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# Table of Contents

## BMW Diagnosis

Subject	Page
<b>BMW Diagnosis</b> .....	<b>3</b>
Diagnostic Head Connection .....	3
Starting Diagnosis .....	5
Vehicle Identification .....	6
Fault Symptom Selection .....	9
Test Plan .....	10
Test Information .....	12
Measurement System Integration .....	13
End of Diagnosis .....	14
Canceling a Session .....	14
Break - Pausing/Interrupting a Session .....	15
Quitting a Session .....	16
"Expert Mode" Troubleshooting .....	17
Control Unit Functions .....	18
Service Functions .....	19
<b>Electrical Troubleshooting Manuals and Schematics</b> .....	<b>20</b>
Introduction .....	20
Components of an ETM .....	20
Circuit Symbols .....	21
ETM Symbols .....	21
Schematics .....	24
General Guidelines .....	24
Working with Schematics in the Diagnosis Program .....	26
Printing a Schematic from the Diagnosis Program .....	28
Print Screen .....	28
Print Document .....	29
Document Abbreviations .....	29

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# BMW Diagnosis

**Model: All**

**Production: All**

# OBJECTIVES

After completion of this module you will be able to:

- Start a diagnostic session with the DISplus or GT1.
- Understand how to use the embedded measuring system used in the test plans.
- Look up wiring schematics.
- Correctly print out a wiring schematic from the diagnostic program.

# BMW Diagnosis

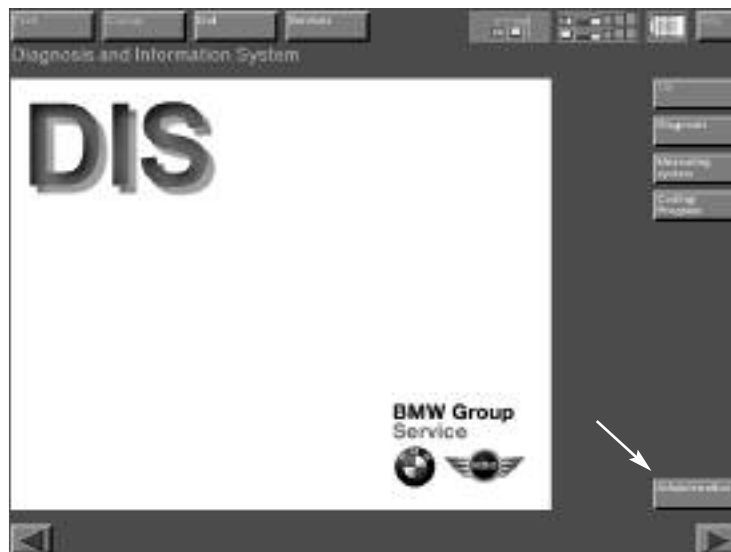
The main purpose of the Diagnosis program is to aid the technician in diagnosing the vehicle's electrical system. The program allows the diagnosis of complaints via:

- Fault driven test plans
- Fault Symptom driven test plans
- Manual override of test plans (Control Unit Function)

The program also incorporates electronic wiring diagrams for the vehicle and an automatic interface with measuring systems during test plans.

## Diagnostic Head Connection

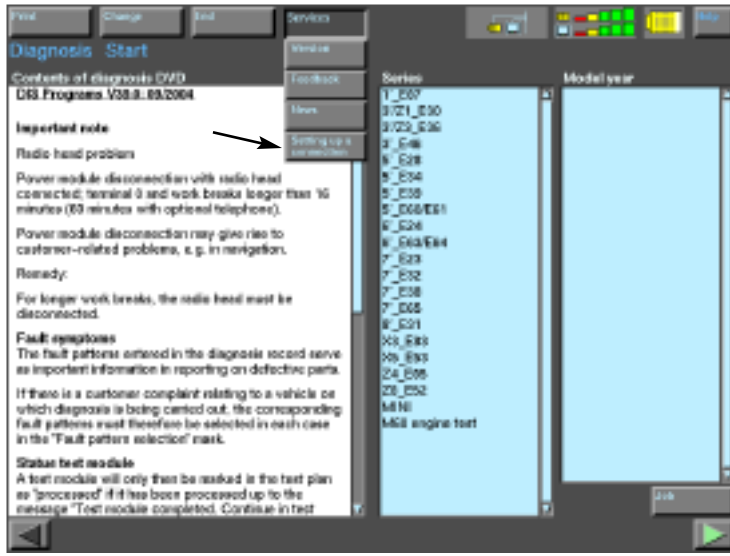
To start diagnosing the vehicle, a connection to a diagnostic head is needed. This connection can be performed via connection setup from either the DIS administration screen or while in the diagnosis program.



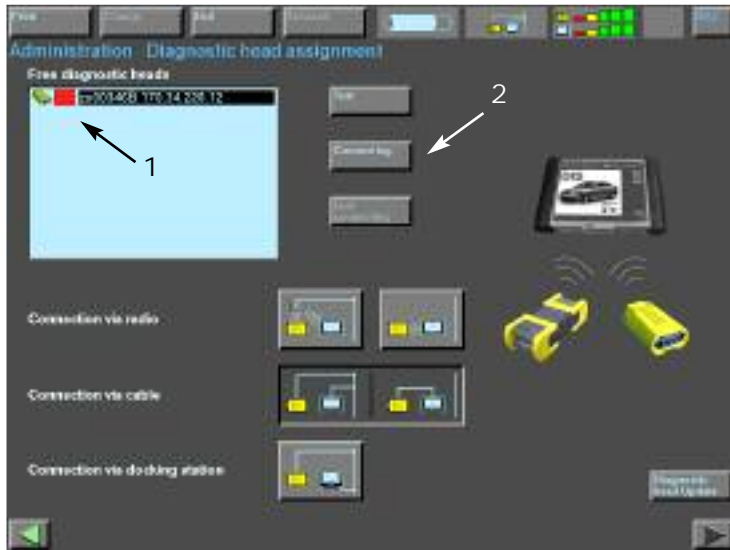
From the DIS main start up screen, Select "Administration".



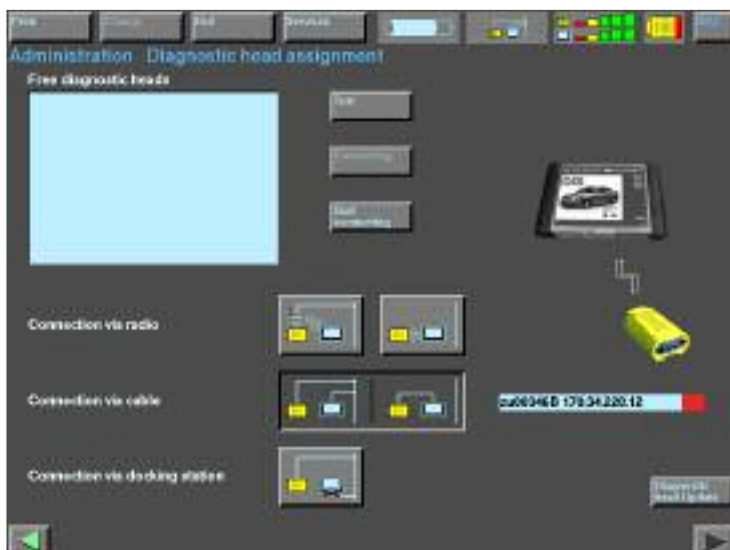
Select "Connection setup".



While in the diagnosis program, Select "Setting up the Connection" under "Services".



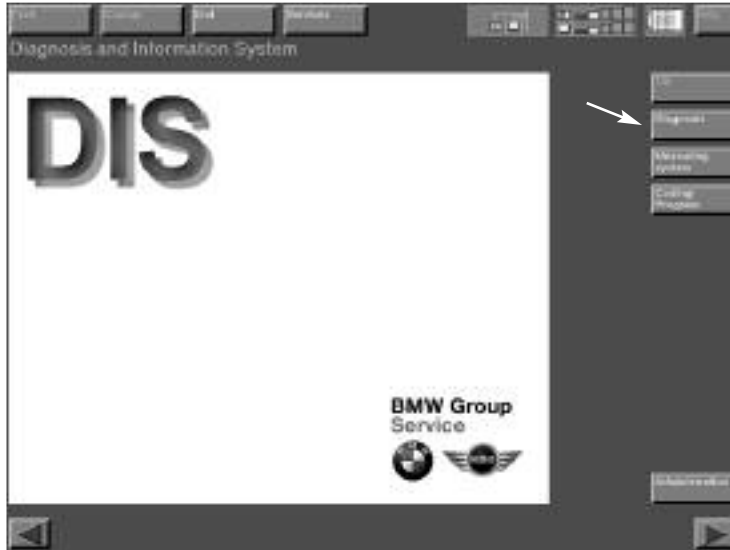
Select the free diagnostic head desired (1), and press "Connecting" (2).



