adapter only.

b   Live data (Data stream) is not available for all systems when using this 2-pin adapter. Only reading the flash signal in the dash panel is available with this adapter and bi-directional serial communication with a scanner is not available. Therefore, it supports the Trouble Code read function only.

2. 3 Pin connector

a   3-pin adapter is generally found together with the 2-pin adapter, however, some cars may have this adapter only.

b   Live data is available but some ABS and SRS systems may support Trouble Code pulse signal only.

3. 2 + 3 Pin connector

a   2-pin and 3-pin adapters are generally found together. In this case,

each adapter is assigned to different systems in the car.

b   You are recommended to try to test the system with 3-pin adapter first, and then try with 2-pin adapter in the event communication using 3-pin adapter fails.

4. 16 Pin connector

16-pin adapter equates to the OBD2 standard adapter.   Fault Code read and erase, and live data is supported for all systems.

D. ECM RESET function

-   Following ECM replacement, fault code erasing or when you feel the necessity to reset ECM adaptation due to poor engine performance, you can activate this function.
-   It cleans up the ECM memory and makes the ECM ready for self-adaptation.

1. Select ECM RESET

You may select this function when you select the ENGINE CONTROL system from the SELECT DEVICE menu that follows the adapter type selection.

```
           HONDA
   1. D. T. C
   2. CURRENT DATA
   3. ECM RESET




   ↕ ↔ : MOVE       ENTER : SELECT
```

```
           HONDA
   1. D. T. C
   2. CURRENT DATA
   3. ECM RESET
   DO YOU WISH TO SEND ECM A RES
   ETING MESSAGE ?
   PRESS YES OR NO



   ↕ ↔ : MOVE       ENTER : SELECT
```
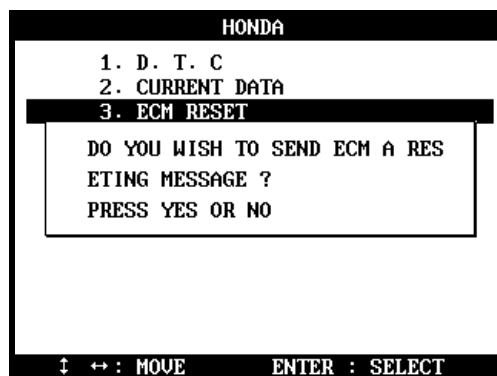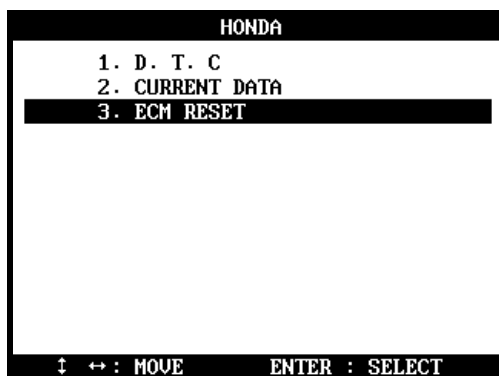
2. After Reset

After the resetting, ECM needs some time to relearn the idling condition and finalize self-adaptation.

Start and idle the car for more than 5 minutes after warm-up.
Otherwise poor engine performance will result.

Chapter 6 - 26

E. Adapter location

a The location drawings are purely from the experience of Hanatech and provided for your reference only.

b The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

c You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [3. HONDA] from the car make list.

```
        SELECT CONNECTOR TYPE
     1. 2PIN Connector
     2. 3PIN Connector
     3. 16PIN Connector
     4. CONNECTOR LOCATION




     ↕ ↔ : MOVE      ENTER : SELECT
```
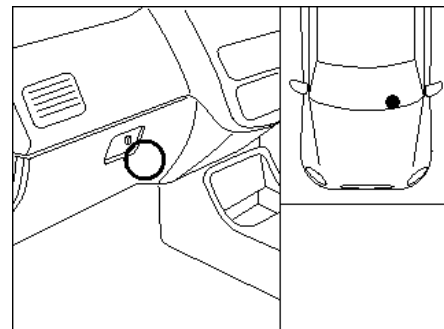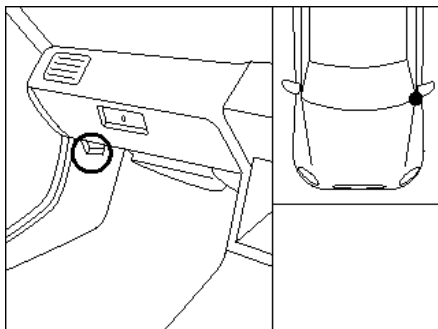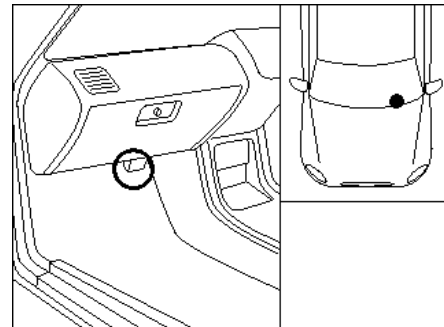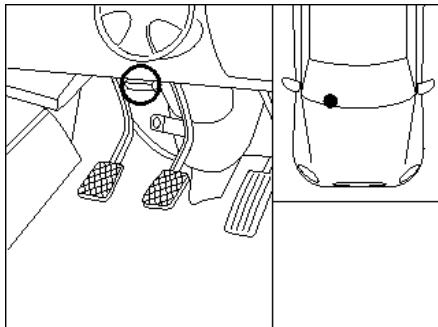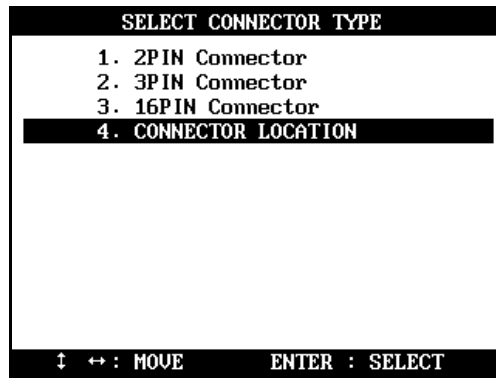
F. Vehicle Coverage

- The vehicle coverage listed below is limited to the cars that supports live data (Data stream / Service data) with 3-pin or 16-pin adapter
- Older cars with 2-pin adapter are not included.

JAPANESE DOMESTIC

Model Name	From	Until
Accord	1994	2002
Acty	1994	2002
Ascot	1994	1997
Avancier	2000	2002
Capa	1998	2001
Civic	1992	2002
Civic Coupe	1993	1996
Civic 5Door	2001	2002
Civic Hybrid	2002	2002
Stream	2001	2002
CR-V	1996	2002
CR-X	1992	1996
Domani	1993	2000
Fit	2002	2002
HR-V	1999	2002
Insight	2000	2002
Inspire	1995	2000
Inspire V6	1995	2003
Integra	1992	2002
Integra SJ	1996	2000

Lagreat	1999	2002
Legend	1996	2002
Life	1997	2002
Logo	1997	2001
Mobilio	2002	2002
NSX	1995	2002
Odyssey	1995	2002
Odyssey V6	1998	2002
Orthia	1996	2000
Partner	1996	2000
Prelude	1992	2001
Rafaga	1994	1997
S2000	1999	2002
Saber	1995	2003
S-MX	1997	2001
Step Wagon	1996	2002
That's	2002	2002
Today	1993	1998
Toreno	1998	2002
Vamos	1999	2002
Z	1999	2000

NORTH AMERICAN

Model Name	From	Until
Accord	1994	2002
Accord V6	1995	2002
Acura 1.6EL	1997	2000
Acura 1.7EL	2001	2002
Acura 2.2CL	1997	1997
Acura 2.3CL	1998	1999
Acura 2.5TL	1995	1998
Acura 3.0CL	1997	2000
Acura 3.2CL	2001	2003
Acura 3.2TL	1995	2003
Acura 3.5RL	1996	2002
Acura MD-X	2001	2002
Acura RSX	2002	2002
Civic	1992	2002
Civic Coupe	1993	2002
Civic Hybrid	2002	2003
CR-V	1997	2002
CR-X	1992	1997
Insight	2000	2002
Integra	1992	2001
NSX	1995	2002
Odyssey	1995	2002
Pilot	2003	2003
Prelude	1992	2001
S2000	2000	2002

EUROPEAN

Accord	1994	2002
Accord V6	1998	2002
Civic	1992	2002
Civic Aero	1998	2000
Civic Coupe	1994	2002
Civic 5Door	1995	2001
Stream	2001	2002
CR-V	1997	2002
CR-X	1992	1997
HR-V	1999	2002
Insight	2000	2002
Integra	1998	2002
Jazz	2002	2002
Legend	1996	2002
Logo	1999	2000
NSX	1995	2002
Prelude	1992	2001
S2000	2000	2002
Shuttle	1995	1999

GENERAL

Accord	1994	2002
Accord V6	1995	2002
Acura 2.5TL	1995	1998
Acura 3.2TL	1996	2002
Acura 3.5TL	1996	2002
City	1996	2001
Civic	1992	2002
Civic Coupe	1994	2002
Civic 5Door	1997	2002
Stream	2001	2002
CR-V	1996	2002
CR-X	1992	1997
FIT	2002	2002
HR-V	1999	2002
Insight	2001	2002
Inspire V6	1999	2000
Integra	1992	2002
Jazz	2002	2002
Legend	1996	2002
Logo	1999	2000
NSX	1995	2002
Odyssey	1995	2002
Odyssey V6	2000	2002
Pilot	2003	2003
Prelude	1992	2001
S2000	2000	2002
Step Wagon	1998	2003
Vigor	1995	1998

III. NISSAN --------------------------------------

A. Features of Nissan S/W

1. Communication Start-up

   a   Nissan has neither the ECM ID check system like Honda nor the complicated menu selection system like Toyota.

   b   After system selection, the scanner sends a set of commands to the ECM for all data listings available within the vehicle, and then communicates with the ECM for the available items only.

c   The system check commands and communication details have been constant without change for both 14-pin and 16-pin diagnostic adapters. Therefore, a scanner does not need to know the ID number or the detailed vehicle specification. Simply select the adapter type and the scanner will communicate with the ECM for all available items.

2. Performance

a   Multiscan NISSAN software is applicable to all Nissan cars up to 2002 model year as of May 2003.

b   System Coverage

  Engine, Transmission, ABS, SRS,

  IVMS (In Vehicle Multiple System): Body control

  HICAS (High Intelligence Control Active Steering)

  ASCD (Automatic Speed Control Device): Cruise control.
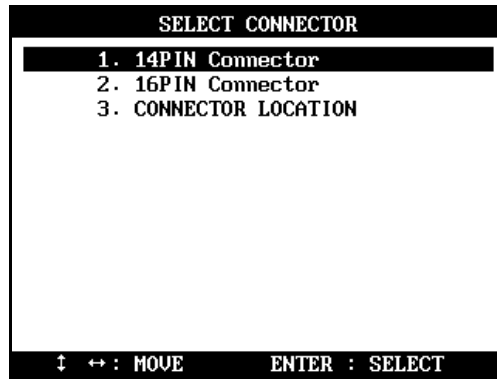
3. Menu Selection

a   Select NISSAN

Select NISSAN / INFINITI from the car make menu.
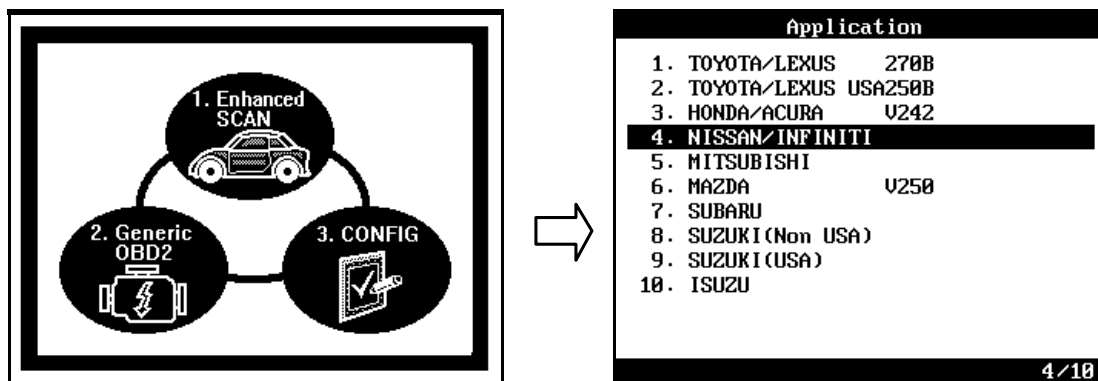
b   Select the adapter type

Find the diagnostic connector in the car referring to the connector location drawings hereinafter and select the connector type found.

```
              SELECT CONNECTOR
        1.  14PIN Connector
        2.  16PIN Connector
        3.  CONNECTOR LOCATION




        ↕  ↔ : MOVE      ENTER : SELECT
```

c   Select test system

Select the system you want to test

```
                   NISSAN
        1.  ENGINE CONTROL
        2.  AUTO TRANSMISSION
        3.  SRS AIR BAG
        4.  ANTI LOCK BRAKE SYSTEM
        5.  IVMS
        6.  HICAS
        7.  ASCD



        ↕  ↔ : MOVE      ENTER : SELECT
```
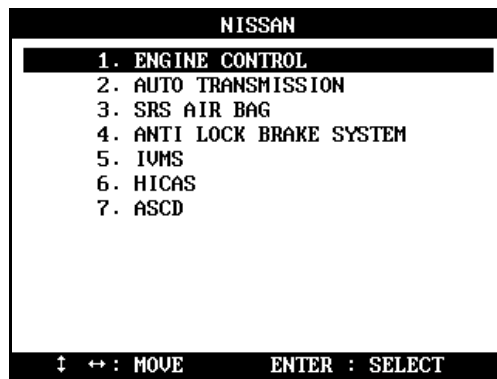
Multiscan always shows 7 systems for selection in the menu. However, it doesn't mean that the car has all the systems and that all of the systems are available for communication with Multiscan.

Select any control module from the menu as illustrated above, then Multiscan will try to talk to the selected control module. If the control module responses properly, then Multiscan shows the detailed function listings for the control module.

If it shows the "Communication Error" message, it is considered the vehicle has no such a system or the control module does not support scanner communication.

B. Adapters

a   14-pin and 16-pin adapters are being used for Nissan cars.

In North America, Nissan cars of 1995 model year or later usually have 16-pin OBD2 adapter while the older cars have 14-pin adapter.   Some cars released around 1996 may have both connectors.

b   Outside North America, late models of Nissan continue to use the 14-pin adapter in some countries, therefore, the application of each adapter is yet to be confirmed.

Refer to the connector location hereinafter, and search for the adapter first to make a correct selection.

C. IVMS (also applicable to HICAS and ASCD systems)

1. System Menu

a   Multiscan always shows the IVMS in the system selection menu.

However, it doesn't conclude that the car has the system or it is available for communication with Multiscan.

```
                    NISSAN
        1. ENGINE CONTROL
        2. AUTO TRANSMISSION
        3. SRS AIR BAG
        4. ANTI LOCK BRAKE SYSTEM
        5. IVMS
        6. HICAS
        7. ASCD




    ↕ ↔ : MOVE        ENTER : SELECT
```
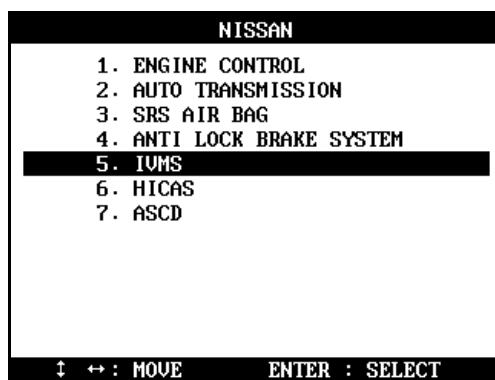
b   Select IVMS from the system menu as shown above, then Multiscan will attempt communication to the IVMS control module. If the car has the IVMS system, then Multiscan will show you the IVMS item listing.

c   If the "Communication Error" message is displayed, the system is either not fitted to the vehicle or does not feature self-diagnostics.

