Technician
Service
Receptionist
Body
Specialist

Training Manual

Mazda-Modular Diagnostic System

(NTOM)

CT-L1001.2

ZOOM-ZOOM

M-MDS Outline

- **M-MDS** (**M**azda **M**odular **D**iagnostic **S**ystem) has been developed as the successor of **WDS** (**W**orldwide **D**iagnostic **S**ystem). This universal diagnostic system enables the technician to utilize sophisticated functions, such as module reprogramming, as well as more accurate diagnosis on computerized vehicle-control systems. M-MDS, the successor of WDS, inherited highly regarded functions from WDS and features new functions and improved performance.

M-MDS Introduction Purposes

- M-MDS is introduced, in the place of WDS, as the only tool that can diagnose all Mazda vehicles and provide service functions, such as module reprogramming. M-MDS will be required to diagnose and perform service on models manufactured after 2006 since WDS will not support these models.

Equipment Configuration

- M-MDS consists of:
    - a dedicated interface module, the **VCM** (**V**ehicle **C**ommunication **M**odule)
    - a VCM software DVD, which includes **IDS** (**I**ntegrated **D**iagnostic **S**oftware), **PDS** (**P**ortable **D**iagnostic **S**oftware) and **PFM** (**P**DS **F**ile **M**anager) software
    - a set of cables
    - a designated laptop **PC** (**P**ersonal **C**omputer) (Dell Latitude D610, not included with Mazda VCM Kit)

- As an **additional option**, the M-MDS also will operate with a designated Pocket PC (DELL AXIM X50/X50V or HP iPAQ rx3715), not included with Mazda VCM Kit. When operating with a designated Pocket PC, a host laptop computer is required for installing software to the Pocket PC. In this case a Pocket PC software (PDS) must be installed on the Pocket PC and a file manager software (PFM) must be installed on the host laptop. PDS/PFM installation and operation is not covered in this manual. For detailed PDS/PFM installation and operation instructions refer to the manuals, provided in local languages on the VCM software **DVD** (**D**igital **V**ersatile **D**isc).

- The diagnostic software of M-MDS, which runs on the laptop PC, is called IDS and will be updated periodically by distributed DVDs.

NOTE: M-MDS updates Module Reprogram Files and Modified Program Files by accessing the designated website by itself automatically. To use this function, the designated laptop PC or host computer must be hooked up on the Internet.

Comparison of M-MDS to WDS

Function		WDS	M-MDS	
			IDS	PDS
Diagnostic Function	Self-Test, Data Logger	X	X	X
	Power Balance Test	X	X	X
	Relative Compression Test	X	X	-
	Function Test	X	X	X *1
Service Function	Module Reprogramming	X	X	X
	Module Configuration	X	X	X
	PATS Reprogramming	X	X	X
	Programmable Parameter	X	X	X
	Part Initialization, Data Reset, & Learning	X	X	X
	ABS (**A**ntilock **B**rake **S**ystem) Service Air Bleed	X	X	X
Instrumentation	**DMM** (**D**igital **M**ulti-**M**eter) & Oscilloscope	X	-	-
	Pressure (Fuel, Hydraulic)	X	-	-
	Secondary Ignition	X	-	-
	Rotary Engine Compression Test	X	-	-
Other Function	Service Information Display	-	X	-
	Vehicle Health Check *2	-	X	-

 (*1)   Limited functionality
(*2)   To be established

Mazda VCM Kit Contents

- VCM DVD

    – This DVD contains all the software necessary for setting up IDS and PDS. In addition to that it includes manuals for installation and operation of IDS, PDS, PFM and VCM.

    – The Menu and manuals appear in the preset language (Windows settings) of the Laptop computer.
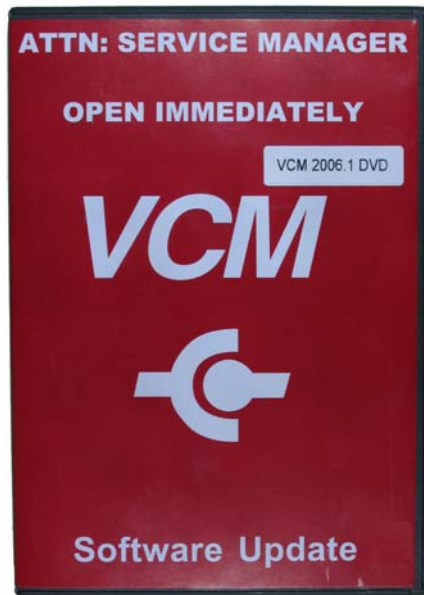
L1001.2_001

- Vehicle Communication Module (VCM)

    – This is a high-performance and long-lasting vehicle serial communication gateway equipped with multiple vehicle serial communications interface and **LED**s (**L**ight **E**mitting **D**iode) that indicate vehicle communication status. For details refer to the VCM manual on the VCM DVD.

L1001.2_002

- 16-Pin **DLC** (**D**ata **L**ink **C**onnector) Cable

  – This is a cable that connects the VCM to the 16-pin DLC connector on the vehicle (length: 4.5 meter; for 12V vehicles only).

L1001.2_003

- VCM 17-Pin DLC Kit

  – This is a cable that connects the VCM to the 17-pin DLC connector on older Mazda vehicles. (The product can vary from the illustration)

L1001.2_004

- PC Ethernet – **USB** (**U**niversal **S**erial **B**us) Host Cable

    – This is a cable that connects the VCM to the designated laptop PC.

L1001.2_005

- **AC/DC** (**A**lternating **C**urrent**/D**irect **C**urrent) Adapter for VCM

    – This is an AC adapter for the VCM. This is used when you need to use the VCM without connecting to a vehicle.

L1001.2_006

- PDS Soft Case

  – This soft case can be used to carry the optional available Pocket PC and the VCM.

L1001.2_007

- PDS USB Master Host Adapter

  – The VCM and the designated Pocket PC can be connected using an off-the-shelf USB sync cable or USB/Serial autosync cable with this adapter.

L1001.2_008

Optional M-MDS Accessory

M-MDS Cart

- The optional wheeled cart accommodates all the system components and allows flexible use of the M-MDS laptop in different working locations. It comprises a retractable desk and a VCM holding space.

- In addition to that, the dedicated M-MDS cart is the right way to store and protect the M-MDS when not in use. The laptop PC case and the lower cabinet can be locked by key.

L1001.2_009

Setting up M-MDS

- The following pages will enable you to build a fully operational M-MDS diagnostic computer from the M-MDS Kit and a locally supplied laptop computer.

Installing IDS Software on the Laptop Computer

- In this step the software will be installed on the laptop PC.
    - insert IDS DVD
    - select "IDS" from installation menue
    - select set-up language
    - click NEXT
    - accept license agreement (tick) and click NEXT
    - confirm information about firewall characteristics (tick) and click NEXT
    - accept (recommended) or change the proposed installation location on your hard drive and click NEXT
    - click INSTALL (this will take a few minutes)
    - when the installation process is completed you will be asked to remove the IDS DVD from the DVD drive
    - click FINISH
    - restart your computer

Installing Calibration Files

- In this step the calibration files needed for module programming will be installed on the laptop PC.

    – insert IDS DVD again

    – select "Calibrations" from installation menue

    – click NEXT

    – accept license agreement (tick) and click NEXT

    – accept (recommended) or change the proposed installation location on your hard drive and click NEXT

    – click INSTALL (this will take a few minutes)

    – click FINISH

    – click EXIT

    – remove the IDS DVD from the DVD drive

Customization of IDS

- In this step local settings like language and measurement units as well as Dealer details will be entered.

  – double-click the IDS-icon on your desktop to start IDS

  – click the system page tab in the top left corner of the screen

  – click the user information icon at the bottom and change the default user preferences or create a new user profile

  – select your preferred language and measurement units and confirm your selection by clicking the tick symbol

  – click the swiss army knife icon at the bottom

  – select "Set Dealer Information" and click the tick symbol

  – type in the required dealer information details and click the tick symbol

  – click X in the top right corner of the screen to exit the IDS programme

First Commissioning of IDS and VCM

- In this step the VCM will be programmed if it is used the first time.

    – double-click the IDS-icon on your desktop to start IDS

    – select "Start New Session"

    – connect the computer to the DLC of a current Mazda vehicle as shown on the screen and click the tick symbol

    – click the tick symbol in the pop-up window to update the VCM code (this only applies for an all new VCM)

    – click the tick symbol once the progress bar has turned green

    – now you can diagnose a car or click X in the top right corner of the screen to exit the IDS programme

Setting up the Internet Connection for IDS

• In this step M-MDS will be enabled to connect to the internet for calibration updates and others.

   – double-click the IDS-icon on your desktop to start IDS

   – click the system page tab in the top left corner of the screen

   – click the swiss army knife icon at the bottom

   – select "Public Internet Access ID/Password Configuration"

   – type in your username and password and click the tick symbol

   – select "Network Options" and click the tick symbol

   – click "Reset LAN"

   – verify "Internet Service Provider" is selected and click OK

   – click "Activate" and then OK

   – select "Network Options" again and click the tick symbol

   – click "Test Network"

   – if the test was completed successfully click OK
(If the test fails, contact your IT department! Reference manuals in pdf-format can be found on the IDS installation DVD.)

Updating IDS via Internet

- Now the existing internet connection will be used to update IDS.

    – start IDS

    – click the system page tab in the top left corner of the screen

    – click the swiss army knife icon at the bottom

    – select "Update Software" and click the tick symbol

    – select "Manual Calibration Update" in the pop-up window and click the tick symbol

    – verify "Include All New Calibration Files" is checked

    – click the "Update Calibration/Tech Tips" button
       (your system might ask for a username and password for the public internet access)

    – if the message "Calibration Update Complete" appears click OK (If this procedure
       fails, contact your IT department! Reference manuals in pdf-format can be found on
       the IDS installation DVD.)

    – click the vehicle **ID** (**Id**entification) tab in the top left corner of the screen

    – click "Start New Session" to diagnose a car or X in the top right corner of the screen
       to exit the IDS programme

Updating IDS via new VCM DVD

- To update IDS insert the DVD and choose IDS on the setup screen. After this the
  computer has to be restarted. Then insert the DVD again and choose CALIBRATION. All
  the IDS and Calibration files will be updated now. All the settings like user profiles,
  dealer details and internet connection settings are not affected by the update process.
  M-MDS is directly operable after the updating process.

Re-booting the VCM

- Re-booting the VCM might be useful in the event of connectivity problems. This is done
  by disconnecting both the USB and the DLC cables from the VCM and connecting them
  again. This procedure causes the VCM to reset and to boot again.

Using IDS

Screen Layout

- The IDS makes extensive use of on-screen buttons and tabs to allow all selections and navigation to be done by clicking on the items on the screen. Each button or tab is represented with a unique icon to make identification easier. The individual items are described in detail in the following pages.
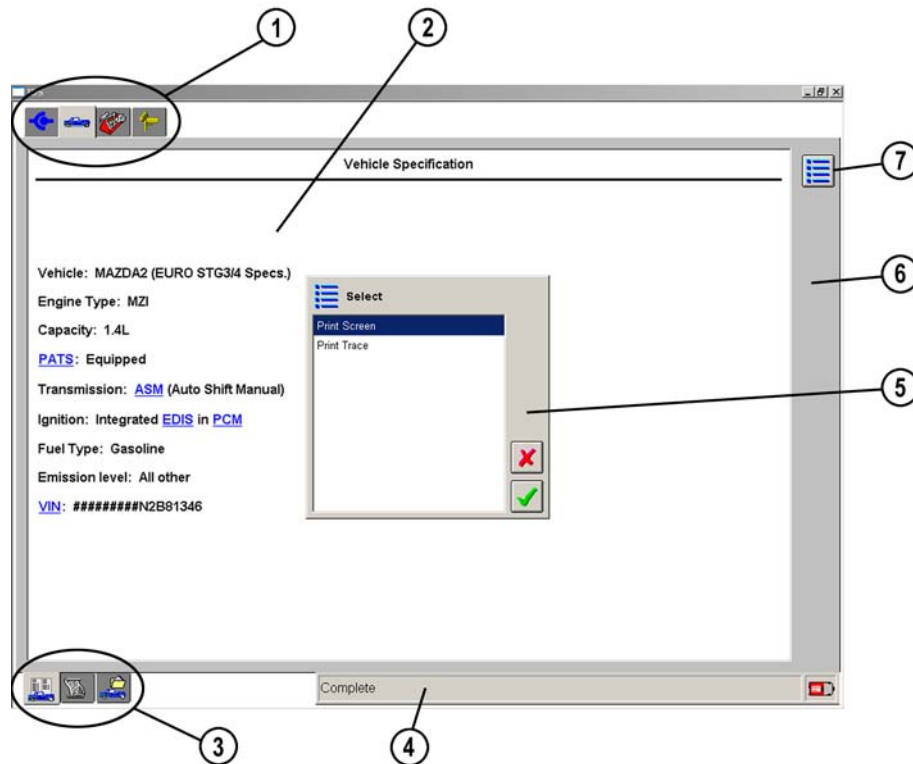
L1001.2_010

1	Top tab row	5	Pop-up window
2	Screen display	6	Side button control bar
3	Bottom tab row	7	Select system options
4	Status indicator		

Top Tab Row

- In addition to the three basic icons for controlling the system, the top tab row contains the icons for the different diagnostic tools.

Screen Display

- All the information in connection with the diagnostic checks and the different tools is shown on the screen display.

Bottom Tab Row

- Depending on the icon selected in the top tab row, further selection icons appear in the bottom tab row in which the tools concerned can be specified further.

Status Indicator

- The status indicator indicates which tool is currently being used. If an icon is pressed for a longer time, the function of the icon is explained in the status indicator. In addition, the running of the self-test and the collection of data are indicated by a blue bar.

Select System Options Button

- The Select System Options button allows the diagnostic check to be aborted at any time. Depending on the application, further options may appear under this button (e.g. print screen, log data).

Side Button Control Bar

- In addition to the Select System Options button the side button control bar can show further buttons which serve to change the screen display (e.g. step-back button, information button).

Using IDS

Lock Icon

- The lock icon in the status indicator bar indicates that the laptop is currently busy performing a task and that other operations cannot be carried out at present.

Information Button

- The information button provides additional information on the particular screen.

Step-Back Button

- The Step-back button allows the user to return to the previous screen.

Pop-Up Windows

- In addition, various pop-up windows (acknowledgement, warning or information windows) can appear on the screen display. In the case of the warning and information windows, only the button to acknowledge the warning or information is available. In the acknowledgement window an abort button is also present.

- If the text in a pop-up window is larger than the window, a scroll bar appears on the right or at the bottom of the window. Then the lower or right-hand part of the screen display can be shown with the aid of this scroll bar.

NOTE: When a pop-up window appears on the screen display, the IDS only carries on working when one of the buttons offered in the window is pressed.

Hot Spots

- Hot spots are "software switches" in the form of coloured underlined text within the screen display. When a hot spot is left-clicked with the mouse, an explanation for it appears in the status indicator.
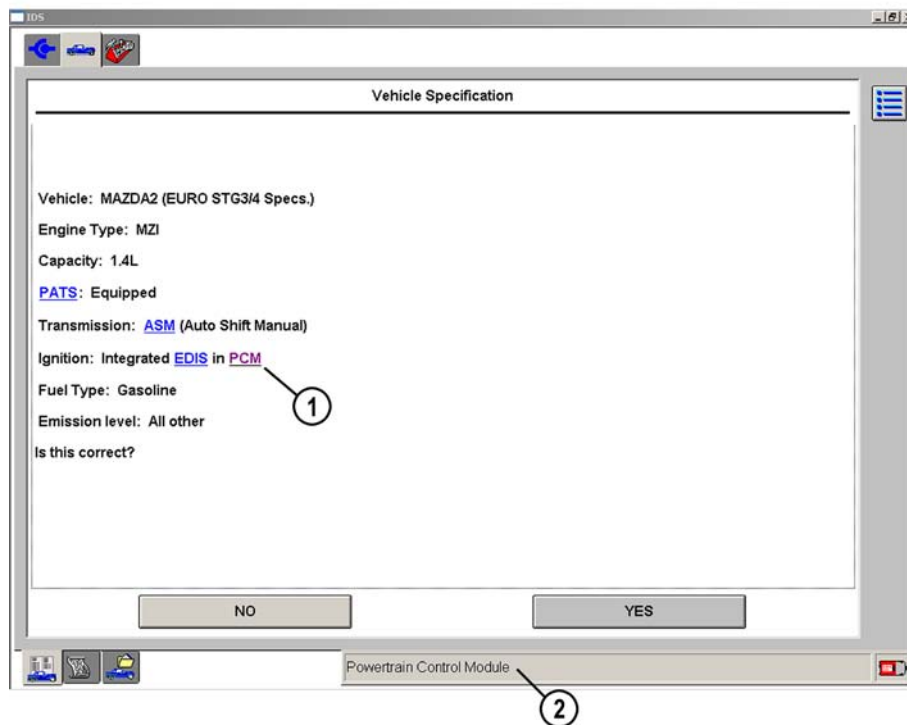
L1001.2_011

1   Clicked hot spot

2   Explanation for hot spot

Using IDS

IDS Settings

- The IDS settings menu contains all the basic setup settings to be checked and adjusted. It consists of the sub-menus "User Preferences", "System Information" and "System Utilities".