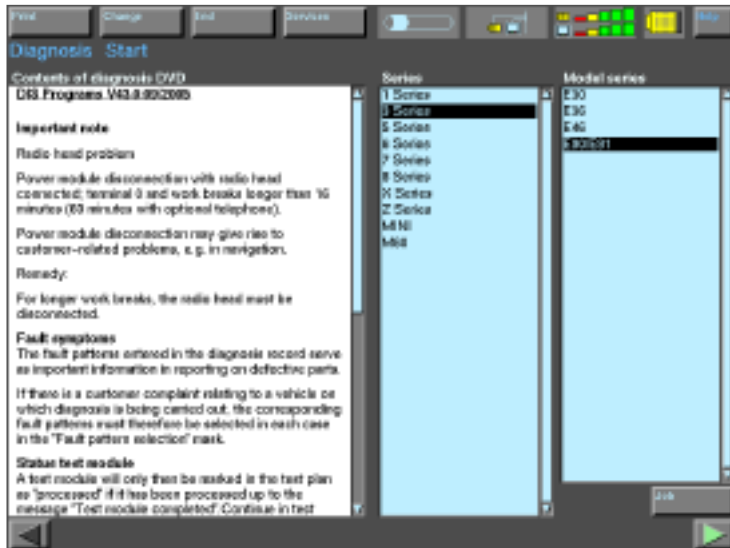
The diagnostic head is communicating with the diagnostic machine.

## Starting Diagnosis

Select the Diagnosis program and choose the appropriate vehicle designation. The tester now accesses the information installed so that the vehicle can be identified.



Select "Diagnosis".



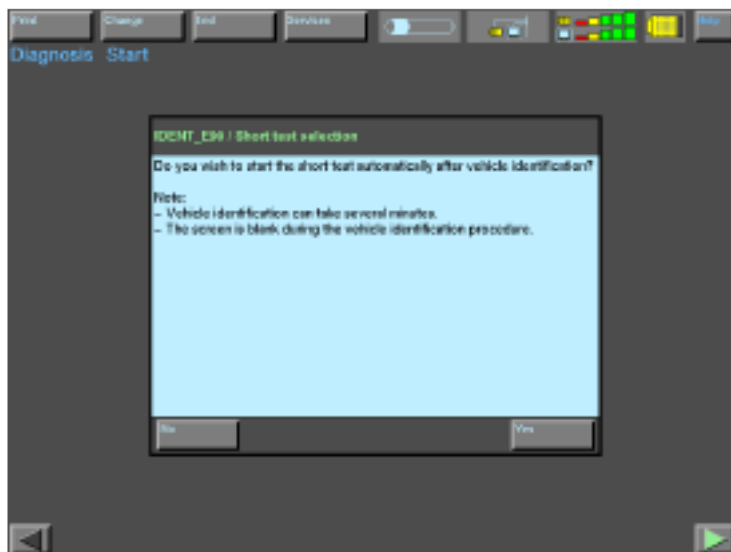
Choose the proper vehicle designation.

## Vehicle Identification

Vehicle ID is carried out on the basis of control module data (CAS, EWS, or IKE/Cluster ZCS or Vehicle Order).

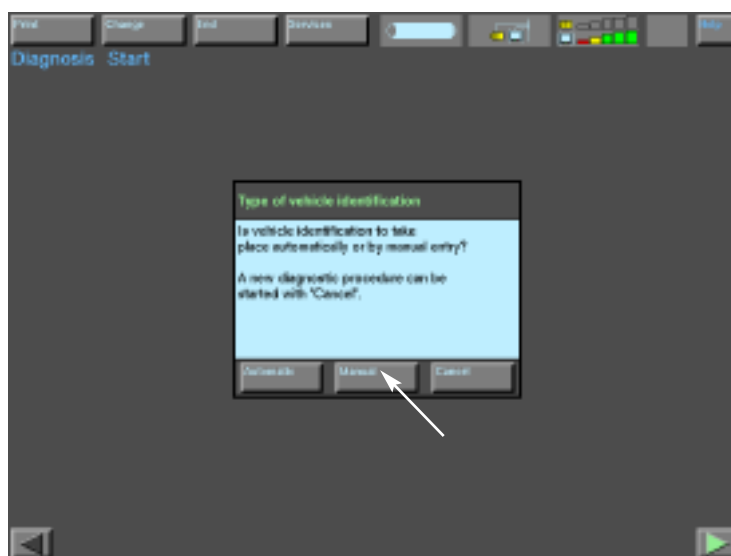
For automatic ID, the DISplus or GT1 reads the ZCS code to determine what systems are installed in the vehicle and directly seeks them out. This process is much faster than previous method of polling all systems possible for a specific vehicle series.

If the D bus is faulted or the tester can not communicate for whatever reason, Manual ID is required.



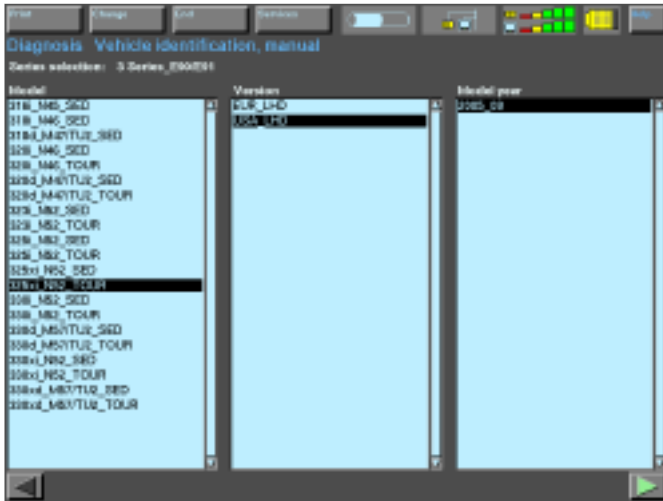
If automatic determination was successful, this screen will be displayed.

From here you can decide to automatically perform a short test once the vehicle is automatically determined.



If automatic determination is not successful, the following screen will be displayed.

Select "Manual".

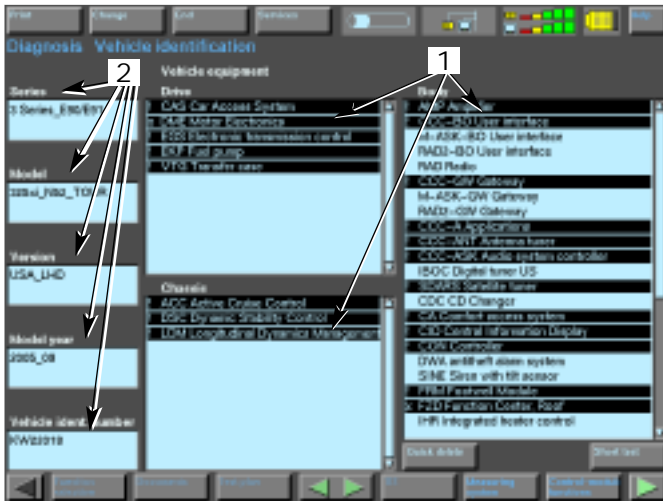


Enter the vehicle information:

- Model
- Version (Market)
- Model year (Production date)

**Note:** A production date of **2004\_09** is defined as **“from September of 2004 production”**.

When either manual or automatic vehicle identification has been completed, the Vehicle Identification screen appears. This screen will appear different dependent on which type of determination was performed.



Automatic Determination

1. Black bars signify modules that are equipped in the vehicle according to the ZCS code read out by the DISplus/GT1.
2. Vehicle information (model, production date, VIN) automatically read out by the DISplus/GT1.