2. IVMS items

a   Once the communication is established, Multiscan lists all 22 IVMS items, however, in the same manner, it doesn't mean that communication with each of 22 items is supported by the IVMS module.

```
               NISSAN
1.POWER WINDOW
2.DOOR LOCK
3.AUTO DRIVER POSITIONER
4.POWER SEAT
5.WIPER
6.REAR DEFROGGER
7.IGNITION KEY WARNING ALARM
8.LIGHT WARNING ALARM
9.ROOM LAMP TIMER
10.ENTRY KEY ILLUMINATER
11.SEAT BELT TIMER
12.THIEF WARNING SYSTEM
↕↔ :MOVE      ENTER: SELECT
```
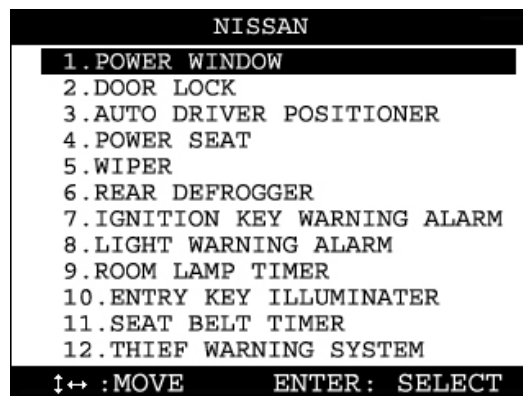
b   Select an IVMS item from the IVMS menu, then Multiscan will communicate to the IVMS control module to check if the item is supported. If the item is supported, then Multiscan will show the available functions with the item, in example, live data and actuation test.

c   If the "Communication Error" message is displayed, it is probable that the item is not supported by the IVMS module.

D. Adapter location

- The location drawings are purely from the experience of Hanatech and provided for your reference only.

  The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

- You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [4. NISAN] from the car make list.
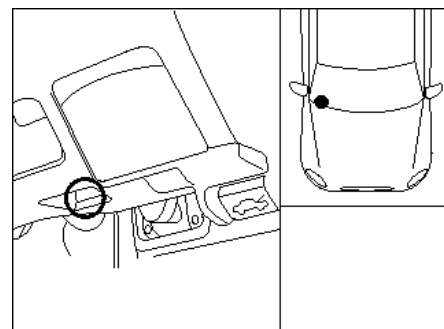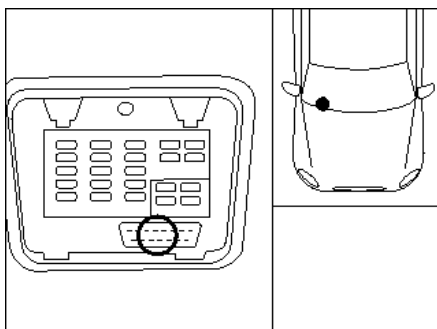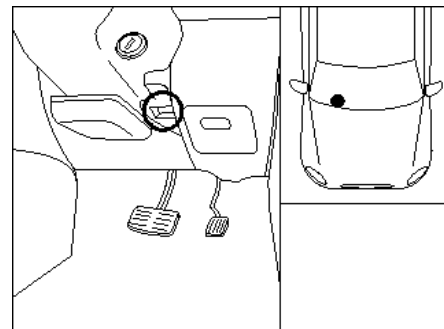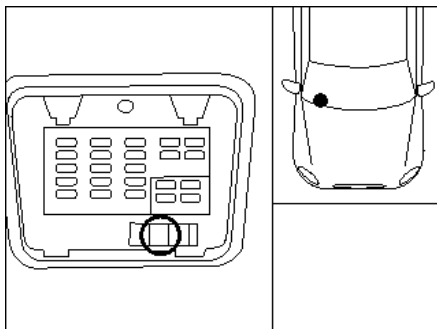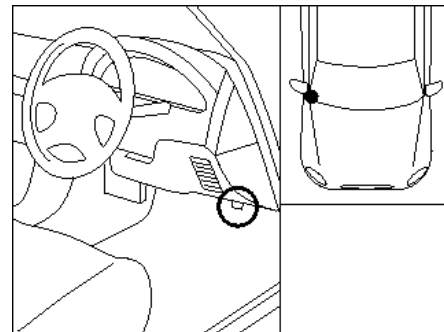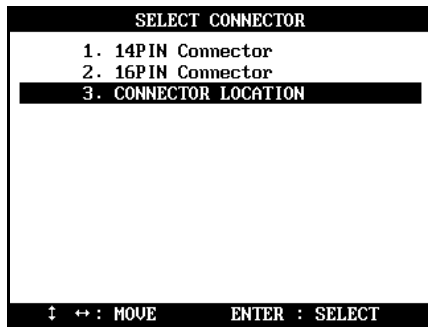
E. Vehicle Coverage

- Since the communication protocol for Nissan cars is quite stable with few variations, vehicle coverage is meaningless to list in detail as for Toyota or Honda.

- The followings are the examples of Nissan models that Hanatech or its worldwide partners have tested and confirmed its successful communication

  200SX, 240SX, 300ZX, ALTIMA, AXXESS, FAIRLADY, FRONTIER, MAXIMA, MINI VAN, NX, PATHFINDER, PICKUP, PULSAR NX, QUEST, SENTRA, SKYLINE, STANZA, XTERRA, CEFIRO, SILVIA, TINO, 240SE, MARCH, VERITA, ALMERA, PRIMERA, TERRANO II, PATROL GR, etc.

IV. MITSUBISHI --------------------------------

A. Features of Mitsubishi S/W

1. Communication Start-up

a　Mitsubishi has the ECM ID check system similar to Honda.
Complicated menu selecting procedure as for Toyota is not necessary for Mitsubishi cars.

b　The user is simply required to check the adapter type of the vehicle and to select the adapter and the desired system to test. Then Multiscan automatically begins to talk to the ECM to identify the ID number and determines its communication details according to the response.

c　One thing different from Nissan is that the communication speed varies a lot, therefore, Multiscan checks the speed of the incoming signal from an ECM and determines communication speed automatically thereupon.
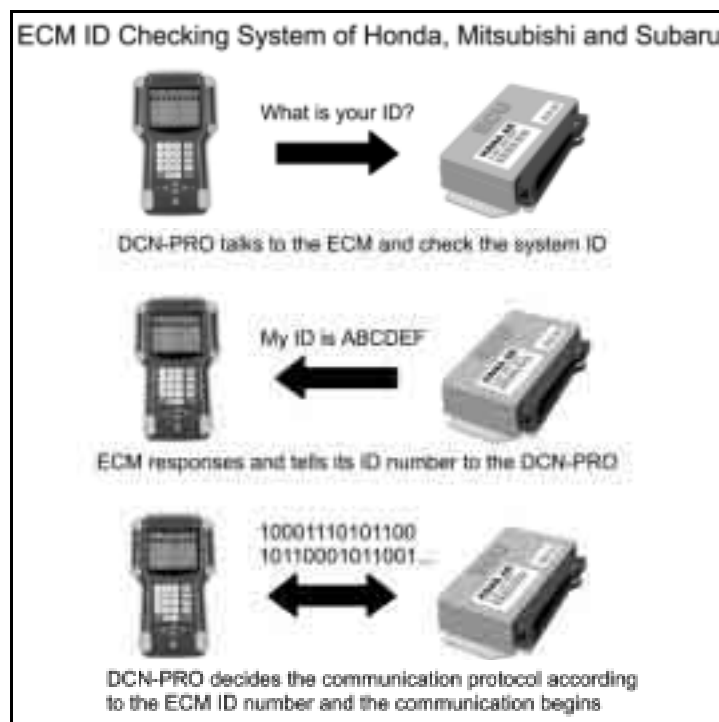
2. Performance

a   Mitsubishi original equipment has various regional versions that cover the Mitsubishi cars in each regional market.

b   Multiscan Non-USA version comprises of Japanese domestic, Australian, Malaysian and European regional versions.

c   Mitsubishi software covers up to 1,500 different system IDs when counting the Engine control system only.   Total 2,500 IDs are included in the database for all Mitsubishi car systems.

d   Multiscan Mitsubishi software provides original equipment level reliability and accuracy for Mitsubishi cars up to 2002 model year.

B. Getting Started

1. Select Mitsubishi

Select MITSSUBISHI from the carmake menu.
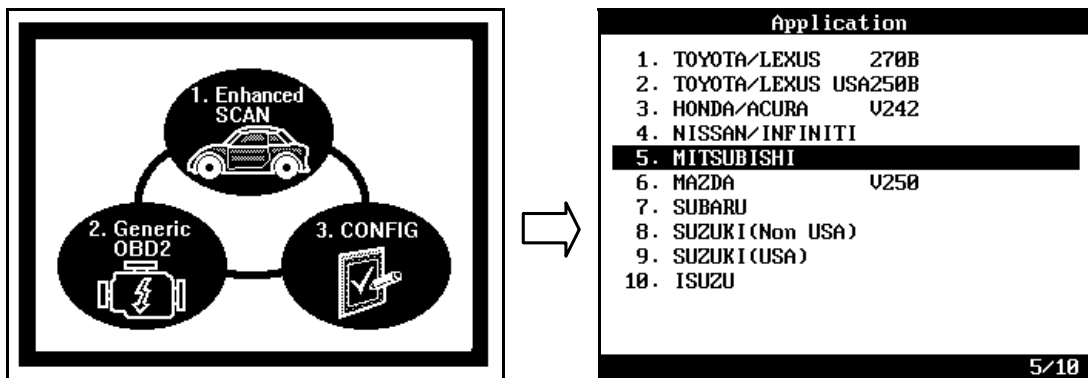

```
                          Application
              1. TOYOTA/LEXUS      270B
              2. TOYOTA/LEXUS USA250B
              3. HONDA/ACURA      V242
              4. NISSAN/INFINITI
              5. MITSUBISHI
              6. MAZDA            V250
              7. SUBARU
              8. SUZUKI(Non USA)
              9. SUZUKI(USA)
             10. ISUZU

                                       5/10
```

2. Select the adapter type

Search for the diagnostic connector in the car referring to the connector location drawings hereinafter and select the connector type you found.

```
                    MITSUBISHI
       1. 12PIN Connector
       2. 12 + 16Pin Connector
       3. 16PIN Connector
       4. CONNECTOR LOCATIONS




     ↕ ↔ : MOVE        ENTER : SELECT
```

3. Select test system

Select the system you want to test

```
                  SELECT DEVICE
       1. ENGINE CONTROL
       2. AUTO TRANSMISSION
       3. SRS AIR BAG
       4. ANTI LOCK BRAKE SYSTEM
       5. ELECTRONIC CONTROL SUSPENS`N
       6. TRACTION CONTROL
       7. AUTO AIR CONDITING SYSTEM




     ↕ ↔ : MOVE        ENTER : SELECT
```
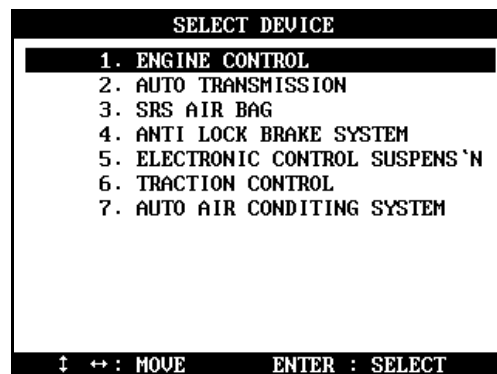
C. Adapters

1. 12-Pin Connector

a   12-pin adapter is widely used for all Mitsubishi cars of OBD generation 1.

b   It provides the same level of data readings as the OBD2 adapter. Read / Erase of fault codes, actuation test and data stream are available for all systems except ETACS.

c   This adapter is also used for Korean Hyundai and Malaysian Proton cars.

Pin number	Assigned System
1	Engine – MPI
2	Steering - 4WS
3	Suspension - Active ECS
4	Brake – ABS
5	Cruise Control – ASC
6	Transmission - ELC-4AT
7	Air Conditioner - Full Auto AC
8	Air Bag – SRS
9	ETACS: Pulse signal only
12	Ground

2. 12+16 Pin Connectors

a   Many of Mitsubishi cars manufactured in mid 90`s have both the 12-pin Mitsubishi adapter and OBD2 16-pin adapter.

b   Many Mitsubishi control modules with MELCO system communicate using its own conventional protocol, which is not OBD2 compliant even though the vehicle has the OBD2 standard adapter.

c   With MELCO system, each pin of the OBD2 adapter is assigned to individual control module, therefore, when the total number of control module exceeds the number of pins, it is necessary to use additional adapter to cover the excessive control modules.

d   When the vehicle has both the OBD2 16-pin and Mitsubishi 12-pin adapters, the 12+16 pin dual headed adapter must be connected for proper operation.

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

25	24		23	22	21
32	31	30	29	28	27	26

⚠ **WARNING**

Do not use this adapter when there is only one 16-Pin OBD2 adapter or 12-Pin Mitsubishi adapter.   Use the corresponding single adapter.

3. 16 Pin connector

a   16-pin adapter equates to the OBD2 standard adapter. Live data is supported for all systems except ETACS and some early transmissions

b   All systems in the control system selection menu are covered with this adapter when it is found alone in the vehicle.

D. Unidentified system ID

1. System ID Check

As explained herein, Multiscan automatically checks the system ID when you select a control system and sets up the communication with the control module thereupon. Multiscan Mitsubishi software contains thousands of system ID for various regional market specifications, however, it is still possible that you may encounter Mitsubishi cars of which system ID is not included in the Multiscan software database.

2. Alternative System IDs

When Multiscan finds an unknown system ID or when it cannot find the matching system ID in the database, it shows the closest system IDs for you to alternatively select as shown below:

```
                    SELECT DEVICE
   ┌───────────────────────────────────────┐
   │  Unidentified System ID: E0AB          │
   │  You can alternatively choose          │
   │  one among the closest ID's as         │
   │  below. However, values may be         │
   │  be incorrect.                         │
   │  1. SYSTEM ID : E0AA                    │
   │  2. SYSTEM ID : E0AC                    │
   │  Press NUM1, NUM2 or ESC.              │
   └───────────────────────────────────────┘

   ↕ ↔ : MOVE          ENTER : SELECT
```
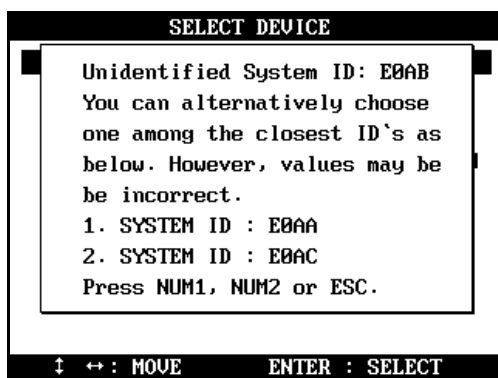
In the example, Multiscan found that the actual system ID E123 is not included in the database, and it presents two closest IDs of E122 and E124 for the user's alternative selection.

3. Possible incorrect values

This is based on the concept that the closest system IDs share the majority of system characteristics with the least differences. However, we cannot guarantee the accuracy of data values when choosing an alternative ID.

4. Cooperation for Update

Should you encounter any of these missing IDs, please contact your local distributor with the ID numbers so that we can add them in the next software update.