User Preferences

- The sub-menu "User Preferences" serves to enter different users. This allows each user to select their own settings. The buttons in the side button control bar allow users to be added, deleted or activated and parameters to be changed.

- After highlighting a particular user on the left-hand side of the screen, a series of options appears on the right-hand side of the screen. The settings for a default user are employed as base settings, i.e. certain settings which can be used by most users are preset. When all the parameters have been set, these are active as soon as the user is active, namely when the little green man icon appears in front of the user name.

- The individual parameters are described in detail in the following page.
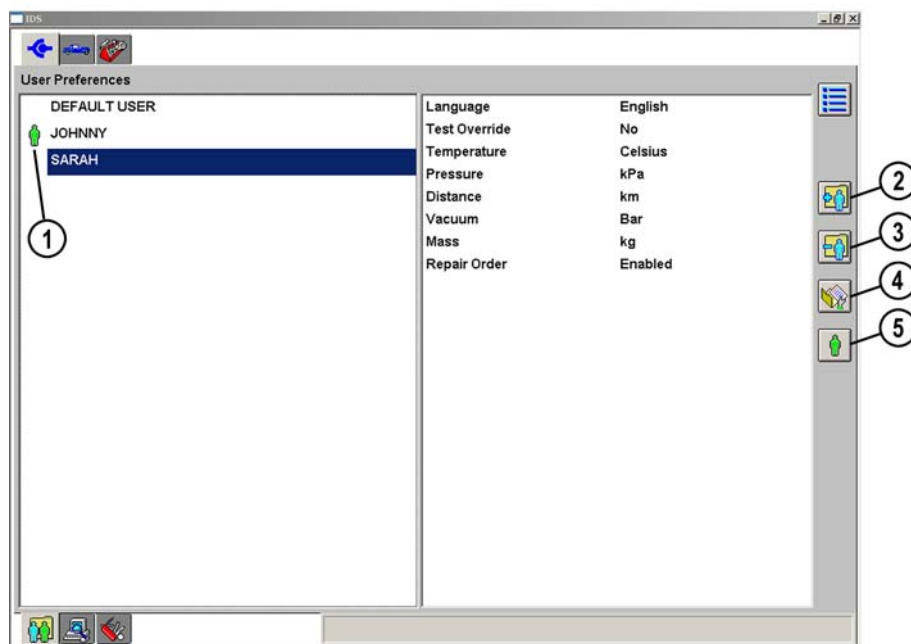
L1001.2_012

1	Little green man icon	4	Adjust user parameters
2	Add user	5	Activate user
3	Delete user		

Language

- This option allows a choice of different languages.

Test Override

- This option makes it possible to override faults which are indicated during a pinpoint test, i.e. it allows the user to continue with the pinpoint test without the need to rectify the fault first. The menu offers the choices Yes, No and Fault Only.

Temperature

- This option allows the user to choose degrees Celsius or Fahrenheit.

Pressure

- This option allows the user to choose kPa, bar, psi or inches of water.

Distance

- This option allows the user to choose km or miles.

Vacuum

- This option allows the user to choose kPa, inches of mercury, bar or inches of water.

Mass

- This option allows the user to choose between kg or lb.

Repair Order

- This option allows to enable or disable the repair order screen.

Using IDS

System Information

- The sub-menu "System Information" reveals information about the system settings (system time, dealer information, software, calibration update, cable versions, VCM, **VMM** (**V**ehicle **M**easuring **M**odule) (not applicable for Mazda dealers)). The time and the dealer information can be set in the System Utilities menu.
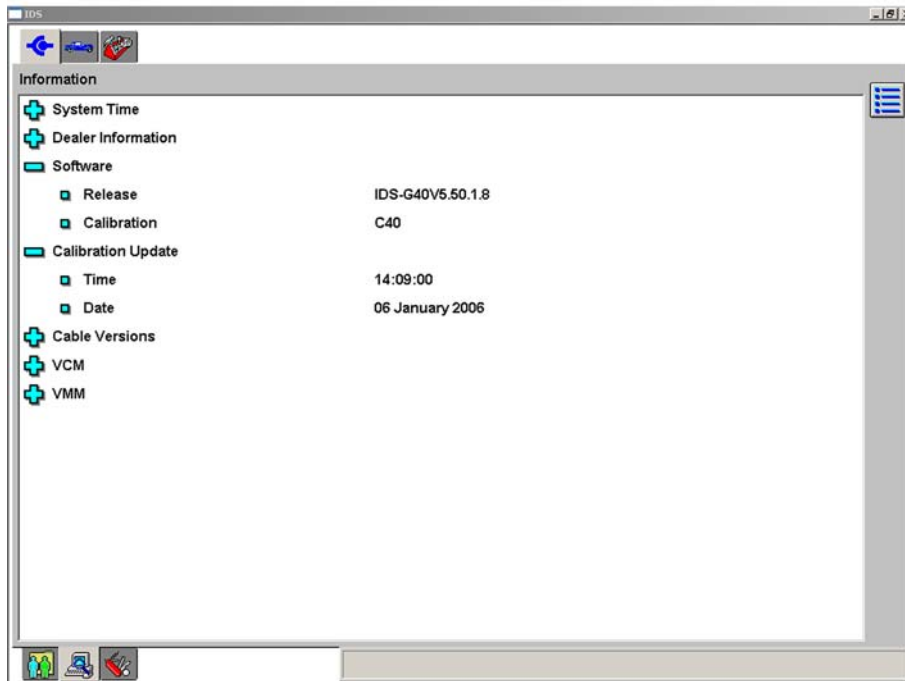
L1001.2_013

System Utilities

- The sub-menu "System Utilities" allows adjustment and selection of a series of system-specific parameters and functions. The individual items are described in detail in the following pages.
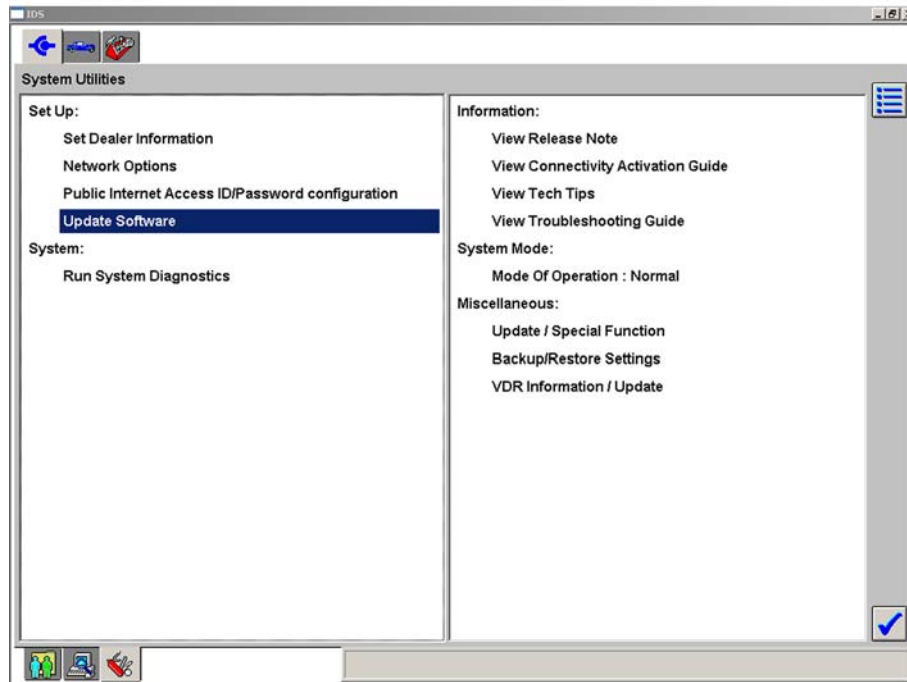
L1001.2_014

Using IDS

Set Up

- Set Dealer Information

    – This option allows the user to set the dealer information. This is essential for accurate reporting of problems to the M-MDS hotline.

- Network Options

    – This option allows changes of the IDS internet connection options.

- Public Internet ID/Password Configuration

    – If your local internet connection requires input of user ID and password, you must store the information here.

- Update Software

    – This option allows the IDS software to be updated from various sources when necessary:

    – Application Software, Calibration Software, Software Patch and Calibration Update requires CD or DVD,

    – Manual Calibration Update uses the internet connection for updates.
    (If Manual Calibration Update is not successful re-activate your internet connection using the network options. After a couple of minutes a pop-up window appears to confirm successful connectivity.)

System

- Run System Diagnostics

    – This option allows the user to run a self-test on the IDS system. The self-test should only be carried out when recommended by the system itself or by the M-MDS hotline.

Information

- View Release Note

  – This option allows the user to check notes on the latest software. Each diagnostic application DVD is accompanied by a software release note, which gives a brief description of the content of the software release as well as an overview of content changes, additions to vehicle coverage and software corrections.

- View Connectivity Activation Guide

  – This guide shows hints and tips for the activation of the internet connection.

- View Tech Tips

  – This option allows the user to view the IDS Tech Tips (only available in English).

- View Troubleshooting Guide

  – This option allows the user to view the IDS Troubleshooting Guide (only available in English).

System Mode

- Mode of Operation

  – This option allows selection of normal, hotline or training mode. The training mode enables the user to conduct simulated diagnostics without connection to a vehicle. In addition, the different icons will be explained.

NOTE: If anything else than normal mode is selected, IDS cannot operate as a regular diagnostic tool.

Using IDS

Miscellaneous

- Update/Special Function

  - This function allows access to special functions, when a certain code is entered (only for the manufacturer). The update feature is only used when instructed to do so by the M-MDS hotline. It is not used in the updating of the IDS software.

- Backup/Restore Settings

  - This option allows the user to back-up the IDS settings and to restore them if necessary.

- VDR Information/Update

  - This option allows the user to access the **VDR** (**V**ehicle **D**ata **R**ecorder) functions (not applicable for Mazda dealers).

Vehicle Selection

- The vehicle selection menu allows the user to select the vehicle to be tested or diagnostic checks which have been completed previously. It consists of the following sub-menus (bottom tab row):

  - "Vehicle Identification"

  - "Log Viewer"

  - "End Session"

Vehicle Identification

- Many of the tools available on IDS are vehicle specific and rely on the proper identification of the vehicle being tested. Items such as year, model, engine and transmission type are retrieved either during or as a result of vehicle identification and can all play a role in the selection of data based values and other vehicle-specific test information.

NOTE: Because of this dependency, failure to correctly identify a vehicle before testing may result in misdiagnosis or the inability to perform a specific test.

- The sub-menu "Vehicle Identification" contains a number of options for starting a diagnosis or displays information about the vehicle currently identified. When the IDS is switched on and the initialization procedure is completed, the vehicle identification menu appears. The individual items are described in detail in the following pages.
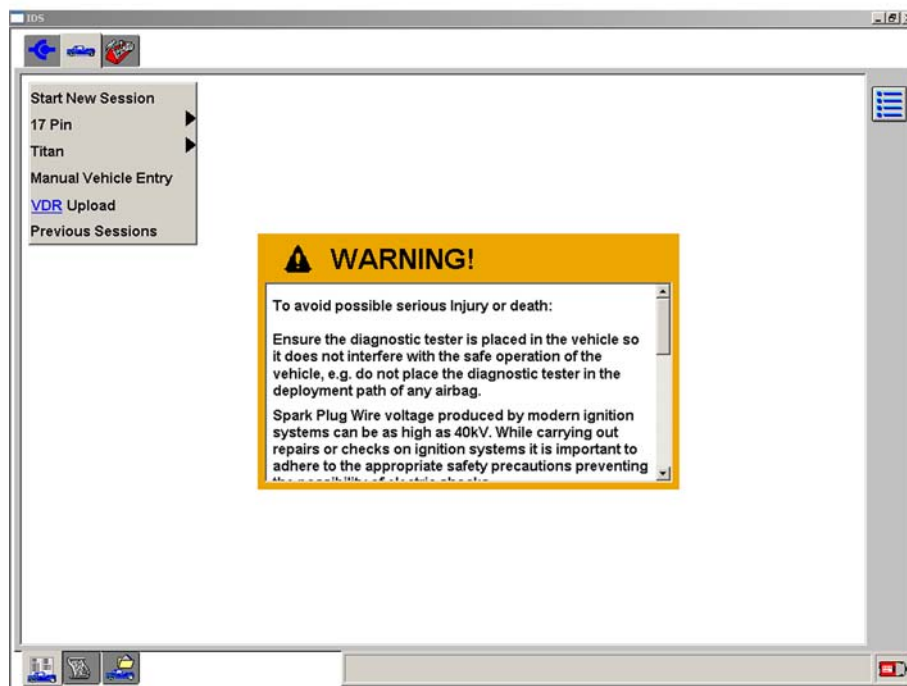
L1001.2_015

Using IDS

Start New Session

- This option allows the user to establish communication with vehicles with 16-pin DLC.

17 Pin

- This option allows the user to establish communication with vehicles with 17-pin DLC.

Titan

- This option allows the user to establish communication with Titan commercial vehicles (not for European markets).

Manual Vehicle Entry

- This option allows the user to establish communication in case the IDS does not recognize the vehicle. Then it can be selected from a list showing several Mazda and Ford vehicles. If the vehicle in question cannot be found in the list, it is possible to establish communication by entering the PCM part number, calibration number or tear tag (= label on the PCM) number.

NOTE: The Mazda PCM part number has to be modified :
18-881 of Mazda part number will be replaced with **12A650**,
e.g. "L813-**18-881**-D" is converted to "L813-**12A650**-D"

NOTE: When communication is established via the manual vehicle entry function, the option "Module Programming" in the Toolbox menu is inoperable.
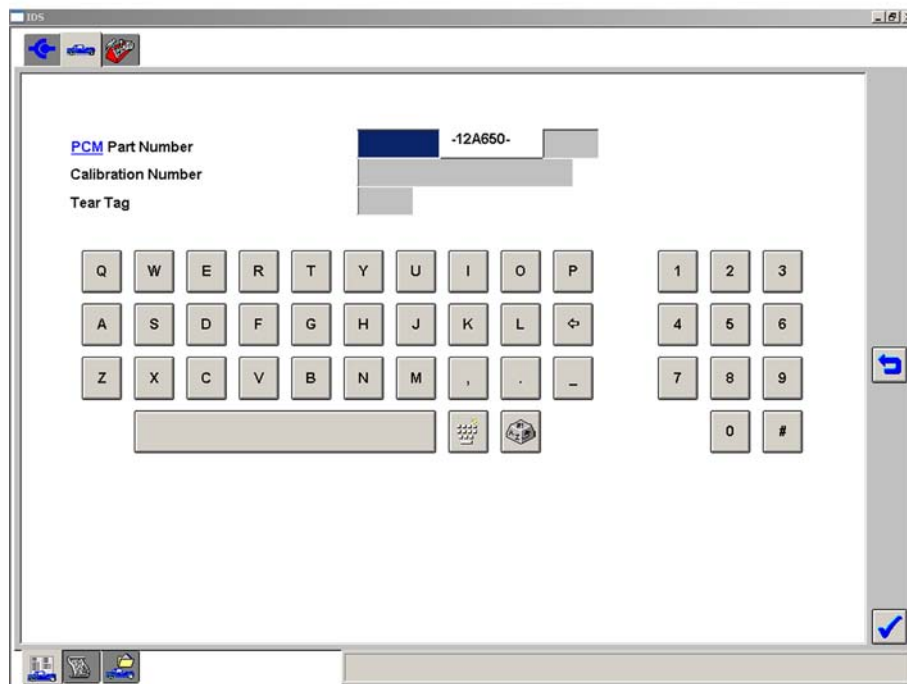
L1001.2_016

VDR (Vehicle Data Recorder) Upload

- This option allows the user to upload data from the VDR (not applicable for Mazda dealers).