Manual Identification

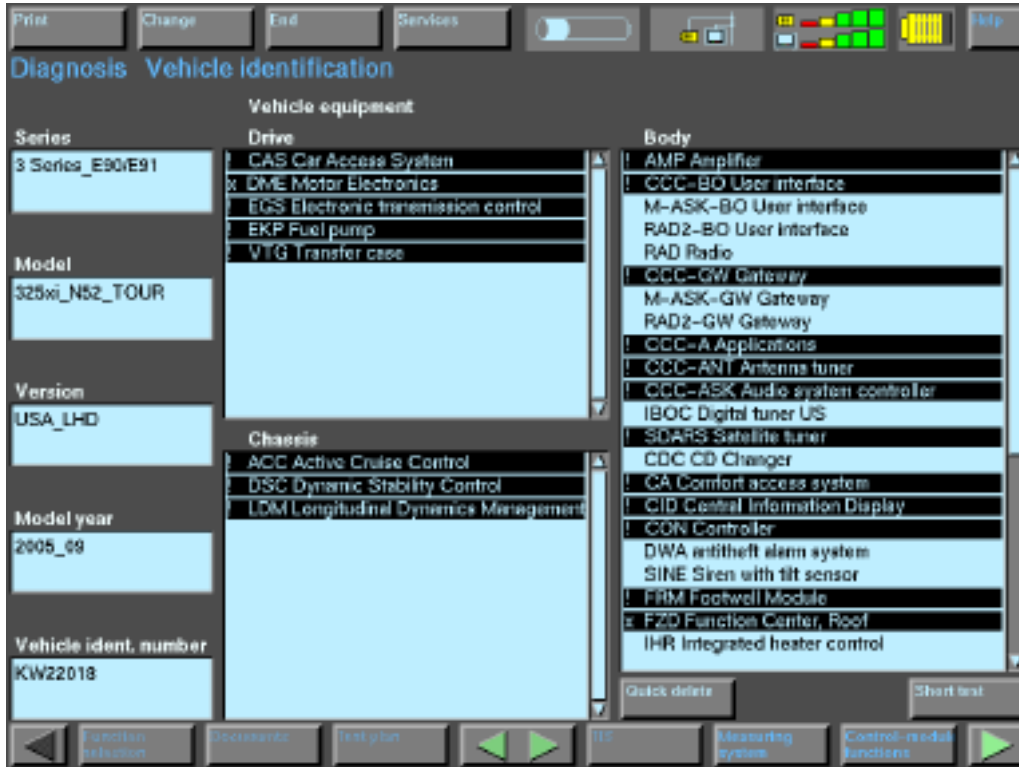
- No black bars appear because the modules fitted could not be automatically determined.
- Complete vehicle information is not displayed (VIN).

**Note:** There is a potential for errors when manually determining vehicle. Notice production dates in pictures (oval).

Although you can perform a short test on only one module by selecting it, the first procedure in performing a complete and thorough diagnosis is to carry out a short test. By selecting this option, the DISplus/GT1 interrogates the fault memories of all control systems.

The system contacts the control modules directly to check if the control module is installed and capable of communication.

The status of the control module is then displayed in the Vehicle ID screen.



The status for each module is represented by a symbol preceding the module. This status can be displayed in one of five ways:

- X - Signifies that the module communicated properly, but there is at least on fault present in that module.
- ! - Signifies that the module communicated properly and there are not stored faults in that particular module.
- (blank space) Signifies that the module is not fitted on the vehicle or the module failed to communicate.
- ? - Signifies that the DISplus/GT1 cannot determine which module is installed in the vehicle (ex. *MRS4* or *MRS5*). This symbol should only appear before the short test. Once the short test is performed, the correct module is identified.
- => - Signifies that the DISplus/GT1 is presently communicating or trying to communicate with that module.



# Fault Symptom Selection

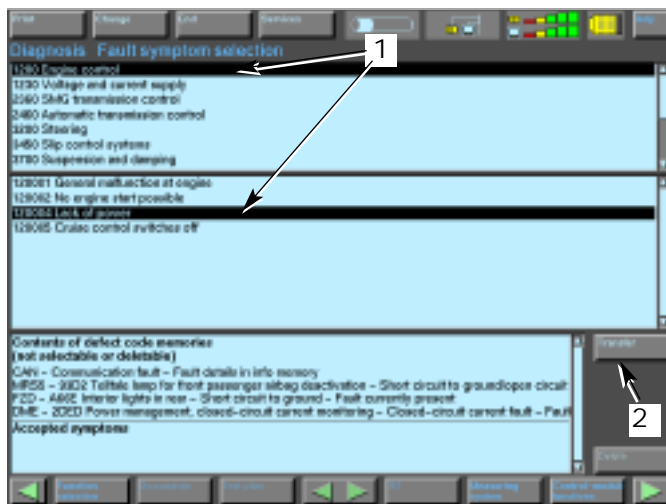
Once the short test has been completed, use the continue arrow (bottom right) to call up the fault symptom selection screen.

The Fault symptom selection screen displays all fault memories set for troubleshooting purposes.

Service technicians can enter fault symptoms observed by themselves or by the vehicle owner. This is done by selecting the appropriate items in a predefined list of symptoms. Several fault symptoms can be selected simultaneously.

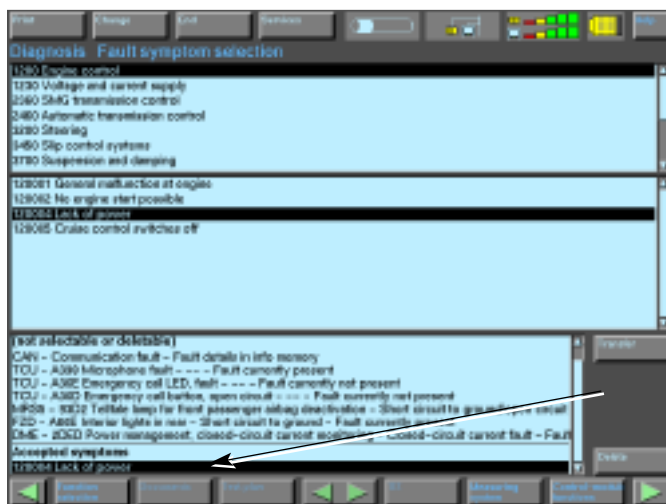
Use the transfer key to transfer selected fault symptoms into the display.

The test schedule is generated on the basis of both the symptoms observed by customers or service tech's and the contents of the fault memories.



To enter fault symptoms:

1. Select the fault symptoms.
2. Press "Transfer".



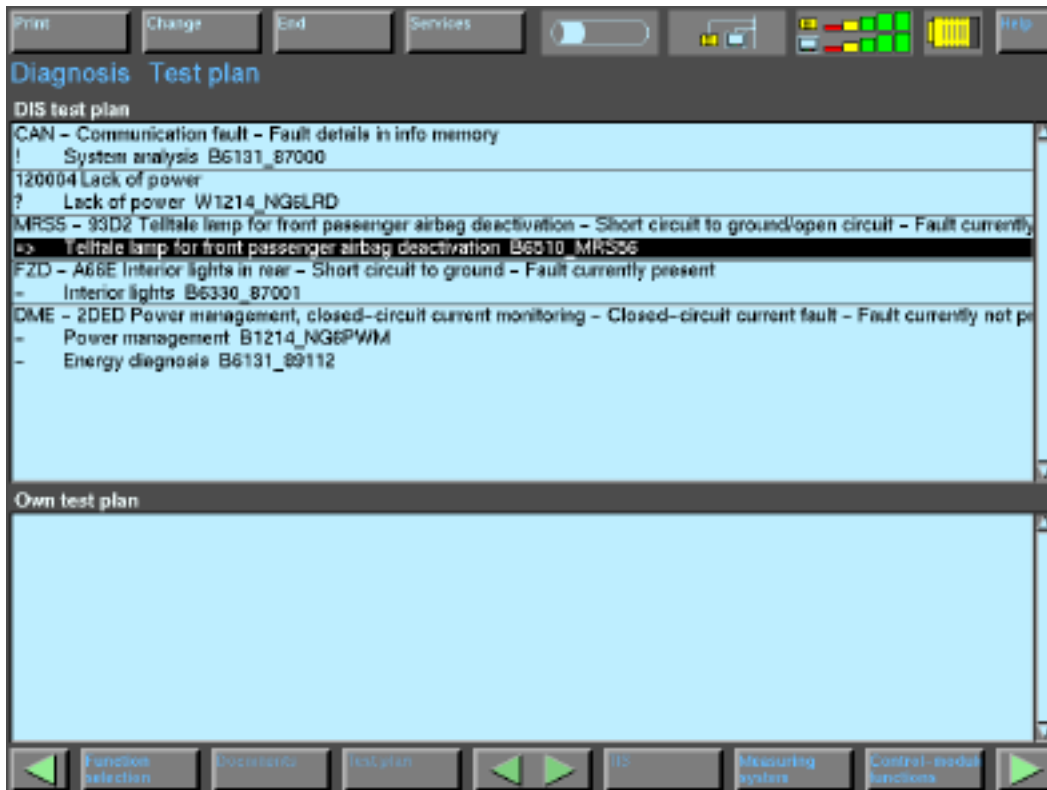
Once the fault symptom(s) have been transferred, the screen displays "Accepted symptoms".