E. Communication Error

1. Menu

Multiscan always shows 7 control systems in the menu as shown in the illustration, however, it doesn't mean that the test vehicle has all the listed systems available for scanner communication.

```
          SELECT DEVICE
1. ENGINE CONTROL
2. AUTO TRANSMISSION
3. SRS AIR BAG
4. ANTI LOCK BRAKE SYSTEM
5. ELECTRONIC CONTROL SUSPENS`N
6. TRACTION CONTROL
7. AUTO AIR CONDITING SYSTEM



↕ ↔ : MOVE      ENTER : SELECT
```
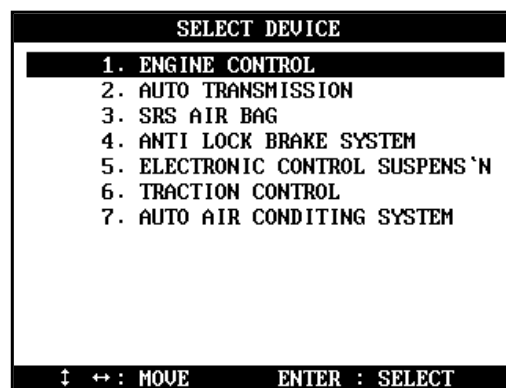
2. Checking the existence of selected control systems

To confirm that the selected is equipped with the electronic control module for the system you want to test, observing the warning lamp soon after turning the ignition key ON. Then let Multiscan talk to the control module first by selecting a system after connecting the correct adapter.

3. Success and Failure

Successful communication or Unidentified ID report confirms that the system is available for scanner communication.

To the contrary, in the case of communication failure, please check the following:

- The vehicle does not have an electronic control module for the selected system
- If the vehicle has the electronic control system:
  - ✓ Improper adapter selection or poor contact
  - ✓ Control module or communication wiring is defective
  - ✓ Unable to establish communication with the control module due to incomplete Multiscan software (Contact your local distributor)

F. Power supply

1. 12-pin adapter

Mitsubishi 12-pin adapter has no pin for power supply. You have to use the cigarette lighter power cable to supply power to Multiscan head unit when you are using this adapter for communication.

Red LED lights:

To the vehicle cigarette lighter socket

To the equipment
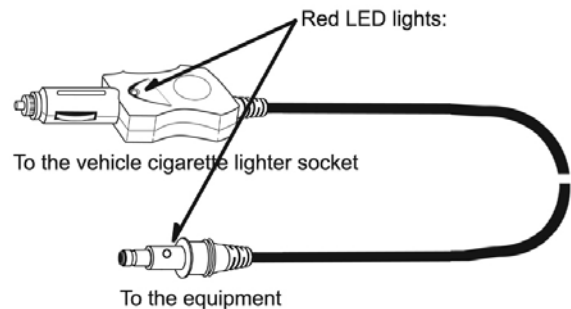
2. OBD2 adapter

The OBD2 adapter does not require external power supply as 12V battery power is supplied from the adapter.

G. Adapter location

- The location drawings are purely from the experience of Hanatech and provided for your reference only.

- The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

- You can view these drawings on the Multiscan screen by selecting [4.Connector Location] after selecting [MITSUBISHI] from the car make list.
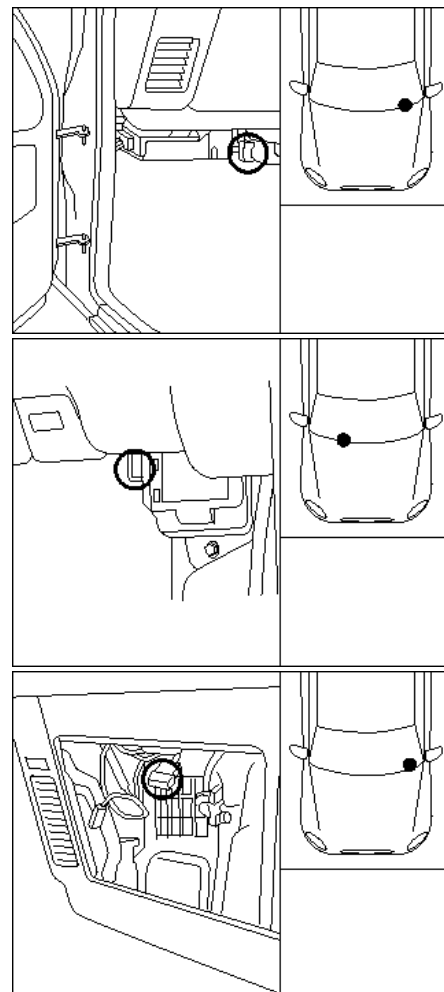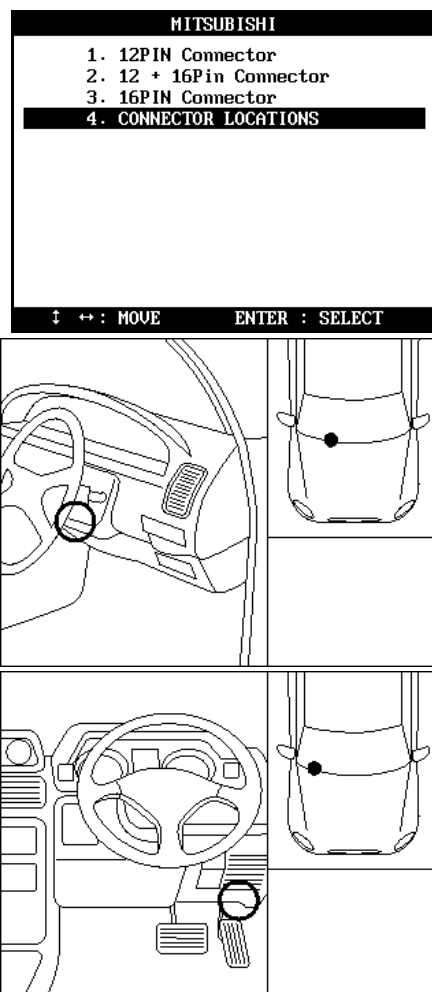
H. Vehicle Coverage

- The communication protocol for Mitsubishi cars is quite stable with few variations. Since the communication between a scanner and control module is established not by the model name but by the system ID, knowing the exact system ID is the most important and the vehicle coverage in the list of model names as Toyota or Honda is almost meaningless.

- The following are the examples of Mitsubishi model names that Hanatech and its worldwide partners have tested and confirmed its successful communication

  3000 GT, Carisma, Diamante, Edipse, Expo, Galant, Lancer, L200, Mirage, Legnum, Libero, Montero, Pajero, Shogun, Space Wagon, etc.

V.   MAZDA --

A. Features of Mazda S/W

1. Communication Start-up

a   Mazda has no ID check system like Honda or Mitsubishi.

Since the communication protocol is quite simple with few variations, complicated menu selecting procedure as Toyota is not necessary, either.

b   The user is simply required to check the adapter type of the vehicle and to select the adapter and the desired system to test.
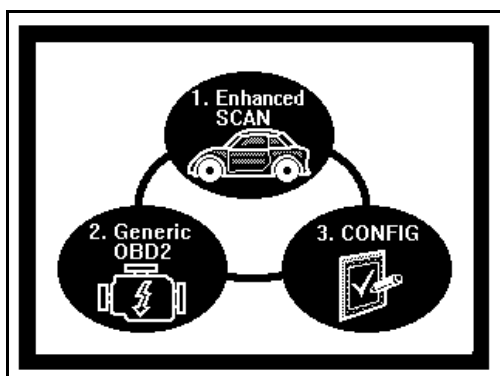

```
                           Application
                1. TOYOTA/LEXUS     270B
                2. TOYOTA/LEXUS USA250B
                3. HONDA/ACURA      V242
                4. NISSAN/INFINITI
                5. MITSUBISHI
                6. MAZDA            V250
                7. SUBARU
                8. SUZUKI(Non USA)
                9. SUZUKI(USA)
               10. ISUZU
                                          6/10
```

2. Performance

a   Mazda has three different communication methods: Pulse signal type for old cars, Mazda MOBD and Generic OBD2 of SAE J1850 type, and uses three types of diagnostic adapter: 6-pin Mazda/Kia adapter, 17-pin Mazda adapter and OBD2 16-pin adapter.

b   Only the pulse signal type Diagnostic Trouble Code reading function is

available when using 6-pin or 17-pin manufacturer's adapter.
Fault code erase and Data Stream are available only when the OBD2
16-pin adapter is used.

c   Multiscan Mazda software is based on the vehicles built in Japan.   It
may not be compatible with Mazda cars locally manufactured in other
countries.

B. Adapters

1. Mazda/Kia 6-pin adapter

Only the pulse signal type DTC reading
function for Engine control system is
available when using this type of
adapter.

2. Mazda 17-pin adapter

a   Multiscan supports only the Diagnostic Trouble
Code reading function for Power train,
Transmission, Airbag, ABS, Cruise Control and
Air conditioner control systems when using this
type of adapter

b   The adapter looks the same as Toyota/Lexus Semi-circular adapter.
The Mazda adapter is colored light gray for distinction from Toyota.   Be
careful not to apply the wrong adapter.   This may cause malfunction of
either vehicle control module or Multiscan.

```
         SELECT VEHICLE MODEL                          MAZDA
  1. 6PIN Connector (Kia 6PIN)            1. PCM - POWERTRAIN CTRL MODULE
  2. 17PIN + 8PIN Connector               2. TCM - T/M CONTROL MODULE
  3. OBD II 16PIN Connector               3. SRS - SRS AIR BAG MODULE
  4. CONNECTOR LOCATION                   4. ABS - ANTI LOCK BRAKE MODULE
                                          5. CCM - CRUISE CONTROL MODULE
                                          6. A/C - AIR CONDITIONER MODULE




  ↕ ↔ : MOVE      ENTER : SELECT          ↕ ↔ : MOVE      ENTER : SELECT
```

3. OBD2 16-pin adapter

1) DTC read / erase and Data stream functions are available when using OBD2 16-pin adapter.

2) You can make selection among "B series trucks" and other cars in the next step menu when choosing this adapter.

```
         SELECT VEHICLE MODEL                   SELECT VEHICLE MODEL
  1. 6PIN Connector (Kia 6PIN)            1. ALL VEHICLE EXCEPT B-SERIES
  2. 17PIN + 8PIN Connector               2. B-SERIES VEHICLE
  3. OBD II 16PIN Connector
  4. CONNECTOR LOCATION




  ↕ ↔ : MOVE      ENTER : SELECT          ↕ ↔ : MOVE      ENTER : SELECT
```

3) Powertrain, ABS, Generic Electronic and Integrated Airbag modules are available for the "B series" trucks. Only Powertrain and ABS are available for other models.

```
            MAZDA
1. PCM - POWERTRAIN CTRL MODULE
2. ABS - ANTI LOCK BRAKE MODULE
3. GEM - GENERIC ELECTRONIC MOD
4. IABM - INTEGRATED AIR BAG MO




 ↕ ↔ : MOVE        ENTER : SELECT
```
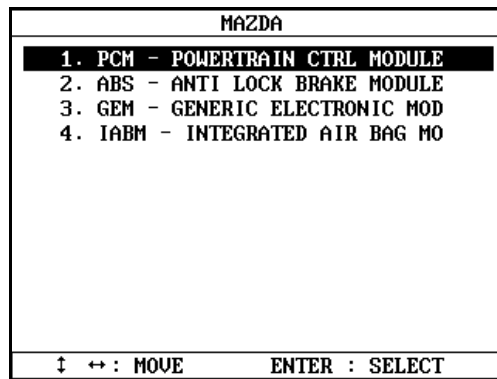
4) Powertrain module communication is made by Generic OBD2 standard J1850 protocol, and the Mazda MOBD protocol is used for all other systems.
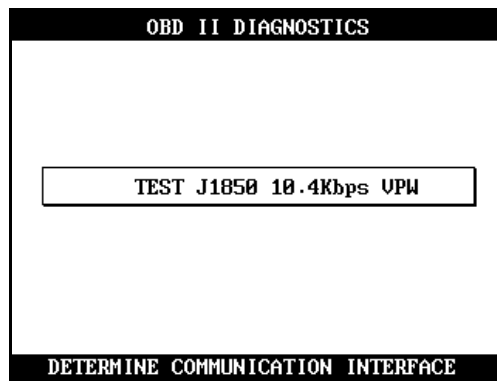
```
        OBD II DIAGNOSTICS



        TEST J1850 10.4Kbps VPW




 DETERMINE COMMUNICATION INTERFACE
```

C. Adapter location

- The location drawings are purely from the experience of Hanatech and provided for your reference only.

- The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

- You can view these drawings on the Multiscan screen by selecting [4.Connector Location] after selecting [MAZDA] from the car make list.


```
                MAZDA
  1. 6PIN Connector (Kia 6PIN)
  2. 17PIN + 8PIN Connector
  3. OBD II 16PIN Connector
  4. CONNECTOR LOCATION



  ↕↔ :MOVE        ENTER: SELECT
```
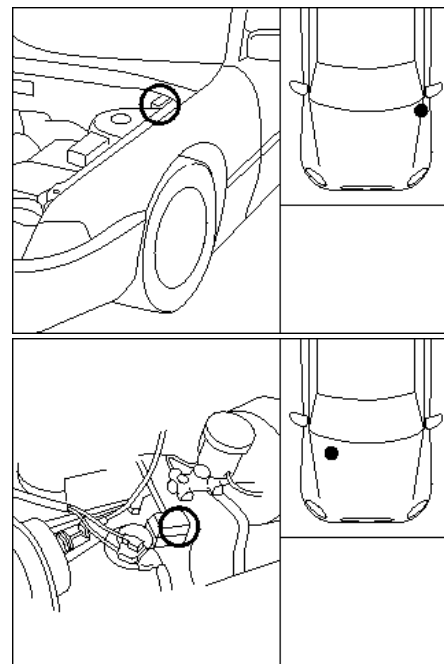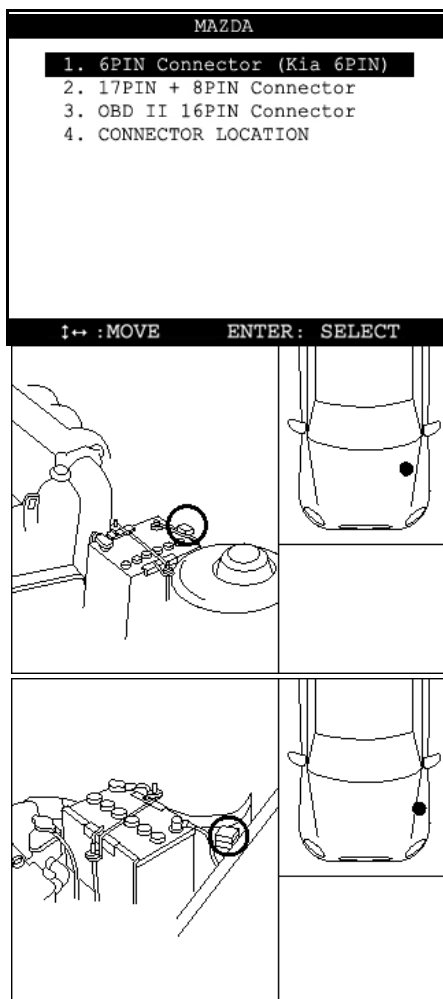
D. Vehicle Coverage

● The communication protocol for Mazda cars is very stable without variations. Since the communication between a scanner and control module is established automatically solely by selecting an adapter type without any specified vehicle model selection or system ID check, detailed vehicle coverage like Toyota or Honda is meaningless.

● The following are the examples of Mazda model names that Hanatech and its worldwide partners have tested and confirmed its successful communication.