Previous Sessions

- When this option is selected, a list is displayed showing the last diagnostic sessions held or completed. The following options are available:

  – Single select or multi select completed or held sessions

  – Delete one or more sessions at the same time

  – Store sessions or load sessions

  – Send selected session to Hotline

  – Sort the session list according to user, model, date, **VIN** (**V**ehicle **I**dentification **N**umber) or repair order number

Using IDS

- In order to store data from individual sessions, select the vehicle concerned and press the Archive session button. For held sessions a further screen appears with the selection of recordings made.
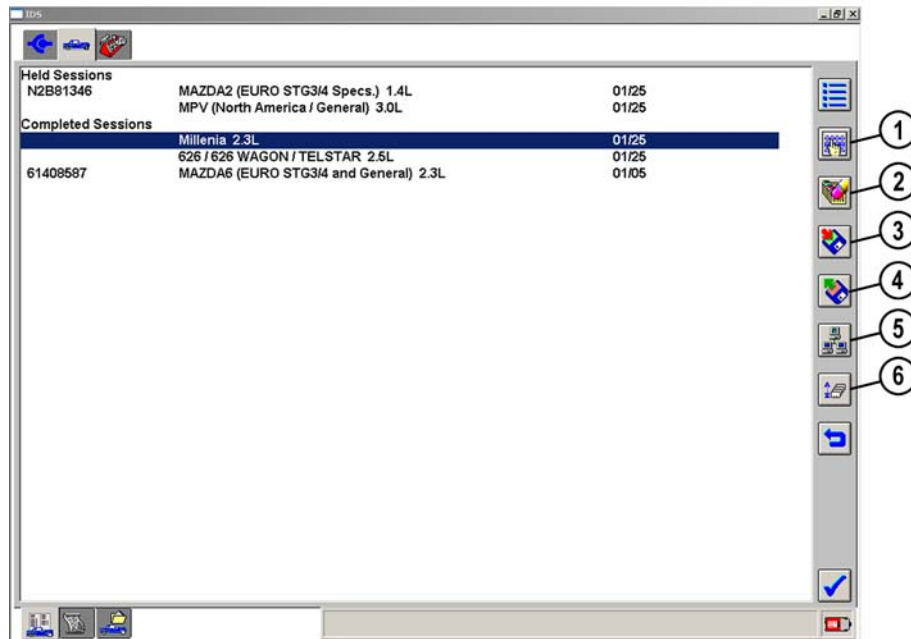
L1001.2_017

Previous Sessions Screen

1	Menu to delete sessions	4	Retrieve session (load)
2	Delete session	5	Send to Hotline
3	Archive session (store)	6	Sort session list

Starting a New Session

- After selecting **Start New Session** or the appropriate DLC, the IDS shows an

  information screen. Follow the instructions on the screen and click the tick symbol
  on the lower right corner of the screen to continue.
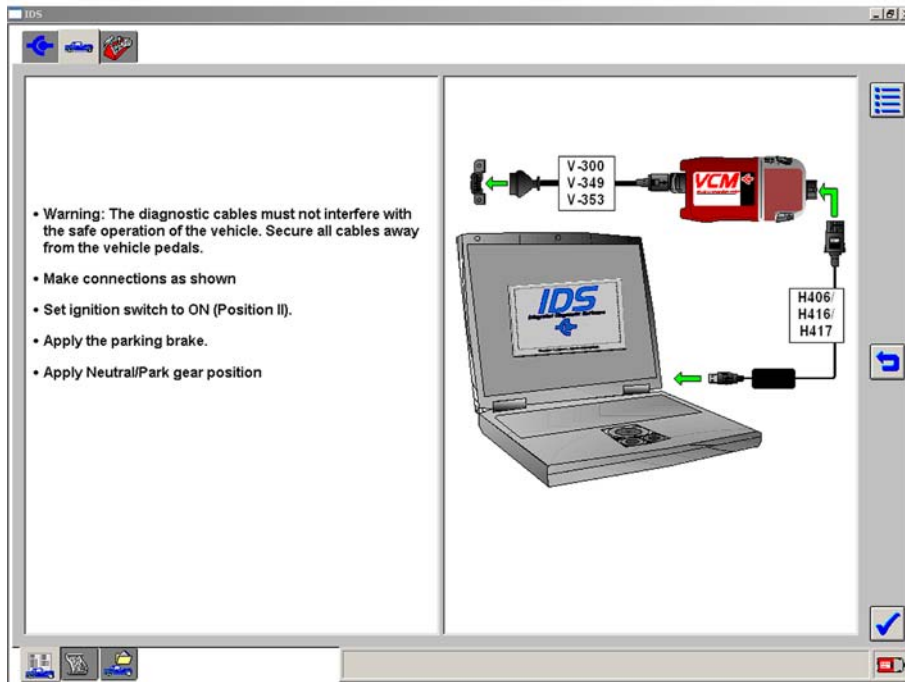
L1001.2_018

Using IDS

- After establishing communication with the vehicle's PCM, IDS might ask the user to select a vehicle specification on certain vehicles. Left-click the correct specification and click the tick symbol on the lower right corner of the screen to continue.

NOTE: In case of connectivity problems, re-boot the VCM.

Select Vehicle Specification Screen

- At the end of the identification process the vehicle specification is displayed for confirmation.
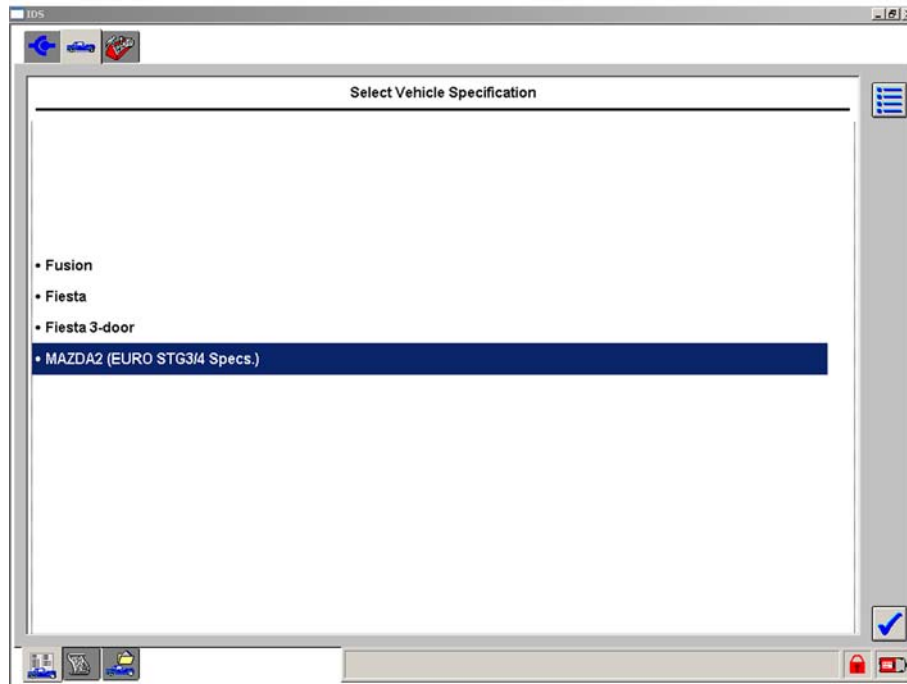
- If the information on the screen is correct, press the YES button to continue.

- If the information on the screen is incorrect, press the NO button and follow the on-screen instructions as IDS tries to determine the appropriate course of action. If communication cannot be established after several tries (during which IDS is checking the network circuits, the PCM power supply and the PCM itself), the IDS allows the user to establish communication via the function "Manual Vehicle Entry".
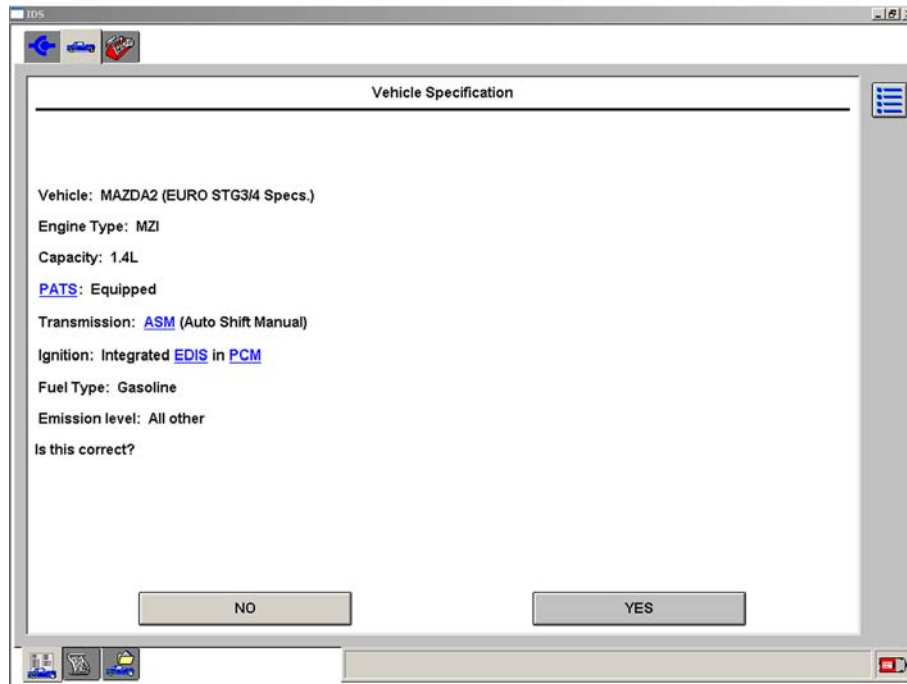
L1001.2_020

Vehicle Specification Screen

Using IDS

- The next screen allows to enter the last 8 characters of the VIN (if all 17 were not already confirmed previously). This field might become pre-filled with partial VIN data if available from the PCM. Additionally, the repair order number and the odometer reading may be entered. All the fields on the screen are optional and are used to aid in the later retrieval of the session from the previous sessions list.

- All these data are just for identification of the session and are not stored in the vehicle's PCM.

NOTE: The repair order screen can be disabled in the User Preferences menu.
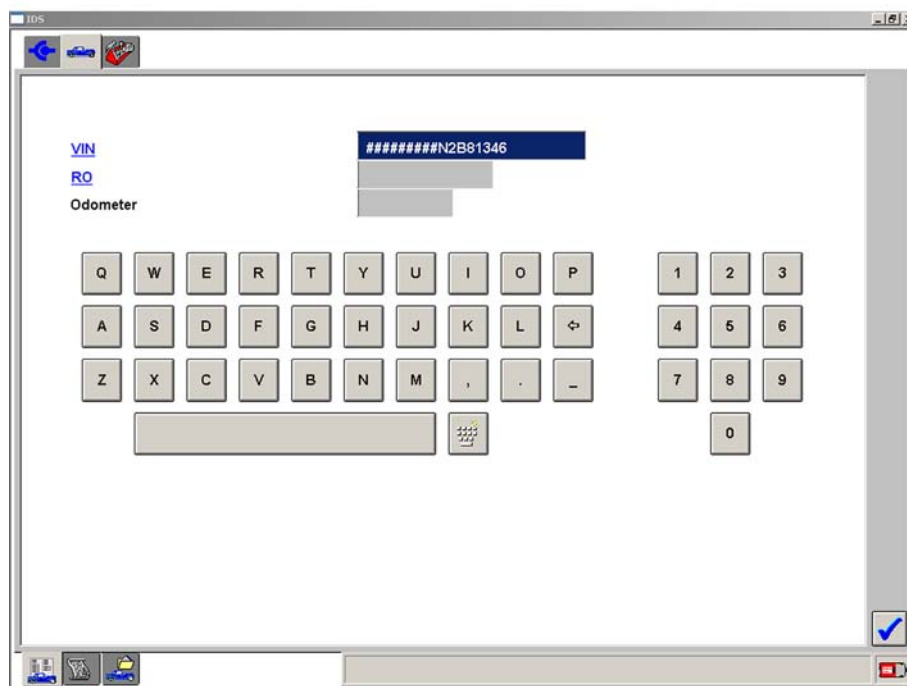
L1001.2_021

Repair Order Screen

NOTE: On some vehicles the IDS conducts the network test (refer to the section "Tools") after confirmation of the vehicle specification, i.e. the integrity of the vehicle network communications is checked and the Continuous Memory **DTC**s (**D**iagnostic **T**rouble **C**ode) are retrieved for later use. The results of the network test can be viewed in the log viewer.

Log Viewer

- The sub-menu "Log Viewer" enables the user to call up a file of relevant information collected during the diagnostic session. The following information gets logged to this file:

  – Timestamp (date and time entered periodically)

  – Session (information gathered during the vehicle identification process)

  – User interaction (selections made or answers provided by the user)

  – Test results (measurements made during the various diagnostics checks)

  – Fault reports (any components indicated by a pinpoint test)

- The quantity of information displayed is preselected in the user settings. However, it can be changed at any time using the Select Item Type button. The following options are available:

  – Technician view (Full Diagnostics)

  – Technician view (After Fault)

  – Freeze frame data

  – Long term fuel trim table

  – Complete view
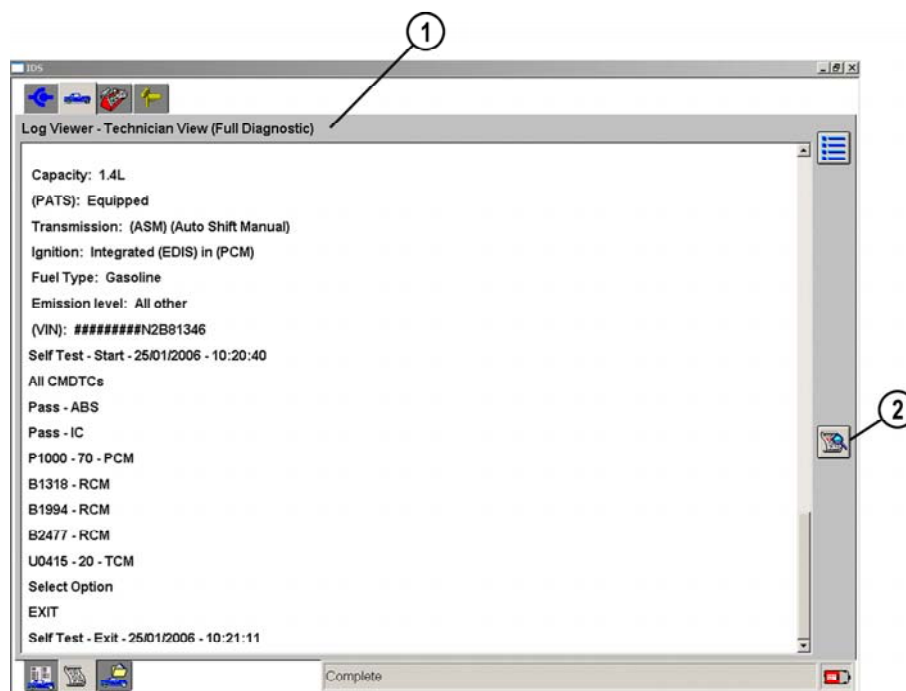
L1001.2_022

| 1 | Selected View | 2 | Select Item Type |

Using IDS

End Session

- The sub-menu "End Session" contains three options for ending a diagnostic session and IDS is ready to begin a new session. Left-click your choice and click the tick symbol on the lower right corner of the screen to continue.

NOTE: If this menu is selected prior to completing the vehicle identification process, "Abort" will be the only available option, allowing you to begin a new session.

Select Option

- Hold (saves recordings).
- Complete (deletes recordings).
- Delete (deletes session).

Complete
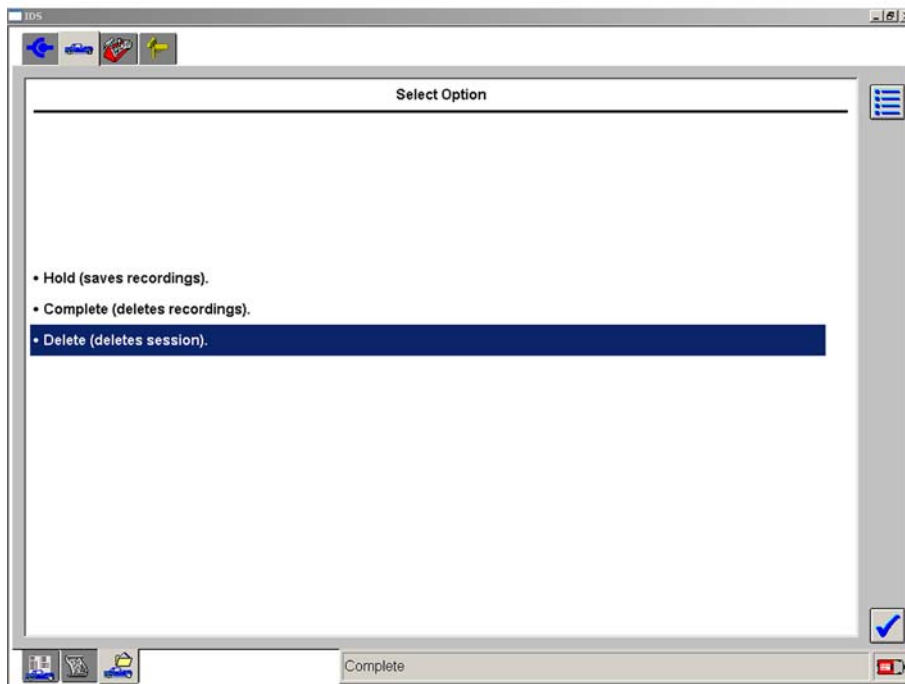
L1001.2_023

Hold (saves all recordings)

- This option is used to end a session and store the data contained in the log file (e.g. vehicle information, test results). In addition, any recordings that were saved during a diagnostic check (e.g. Datalogger recordings) can be stored. This option is useful if you intend to do any further work on the vehicle.

NOTE: Held sessions are never automatically deleted and will be stored until manually deleted.

NOTE: The IDS can store a maximum of the last 20 sessions held. Attempts to add a 21st session will result in the requirement to complete one of the sessions currently on hold.

Complete (deletes recordings, but not the session)

- This option allows to end a completed session and store the data contained in the log file, but will not save any recordings that were made during a diagnostic check. It is useful if you do not intend to do any further work on the vehicle.

NOTE: Completed sessions which are more than 60 days old are automatically deleted.

Delete (deletes session)

- This option allows to end a session and deletes the entire session incl. all data immediately. It is useful when you never intend to reactivate a session for any reason.

NOTE: Use this option with care, as a deleted session cannot be restored.