## Test Plan

The test schedule is generated specifically for the problem at hand based on all current fault symptoms including those stored in fault memories of other control modules.

Diagnosis tests are prioritized in an order established by the DISplus/GT1.

The test plan screen displays the fault code (along with P-code if applicable), a brief description of the fault, one or several symptoms, diagnosis tests, and corresponding test modules.



The test modules have a status indicator preceding them on the screen. This status can be displayed in one of five ways:

- X Signifies that the test module's result is not OK. This symbol might show up in any modules/test plans that are associated with the module or system tested.
- ! Signifies that the test module has been performed and that the result is good.
- Signifies that the test module has not been performed.
- ? Signifies that the test module has been interrupted before a conclusion /result has been obtained.
- => Signifies that the test module is currently active. (*hint : if this symbol appears in any of the test plans, the short test or quick delete buttons cannot be selected*).

---

The number and sequence of test schedule items is calculated on the basis of:

- Severity of the symptom or faults stored.
- Number of times the symptom has been observed.

Test results are continually analyzed, and the inspection plan is revised accordingly.

The results of tests already completed influence the order of preference set up for remaining test modules.

Use the continue arrow to proceed to the next test.

DISplus/GT1 highlights the test which should be carried out next (dark background).

The results of tests already completed are indicated to the left of the test designations.

**Note: 1. The test schedule is revised each time the “test schedule” screen is re-entered following the completion of a module. If a fault has been rectified or its symptoms have changed, this is indicated in the “Inspection plan” display (sequence of test modules).**

**2. Fault memory contents are assessed according to various criteria (e.g. frequency, temperature).**

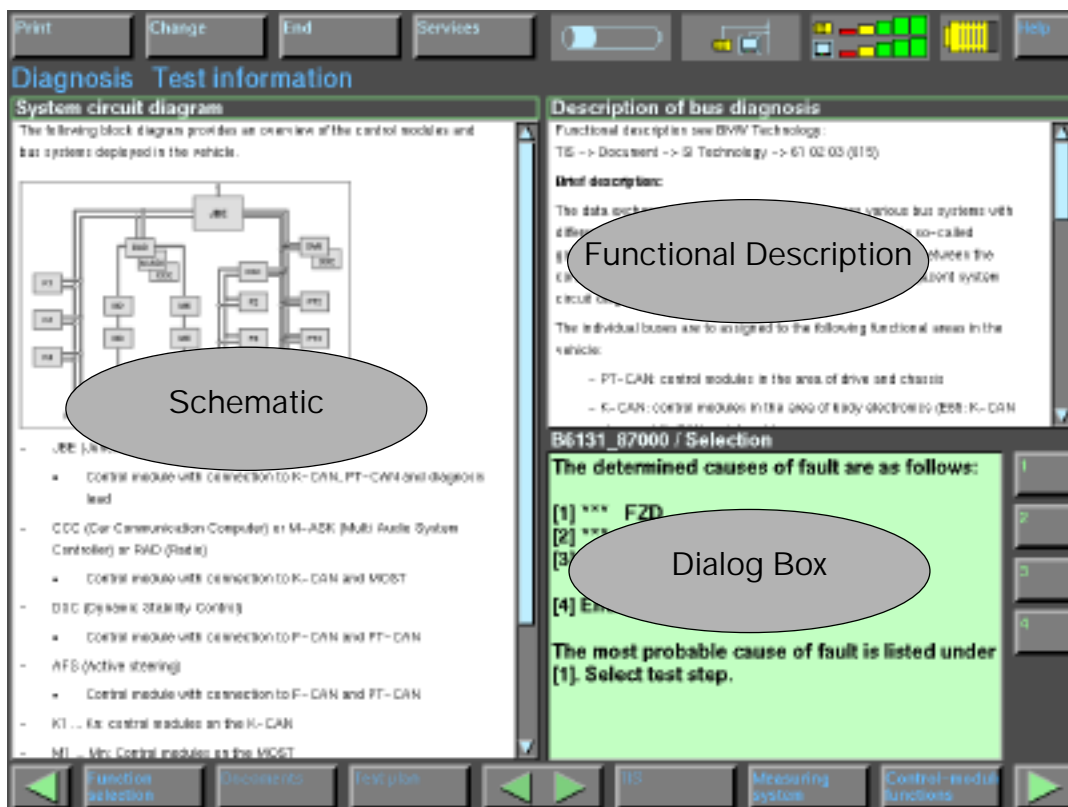
## Test Information

Press the continue arrow to advance to the next test schedule. The Test Information screen appears automatically.

The test information screen automatically displays documents containing any pertinent information needed to diagnose the fault. This information may include:

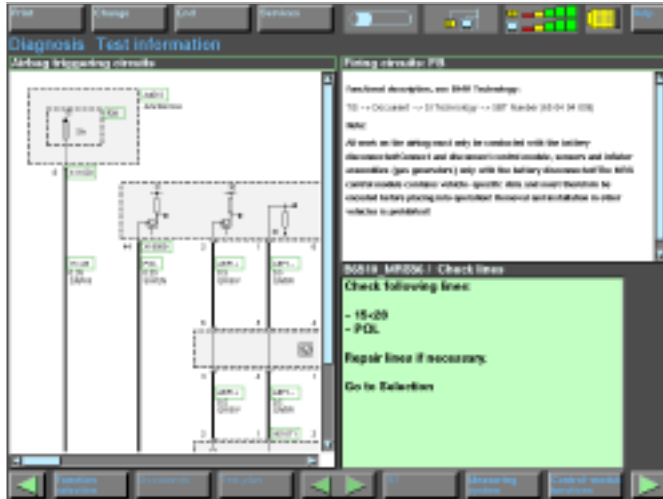
- Wiring Schematics,
- Functional descriptions,
- Connector locations, etc.

The Test Dialog box displays test points and nominal values automatically. This screen format is used throughout the diagnostic software for all systems.



## Measurement System Integration

All measurements now relate to circuit name acronyms that are “hot spot” activated (if needed). Nominal values are displayed with the actual measured display. Simply answer the question the system provides in response to the measured value.



The diagnostic program in the tester has measuring capabilities an integral part of the the test procedure. It displays automatically when needed by the test plan.



The test plan utilizes the MFK 1 leads as an input for the measurement. By pressing start, the measurement is automatically taken from these leads.

**Note: If the test plan needs KLR or KL15 status it can obtain these results from the diagnostic head if hard wired.**



If you are using a DVOM for measuring the values in place of the MFK leads, you can enter the measured values into the system and follow the test plan as follows:

- Press the measurement system value display bar to bring up a “key pad”.
- Enter the measured value into the key pad and press the enter button. The “keyed in” values will be used.

# End of Diagnosis

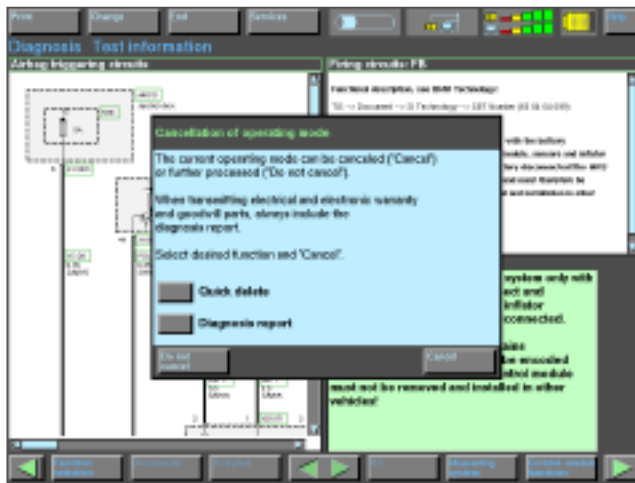
There are three options available on the end “drop down” menu of the software.