323, 626, 929, MX3, MX6, Miata, Protégé, RX7, etc

VI. SUBARU --

A. Features of SUBARU S/W

1. Communication Start-up

a   SUBARU has the ECM ID check system like Honda and Mitsubishi. Complicated menu selection procedure as in Toyota is not necessary for Subaru cars.

b   The user is simply required to check the model year and then select the system to test.

c   Then Multiscan automatically begins to talk to the ECM to identify the system ID and determines its communication details according to the response from the ECM.
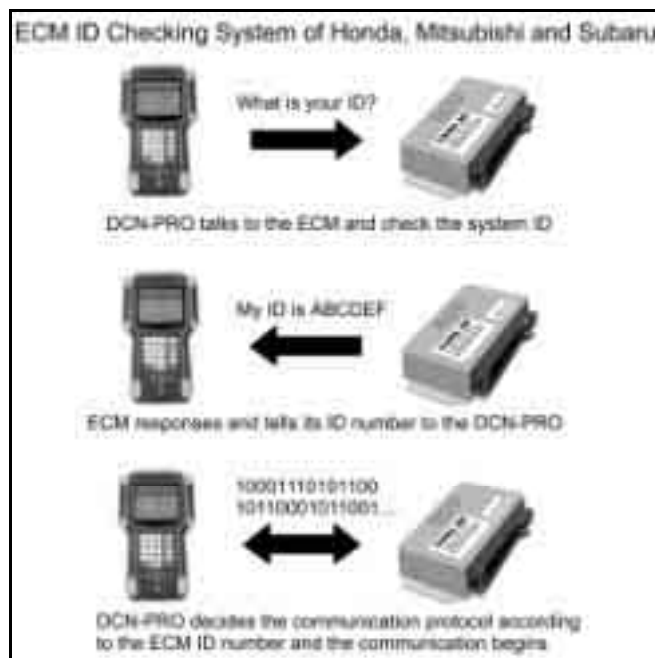
2. Performance

a   Multiscan SUBARU software was engineered and developed in Australia and New Zealand for the cars in this regional market where Multiscan provides more than 90% of the original equipment coverage.

b   Multiscan SUBARU software covers SUBARU cars from 1994 model-year up to 2002 as of May 2003.

c   Subaru software is being upgraded and is scheduled to extend its coverage to 1994 or earlier model years before the end of year 2003. Please contact your local distributor and check the availability of update

3. Difference

a   It is very difficult and time consuming to analyze all the system IDs for a certain car make. Most scanners provide only the limited readouts that are commonly available in all SUBARU cars.

b   Multiscan identifies each ECM version and provides the most optimized and precise diagnostic information of OE tool level.

B. Menu Selection

1. Select SUBARU

Select SUBARU from the car make menu.

```
                              Application
                      1. TOYOTA/LEXUS     270B
                      2. TOYOTA/LEXUS USA250B
                      3. HONDA/ACURA      V242
                      4. NISSAN/INFINITI
                      5. MITSUBISHI
                      6. MAZDA            V250
                      7. SUBARU
                      8. SUZUKI(Non USA)
                      9. SUZUKI(USA)
                     10. ISUZU

                                            7/10
```
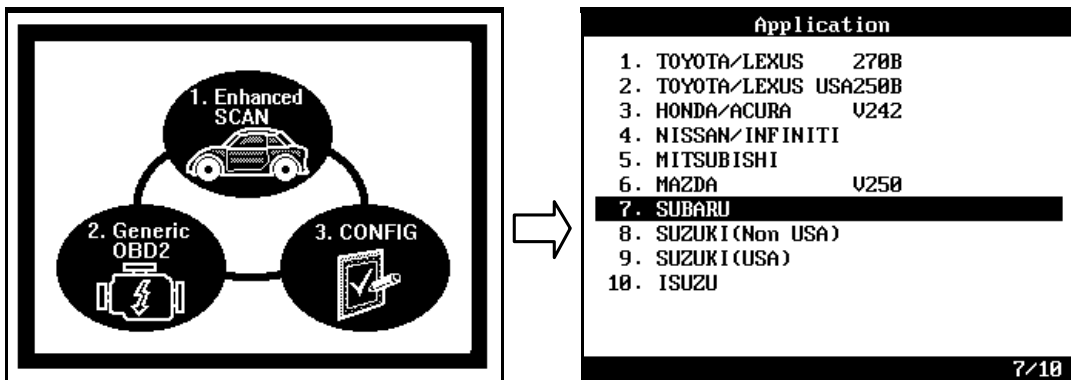
2. Select Model-year

Select the model year of the test vehicle.

```
            SELECT VEHICLE MODEL    1/ 7
       1. SUBARU   -91 MY
       2. LEGACY    92 MY
       3. LEGACY    93 MY
       4. IMPREZA   94 MY
       5. SUBARU 94-97 MY
       6. SUBARU 98-00 MY
       7. SUBARU 01-02 MY



       ↕ ↔: MOVE        ENTER : SELECT
```

3. Select Test System

Select the system you want to test
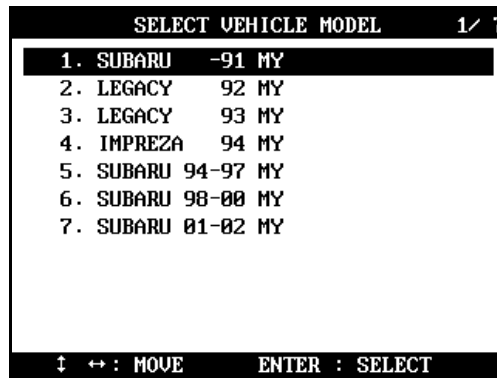
```
           SUBARU 98-00 MY          1/ 4
   1. ENGINE CONTROL
   2. AUTO TRANSMISSION
   3. ANTI SKID BRAKE
   4. AIR BAG




   ↕ ↔ : MOVE        ENTER : SELECT
```
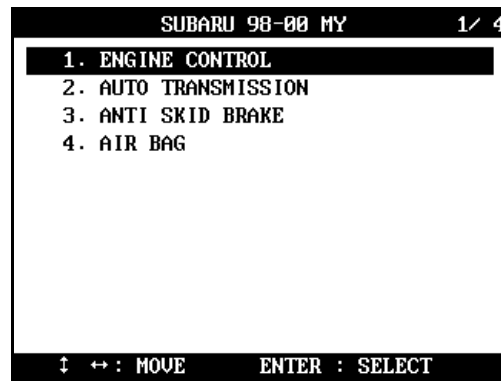
Subaru software is being upgraded to include various factory tool functions such as dealer check mode, system operation check mode and OBD system check for engine, transmission and ABS systems. Also the update for extending the coverage to air conditioning, cruise control, air suspension, image processing, preview control and immobilizer systems are being carried out.

Please contact your local distributor for the availability of these software updates.

C. Adapters

1. 9 Pin Connector

SUBARU 9 pin adapter is widely used for most of SUBARU cars. Trouble code read, erase and data stream are all available through this adapter.

2. 16-pin OBD2 connector

A standard adapter used for relatively new SUBARU cars. Trouble code read and erase, and Data stream are supported.

D. SRS airbag diagnosis

It is said that the manufacturer has designed the system without scanner communication for safety reasons. You are recommended to check the trouble codes manually referring to the following information. It is also recommended NOT to test SRS system when using diagnostic equipment for the other systems such as Engine and Transmission.

1. Selecting SRS

a When you select [4. Airbag] from the system selection menu, Multiscan will show a message as shown below:

```
SUBARU 98-00 MY        4/ 4
 1. ENGINE CONTROL
 2. AUTO TRANSMISSION
 3. ANTI SKID BRAKE
 4. AIR BAG




 ↕ ↔: MOVE      ENTER : SELECT
```

```
 1993 - 1998        1/ 1
 This information is based on
 common DTC descriptions found
 in Forester, Impreza, Legacy
 of Non-USA models.
 Make sure to refer to the
 factory manual for correct
 and detailed information.


 ↕ ↔: MOVE      ENTER : SELECT
```
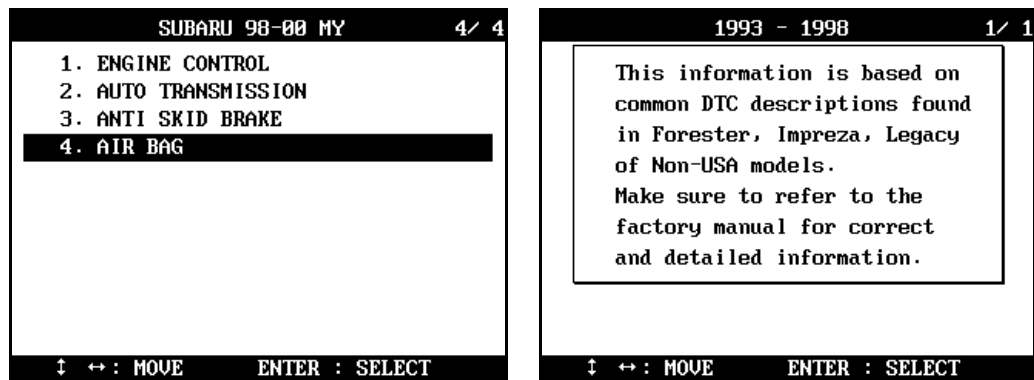
Please note that Airbag DTC descriptions that Multiscan provides on screen are extracted from a few famous models of Subaru, roughly identified by model years. However, the DTC definitions and descriptions may differ according to the regional and vehicle detail variations.

Therefore, Airbag DTC information of Multiscan <u>does not cover all Subaru cars and may be incorrect</u>.

It is always highly recommended to refer to factory manuals for correct and detailed information.

b   Function selection menu follows when the [ENTER] key is pressed as shown below:

```
           D. T. C            1/ 4
  1. FAULT CODE LIST
  2. FAULT CDDE EXTRACTION
  3. FAULT CODE ERASURE
  4. CONNECTOR




  ↕ ↔ : MOVE        ENTER : SELECT
```
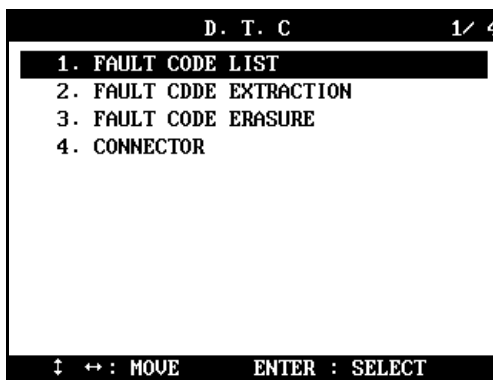
2. Fault code list

When selected, Multiscan shows the DTC descriptions of Subaru airbag system as shown below.   You can refer to this list after reading the fault code(s) manually.

```
        FAULT CODE LIST        ↓
  02. Crash sensor-Driver's or passen_
      ger's airbag: Wiring short circ_
      uit, wiring, component
  03. Crash sensor: Wriring open circ_
      uit, component
  04. Passenger's airbag, SRS control
      module: Wiring short circuit, c_
      omponent
  05. SRS Control module failure: SRS
      Control module
  08. SRS control module: Wiring, com_
  DTC    :28  ITEM
```
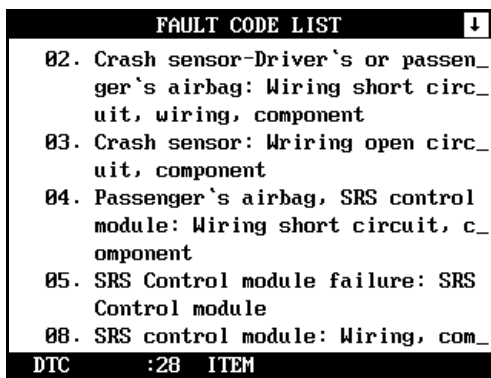
Once again, Airbag DTC information of Multiscan does not cover all Subaru cars and may be incorrect.

It is always highly recommended to refer to factory manuals for correct and detailed information.

3. Connector

a   A separate connector is used for airbag system check.

When the [4. CONNECTOR] is selected, the illustration as shown below follows.
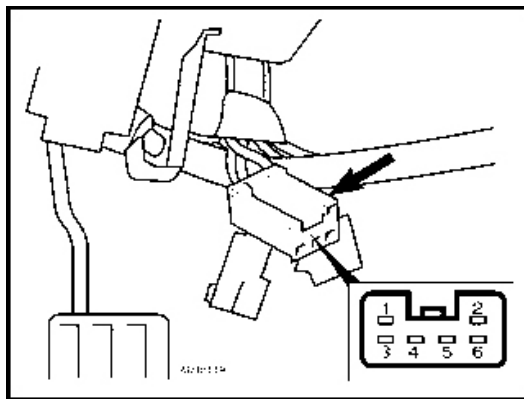
b   Locate the separate 6-pin harness for the SRS airbag under the dash panel referring to the above illustration. The 6 pins of the connector are numbered as shown below:
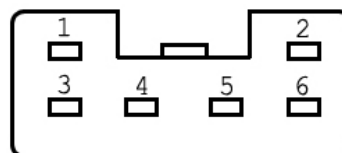
c   Following charts are for SUBARU Forester 1997~98 and 99~00MY. Refer to the original repair manual for the details of trouble codes of the other models.

4. Fault Code Extraction

a   Subaru SRS system does not support serial communication, therefore, you have to read the fault code(s) from the 6-pin separate connector

manually observing the instructions displayed on Multiscan screen.

> Instructions for manually reading DTC of Subaru airbag system are from Hana Tech's experiences only. It is recommended to refer to the factory manual to extract correct fault code(s).

b   There are two types of fault code extraction procedure, and you can select among these two in the menu that follows as below:

```
        D. T. C          1/ 2
 1. ALL EXCEPT LIBERTY2.2L(EJ22)
 2. LIBERTY 2.2L (EJ22) 1989-03




 ↕ ↔ : MOVE      ENTER : SELECT
```

c   ALL EXCEPT LIBERTY 2.2L (EJ22)

Select this item from the menu to extract fault code(s) from all Subaru cars except Liberty 2.2L(EJ22).   Following instruction will appear.

```
      FAULT CODE EXTRACTION      ↓
 Switch ignition ON. Do NOT start
  engine.
 Bridge diagnostic connector termin_
  al 1 and earth.
 Count SRS warning lamp flashes.
 Note trouble codes.
 Compare with trouble code table.
 The OK code is flashes of 0.6 seco_
  nds duration.
 Each trouble code consists of two
 ↕ ↔ : MOVE      ENTER : EXIT
```

-    Turn the ignition key ON without starting engine.   Bridge

terminal 1 of the 6-pin connector and earth.

- The SRS warning lamp will begin to flash.

- Long flashes (1.2 sec) indicate the [Tens] of the DTC, and the short ones (0.3 sec) indicate the [ones (units)].

d   LIBERTY 2.2L (EJ22)

Select this item from the menu to extract fault code(s) from Subaru Liberty 2.2L(EJ22).   Following instruction will appear.
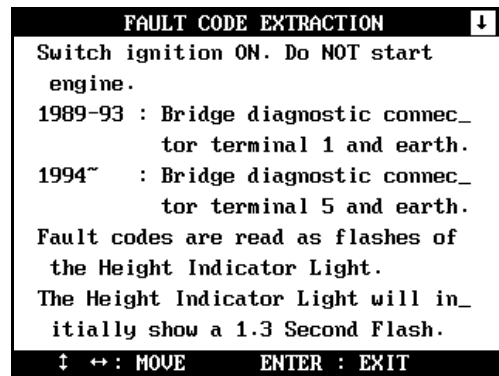
- Turn the ignition key ON without starting engine.

- For the older cars from 1989 to 1993 model year, bridge the connector terminal 1 and earth.

  For the newer cars from 1994 model year, bridge the connector terminal 5 and earth.