Using IDS

Tools

- The IDS offers the experienced operator the possibility of selecting a large number of different tools which he can use to diagnose faults.
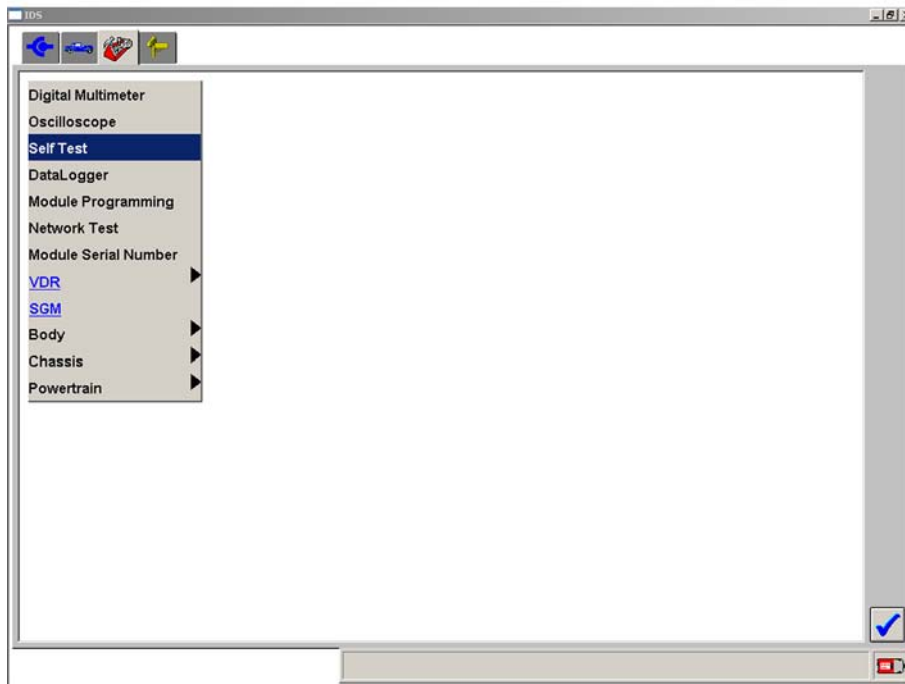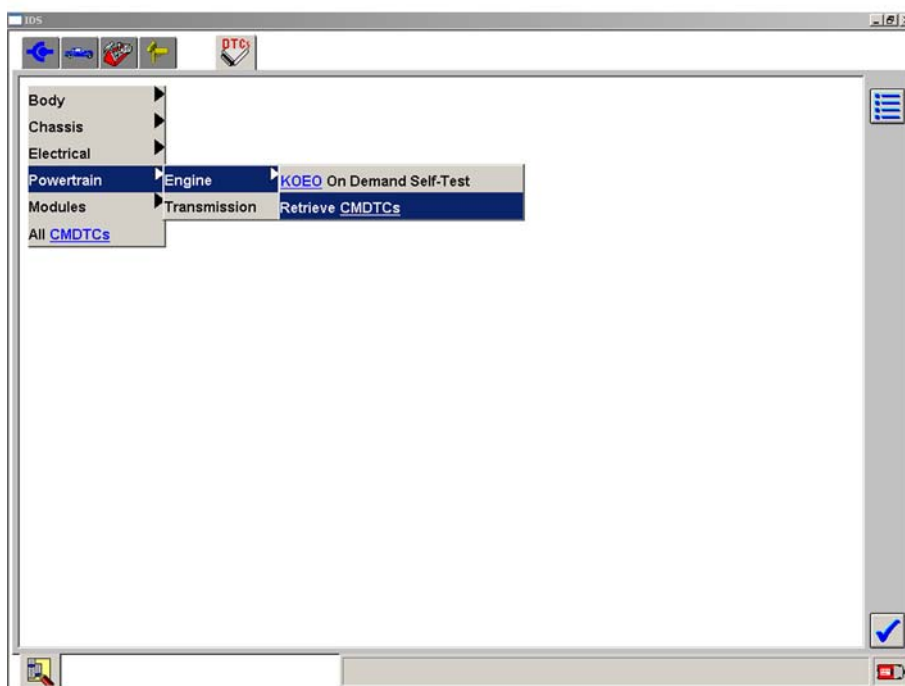

L1001.2_024

- The following items are **not** applicable for Mazda dealers:

  – Digital multimeter (requires VMM)

  – Oscilloscope (requires VMM)

  – VDR

  – **SGM** (**S**ignal **G**enerator **M**onitor) (requires VMM)

- The following items are **not** covered in this manual, but in the dedicated Curriculum Training publications:

  – Body

  – Chassis

  – Powertrain

Self Test

- The self test is a vehicle-specific tool, i.e. it can only be accessed after identifying the vehicle. It allows the user to retrieve DTCs. After selecting the Self Test function the System Selection screen appears.

System Selection

- This menu offers the possibility of retrieving the **CM**DTCs (**C**ontinuous **M**emory **DTC**) on systems (testing several modules belonging to a system), directly on a module or on all modules at once. In addition the user can conduct an **KOEO** (**K**ey **O**n **E**ngine **O**ff) and/or **KOER** (**K**ey **O**n **E**ngine **R**unning) On-Demand self test on certain vehicles.
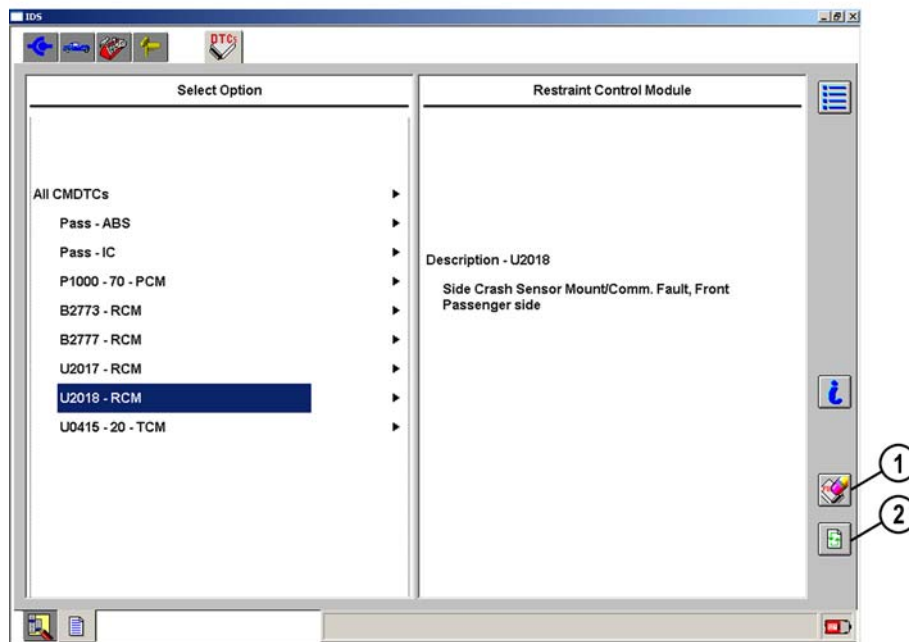

L1001.2_025

Using IDS

Code Display

- This menu contains instructions indicating the conditions that must be met before performing a KOEO or KOER On-Demand self test and displays the results of the tests.

- The **OD**DTCs (**O**n-**D**emand DTC) and CMDTCs are called up according to the selected option and displayed on the left-hand side of the screen. After highlighting a certain item the corresponding description and possible causes for the fault appear on the right-hand side of the screen. On vehicles with **EOBD** (**E**uropean **O**n-**B**oard **D**iagnostics) the freeze frame data and the pending DTCs are displayed as well, when reading out the DTCs of the PCM.

- When a question mark appears behind a DTC, the IDS offers a pinpoint routine in the sub-menu (bottom tab row) to guide the user to the fault (not applicable for Mazda dealers; requires VMM).

- After pressing the Clear button the DTCs are deleted and the self test is repeated. With the aid of the Repeat button the test can be repeated any number of times.

L1001.2_026

| 1 | Clear button | 2 | Repeat button |

Datalogger

- The Datalogger is a vehicle-specific tool, i.e. it can only be accessed after identifying the vehicle. It allows the user to monitor the **PID**s (**P**arameter **Id**entification) of the vehicle and consists of the sub-menus "System Selection", "PID Selection", "Live Display" and "Playback".

System Selection

- After selection of the Datalogger function from the toolbox menu the corresponding icon appears in the top tab row and the Datalogger is ready for use. This menu offers the possibility of monitoring the PIDs on systems (testing several modules belonging to the system) or directly on the module.

NOTE: System categories ("Body", "Chassis", "Electrical", "Powertrain") will only display PIDs related to that specific system while "Modules" (e.g. **PCM** (**P**owertrain **C**ontrol **M**odule), ABS module) will display all PIDs from the corresponding module. Therefore it's recommended to select the signals by means of the modules installed in the vehicle.
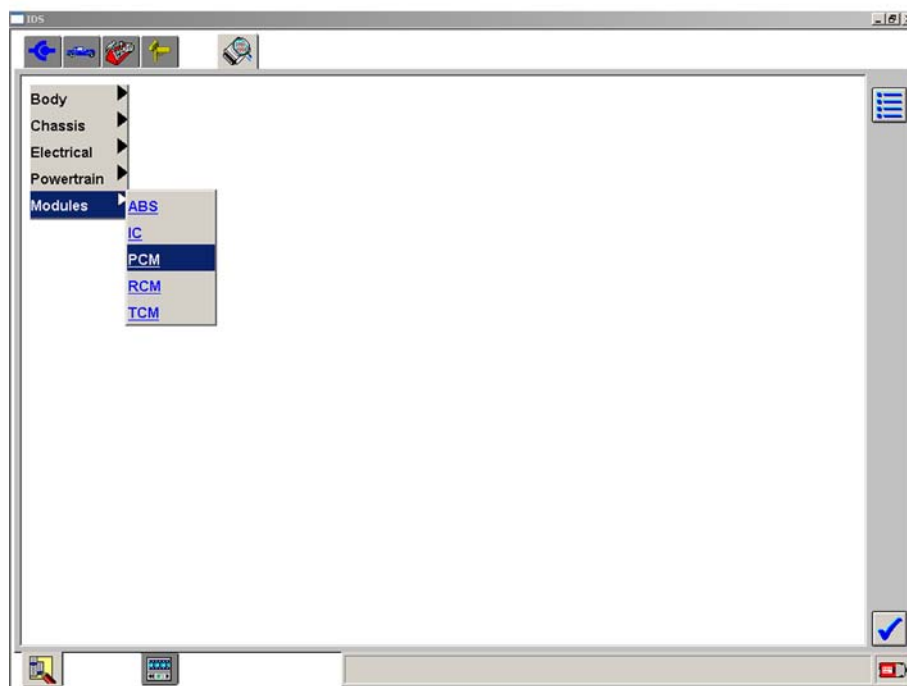
L1001.2_027

Using IDS

PID Selection

- This menu allows the user to select from a list of PIDs to be displayed. Depending on the system concerned some of the most common signals will be pre-selected. The selection and display of the individual signals can be changed at any time and adapted to the requirements of the user.

- The signals are selected or deselected by clicking the appropriate signal in this screen. Selected signals are shown bordered/highlighted and described in the status indicator. Some signals can be displayed in different ways (e.g. **ECT** (**E**ngine **C**oolant **T**emperature) as a temperature, voltage or mode). These additional choices are offered in the lower center of the screen, when the corresponding PID is selected.

- Many of the vehicle modules such as the PCM are only capable of outputting data at a set maximum rate. If the number of selected signals is too high, the sampling rate is reduced. If the sampling rate would be reduced too much, all signals appear in yellow or red. The total number of signals must then be reduced.

- Clicking the Clear button deselects all the signals. The "Store Signal" and "Load Signal" buttons allow the user to store individual signal selections with the corresponding settings and load them again later.
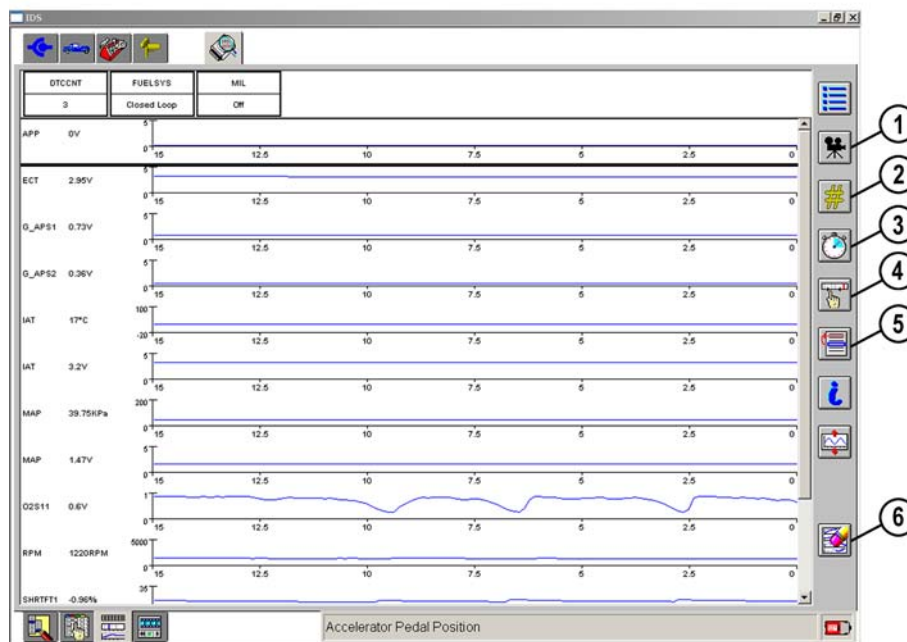
L1001.2_028

PID Selection Screen

1   Store Signal selection   3   Clear button
2   Load Signal selection

Using IDS

Live Display

- This menu allows the user to monitor and record the selected PIDs. The number of signals shown on the screen depends on the size with which they are displayed. If the number of required signals exceeds the capacity of the display, a scroll bar appears in the right-hand part of the screen so that the user can scroll through the displayed signals.

- The side button control bar provides a large number of additional options (refer to the next pages).
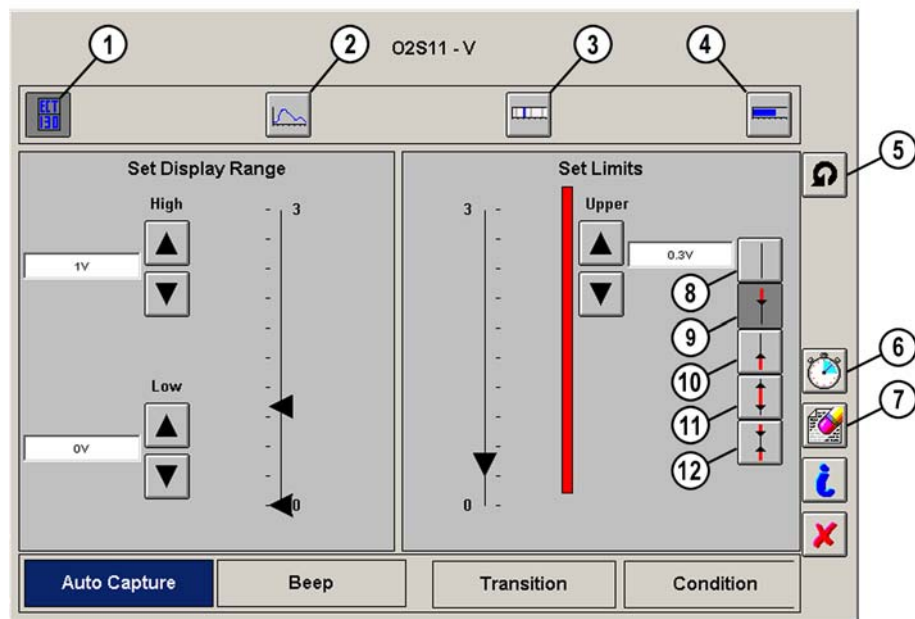
L1001.2_029

1	Camera button	4	Trigger button
2	Output State Control mode	5	Order button
3	Capture Buffer setup	6	Clear button

- The Trigger button opens the Display Setting screen for changing the preset limits and the type of display format of a selected PID. Clicking one of the four display buttons allows the user to display the signal in a different format (digital-type, analogue-type, line-type, bar graph-type). On the left-hand side of the menu the display range can be set (e.g. the display range can be reduced to see a tiny signal deflection more clearly). The right-hand side is used to adjust the limits for the auto capture and/or the beep according to the user's needs. The choices for the limits are as follows:

  – Above a certain limit

  – Below a certain limit

  – Within a certain range

  – Outside a certain range

- In addition, the trigger button serves to activate/deactivate auto capture and/or the beep when reaching or exceeding the limits. The auto capture function is a feature that allows the user to capture all displayed data based on the limits set for one or multiple signals. Depending on the selection "Transition" or "Condition" the auto capture is triggered when the PID in question overshoots/undershoots the set limits or when a certain condition is fulfilled. The changed limits are shown on the live display in color or as a line depending on the display format.
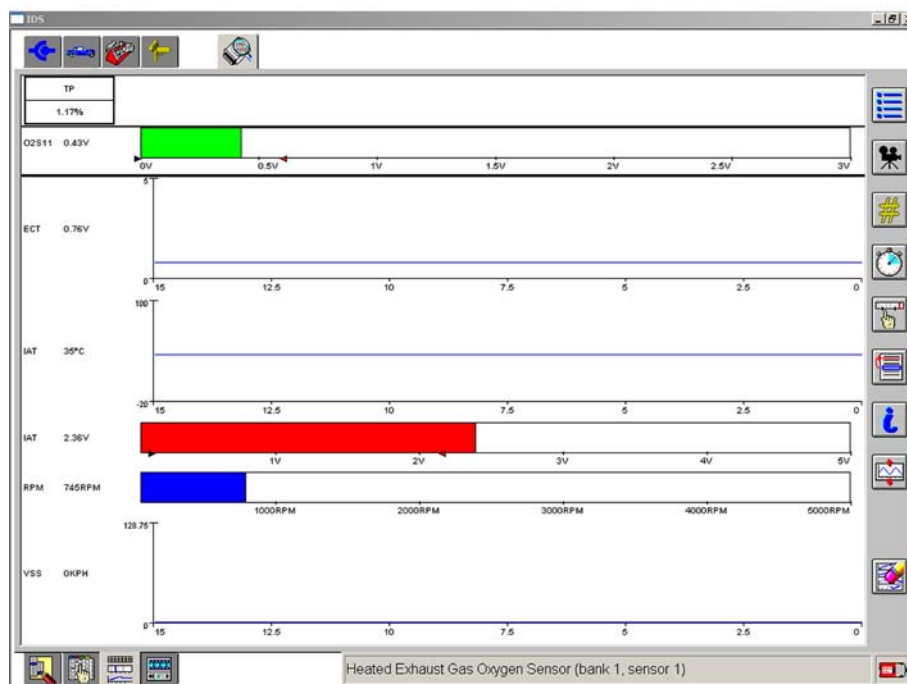
Using IDS

L1001.2_030

Display Setting Screen

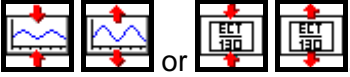|			
1	Digital-type display	7	Clear set limits
2	Analogue-type display	8	No limits set
3	Line-type display	9	Signal above limit
4	Bar graph-type display	10	Signal below limit
5	Reset to default	11	Signal within range
6	Capture Buffer setup	12	Signal outside range

- The Datalogger also offers some special functions which make it easier to read and locate faults:

  - A value lying outside the selected range is indicated by a dot at the start or end of the scale.