Three options when ending a session:

- Break
- Cancel
- Quit

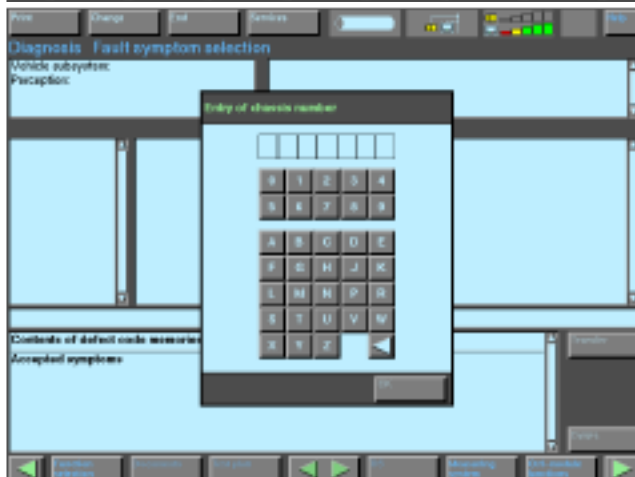
# Canceling a Session



A dialog box reminds you to print the diagnosis report. The dialog box offers the following options:

- "Terminate" ends diagnosis without printing the diagnosis report.
- "Diagnosis Report" prints the report before terminating.

*Hint: The Diagnostic Report will be stored. To print select "Stored Diagnosis Report" from the Print menu.*



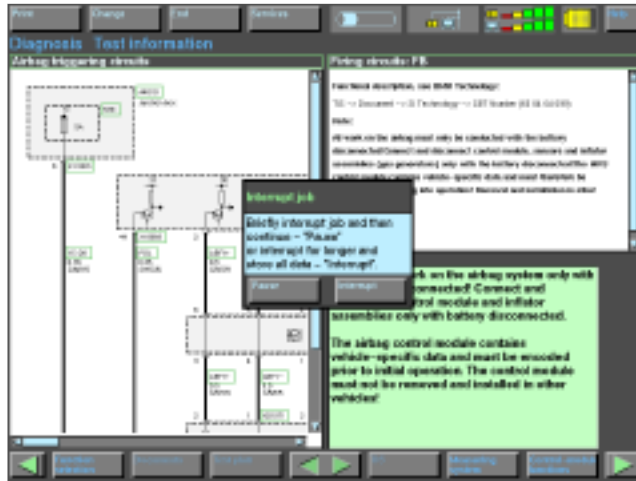
If manual determination was used a dialog box asking for the chassis number appears before the reminder box.

The program uses the chassis number entered for the diagnostic report.

## Break - Pausing/Interrupting a Session

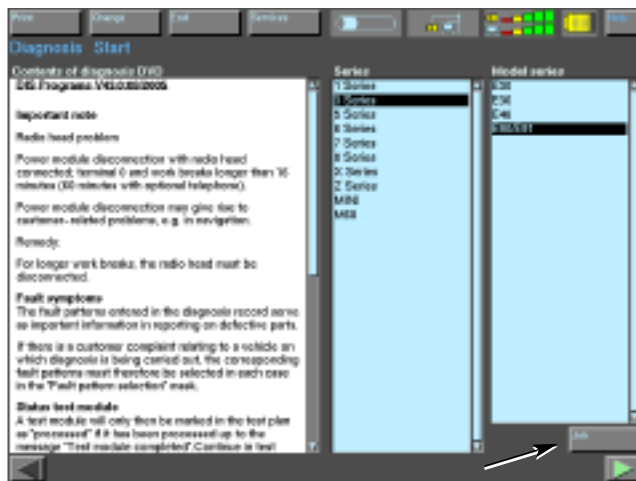
This feature allows the session to be "stopped" temporarily and resumed at a later time.

*Example: A co-worker needs to clear faults on a waiter vehicle. Your diagnosis might take another 20 minutes. If you select "Pause", the faults on the other vehicle can be cleared and afterwards you can resume in the exact same position you left off.*

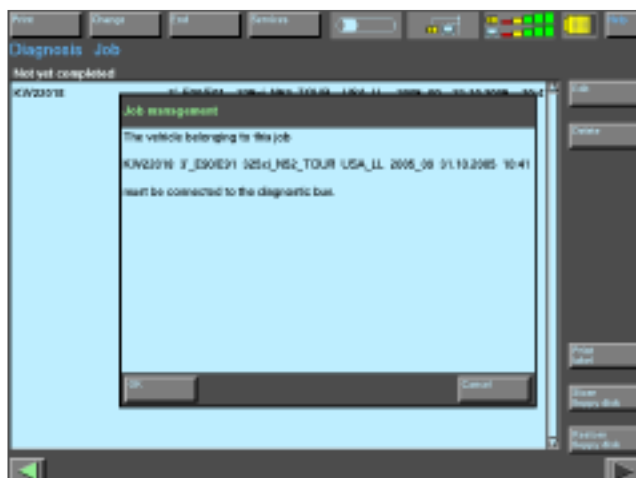


When Break is selected there are options for:

- Pause - A brief interruption in diagnosis.
- Interrupt - An extended interruption in diagnosis.

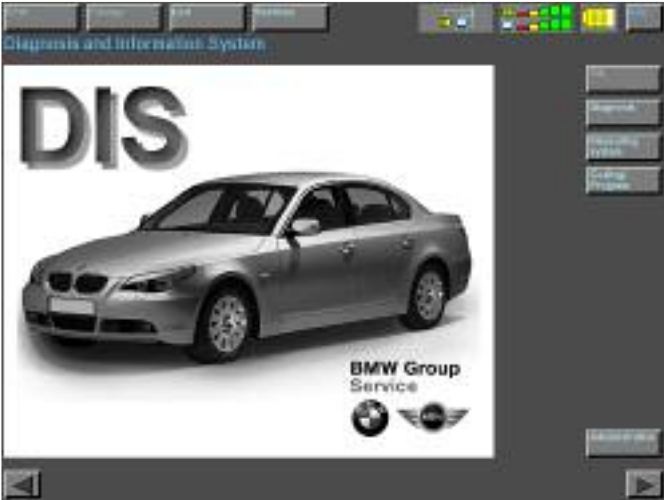


To resume a session that has been interrupted from the diagnosis start screen, select "Job".



Select the chassis number of the vehicle you need to resume diagnosing.

# Quitting a Session



Quitting a session takes the DISplus/GT1 back to the startup screen.