- The SRS warning lamp initially flashes for 1.3 second. There is a pause for 1 second, followed by the codes of 0.5-second flashes.
- When there are multiple codes, the next code follows after a 1.5-second pause.
- No Fault Code is represented by ON/OFF flashes on regular intervals of 1.3 seconds.
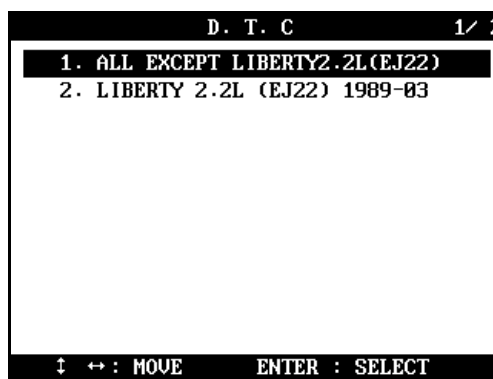
5. Fault Code Erasure

a   In the same manner as in Fault Code Extraction, Subaru SRS system does not support serial communication, therefore, you have to erase the fault code(s) from the 6-pin separate connector manually observing the instructions displayed on Multiscan screen.
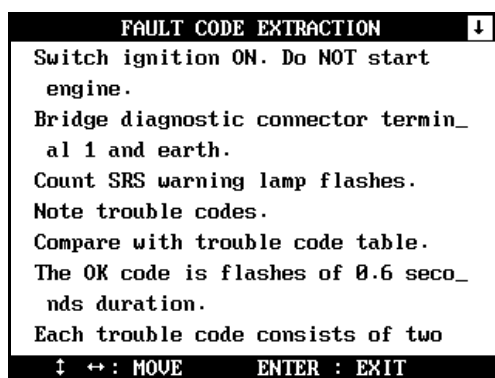
> Instructions for manually reading DTC of Subaru airbag system are from Hanatech's experiences only. It is recommended to refer to the factory manual to extract correct fault code(s).

b   There are two types of fault code erasure procedure, and you can select among these two in the menu that follows as below:

```
            D. T. C          1/ 2
 1. ALL EXCEPT LIBERTY2.2L(EJ22)
 2. LIBERTY 2.2L (EJ22) 1989-03




   ↕ ↔ : MOVE      ENTER : SELECT
```
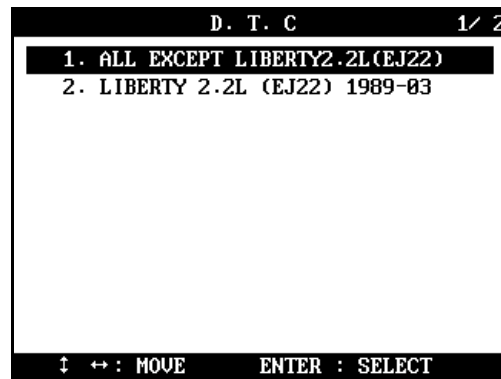
c   ALL EXCEPT LIBERTY 2.2L (EJ22)

Select this item from the menu to erase fault code(s) of all Subaru cars except Liberty 2.2L(EJ22).   Following instruction will appear.

```
     FAULT CODE ERASURE       ↓
 Switch ignition ON. Do NOT start
  engine.
 Bridge diagnostic connector termin_
  al 1 and earth.
 While SRS warning lamp flashes bri_
  dge diagnostic connector terminal
  2 and earch for at least 3 seconds
 When fault memory is cleared, the
  SRS warning lamp flashes ON and
  OFF at regular intervals.
   ↕ ↔ : MOVE      ENTER : EXIT
```
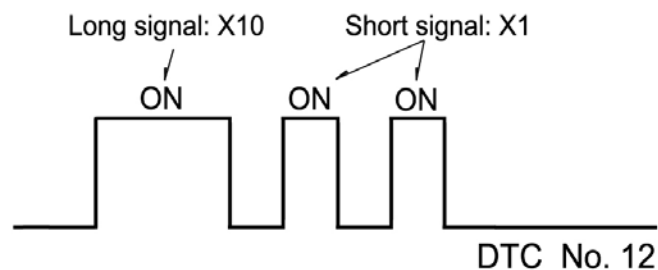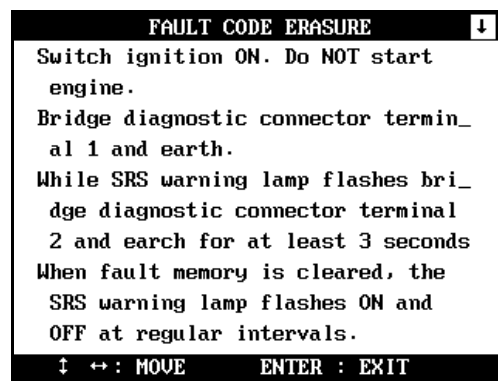
- Turn the ignition key ON without starting engine. Bridge terminal 1 of the connector and earth. The SRS warning lamp will begin to flash.
- Bridge terminal 2 and earth while the SRS warning lamp flashes for at least 3 seconds, then the fault memory will be cleared.
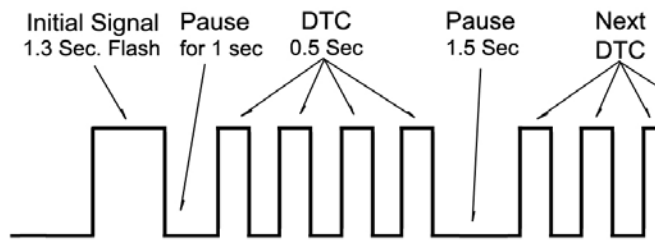- When the fault code is erased, the SRS warning lamp flashes ON and OFF on regular intervals.

d   LIBERTY 2.2L (EJ22)

Select this item from the menu to erase fault code(s) of Subaru Liberty
2.2L(EJ22).   Following instruction will appear.

```
        FAULT CODE ERASURE
 Switch Ignition OFF.
 Remove Fuse #25 for One Minute.




   ↕ ↔ : MOVE      ENTER : EXIT
```

- Turn the ignition key OFF.
- Remove Fuse #25 for one minute.

E. Unidentified system ID

1. System ID Check

As explained herein, Multiscan automatically checks the system ID when you select a control system and sets up the communication with the control module thereupon. Multiscan SUBARU software contains thousands of system ID, however, it is still possible that you encounter a SUBARU car of which system ID is not included in the Multiscan software database.

2. Cooperation for update

When Multiscan encounters a system ID that is not included in its data base, it shows the detected system ID and communication features. If you encounter these systems, contact your local distributor, and the system ID will be relayed to Hanatech for a future update.

F. Adapter location

a   The location drawings are purely from the experience of Hanatech and provided for your reference only.

b   The drawings are based on Right Hand Drive cars, therefore, you may have to consider the mirror image for any Left Hand Drive cars.

c   You can view these drawings on the Multiscan screen by selecting [2.Connector Location] after selecting [SUBARU] from the car make list.

```
        SELECT VEHICLE MODEL
     1.  SUBARU
     2.  CONNECTOR LOCATION



        ESC: RETURN TO ABOVE
```
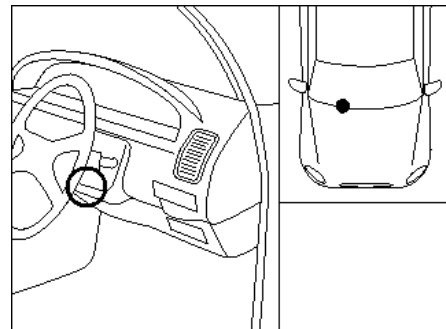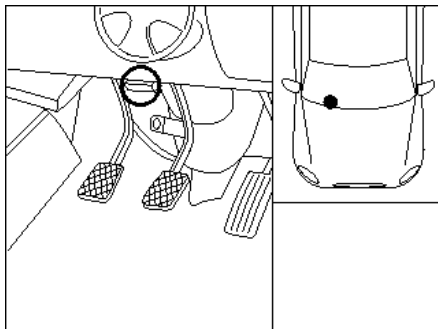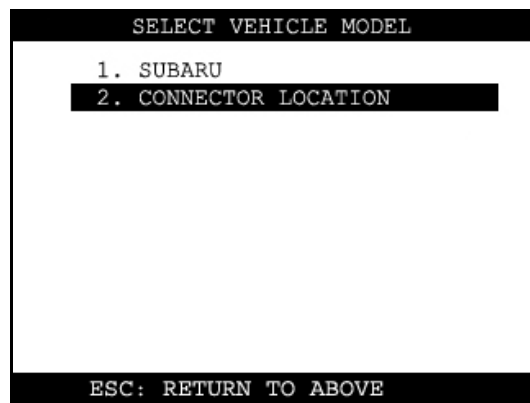
CHAPTER 7   KOREAN CARS

Korean Cars

I.   BACKGROUND ----------------------------

Korean automotive industry has experienced rapid development and progress both in size and technology in less than 15 years since its first fuel-injection vehicle was introduced in 1987. During this relatively short history of on-going experiments, Korean car makes implemented and tested control systems from various suppliers such as Bosch, Siemens, VDO, Delphi, Melco, etc.   And they actually manufactured hundreds of different models using different control systems throughout the relatively short industrial history. From a scanner's viewpoint, the genealogical chart of Korean cars is very much complicated and it is difficult to provide sufficient coverage.

Hanatech, the manufacturer of Multiscan, has been developing aftermarket scan tools from the very beginning of the fuel injection history of Korean cars since late 80's, and such accumulation of experience and know-how in Korean domestic market enabled Multiscan to provide original equipment level functions and coverage for all Korean cars.

II.　Regional differences ----—--------------------

Hyundai and Kia, the best selling Korean car makes, are manufacturing the cars differently to meet the emission related regulations of regional markets. According to the target markets, cars of these two companies are categorized into three groups: Korean domestic, North American and Non-USA exports.

Daewoo, Ssangyong and Samsung cars do not have such regional variations.

A. Korean Domestic

    a.　Korean cars sold in Korean domestic market.

    b.　Secondhand cars imported from Korea

B. USA (North American) Exports

    a.　Hyundai and Kia cars exported to USA, Canada and Mexico where strict emission regulations are applied.

    b.　Hyundai and Kia secondhand cars imported from USA, Canada and Mexico.

    c.　OBD2 compliant since 1996.

C. Non-USA Exports

    a.　Hyundai and Kia cars sold outside Korea other than North America.

    b.　Hyundai and Kia secondhand cars imported from outside Korea other than North America.

    c.　Meets European OBD (EOBD)

D. Used cars

A real problem is in developing countries where Korean secondhand cars share big market portion

In these countries, the user may have to try all three regional versions unless he knows where the car is originated.

E. Regional application

According to the regional markets, Multiscan PCMCIA cards for Korean cars contain the combination of regional versions as shown below.

Car Make	Regional	Europe	Asia, Africa, Oceania	North America	South America
Hyundai	Domestic		√		√
	USA			√	√
	Non-USA	√	√		
Kia	Domestic		√		√
	USA			√	√
	Non-USA	√	√		
Daewoo		√	√	√	√
Ssangyong		√	√	√	√
Samsung			√		√

III. HYUNDAI ----------------------------------

A. Vehicle Model Selection

1. Korean Domestic

    a. In export markets, Hyundai has kept using a constant model name for a certain model quite long identifying the details by the model year. To the contrary, in Korean domestic market, Hyundai has named the same model differently after applying a slight change in design and system. For example, while Hyundai Sonata has been called Sonata for more than 10 years in export market, they have changed the name at each face-lift and system change in Korea as shown below:

	Export Model Name	Domestic Model Name
	SONATA 1989~1990 MY	SONATA
	SONATA 1991~1993 MY	SONATA II
	SONATA 1994~1998 MY	SONATA III
	SONATA 1999~2000 MY	EF SONATA
	SONATA 2001 MY ~	NEW EF SONATA

b. Since the model names are so diversified, you do not have to select a model year when you are testing a Hyundai car of Korean domestic version. It is directly followed by the system selection.

```
          Application
 1. HYUNDAI-DOMESTIC
 2. HYUNDAI (NON USA)
 3. HYUNDAI (USA)
 4. KIA-DOMESTICS
 5. KIA (NON USA)
 6. KIA (USA)
 7. DAEWOO
 8. SSANGYONG
 9. SAMSUNG

                           1/9
```

```
      SELECT VEHICLE MODEL



    1. HYUNDAI MOTORS
    2. BLACK BOX RECORD LOAD/ERASE
    3. CONNECTOR LOCATIONS



  ↕ ↔: MOVE        ENTER : SELECT
```

```
    SELECT VEHICLE MODEL      ↕
    1. EXCEL
    2. SCOUPE
    3. ELANTRA
    4. SONATA
    5. SONATA II
    6. SONATA III
    7. GRANDEUR
    8. NEW GRANDEUR
    9. GALLOPER
   10. ACCENT
  ↕ ↔: MOVE        ENTER : SELECT
```

```
        NEW GRANDEUR          ↓
    1. ENGINE CONTROL SOHC
    2. ENGINE CONTROL DOHC
    3. ENGINE CONTROL V6 SOHC
    4. ENGINE CONTROL V6 DOHC
    5. AUTO TRANSMISSION
    6. ANTI SKID BRAKE
    7. AIR BAG
    8. E.C.S
    9. T.C.L
   10. AUTO AIRCONDITIONER
  ↕ ↔: MOVE        ENTER : SELECT
```

2. USA / NON-USA Exports

   a. As explained above, in export market, Hyundai and Kia maintained the same model name quite long, therefore, it is necessary to specify the model year and other details to successfully establish communication with the control module.

   b. A detailed model name and model year listings are provided for your selection, and followed by the system selection.

```
          Application
  1. KOREAN
  2. JAPANESE



                         1/2
```

```
          Application
  1. HYUNDAI-DOMESTIC
  2. HYUNDAI (NON USA)
  3. HYUNDAI (USA)
  4. KIA-DOMESTICS
  5. KIA (NON USA)
  6. KIA (USA)
  7. DAEWOO
  8. SSANGYONG
  9. SAMSUNG
                         2/9
```

```
    SELECT VEHICLE MODEL      ↕
   1. ATOS          1998-2003
   2. GETZ              2003
   3. ACCENT(EXCEL)     2003
   4. ACCENT(EXCEL) 2000-2002
   5. ACCENT(EXCEL) 1995-1999
   6. EXCEL         1990-1994
   7. SCOUPE        1991-1996
   8. MATRIX        2002-2003
   9. ELANTRA       2001-2003
  10. ELANTRA       1996-2000
  11. ELANTRA       1992-1995
  12. HD COUPE      2002-2003
  ↕ ↔: MOVE    ENTER : SELECT
```

```
  ACCENT(EXCEL)     2000-2002
   1. ENGINE L4-SOHC
   2. ENGINE L4-DOHC
   3. ENGINE-DIESEL
   4. AUTOMATIC TRANSMISSION
   5. ANTI-LOCK BRAKE SYSTEM
   6. SRS-AIRBAG
   7. IMMOBILIZER



  ↕ ↔: MOVE    ENTER : SELECT
```

3. Model name comparison chart

<Based on Non-USA Exports>

Export Model Name	Domestic Model Name
ATOS	ATOS
GETZ	CLICK
ACCENT 2003	NEW VERNA
ACCENT 2000~2002	VERNA
ACCENT or ECXEL 1995~1999	ACCENT
EXCEL 1990~1994	EXCEL
SCOUPE 1991~1996	SCOUPE
MATRIX	LAVITA
ELANTRA 2001~2003	AVANTE XD
ELANTRA 1996~2000	AVANTE, ALL NEW AVANTE
ELANTRA 1992~1995	ELANTRA
HD COUPE 2002~2003	TUSCANI
HD COUPE 1997~2001	TIBURON
SONATA 1999~2003	EF SONATA, NEW EF SONATA
SONATA 1994~1998	SONATA III
SONATA 1989~1993	SONATA, SONATA II
XG	GRANDEUR XG
MARCIA	MARCIA
CENTENNIAL	EQUUS
GRANDUER 1994~1998	NEW GRANDEUR
GRANDEUR 1989~1993	GRANDEUR
H-100 1994~2001	GRACE
H-100 TRUCK 1997~2003	PORTER
H-1 1998~2003	STAREX
H-1 TRUCK 2001~2003	LIBERO
SANTAFE 2001~2003	SANTAFE
TRAJET 2001~2003	TRAJET XG
TERRACAN 2001~2003	TERRACAN
GALLOPER	GALLOPER I, II
SANTAMO	SANTAMO

B. System Selection

1. Select test system

    a.   When the model name and model year selections are made, Multiscan proceeds to system selection menu.

    b.   Multiscan shows all possible systems that are available with the selected vehicle. The menu generally has multiple Engine types for selection.
Any system shown in the menu does not mean that Multiscan confirms actual existence of the system in the car.

```
ACCENT(EXCEL)      2000-2002
  1. ENGINE L4-SOHC
  2. ENGINE L4-DOHC
  3. ENGINE-DIESEL
  4. AUTOMATIC TRANSMISSION
  5. ANTI-LOCK BRAKE SYSTEM
  6. SRS-AIRBAG
  7. IMMOBILIZER



  ↕ ↔ : MOVE      ENTER : SELECT
```

2. Engine type

a. When an engine control system is selected, another engine specification selection menu follows as shown below:

```
            ENGINE L4-SOHC
     1. UNLEAD GEN
     2. LEAD   ALL
     3. UNLEAD EOBD
     4. UNLEAD OBD-II




     ↕ ↔ : MOVE      ENTER : SELECT
```
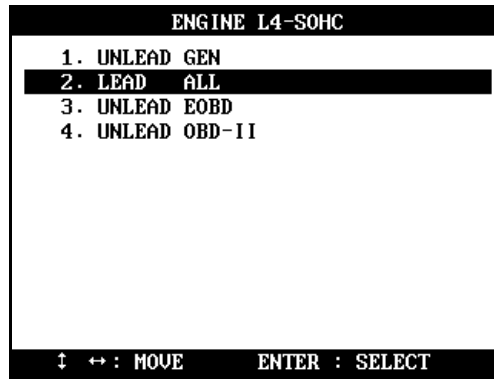
b. There is a variety of engine specification according to the engine size, model year, fuel type and regional emission regulations.