  - For the digital display in the top row the status of the limits is indicated by the color of the boxes concerned. White/green indicates, that the value lies within the limits. Red/red means that the value lies outside the limits. Red/green indicates, that the value has come back from outside to within the limits again.

  - When the signal is displayed in line or bar graph form, it is shown in green as long as it lies within the limits. When it overshoots or undershoots the limits, the color changes to red.
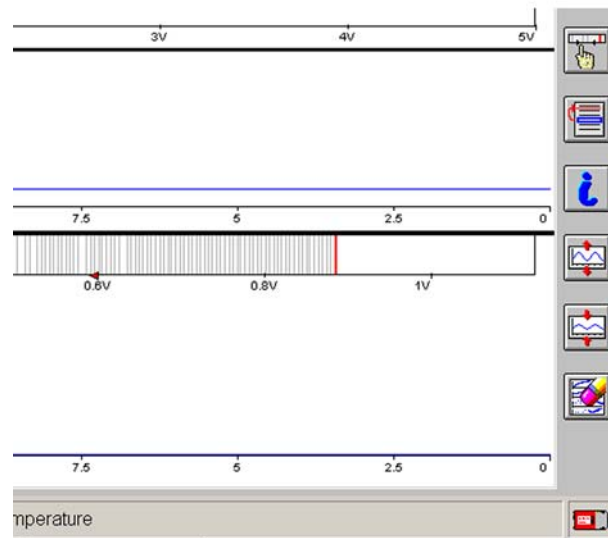

L1001.2_031

Datalogger Live Display with Coloured Indication

Using IDS

- The Order button ![Order button] is used to move a signal to a different position. To do this, the required signal must be selected, then the Order button is pressed followed by selection of the point on the screen at which the signal is to appear.

- The size with which selected signals are displayed on the vertical axis can be changed with the Zoom buttons ![Zoom buttons] or ![Zoom ECT buttons].

- The Clear button ![Clear button] is used to delete the grey lines which appear on the left and right-hand sides next to the blue lines, when the line-type display is selected.

L1001.2_032

- If no signal is selected (click the selected item once more to deselect), the Zoom buttons appear for the horizontal axis. Clicking these buttons changes the timescale for all the signals in the range of 1…120 s.

L1001.2_033

Using IDS

- The Camera button ![camera icon] serves to record data, i.e. clicking it starts a recording. The recording time can be preset with the aid of the Capture Buffer Setup button ![stopwatch icon] in the range of 8…120 s (default setting 15 s). Here, the pre- and post-trigger times can also be changed depending on the recording time.

- The recorded data can be viewed in the Playback menu (refer to the section "Playback").
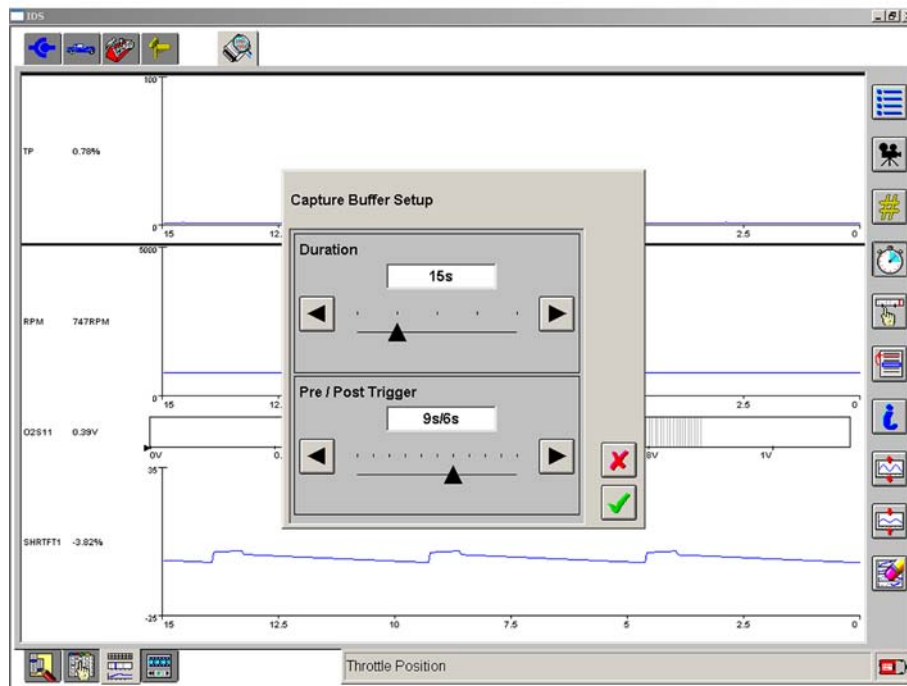
L1001.2_034

Capture Buffer Setup Screen

- The **OSC** (**O**utput **S**tate **C**ontrol) mode button is used to change certain output signals. The output signals which can be changed by means of the IDS are marked with a "#" symbol. After selection of the desired PID and pressing the OSC mode button, further buttons appear in the side button control bar.

  When the Activate Control Position button is pressed, it is possible to change or overwrite the values using the Plus or Minus buttons (e.g. increase or reduce the idle speed).

- When the PID has been activated in the OSC mode, various characters can appear behind the signal name instead of the "#" symbol:

  – The "=" indicates that the signal is in the OSC mode with feedback from the module.

  – The "@" means that the signal is in the OSC mode without feedback from the module.

  – The "!" indicates that controlling the PID in question is currently not possible because of incorrect conditions.

- When several signals are changed, these can be deleted simultaneously with the

  Clear button . All the values return to "normal" when the user exits from the OSC mode or from the Datalogger.

Using IDS
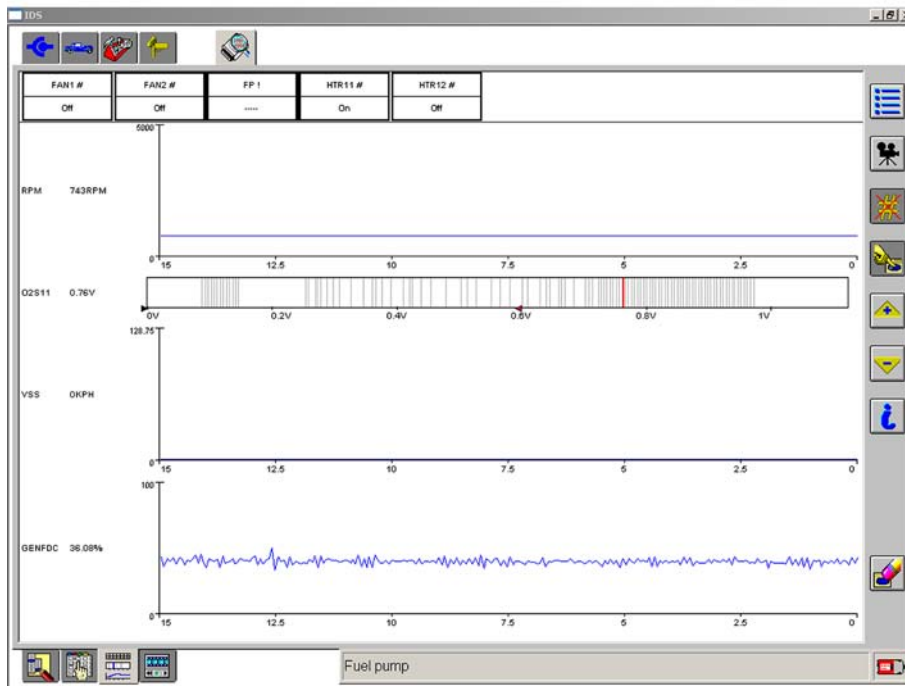
L1001.2_035

OSC Mode Screen

Playback

- The Playback menu serves to view the recorded data. It can be entered by clicking the playback button in the sub-menu (bottom tab row).

- The scroll button at the bottom of the screen allows the user to move the cursor in the recording as required. With the single arrow buttons the cursor can be moved step by step in the scanning mode, while the double arrow buttons serve to move the cursor automatically to the start or end of the recording. In addition, the cursor can be moved back and forth in the recording by clicking and pulling the scroll button.

- When the Parameter selection button is clicked, a list of all the recorded signals appears. These can then be deselected individually for clarity. This does not delete the signals, they are simply no longer visible.

- If more than one recording has been made, the individual recordings can be selected with the arrow buttons . The recording concerned is shown in the status indicator.

- Clicking the Select system options button makes it possible to store the recording permanently.

- Stored recordings can be called up again using the "Load data" button .

NOTE: The stored recordings only remain in the memory of the IDS if the session is ended with the option "Hold (saves recordings)".

Using IDS
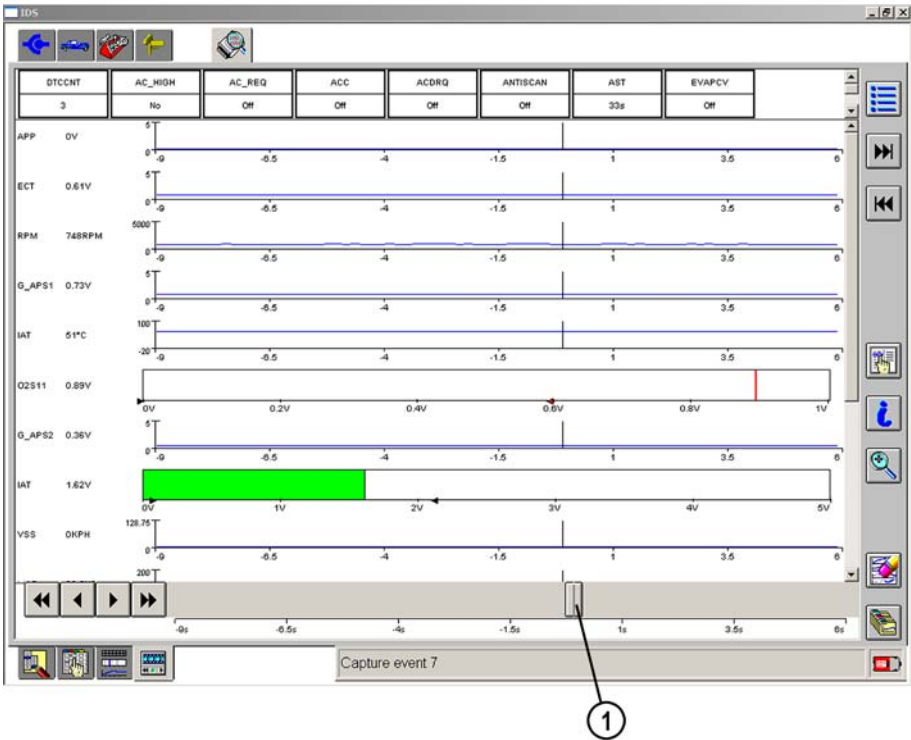
L1001.2_036

Datalogger Playback Screen

1   Scroll button

Module Programming

- The module programming function is a vehicle-specific tool, i.e. it can only be accessed after identifying the vehicle. It allows the user to program electronic control modules.

- After selection of the module programming function from the toolbox menu the corresponding icon appears in the top tab row and the module programming function is ready for use. This menu offers the following functions:

  – Programmable Module Installation

  – Module Reprogramming

  – Programmable Parameters

NOTE: Information obtained during vehicle identification is critical to obtaining correct results with this tool. IDS automatically retrieves configuration data from all the vehicle's configurable modules during vehicle identification. Whatever configuration data was retrieved during the opening of a session is later used to configure any new or existing modules, even if the session was Held or Completed and then reactivated.

NOTE: The module programming function is inoperable, when communication to the vehicle is established via the option "Manual Vehicle Entry".
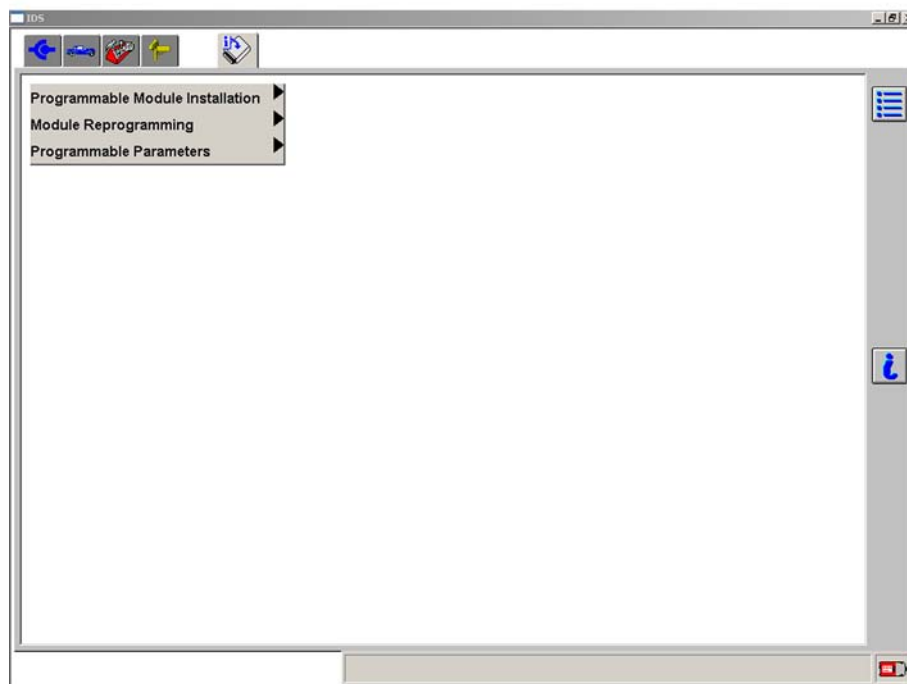
L1001.2_037

Using IDS

Programmable Module Installation

- This function is used when it is necessary to install a new module that requires configuration data to be transferred from the old module. In addition, some modules must be programmed with the latest software calibration as they are supplied blank.

- Selecting "Programmable Module Installation" from the main menu will call up a sub-list of all the modules on the vehicle that require configuration and/or programming. After selecting the module in question follow the on-screen prompts. IDS will present a series of screens with instructions to perform such as turning the ignition key off or on, and when to install the new module in the vehicle.

NOTE: Be sure to follow these instructions in the exact order they are given, i.e. do not remove or install any modules before instructed to do so. Failure to follow the instructions correctly may result in programming incorrectly or not at all.