## “Expert Mode” Troubleshooting

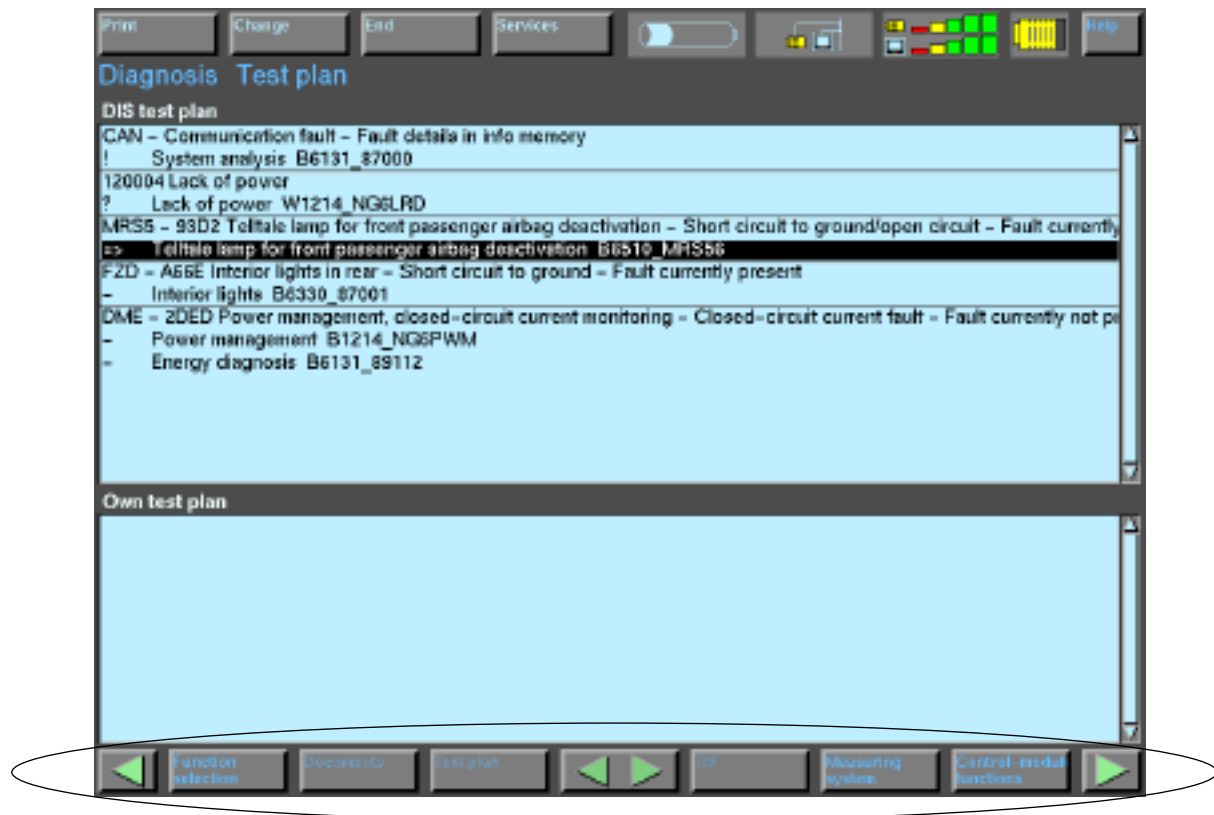
Expert Mode troubleshooting can be activated at any time during system guided troubleshooting.

Press the operating button in the navigation line. You have access to the following screens.

- Function and component selection
- Documents
- Test plan (own test plan)
- Control module functions
- Measurement system

To return to system - guided diagnosis, press the appropriate button. Any documents assigned to the diagnosis test which is currently active may be viewed. A new diagnosis test can be selected at any time in “Function selection”.

Press the “Test Plan” button to call up the test modules assigned to the diagnosis tests. A second schedule list, “Own test plan” now displays the test modules assigned to selected diagnosis tests.

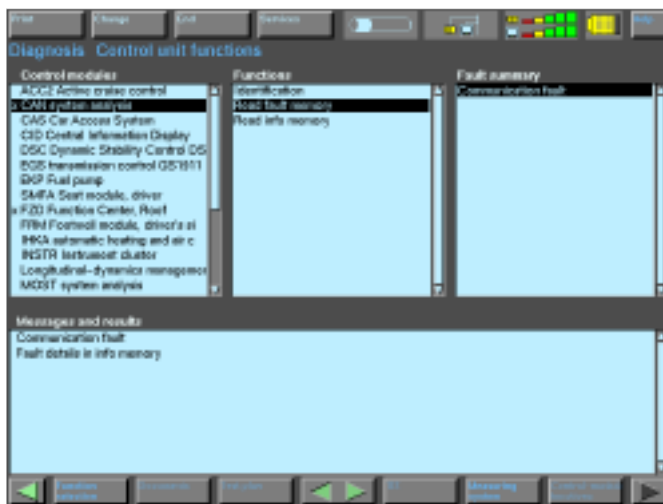


## Control Unit Functions

By selecting the Control Unit Function button on the bottom right of the screen, troubleshooting information is also available in the form of:

- Control Module Identification
- Reading fault memory
- Clearing fault memory
- Component activation
- Diagnostic requests

Only control modules identified during the short test can perform control unit functions.



All modules recognized during the short test are listed.

**Note: An “X” appears next to a module or system with a fault registered.**



If a short test was not performed from the vehicle identification screen, no modules will appear under the control modules column.

# Service Functions

Service Functions are special procedures used to make adjustments or complete repairs. Service functions are found in the Function Selection page of the Diagnosis Program.

An example of some service functions include:

## Maintenance

- Transport mode/pre-delivery check
- CBS correction, Tester data
- Reset CBS Condition Based Service
- CBS correction, vehicle data

## Drive

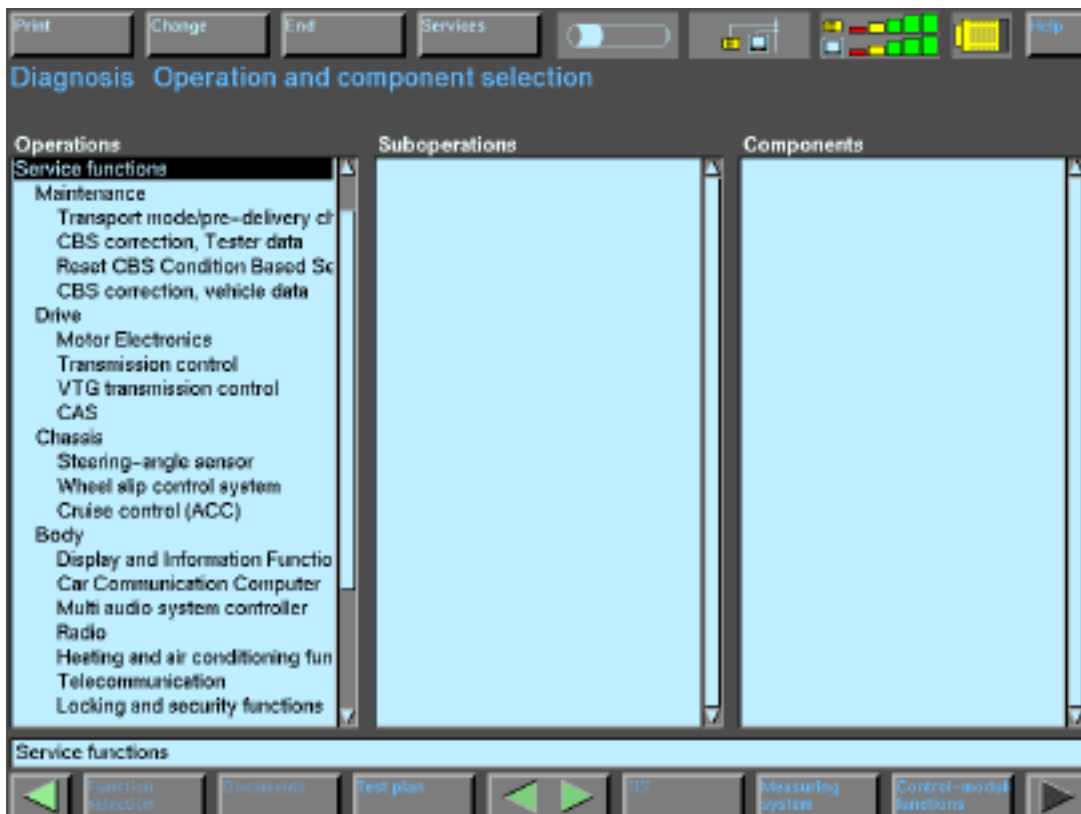
- Motor Electronics
- Transmission Control
- VTG transmission control
- CAS

## Chassis

- Steering-angle sensor
- Wheel slip control system
- Cruise control (ACC)

## Body

- Display and Information Function
- Car Communication Computer
- Multi audio system controller
- Radio
- Heating and air conditioning system
- Telecommunication
- Locking and security functions
- Rain/driving light sensor
- Power supply
- Multiple restraint system
- Seat occupancy detector, passenger
- MOST ring
- Flexible diagnosis module
- Vehicle Information



# Electrical Troubleshooting Manuals and Schematics

## Introduction

The purpose of the ETM is to provide the Technician with all the information needed to properly diagnose, test and repair a circuit in the vehicle electrical system.

All schematics are integrated into the Diagnosis Program of the DISplus and GT1 or on BMW dealernet, printed versions are not available.