Following chart shows the examples of fuel type and emission regulations that Multiscan Hyundai software presents for your selection.

Diesel			Standard
Gasoline	LEADED		Standard
	UNLEADED	GEN	General – Except Europe and North America
		ALL	All countries
		CAL	Subject to Californian emission regulations
		KOR	Subject to Korean emission control guideline
		FED	Subject to US Federal emission regulations
		OBD-II	Subject to OBD-II requirements
		EOBD	Subject to European OBD requirements
		IMM	Vehicle with Immobilizer system
LPG			Liquefied Petroleum Gas vehicles – Standard

3. Uncertain details – Trial and error

a. It is easy to know the engine size, model year and fuel type, however, identifying the applied emission regulations is difficult for an independent workshop technician.

b. The other control systems such as ABS and SRS also may ask your further detailed selection as below:

```
        ANTI-LOCK BRAKE SYSTEM
  1. CTC TYPE(99~02MY)
  2. BOSCH TYPE(03MY~)




  ↕ ↔: MOVE      ENTER : SELECT
```

```
            SRS-AIRBAG
  1. 1999-2001MY
  2. F/LIFT




  ↕ ↔: MOVE      ENTER : SELECT
```
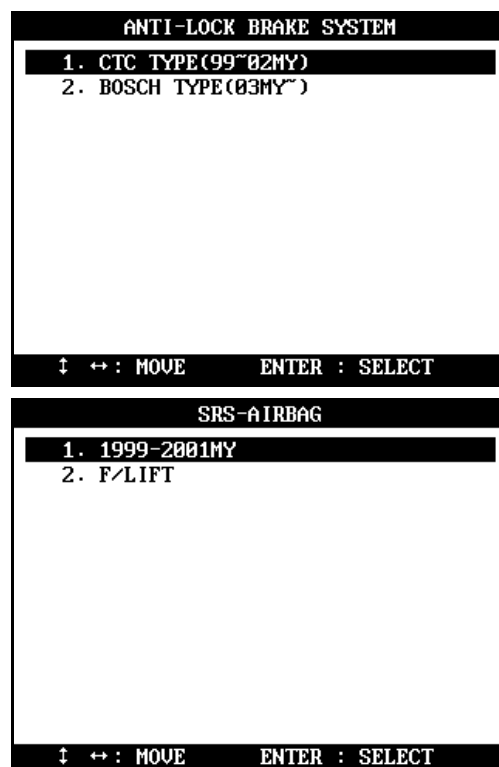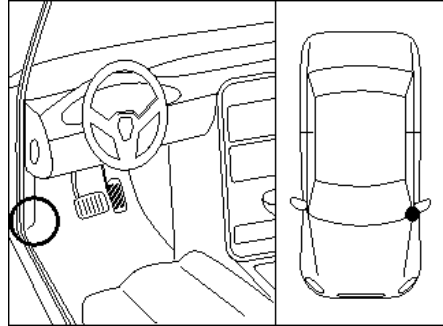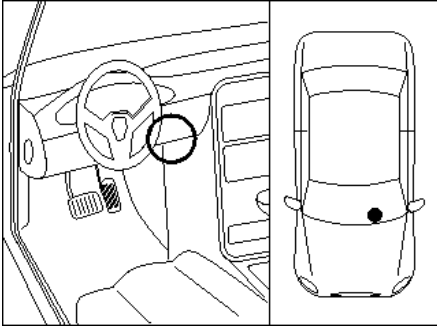
c. You have to find the correct selection by trial and error when it is not clear which one to select.
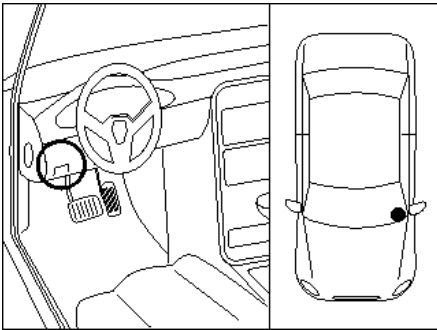
C. Diagnostic Adapter Location
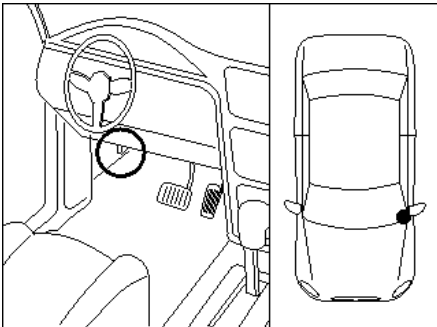
a. The DLC adapter location drawings are purely from the experience of Hanatech and provided for your reference only.

b. The drawings are based on Left Hand Drive cars, therefore, you may have to consider the mirror image for the Right Hand Drive cars.

c. You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [Hyundai (Domestic / Non-USA / USA)] from the car make list.
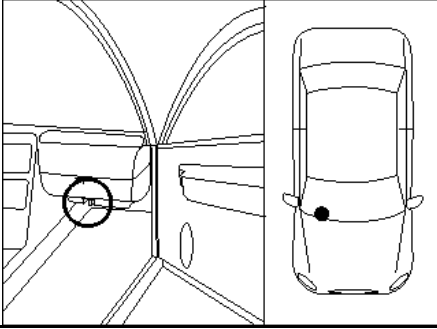
12-pin Mitsubishi / Hyundai adapter	16-pin OBD2 adapter

	Export name	Excel, Scoupe, Sonata (~`98), Marcia, LPG Taxi, H-100 Truck, H-1, Santamo, Elantra(~`95), Grandeur
	Domestic name	Excel, Scupe, Tiburon, Sonata I, II, III, Marcia, LPG Taxi, Porter, Starex, Santamo, Elatra, Grandeur
	Adapter type: Hyundai 12-pin Adapter	

Export name	Atos, Elantra(`96~), Sonata(`99~), XG, Accent(2000~), Matrix, Trajet, SataFe, Centennial, H-1 Truck
Domestic name	Atos, Avante, Avante XD, EF Sonata, New EF Sonata, Grandeur XG, Verna, Lavita, Trajet XG, Santa Fe, Equus, Libero
Adapter type: OBD2 16-pin Adapter	
* Some of Avante (Elantra 96~00) have 12-pin adapter. * H-1 Truck (Libero) uses 12-pin adapter	

Export name	Accent (2000~)	Accent (~`99)
Domestic name	Verna	Accent
Adapter Type	OBD2 16-pin adapter	Hyundai 12-pin adapter

Export name	New Grandeur, Dynasty, New Dynasty, Santamo (2000)
Domestic name	
Adapter type: Hyundai 12-pin Adapter	

Export name	Galloper II
Domestic name	
Adapter type: Hyundai 12-pin Adapter	

D. Coverage

All Hyundai cars

IV. KIA ---

A. Vehicle Model Selection

1. Model Name

Kia's model naming practice is no less complicated than Hyundai. Kia names most of their cars differently in export and domestic market. And they even name a same car differently according to the target market. This brings about confusion in selecting proper model name, especially where new and secondhand Kia cars are found mixed in the market.

Refer to the following model name comparison chart to make proper model name selection when using Multiscan.

Model Name

Domestic	Export
Pride(Hatch back) Pride β(Sedan)	Ford Festiva Pride

Multiscan Model selection

Domestic	USA / Non-USA
Pride	Pride

Model Name

Domestic	Export
Avella (Hatch back) Avella Delta(Sedan)	Ford Festiva Avella

Multiscan Model selection

Domestic	Non-USA / USA
Avella	Avella

Model Name

Domestic	Export
Rio Rio SF	Rio

Multiscan Model selection

Domestic	Non-USA / USA
Rio / Rio SF	Rio

Model Name

Domestic	Export
Sephia Sephia II	Sephia Mentor

Multiscan Model selection

Domestic	Non-USA / USA
Sephia / Sephia II	Sephia

Model Name

Domestic	Export
Spectra	Sephia II Spectra

Multiscan Model selection

Domestic	Non-USA / USA
Spectra	Sephia

Model Name

Domestic	Export
Shuma	Sephia Shuma

Multiscan Model selection

Domestic	Non-USA / USA
Shuma	Sephia / Shuma

Model Name

Domestic	Export
Spectra Wing	Shuma II Spectra

Multiscan Model selection

Domestic	Non-USA / USA
Spectra	Shuma

Model Name

Domestic	Export
Carens	Carens

Multiscan Model selection

Domestic	Non-USA / USA
Carens	Carens

Model Name

Domestic	Export
Sportage	Sportage

Multiscan Model selection

Domestic	Non-USA / USA
Sportage	Sportage

Model Name

Domestic	Export
Credos Credos II	Clarus

Multiscan Model selection

Domestic	Non-USA / USA
Credos / Credos II	Clarus

Model Name

Domestic	Export
Optima Optima Regal	Optima Magentis

Multiscan Model selection

Domestic	Non-USA / USA
Optima Optima Regal	Optima(Magentis)

Model Name

Domestic	Export
Elan (Lotus)	Elan

Multiscan Model selection

Domestic	Non-USA / USA
Elan	Elan

Model Name

Domestic	Export
Potentia	Potentia

Multiscan Model selection

Domestic	Non-USA / USA
Potentia	Potentia

Model Name

Domestic	Export
Enterprise	Enterprise

Multiscan Model selection

Domestic	Non-USA / USA
Enterprise	Enterprise

Model Name

Domestic	Export
Carnival	Sedona Carnival

Multiscan Model selection

Domestic	Non-USA / USA
Carnival	Carnival(Sedona)

Model Name

Domestic	Export
Retona	Military 4WD - KM42 Series

Multiscan Model selection

Domestic	Non-USA / USA
Retona	Retona

Model Name

Domestic	Export
Carstar	Joice

Multiscan Model selection

Domestic	Non-USA / USA
Carstar	Joice

Model Name

Domestic	Export
Pregio	Pregio

Multiscan Model selection

Domestic	Non-USA / USA
Pregio	Pregio

Model Name

Domestic	Export
Bongo Truck Bongo Frontier	Frontier K2700

Multiscan Model selection

Domestic	Non-USA / USA
Frontier	Frontier

Model Name

Domestic	Export
Sorento	Sorento

Multiscan Model selection

Domestic	Non-USA / USA
Sorento	Sorento

B. System Selection

1. Select test system

a When the model name and model year selection are made, Multiscan proceeds to the system selection menu.

```
          Application
┌──────────────────────────────┐
│ 1. KOREAN                    │
│ 2. JAPANESE                  │
│                              │
│                              │
│                              │
│                              │
│                              │
│                          1/2 │
└──────────────────────────────┘
```

```
          Application
┌──────────────────────────────┐
│  1. HYUNDAI-DOMESTIC         │
│  2. HYUNDAI (NON USA)        │
│  3. HYUNDAI (USA)            │
│  4. KIA-DOMESTICS            │
│  5. KIA (NON USA)            │
│  6. KIA (USA)                │
│  7. DAEWOO                   │
│  8. SSANGYONG                │
│  9. SAMSUNG                  │
│                          5/9 │
└──────────────────────────────┘
```

```
    SELECT VEHICLE MODEL     ↕
┌──────────────────────────────┐
│  6. SHUMA                    │
│  7. CARENS                   │
│  8. SPORTAGE                 │
│  9. CLARUS                   │
│ 10. OPTIMA(MAGENTIS)         │
│ 11. ELAN                     │
│ 12. POTENTIA                 │
│ 13. ENTERPRISE               │
│ 14. CARNIVAL(SEDONA)         │
│ 15. RETONA                   │
│ 16. JOICE                    │
│ 17. TOWNER                   │
│ ↕ ↔: MOVE    ENTER : SELECT  │
└──────────────────────────────┘
```

```
      OPTIMA(MAGENTIS)
┌──────────────────────────────┐
│  1. 2000 ~ 2001 MY           │
│  2. 2002 MY                  │
│  3. 2003 MY                  │
│                              │
│                              │
│                              │
│                              │
│ ↕ ↔: MOVE    ENTER : SELECT  │
└──────────────────────────────┘
```
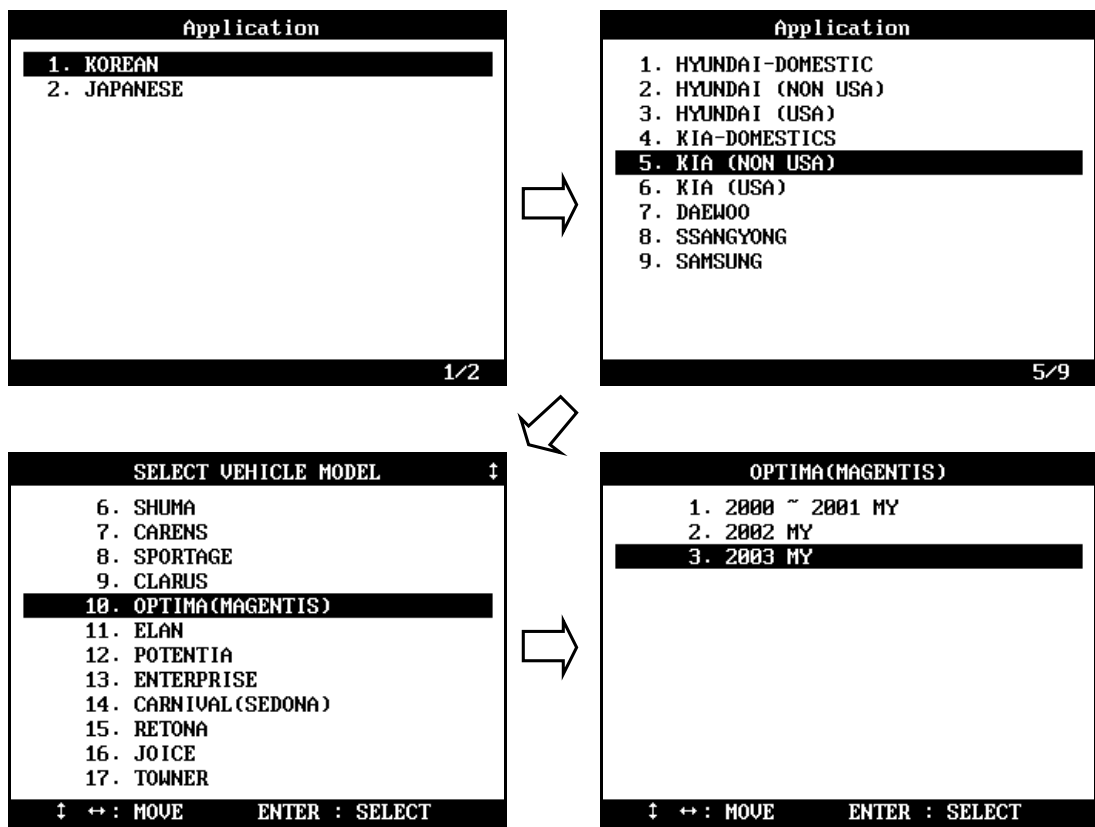
b Multiscan shows all possible systems that are available with the selected vehicle.