- The programming process begins automatically and a bar graph appears indicating the progress.
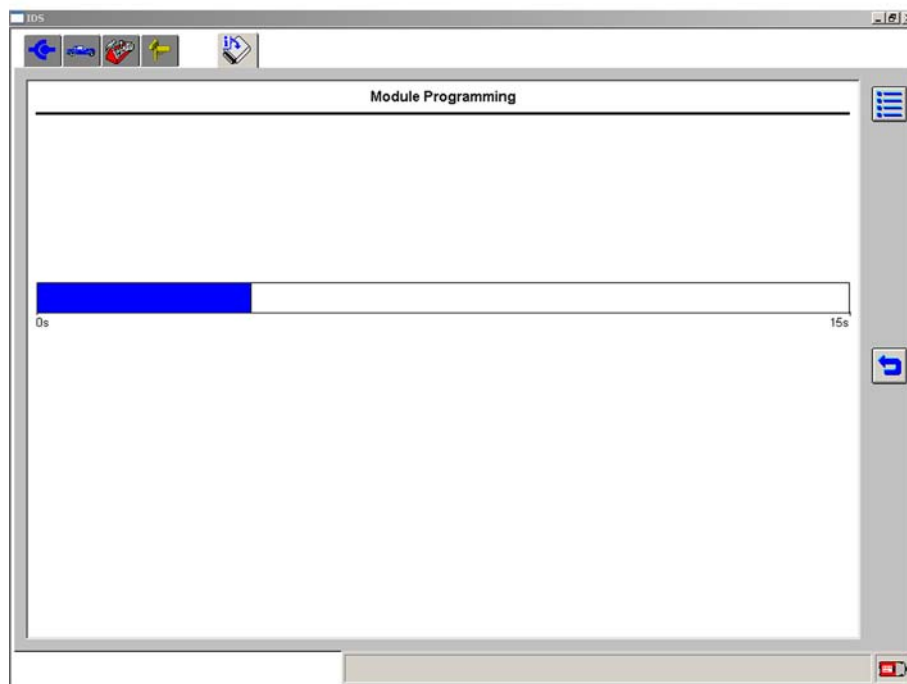
L1001.2_038

- If IDS was unable to retrieve configuration data because of either a non-functioning module or a module which was removed and discarded before IDS was allowed to retrieve the data, the user is presented with the opportunity to obtain the so called "As-Built" data. This data are the records of the applicable module configurations stored in each module as the vehicle left the factory. The As-Built data contain information about the specific functions of a certain vehicle variant in the form of hexadecimal numbers.

NOTE: The As-Built data can be obtained via the Technical Hotline or the Technical Service Department.

- The following picture shows a sample of an As-Built data sheet. It contains the As-Built data for the PCM and the **BCE** (**B**ody/**C**hassis/**E**lectrical) modules of a certain vehicle variant (identified by the VIN). The data are only applicable for this specific vehicle and therefore must not be used for any other vehicle.

Module Reprogramming

VIN: JMZBK14F241101114
Vehicle Data: 1CCD FFFF FFE6

PCM Module				BCE Modules		
PCM 1	FFFF	FFFF	0310	720-01	2100	8100	OOCA
PCM 2	35FF	FFFF	FF43	726-01	8CDO	C480	400E
PCM 3	FF41	FFFF	FF50	730-01	0000	004A	4DCF
PCM 4	FFFF	FFFF	FFOF	730-02	5A42	4631	3485
PCM 5	FFFF	FFFF	FF10	730-03	4632	3431	3148
PCM 6	FFFF	FFFF	FF11	730-04	3031	3131	3432
PCM 7	FFFF	FFFF	FFI 2	730-05	0200	0000	003E
PCM 8	FFFF	FFFF	FF13	737-01	66EE	0088	001B
PCM 9	FFFF	FFFF	FF14	751-01	FFFF	FFFF	FF54
PCM 10	FFFF	FFFF	FF15	751-02	FFFF	FFFF	FF55
PCM 11	FFFF	FFFF	FF16	751-03	FFFF	FFFF	FF56
PCM 12	FFFF	FFFF	FF17	751-04	FFFF	FFFF	FF57
PCM 13	FFFF	FFFF	FF18	751-05	FFFF	FFFF	FF58
				751-06	FFFF	FFFF	FF59
				751-07	FFFF	FFFF	FF5A
				751-08	FFFF	FFFF	FF5B

End of As Built information

L1001.2_056

Using IDS

- If As-Built data are required for module configuration, the IDS displays a screen with the module identification code and three boxes for the hexadecimal numbers. After matching the module identification code (e.g. PCM1) with the similar code on the As-Built data sheet the corresponding hexadecimal numbers can be entered into the boxes.

- After pressing the tick button the programming process begins automatically and a bar graph appears indicating the progress.

NOTE: Do not configure a module by downloading configuration data from another vehicle of similar build and uploading it into the vehicle concerned. This may create problems as configurable modules are only working properly if they are configured according to the appropriate data specified by each VIN. In addition, this procedure may also transfer the VIN logged in the module from one vehicle to another.
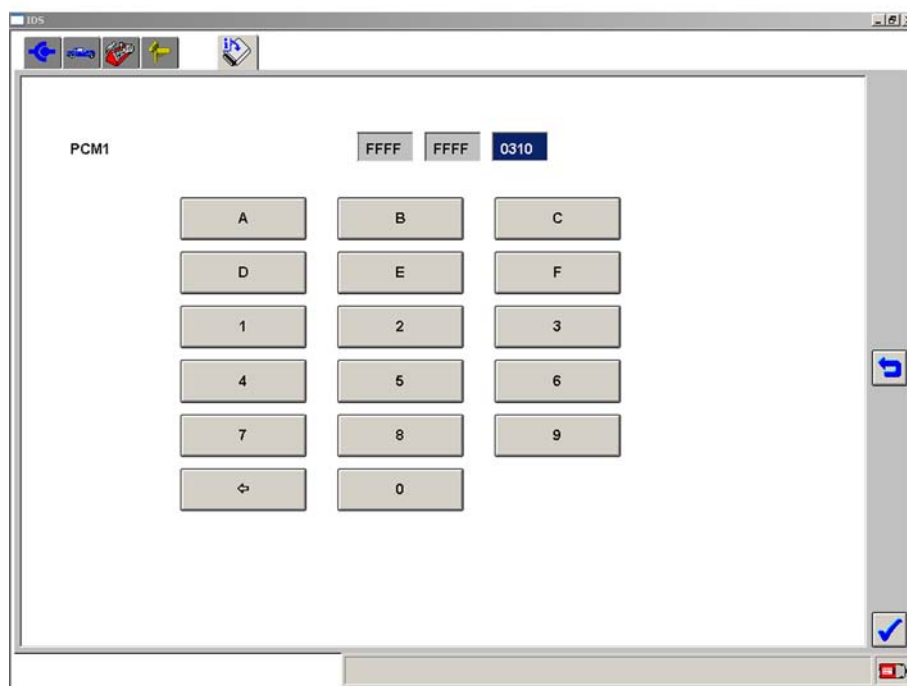
L1001.2_039

As-Built Data Entry Screen

- In addition, manual selection of the configuration data may be required for some modules. Then IDS displays a pick list with the parameters to be selected on the left-hand side of the screen. After highlighting a certain item the possible settings appear on the right-hand side of the screen. Now the user can select the configuration data by highlighting the desired settings.

- After pressing the tick button the programming process begins automatically and a bar graph appears indicating the progress.

L1001.2_040
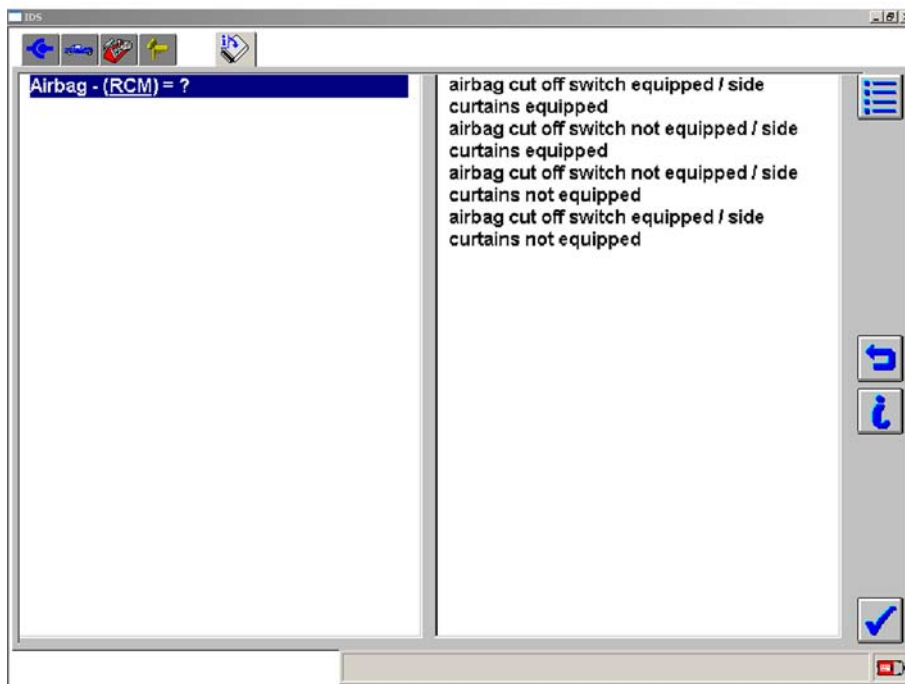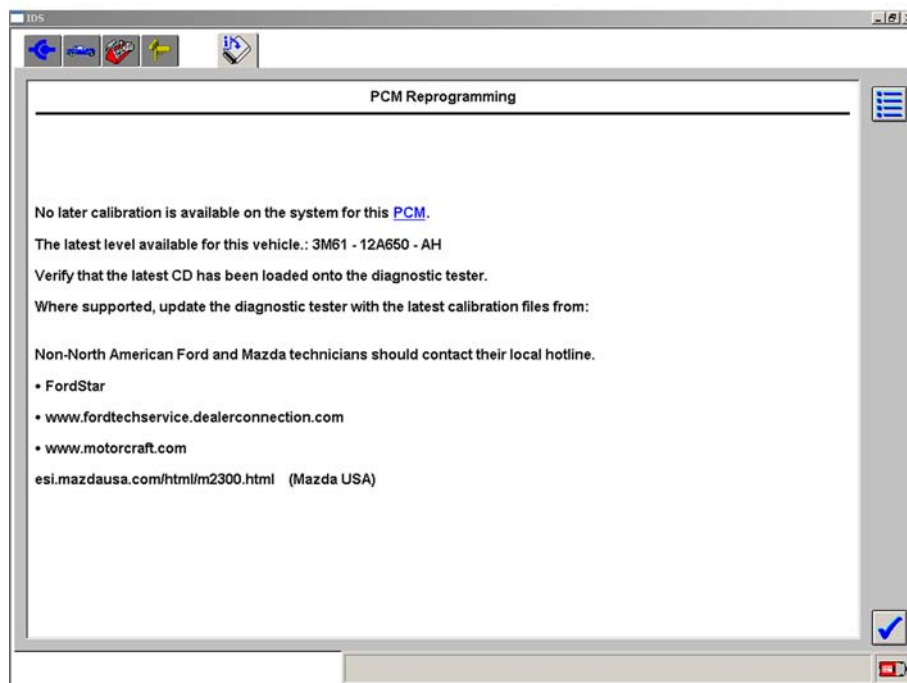
Configuration Selection Screen

Using IDS

Module Reprograming

- This function is used when it is necessary to reprogram a module with an updated software calibration (e.g. PCM or **TCM** (**T**ransmission **C**ontrol **M**odule)).

NOTE: As later software calibrations are usually released to resolve specific customer concerns, module reprogramming should only be carried out when recommended e.g. by a Service Information or by the Technical Hotline/Technical Service Department.

- Selecting "Module Reprogramming" from the main menu will call up a sub-list of all the modules on the vehicle that can be reprogrammed with updated calibrations. The module is not removed from the vehicle and the complete process is done through the communications network via IDS. After selecting the module in question, follow the on-screen prompts. IDS will check whether there is a later software calibration available for the module concerned.

- If no later calibration is available a screen with the latest level part number is displayed, indicating that there is no further action necessary.

PCM Reprogramming

No later calibration is available on the system for this PCM.

The latest level available for this vehicle.: 3M61 - 12A650 - AH

Verify that the latest CD has been loaded onto the diagnostic tester.

Where supported, update the diagnostic tester with the latest calibration files from:

Non-North American Ford and Mazda technicians should contact their local hotline.

• FordStar

• www.fordtechservice.dealerconnection.com

• www.motorcraft.com

esi.mazdausa.com/html/m2300.html   (Mazda USA)

L1001.2_041

- If a later calibration is available a screen will appear with the new part number, asking if you want to reprogram e.g. the PCM. In addition, information on the concerns resolved by the new calibration may be displayed.
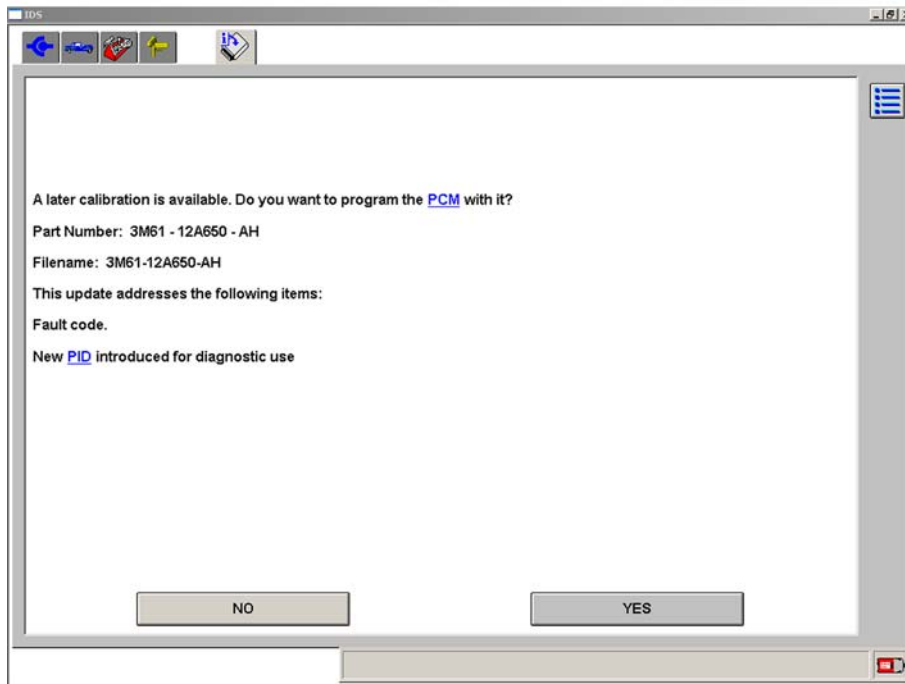
L1001.2_042

Calibration Availability Screen

Using IDS

- If you do not want to reprogram the PCM, press NO, which will return you to the main menu.

- If you intend to reprogram the PCM, select YES which will present a series of screens instructing you to prepare the vehicle and turn the ignition key off or on. As any DTCs logged in the PCM will get lost during reprogramming, the user is presented with the opportunity to run a KOEO self-test of the PCM before the reprogramming process begins.
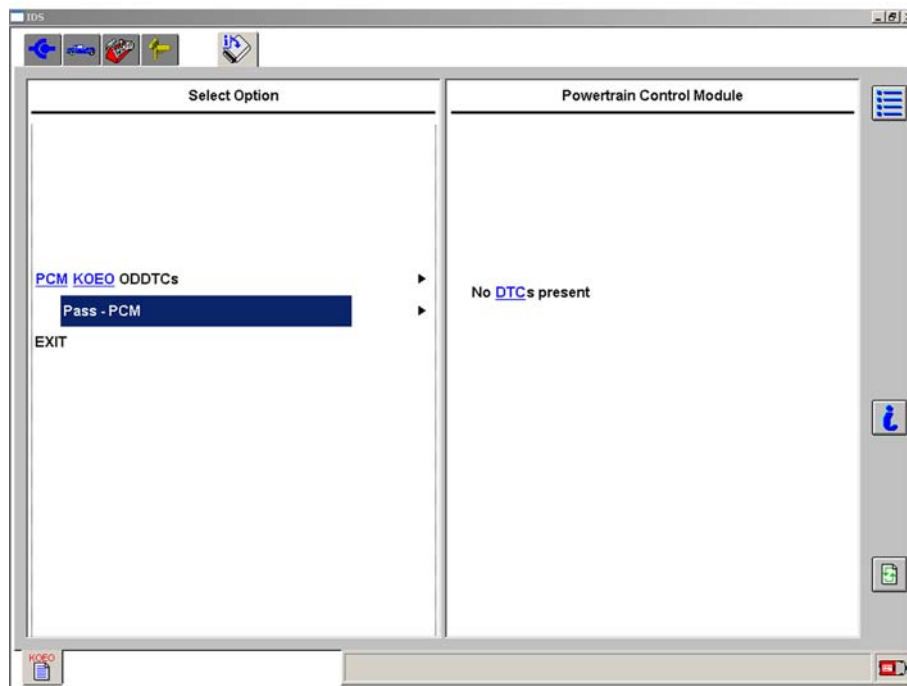
L1001.2_043

KOEO Test Screen

- Upon exiting from the KOEO self-test the reprogramming process begins automatically and a bar graph appears indicating the progress.
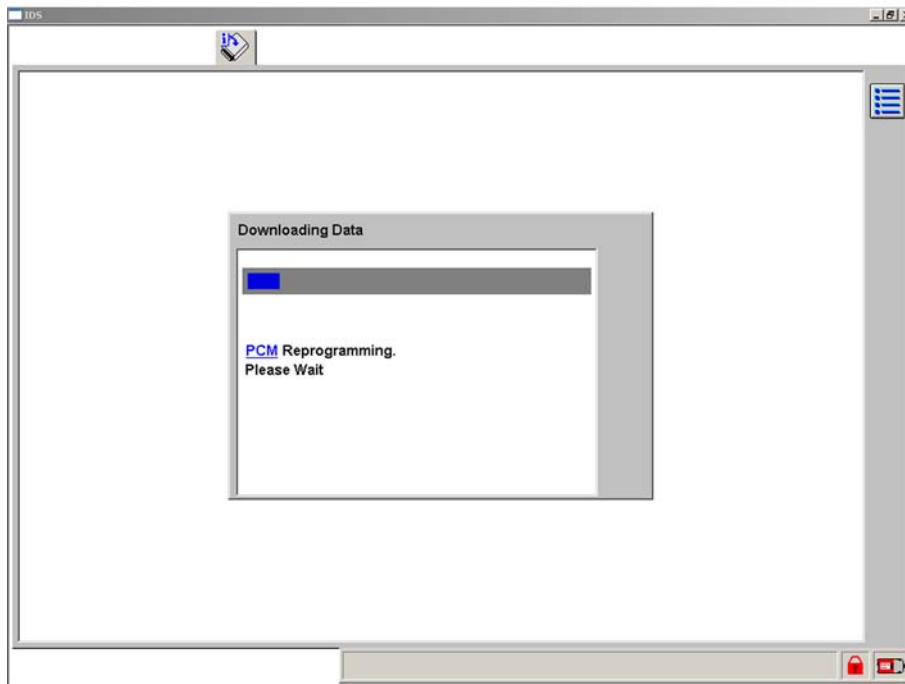
L1001.2_044

Reprogramming Progress Screen

Using IDS

- After successful module programming the IDS displays a status message.