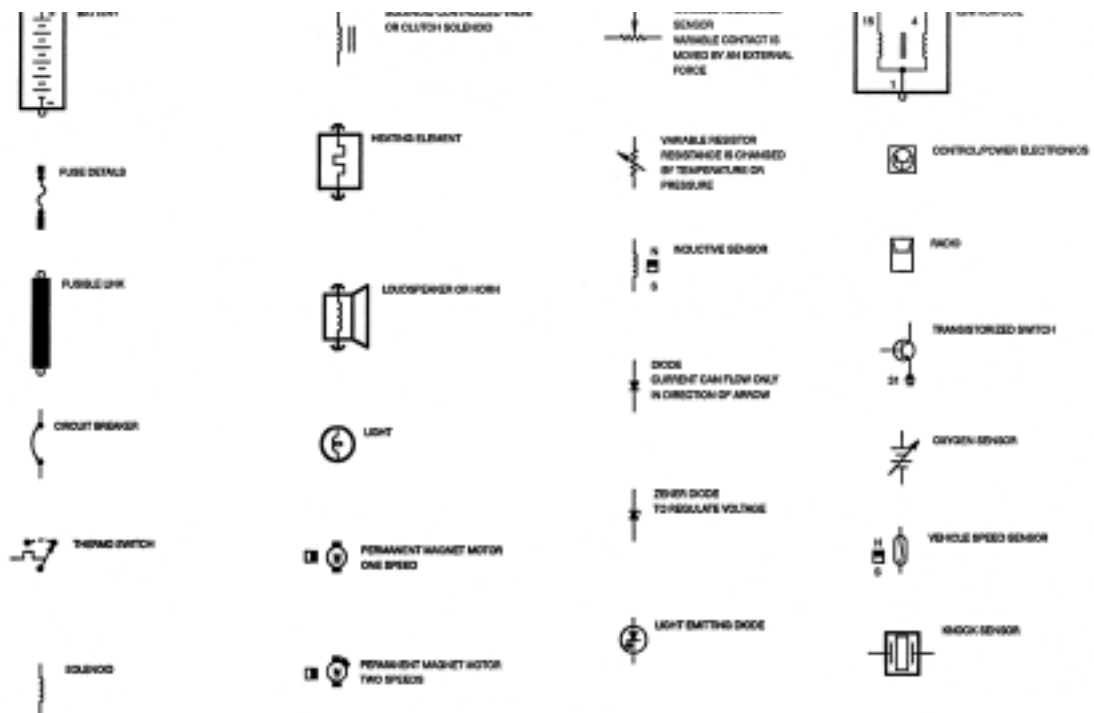
## Components of an ETM

An ETM consists of the following information:

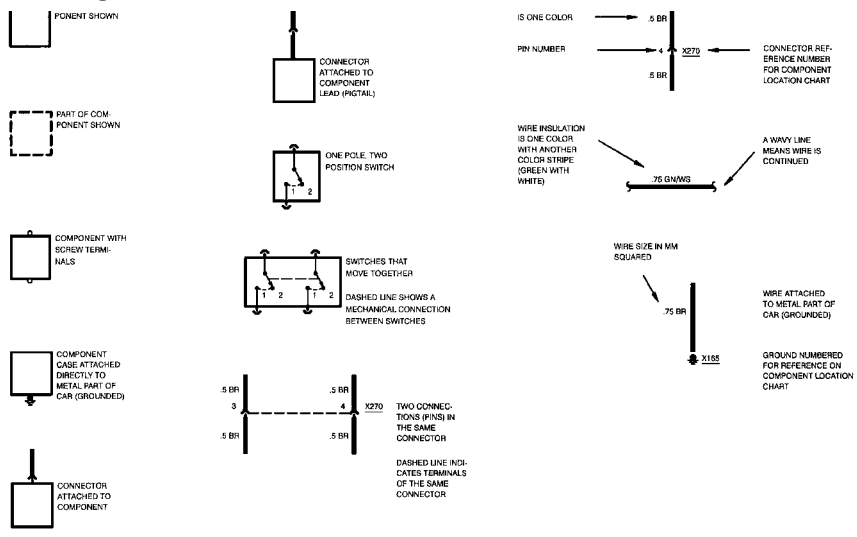
- Functional Descriptions
- Block Diagrams
- Test Instructions
- Circuit Diagrams
- Power Distribution
- Component Locations
- Ground Distribution
- Component Views
- Fuse Details
- Splice Locations
- Data Communications
- Connector views
- Pin Assignments

# Circuit Symbols

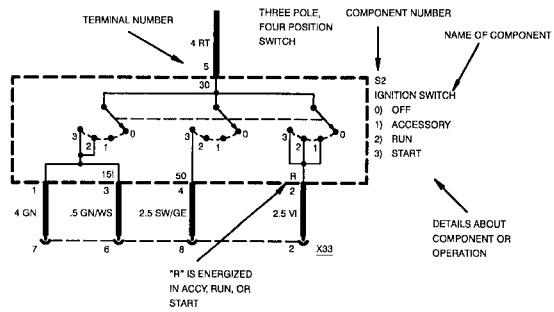
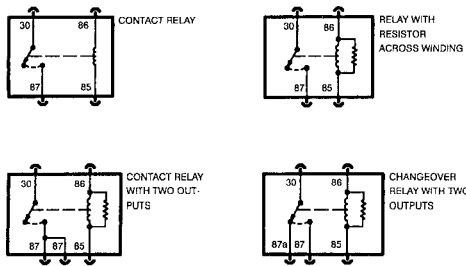
In order to work effectively with the ETM, the Technician has to understand the meaning of the symbols used to represent electrical components and connections. In the introduction pages of printed ETMs there is a list of symbols that are used.



# ETM Symbols



# ETM Symbols (cont.)



TERMINAL NUMBER	DESCRIPTION
30	RELAY INPUT
85	RELAY OUTPUT (WINDING)
86	RELAY INPUT (WINDING)
87	RELAY OUTPUT (ENERGIZED)
87a	RELAY OUTPUT (AT REST)

TERMINAL NUMBER	DESCRIPTION	TERMINAL NUMBER	DESCRIPTION
50	VOLTAGE: IGNITION SWITCH IN START	15I	VOLTAGE: IGNITION SWITCH IN RUN
30	VOLTAGE: SUPPLIED AT ALL TIMES	R	VOLTAGE: IGNITION SWITCH IN ACCESSORY, RUN OR START
15	VOLTAGE: IGNITION SWITCH IN RUN OR START	31	GROUND

**HOT AT ALL TIMES**



INDICATES THAT FUSE 9 IS SUPPLIED WITH POWER AT ALL TIMES

POWER STATUS

**HOT AT ALL TIMES**

**HOT IN RUN AND START**

**HOT IN ACCY, RUN AND START**

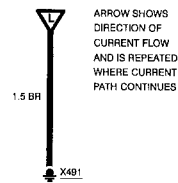
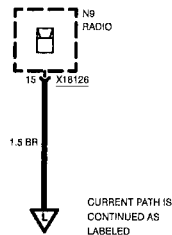
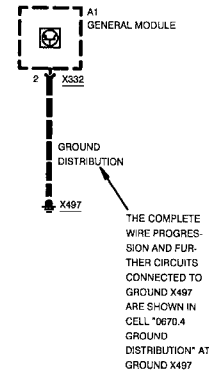
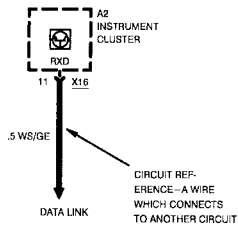
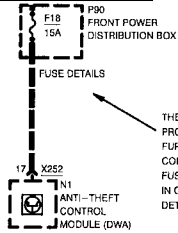
DESCRIPTION