Any system shown in the menu does not mean that Multiscan confirms actual existence of the system in the car.

2. Engine type

a   When an engine control system is selected, another engine specification selection menu follows as shown below:

```
┌──────────────────────────────┐   ┌──────────────────────────────┐
│          2003 MY             │   │       ENGINE L4-SOHC         │
│  1. ENGINE CONTROL           │   │   1. UNLEAD GEN              │
│  2. AUTOMATIC TRANSAXLE      │   │   2. LEAD    ALL            │
│  3. ANTI-LOCK BRAKE SYSTEM   │   │   3. UNLEAD EOBD            │
│  4. SRS-AIRBAG               │   │   4. UNLEAD OBD-II          │
│  5. IMMOBILIZER              │   │                              │
│                              │   │                              │
│  ↕ ↔: MOVE    ENTER : SELECT │   │  ↕ ↔: MOVE    ENTER : SELECT │
└──────────────────────────────┘   └──────────────────────────────┘
```

b   There is a variety of engine specification according to the engine size, model year, fuel type and regional emission regulations.

Following chart shows the examples of fuel type and emission regulations that Multiscan Hyundai software presents for your selection.

Diesel		EUROPE	Meets European emission regulations
		GENERAL	All countries
		C/RAIL	Common Rail Injection type
Gasoline	LEADED		Standard
	UNLEADED	EURO III, IV	Meets European emission regulations
		GENERAL	All countries
		MELCO	Control module manufactured by MELCO
		BOSCH	Control module manufactured by BOSCH
		NON IMMO	Vehicle without Immobilizer
		W/IMMO	Vehicle with Immobilizer
		TED	One of KIA's model codes (project name) – no special meaning
LPG			Liquefied Petroleum Gas vehicles – Standard
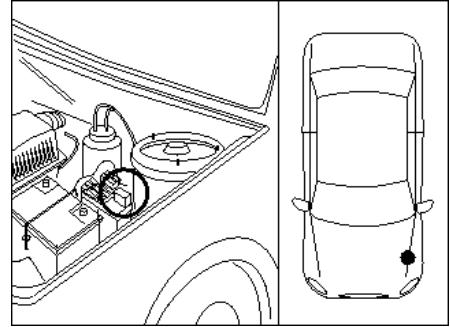
C. Diagnostic Adapter Location
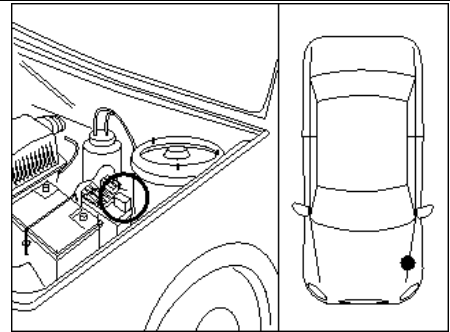
a. The DLC adapter location drawings are purely from the experience of Hanatech and provided for your reference only.

b. The drawings are based on Left Hand Drive cars, therefore, you may have to consider the mirror image for the Right Hand Drive cars.

c. You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [KIA (Domestic / Non-USA / USA)] from the car make list.
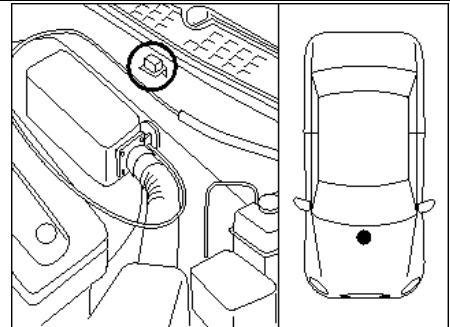
14-pin circular adapter	20-pin adapter	16-pin OBD2 adapter

	Export name	Joice
	Domestic name	Carstar
	Adapter type: <u>Hyundai 12-pin</u>	

	Export name	Optima (Magentis), Visto
	Domestic name	Optima, Optima Regal, Visto
	Adapter type: OBD2 16-pin	

	Export name	Ford Festiva, Captial, Concord
	Domestic name	Pride, Avella, Capital, Concord
	Adapter Type	Adapter type: KIA/MAZDA 6-pin

	Export name	Carens, Potentia, Credos (Clarus), Sportage, Shuma (Sephia), Elan, Carnival (Sedona), Rio, Rio SF, Retona (KM42), Enterprise, Sephia II, Shuma II, Sorento, Optima (Magentis)
	Domestic name	Carens, Potentia, Credos, Sportage, Shuma, Shuma, Elan, Carnival, Rio, Retona, Enterprise, Spectra, Sorento, Optima
	Adapter type: KIA 20-pin	

	Export name	Sephia, Sephia II, Mentor, Timor
	Domestic name	Sephia, Sephia II
	Adapter type: KIA 20-pin	

D. Coverage

All Kia cars

V. DAEWOO ------------------------------------

A. Vehicle Model Selection

1. Regional Variation

Differently from Hyundai or Kia, Daewoo has no regional variations. Korean domestic version software is compatible with export models, too.

Therefore, Multiscan Korean car software package includes Daewoo domestic version codes only.

```
               Application
   1. HYUNDAI-DOMESTIC
   2. HYUNDAI (NON USA)
   3. HYUNDAI (USA)
   4. KIA-DOMESTICS
   5. KIA (NON USA)
   6. KIA (USA)
   7. DAEWOO
   8. SSANGYONG
   9. SAMSUNG


                                   7/9
```

2. Model Name

Daewoo has few variations in model naming when compared with Hyundai or Kia. Most of Daewoo cars share the same name regardless of manufacturing place and regional market except for Lemans and Cielo.

a   Lemans

Introduced in 1986 based on Opel Cadet 1.6 or Pontiac Lemans, and started to implement TBi fuel injection system since 1988. Export model name was Racer.

b   Cielo

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Daewoo renamed Lemans to Cielo after face-lifting. Cielo was also manufactured in their overseas plants in India and Uzbekistan. Both of "Cielo" and "Heaven" were used for export models. Lemans and Cielo were replaced by Lanos in 1997.

c   Ssangyong cars

Ssangyong cars once had been sold through Daewoo dealer networks for a few years in late 90's, and most of Ssangyong cars manufactured in this period were wearing Daewoo emblems.

You should choose Ssangyong in the carmake menu to diagnose these cars : Musso, MB100 (Istana), Chairman, Korando.

```
┌──────────────────────────────────┐
│    SELECT VEHICLE MODEL       ↕  │
├──────────────────────────────────┤
│  1. LEMAN (EXP.RACER)           │
│  2. ESPERO                      │
│  3. NEW PRINCE/SALON            │
│  4. CIELO (EXP.HEVEN)           │
│  5. NEXIA                       │
│  6. LANOS (LANOS II)            │
│  7. NUBIRA                      │
│  8. NUBIRA II                   │
│  9. LEGANZA                     │
│ 10. MATIZ (MATIZ II)            │
├──────────────────────────────────┤
│ ↕ ↔: MOVE      ENTER : SELECT   │
└──────────────────────────────────┘
```
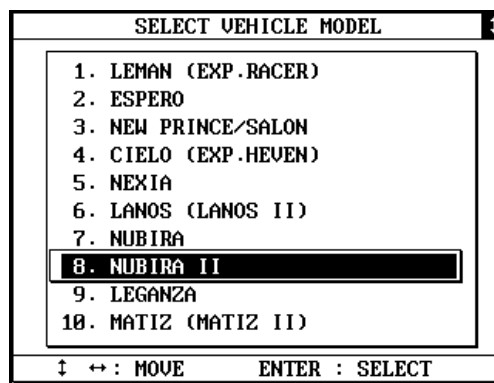
B. System Selection

1. Menu Selection

A system selection menu promptly follows the model name selection. Multiscan Daewoo software does not require you to make selections among complicated model codes and applied emission regulations.

A simple engine size and model year selection menu follows when [Engine control] system is selected.

```
          NUBIRA II                              ENGINE CONTROL

     ┌──────────────────────┐              ┌──────────────────────┐
     │ 1. ENGINE CONTROL    │              │ 1. NUBIRA II 1.5 DOHC│
     │ 2. AUTO TRANSMISSION │              │ 2. NUBIRA II 2.0     │
     │ 3. ANTI SKID BRAKE   │              └──────────────────────┘
     │ 4. AIR BAG           │
     └──────────────────────┘

   ↕ ↔ : MOVE    ENTER : SELECT        ↕ ↔ : MOVE    ENTER : SELECT
```
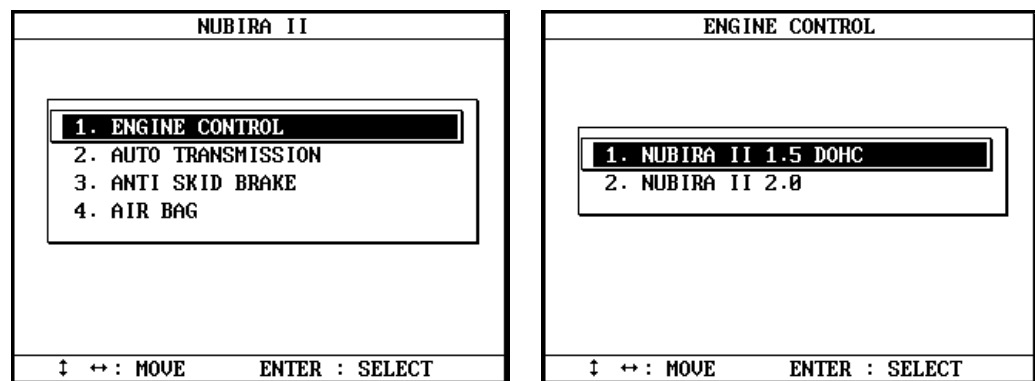
2. Auto Transmission

Until late 1990's, "New Prince / Salon" of Daewoo had mechanical type automatic transmission, not the electronic control type. These mechanical types are not subject to scanner communication.

3. Supported systems and coverage

Model Name	ENGINE	A/T	ABS	SRS	ISU
LEMANS (RACER)	√				
ESPERO	√	√	√		
NEW PRICE / SALON	√		√		
CIELO (HEAVEN)	√	√	√		
NEXIA	√	√	√		
LANOS I / II	√	√	√	√	
NUBIRA I / II	√	√	√	√	
LEGANZA	√	√	√	√	
MATIZ I / II	√	√	√	√	
MAGNUS	√	√	√	√	√
DAMAS/LABO	√				
TICO		√			
REZZO	√	√	√	√	
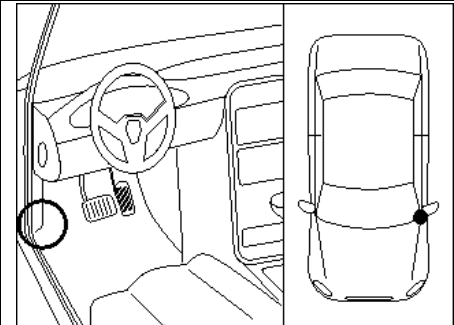
C. Function Selection
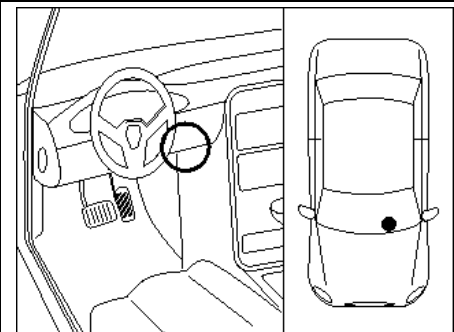
All Daewoo cars support DTC read / erase and data stream functions. Please refer to the previous chapter for detailed operations of each function.

D. Diagnostic Adapter Location
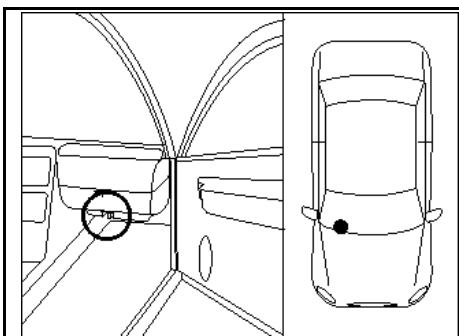
a. The DLC adapter location drawings are purely from the experience of Hanatech and provided for your reference only.

b. The drawings are based on Left Hand Drive cars, therefore, you may have to consider the mirror image for the Right Hand Drive cars.

c. You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [DAEWOO VEHICLES] from the car make list.

12-pin adapter	16-pin OBD2 adapter
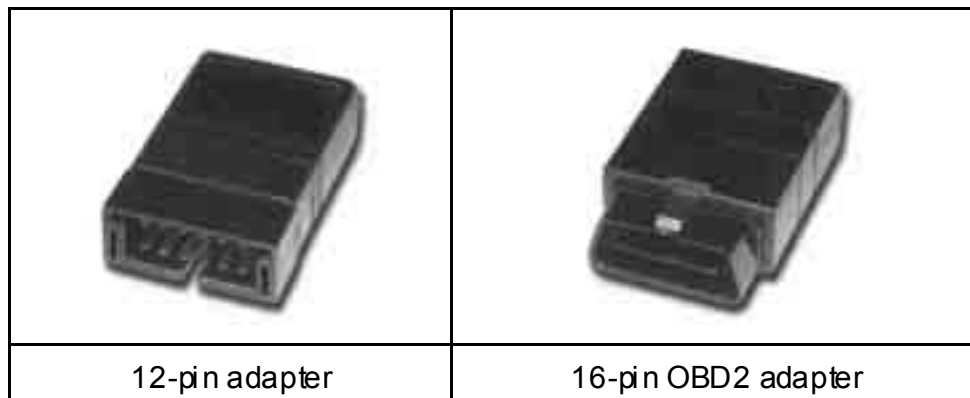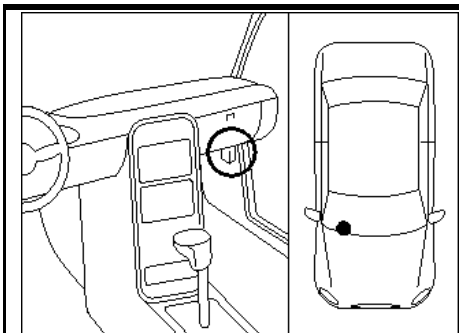
Model Name	NUBIRA II	
Adapter type: OBD2 16-pin		

Model Name	Magnus	Leganza
Adapter type	OBD2 16-pin	DAEWOO 12-pin

Model Name	Damas, Labo
Adapter type: DAEWOO 12-pin	

Model Name	Matiz
Adapter type: DAEWOO 12-pin	

Model Name	Lemans(Racer), Espero, New Price / Salon, Cielo(Heaven), Nexia, Tico, Lanos, Nubira
Adapter type: DAEWOO 12-pin	

E. Coverage

All Daewoo cars

Refer to the [B-3. Supported Systems and Coverage] for further information.