Calibration has been loaded and checked.

PCM Reprogramming
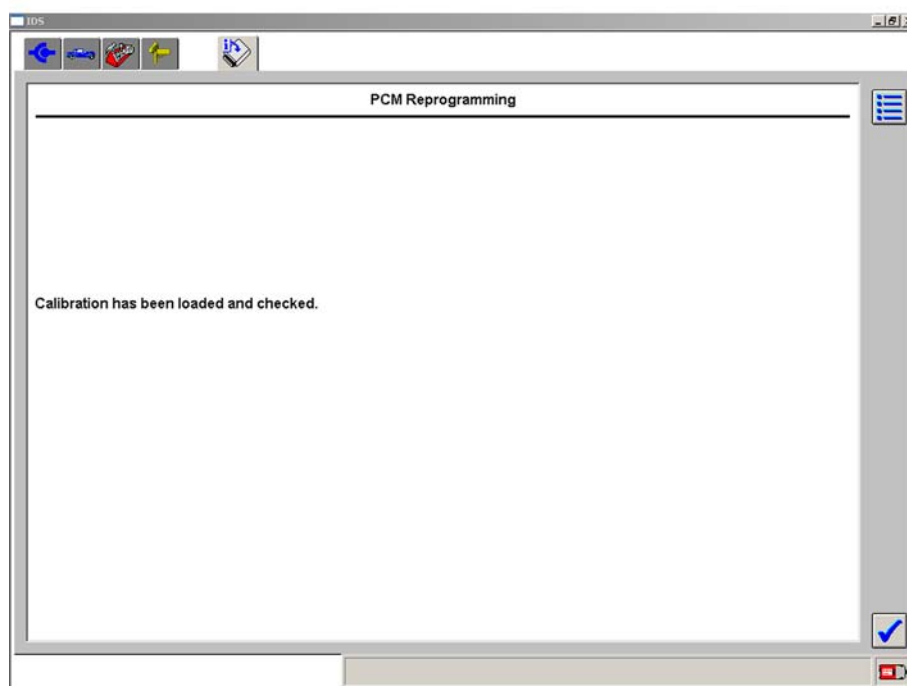
L1001.2_045

Reprogramming Status Screen

- When the reprogramming process is complete, a screen will appear indicating that the calibration has been loaded and checked. Then the part number required to be written on a reprogramming label will be displayed.

NOTE: The part number assigned by IDS must be indelibly entered on a label, which should be placed on the PCM. In addition, this part number is also programmed into the module and can be retrieved using IDS.
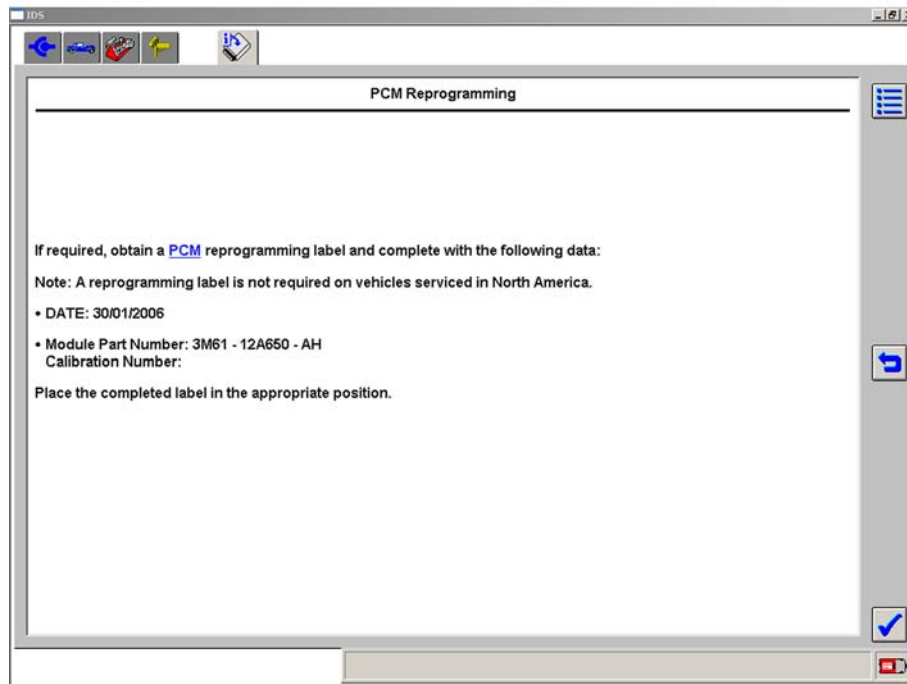
L1001.2_046

Reprogramming Label Screen

Using IDS

- Finally, IDS clears all CMDTCs from the PCM memory since network DTCs (marking "U") may have been set during the reprogramming process.

L1001.2_047

Clear Fault Codes Screen

Programmable Parameters

- This function is used when it is necessary to change specific module configuration data due to vehicle modification or customer preference. Certain modules support the ability to configure individual paramete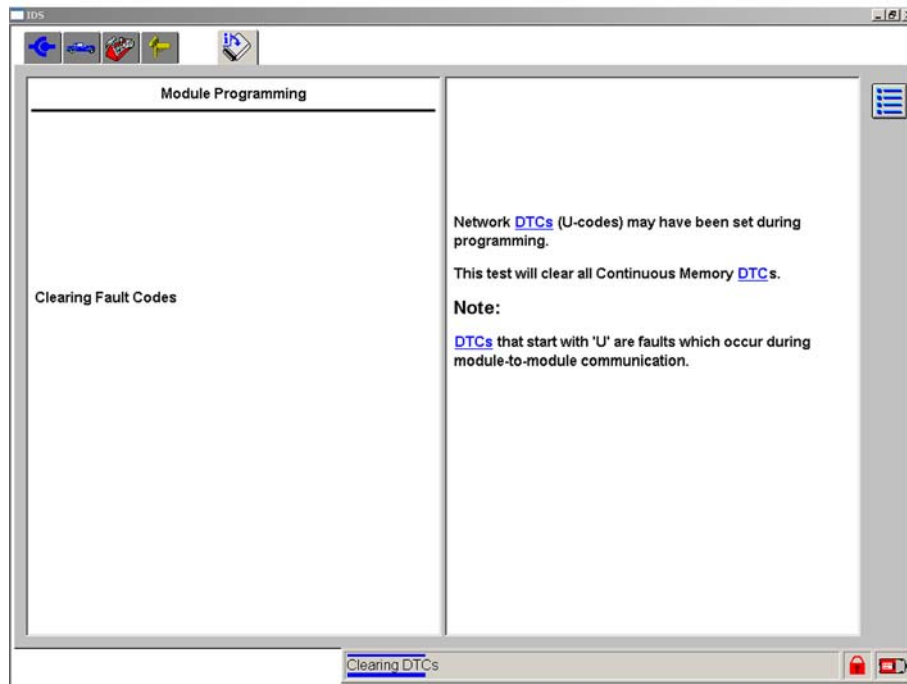rs such as tire size/axle ratio or injector correction factors (PCM), display interval adjustment (Instrument Cluster module) or autolamp on setting (**GEM** (**G**eneric **E**lectronic **M**odule)). E.g. the configuration data of the PCM may have to be changed when tires with a different size are fitted.

- Selecting Programmable Parameters from the main menu will call up a sub-list of all the items on the vehicle that can be changed. After selecting the item being changed IDS will present a pick list with the parameters and their current settings on the left-hand side of the screen. After highlighting a certain item the possible settings appear on the right-hand side of the screen. The current setting will be indicated by an asterisk (*). Now the user can change the configuration data by highlighting the desired settings.

- After pressing the tick button the programming process begins automatically and a bar graph appears indicating the progress.
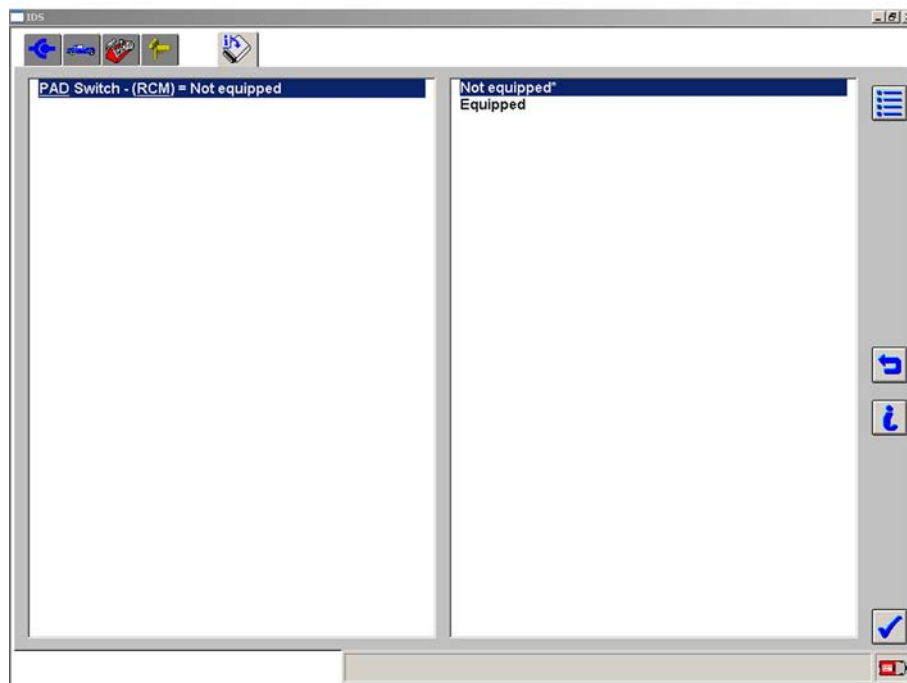
L1001.2_048

Using IDS

Module Programming Tips

- The tips below should be followed when using any of the programming functions:

  1. Make sure that the latest diagnostic application and calibration files are loaded on IDS.

  2. To ensure that the vehicle being serviced maintains required battery voltage to perform a module programming function, a battery charger should be connected to the vehicle battery and operated on low charge rate (max. 20 A).

  3. Save a session of the vehicle before using any of the programming functions. Therefore establish communication to the PCM and end the session with the option "Hold (saves recordings)". Then establish communication again without reactivating the held session and conduct the desired programming function. If the upload process fails and a module is left blank, the held session can be used to program this module.

  4. If accidentally the ignition is turned off or the 16-pin DLC cable is disconnected during the upload process, an error message asking "Do you wish to retry?" will appear. Press YES as this will allow IDS to recover the error, that was encountered during the programming function. Pressing NO may result in the module being left blank.
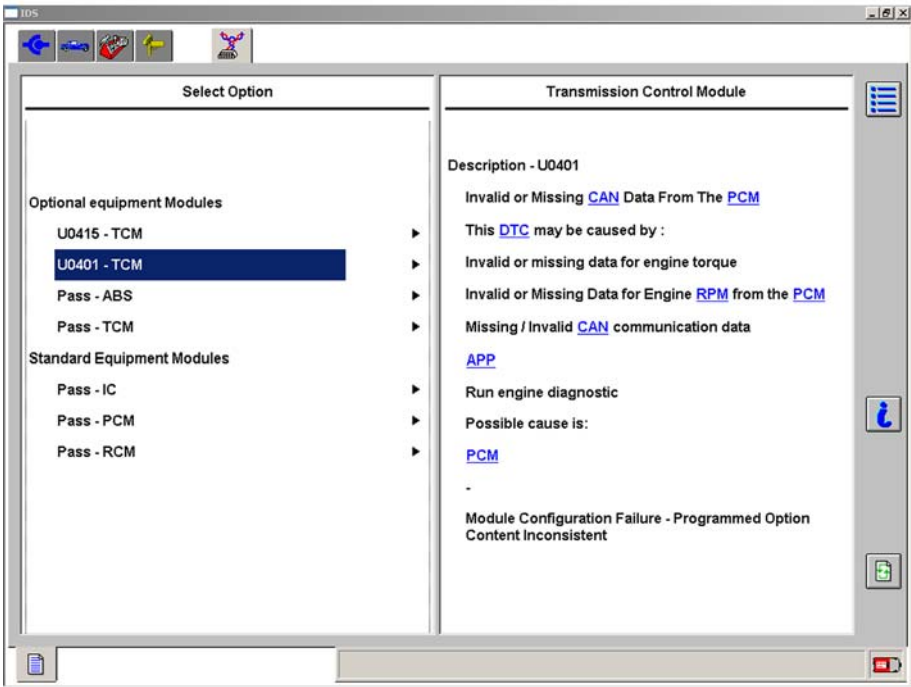
Network Test

- The Network Test is a vehicle-specific tool, i.e. it can only be accessed after identifying the vehicle. It allows the user to check the network of the vehicle.

- After selection of the network test function from the toolbox menu the corresponding icon appears in the top tab row and the network test is carried out. The IDS sends a "ping" to the network, which prompts all the modules to respond again. Then the IDS indicates the modules which can be fitted as standard or as options, and whether they have passed the test or not.

- The modules and the corresponding DTCs are displayed on the left-hand side of the screen. After highlighting a certain item the corresponding description and possible causes for the fault appear on the right-hand side of the screen.

NOTE: The IDS attempts to communicate with all known modules that are available on the particular vehicle either as standard or as optional equipment. Therefore it may indicate a failed status for a module that is not installed on the vehicle (e.g. **TCM** (**T**ransmission **C**ontrol **M**odule)). If a module fails the network test, first verify that the vehicle is equipped with the module in question at all before attempting to perform any further diagnostics.

- When a question mark appears behind a module which has not responded, the IDS offers a pinpoint routine in the sub-menu (bottom tab row) to guide the user to the fault (not applicable for Mazda dealers; requires VMM).

- With the aid of the Repeat button the test can be repeated any number of times.

Using IDS

L1001.2_049

Network Test Screen

Module Serial Number

- The function "Module Serial Number" is vehicle-specific, i.e. it can only be accessed after identifying the vehicle. It allows the user to call up the serial numbers of the modules connected to the communications network.

- After selection of the Module Serial Number function from the Toolbox menu the corresponding icon appears in the top tab row and the serial numbers of the modules are called up via the communications network. Then IDS displays the modules and their serial numbers.

NOTE: The IDS attempts to read out the serial numbers of all known modules that are available for the particular vehicle either as standard or as optional equipment. Therefore it may indicate "Module not hooked up" for a module that is not installed on the vehicle (e.g. TCM).
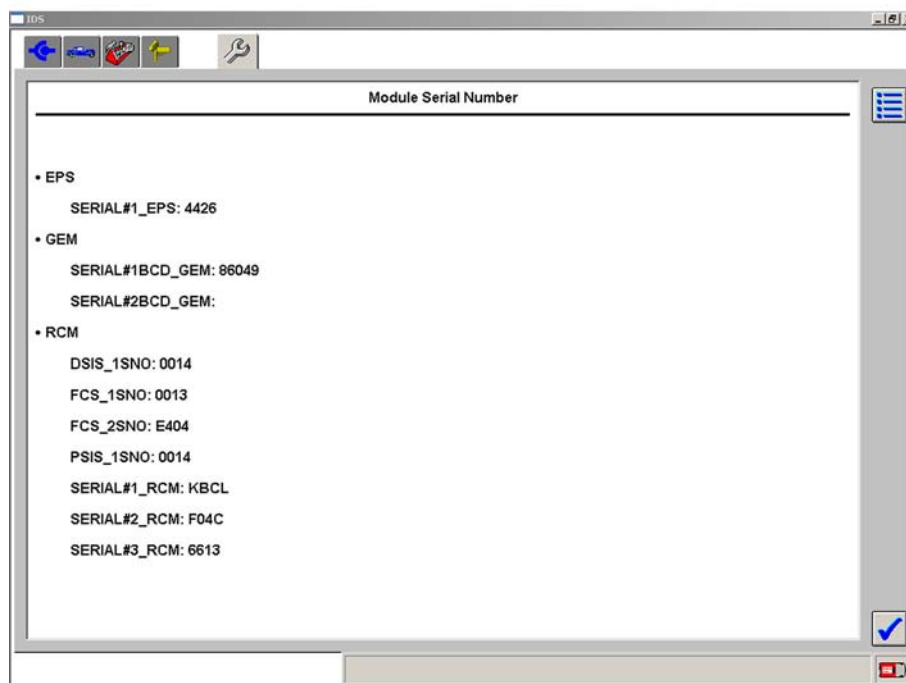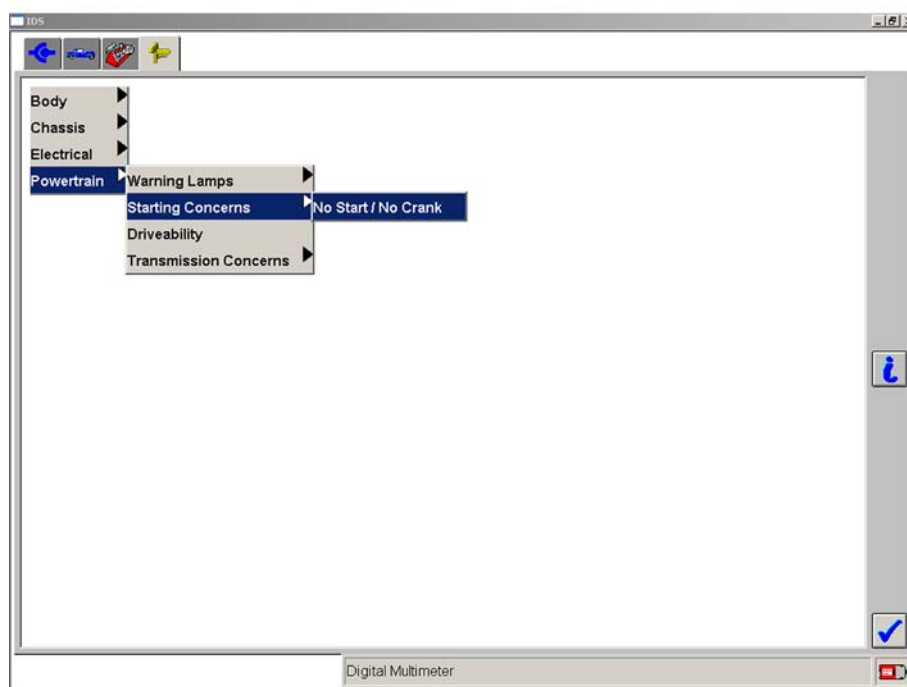

L1001.2_050

Using IDS

Guided Diagnostics

- The guided diagnostics is a vehicle-specific tool, i.e. it can only be accessed after identifying the vehicle. It offers the less-experienced user the option of being guided through the diagnostic process on the basis of a symptom.

- After establishing communication to the vehicle the corresponding icon appears in the top tab row and the guided diagnostics is ready for use. In the guided diagnostics function the vehicle systems are divided into four main systems (Body, Chassis, Electrical, Powertrain) with the corresponding subsystems. The user selects the system/subsystem to be tested according to the symptom. Then the IDS suggests several diagnostic steps to trace a fault. The user can carry out these individual diagnostic steps in any order and even skip steps if necessary.

NOTE: When using the guided diagnostics it is important to read through all the text on screen carefully and to carry out all the instructions precisely. This is essential to ensure that the IDS can diagnose a fault correctly.
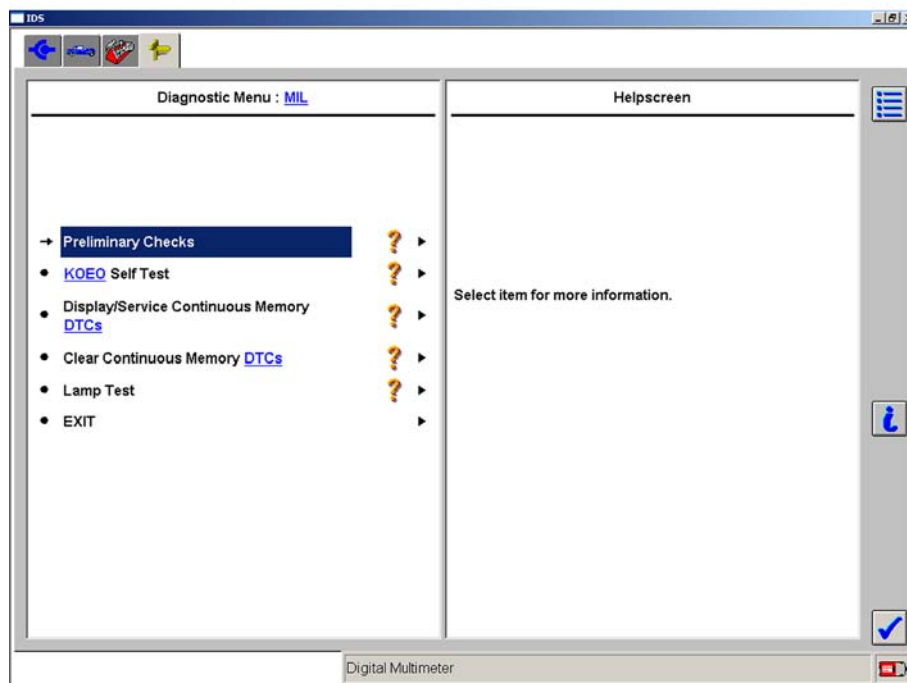
- The guided diagnostics consists of the sub-menus "Diagnostic Routine" and "Pinpoint Routine" (not applicable for Mazda dealers; requires VMM).

L1001.2_051

Diagnostic Routine

• This menu offers several functional tests to test the performance of a vehicle sub-system, module or component (e.g. KOEO/KOER self test, **MAF** (**M**ass **A**ir **F**low) sensor test, **EGR** (**E**xhaus **G**as **R**ecirculation) system test). Functional tests are generally non-intrusive, i.e. it is not necessary to disconnect components or modules to determine if a system is functioning correctly.

• As the IDS is capable of controlling certain devices and components (e.g. changing the engine idle speed, open the EGR valve), the functional tests are often conducted automatically. But it is also possible that the user is instructed to operate certain controls or switches manually in conjunction with the test.

• If a functional test passes, IDS returns to the Diagnostic Routine menu ready to perform further functional tests. If the test fails further testing is required to identify the root cause, i.e. a pinpoint routine (not applicable for Mazda dealers; requires VMM) usually follows.

L1001.2_052

Using IDS

Menu Walker

- The Menu Walker provides guidance through the different menus and tests of the Guided Diagnostics function. Therefore several tests are displayed on the left-hand side of the screen. After highlighting a certain test the corresponding description appears on the right-hand side of the screen.

- After a certain test has been carried out various icons behind the test name provide information about the result:

  – The arrow icon ⬛ indicates that this test is to be carried out next.

  – The tick icon ⬛ indicates that this test has been completed and passed.

  – The cross icon ⬛ indicates that this test has been completed and failed.

  – The question mark icon ⬛ indicates that this test has only been carried out in part or not at all.
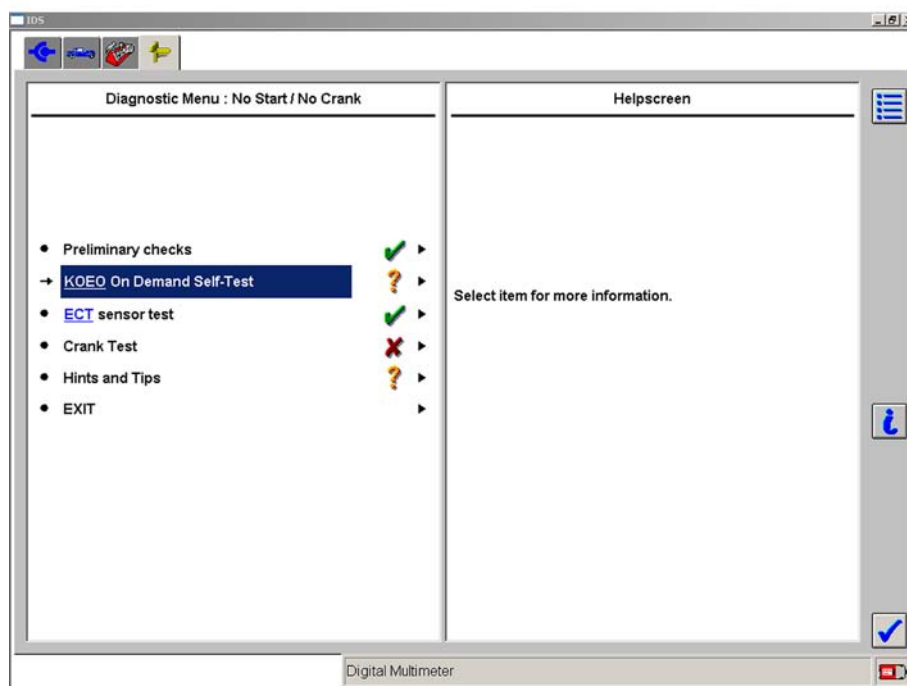
L1001.2_053

- Menu walker allows complete flexibility while carrying out a Guided Diagnostics, i.e. the user can carry out the suggested test routines in any order and even skip tests if necessary. In addition each test routine can be repeated any number of times.

- When the user selects a preferred test, this test is highlighted but the arrow symbol will continue to point at the original test. As a result the suggested sequence is always known. The sequence of tests in the Menu Walker is governed by the following rules:

  - Tests that have a high probability of finding the fault and non-intrusive tests are generally first in the sequence. Also with powertrain diagnostics, tests that do not require the engine running or the engine at a certain temperature are always first in the sequence.

  - When a test is carried out and passes, the next test in the menu is highlighted. If a test fails, further diagnosis usually follows. After repairing the fault and returning to the same menu, the test that originally failed is once again highlighted. Thus, the user is reminded to rerun this test.

**NOTES:**

Pinpoint Routine

NOTE: If the pinpoint routine requires to connect VMM or DMM, abort the procedure (VMM/DMM is not applicable for Mazda dealers).

- This menu offers various tests to isolate the root cause of a fault. A pinpoint routine is usually suggested when a functional test in a diagnostic routine failed. In addition most DTCs retrieved during Self Test have pinpoint routines associated.

NOTE: If a fault was initially detected in a functional test and a pinpoint routine has been carried out, this functional test must be repeated to ensure the fault is fixed. If a fault was first detected in Self Test and a pinpoint routine has been carried out, then Self Test should be carried out once more to ensure the fault is no longer present.

- A pinpoint routine usually consists of the following items:
    - Data link monitor
    - Digital multimeter
    - Pinpoint test
   - Test override
    - Fault report

Using IDS
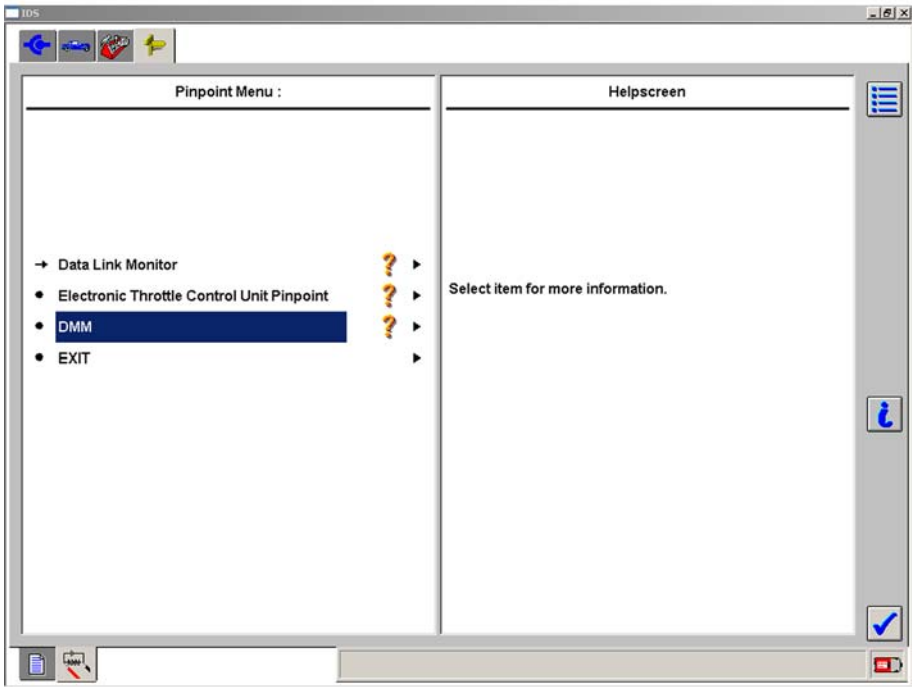
L1001.2_054

Pin Point Routine Screen

Data Link Monitor ⊞

- The **DLM** (**D**ata **L**ink **M**onitor) is very similar to the Datalogger, i.e. it allows the user to monitor the PIDs of a certain system. The main difference is that all the signals are pre-selected and automatically configured. As a result it is possible to monitor all the necessary signals associated with the component or subsystem without making any settings. Additional guidance may be available in the form of an information screen that is displayed before the DLM starts.

NOTE: The DLM is a non-intrusive tool, i.e. the system or component can be monitored without disconnecting components or modules. Therefore the DLM is the preferred tool for trying to find the root cause of an intermittent fault.
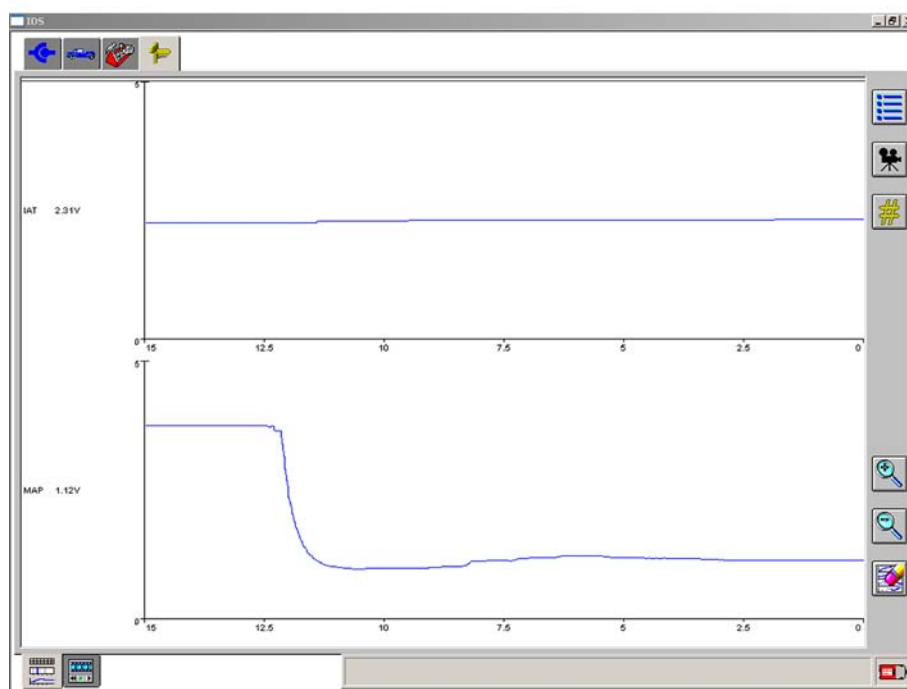
L1001.2_055

ABS	Anti-lock Brake System		**ID**	Identification
AC/DC	Alternating Current/Direct Current		**IDS**	Integrated Diagnostic Software
BCE	Body/Chassis/Electrical		**KOEO**	Key On Engine Off
CMDTC	Continous Mode DTC		**KOER**	Key On Engine Running
DLC	Data Link Connector		**LED**	Light Emitting Diode
DLM	Data Link Monitor		**MAF**	Mass Air Flow
DMM	Digital Multi Meter		**M-MDS**	Mazda Modular Diagnostic System
DTC	Diagnostic Trouble Code		**ODDTC**	On Demand DTC
DVD	Digital Versatile Disc		**OSC**	Output State Control
ECT	Engine Coolant Temperature		**PC**	Personal Computer
EGR	Exhaust Gas Recirculation		**PCM**	Powertrain Control Module
EOBD	European On-Board Diagnostics		**PDS**	Portable Diagnostic Software
GEM	Generic Electronic Module			

PFM   **P**DS **F**ile **M**anager

PID   **P**arameter **Id**entification

SGM   **S**ignal **G**enerator **M**onitor

TCM   **T**ransmission **C**ontrol **M**odule

USB   **U**niversal **S**erial **B**us

VCM   **V**ehicle **C**ommunication **M**odule

VDR   **V**ehicle **D**ata **R**ecorder

VIN   **V**ehicle **I**dentification **N**umber

WDS   **W**orldwide **D**iagnostic **S**ystem