VI. SSANGYONG ----------------------------

A. Vehicle Model Selection

1. Regional Variation

Ssangyong has no regional variations.　Korean domestic version software is compatible with export models, too.

Therefore, Multiscan Korean car software package includes Ssangyong domestic version codes only.

```
            Application
  1. HYUNDAI-DOMESTIC
  2. HYUNDAI (NON USA)
  3. HYUNDAI (USA)
  4. KIA-DOMESTICS
  5. KIA (NON USA)
  6. KIA (USA)
  7. DAEWOO
  8. SSANGYONG
  9. SAMSUNG


                              8/9
```
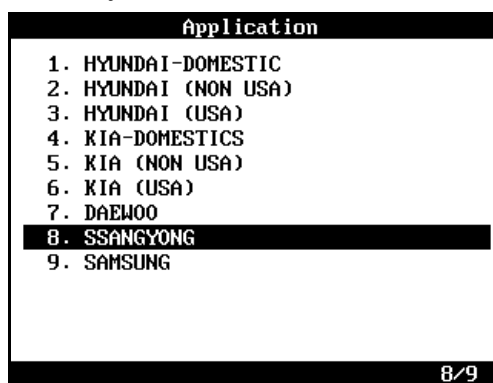
2. Model Name

a　Ssangyong has only one variation in model naming: Istana, a van sold under Mercedes Benz brand, called MB100 in export market.

b　Ssangyong cars with Daewoo emblem

Ssangyong cars once had been sold through Daewoo dealer networks for a few years in late 90's, and most of Ssangyong cars manufactured in this period were wearing Daewoo emblems.

Even though the car may have Daewoo marks in the front and rear, you should choose Ssangyong in the car make menu to diagnose these cars

```
┌─────────────────────────────────────┐
│         SELECT VEHICLE MODEL         │
├─────────────────────────────────────┤
│                                      │
│   ┌──────────────────────────────┐   │
│   │  1. MUSSO                    │   │
│   │  2. ISTANA                   │   │
│   │  3. KORANDO                  │   │
│   │ ▆4.▆CHAIRMAN▆▆▆▆▆▆▆▆▆▆▆▆▆▆▆  │   │
│   │  5. REXTON                   │   │
│   │                              │   │
│   └──────────────────────────────┘   │
│                                      │
│  ↕ ↔: MOVE        ENTER : SELECT     │
└─────────────────────────────────────┘
```

B. System Selection

    a   A system selection menu promptly follows the model name selection. Multiscan Ssangyong software does not require you to make selections among complicated model codes, system version and applied emission regulations at this stage.

    b   When a system is selected, a detailed specification menu follows.

    c   Diesel powered Ssangyong cars still do not have electronic control unit, therefore, only gasoline vehicles are available with scanner communication.

```
       CHAIRMAN                      ENGINE CONTROL

1. ENGINE CONTROL              1. CHAIRMAN 3.2 (VOD)
2. AUTO TRANSMISSION           2. CHAIRMAN 2.8 (VOD)
3. ANTI SKID BRAKE             3. CHAIRMAN 2.3 (VOD)
4. E.C.S                       4. CHAIRMAN 3.2 (BOSCH)
5. AIR BAG

↕ ↔: MOVE   ENTER : SELECT     ↕ ↔: MOVE   ENTER : SELECT
```
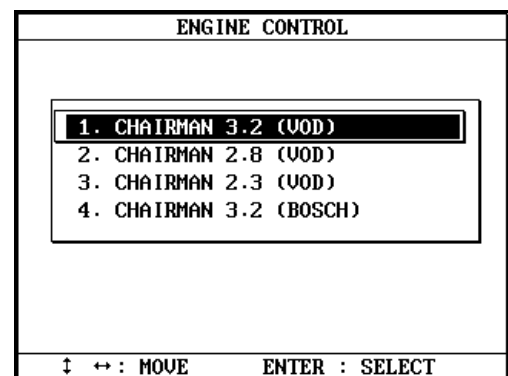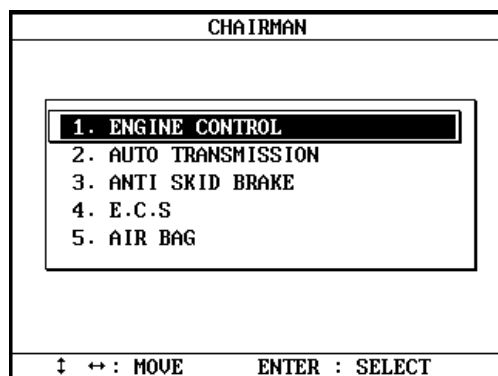
C. Supported systems

Model Name	ENG	A/T	ABS	ECS	SRS	TOD	TCCU
MUSSO	√	√	√	√	√	√	√
ISTANA(MB100)			√				
KORANDO	√	√	√	√	√	√	√
CHAIRMAN	√	√	√	√	√		
REXTON	√	√	√		√	√	√

D. Function Selection
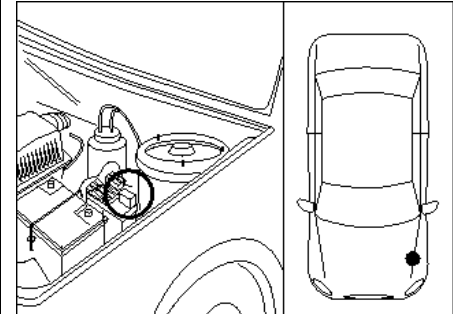
All Daewoo cars support DTC read / erase and data stream functions. Please refer to the previous chapter for detailed operations of each function.
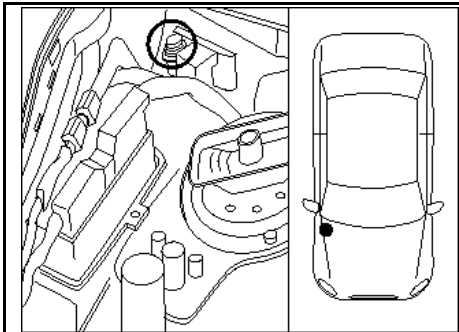
TCCU system may support DTC reading function only.
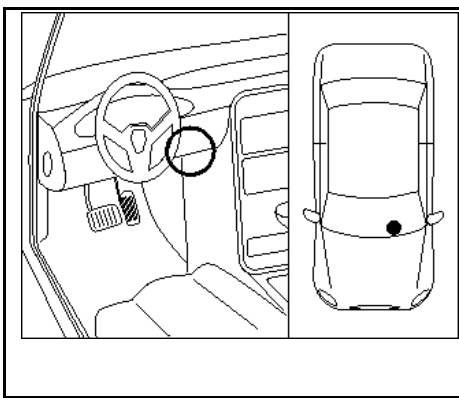
E. Diagnostic Adapter Location
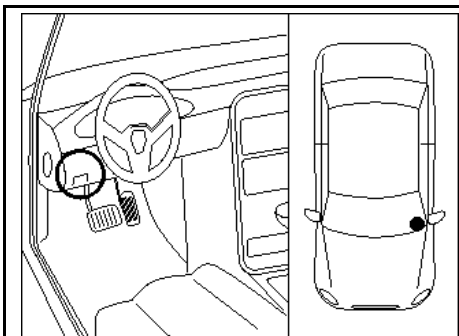
a   The DLC adapter location drawings are purely from the experience of Hanatech and provided for your reference only.

b   The drawings are based on Left Hand Drive cars, therefore, you may have to consider the mirror image for the Right Hand Drive cars.

c   You can view these drawings on the Multiscan screen by selecting [3.Connector Location] after selecting [DAEWOO VEHICLES] from the car make list.

14-pin circular adapter	20-pin adapter	16-pin OBD2 adapter
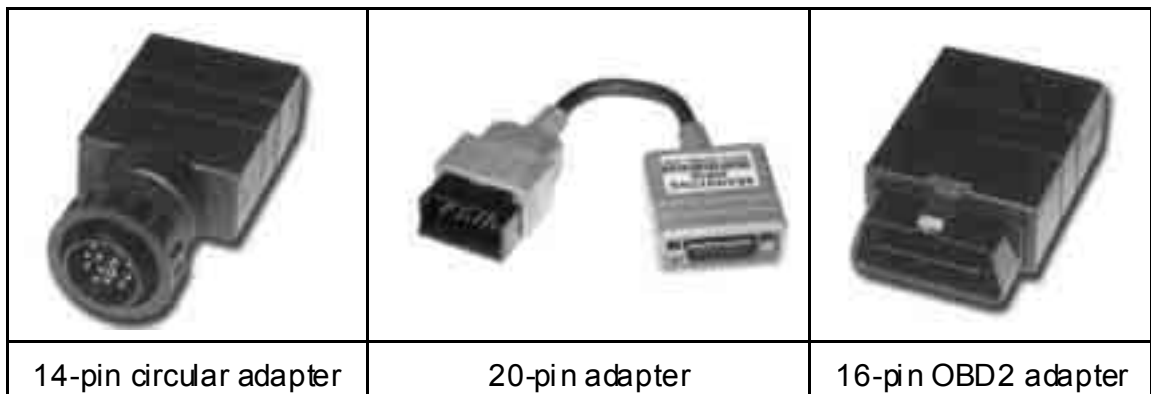
	Model Name Korando, Musso (before 1999)
	Adapter type: 14-pin circular or 20-pin

	Model Name	Chairman
	Adapter type: 14-pin circular You have to remove the plastic cover	

	Model Name	Istana (MB100)
	Adapter type: 14-pin circular	
	This drawing is based on passenger car. You may have to access the adapter through the engine compartment for this kind of van.	

	Model Name	Musso, Rexton
	Adapter type: 16-pin OBD2	

F. Coverage

Refer to the [C. Supported Systems] section hereinbefore.

VII. SAMSUNG ----------------------------

A. Background

Renault-Nissan-Samsung

a   Samsung motor company's official name is Renault-Samsung motor company, and is a family of Renault-Nissan network, and manufactures knockdown models of Nissan cars in the assembly plant in Korea.
Samsung has two models of SM5 and SM3, which are the same as Nissan Maxima and Bluebird.

b   The electronic control system of these Nissan cars are directly migrated to Samsung cars with least modification, and therefore, the scanner communication is the same as ordinary Nissan cars.
Refer to the Nissan section in the previous chapter for further information.

c   The licensed models are basically prohibited to sell in other countries, therefore, Samsung cars are found in a few limited countries.
Samsung SM5 being sold in Chile is renamed to SQ5.
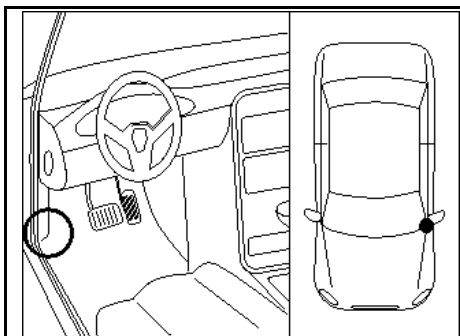
B. Supported Systems

Model Name	ENGINE	A/T	ABS	SRS	IVMS
SM5 (SQ5)	√	√	√	√	√
SM3	√	√	√	√	

C. Diagnostic Adapter Location

Samsung cars use 14-pin Nissan adapter found in only one location.

14-pin Nissan adapter

Model Name	SM5 (SQ5), SM3
Adapter type: 14-pin Nissan	

CHAPTER 8   TROUBLE SHOOTING

Trouble Shooting

This part of manual presents you the instant actions to be taken for the most frequently reported troubles.

The purpose of this troubleshooting guide is to minimize the loss of time and cost caused by disputing of troubles that can be simply solved by the user himself.

Please always refer to this troubleshooting guide and do as suggested herein when you have any trouble while using Multiscan equipment in advance to calling up your local distributor.

The manufacturer keeps endeavoring to minimize the possible troubles, therefore, remedies to prevent listed problems can be made without notice to individual users.

Note your local distributor's contact information here:

Would not turn on when the power is supplied

Check the power cable connection

YES. The cable is firmly connected   NO. It was not properly connected

Reconnect the power cable firmly

NO. It still does not work

Check if the red LED's on both ends of the power cable are ON

Both LED's are ON   Only one LED is ON   Both LED's are OFF

Replace the power Cable

Open the cigarette lighter socket, and check if the fuse is blown

It is O.K.   It is Blown

Replace the fuse

Check the battery voltage

It is less than 8~10V   It is more than 8V

Vehicle Battery Voltage is too LOW

Multiscan is not defective
Try again with the other vehicle

Contact local distributor

The unit may not respond to the key input due to internal keypad connection failure. The distributor may have to open the head unit to check the connection. Report the symptoms to your local distributor and wait for the instruction.

Power automatically turns off after turned on

Check the battery voltage

Multiscan requires the power of 8V or higher for proper operation. Insufficient vehicle battery voltage may result in prompt system turn off. Check the vehicle battery voltage

| It is lower than 10 V | It is normal. It is higher than 10 V |

Use the other power source

Replace the vehicle battery with fresh new one. Or use external vehicle battery for temporary power supply.

Check the power Amperage

Multiscan requires the power of 600mA or more for proper operation. Insufficient power amperage may result in prompt system turn off.

| It is lower than 600mA | It is normal. It is higher than 600mA |

Use the other power source

Replace the vehicle battery with fresh new one. Or use external vehicle battery for temporary power supply.

Report to your local distributor

The distributor may have to replace the main board. Report the symptoms to your local distributor and wait for our instruction

LCD screen problems

The display is too dim or too dark

Adjust the contrast using the contrast wheel on the right side of Multiscan

LCD stands for Liquid Crystal Display, and it is very sensitive to temperature.

If you have placed Multiscan in a cold or hot place, the display may become too dim or too dark when turned on. This is not a defect of Multiscan, but a normal response of all LCD's to the change of temperature.

However, if you cannot control the contrast using the dial, please contact us for further assistance.

A part of LCD became very dark

Adjust the contrast using the contrast wheel on the right side of Multiscan

The LCD unit of Multiscan has a backlight for brighter display. This backlight generates heat as time elapses when turned on.

As mentioned above, because LCD is sensitive to temperature, the part of the LCD near the backlight may turn dark when you keep Multiscan turned on for more than 2 hours.

This is not a defect of Multiscan.

However, if the LCD becomes dark too early or the contrast adjustment doesn't work, please contact us for further assistance.

Report to your local distributor

If the problem is too serious to use properly or the contrast dial does not function, report the symptoms to your local distributor and wait for instruction.
Replacement of the LCD module may be necessary.

Communication Error

Check the cable connection

Check the followings

The main data link cable is firmly connected to the Multiscan.

The correct adapter is firmly connected to the main data link cable.

The adapter is firmly connected to the vehicle side connector.

Try with the other vehicle

If you can find another vehicle of the different model that requires the same adapter, please try again with the vehicle.

No, it doesn't work, either

Yes, it works fine with the other cars

Try with the other vehicles

If you can find other vehicles of different make and model, try to test with as many cars as possible.

Check if the car has any other connector for communication

A car may have multiple connectors for diagnostic communication for different systems. Please try with the other connector if available.

Cable or Adapter is defective

If the communication error occurs with all cars, we can conclude that the main data link cable is defective.

If the communication error occurs with vehicles using a specific adapter, the adapter is regarded defective

Report the symptom to your local distributor and wait for instruction.

Check if the detailed vehicle selection was correctly made

Please restart the vehicle selection procedure.

Check if the vehicle is included in the coverage list

The applicable vehicle range is updated frequently. Please consult your local distributor if the vehicle is included in your current software version.

Software update is necessary

Please report your error to your local distributor. We will revise the software and let you have the updated software as soon as it is released

Hanatech Co., Ltd.

Automotive Diagnostic Equipment Specialist