VOLTAGE: SUPPLIED AT ALL TIMES

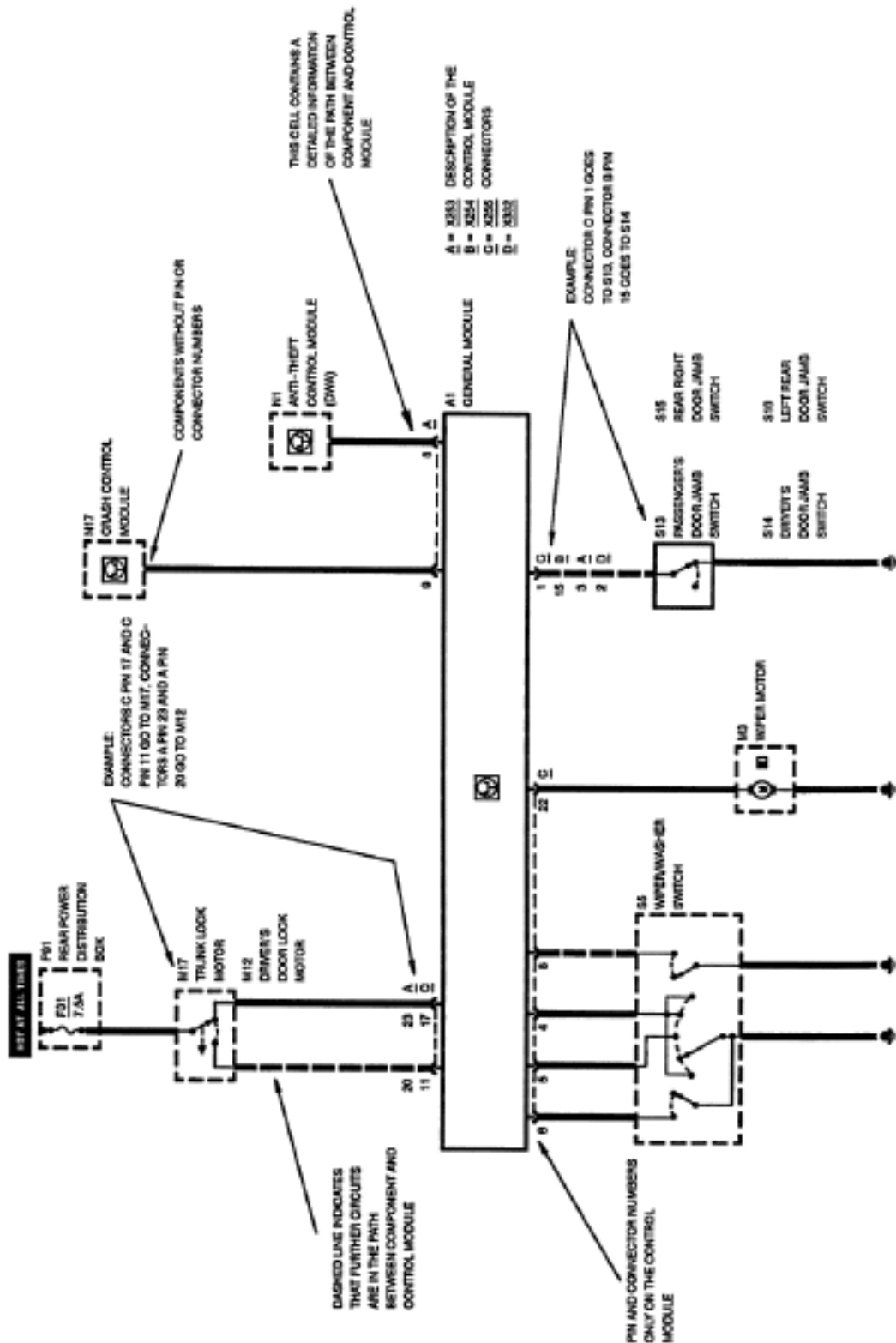
VOLTAGE: IGNITION SWITCH IN RUN OR START

VOLTAGE: IGNITION SWITCH IN ACCESSORY, RUN OR START

**HOT IN ACCY, RUN AND START**



# ETM Symbols (cont.)



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# Schematics

The schematics divide the vehicle electrical system into individual circuits. Components which interact with that circuit are shown on the same schematic.

In order to provide a standard for the way in which an ETM is written and read, there are general rules that apply. Components are drawn in such a way that their general layout and function are self-explanatory. They are arranged on the page so that the current path can be followed from positive (top) to negative (bottom).

## General Guidelines

(ETM rules): The schematic below will be used as an example.

- 1. Switches and relays are always shown in their rest position.
- 2. A component drawn in a dotted line indicates that only part of the component is shown.
- 3. A component drawn as a solid line indicates that all of that component is shown.
- 4. The dotted line between:

pins 3, 8, 9, 20, 21, and 22 of connector X253

pins 2, 3, 4, 9, 11, and 10 of connector X257

pins 1, 3, 4, 6, 7, and 8 of connector X747

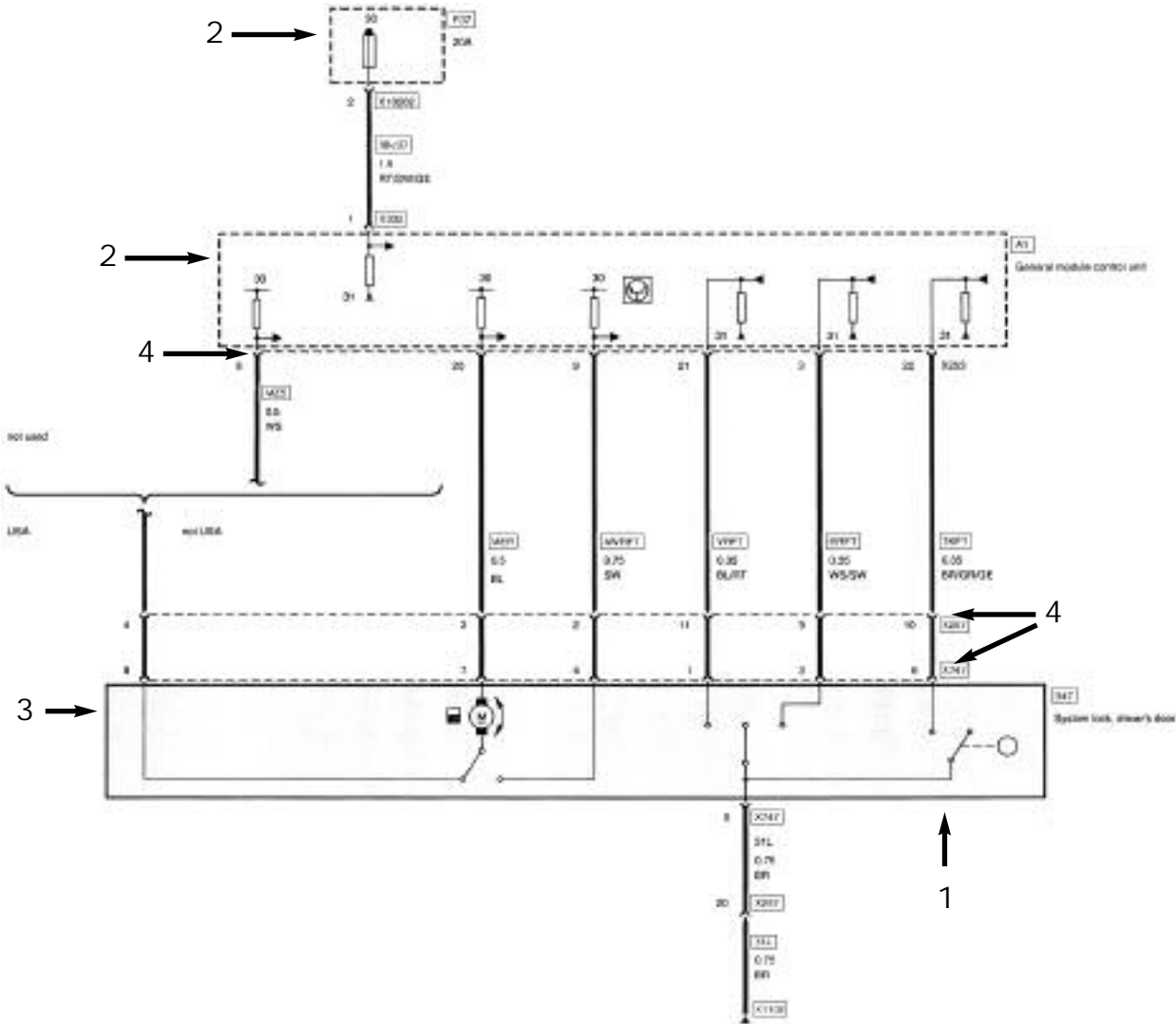
indicate all the pins belong to that connector.

- 5. To obtain more information on a component or signal select any hotbox and press the documents button on the lower navigation bar of the diagnosis software.

**Notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_

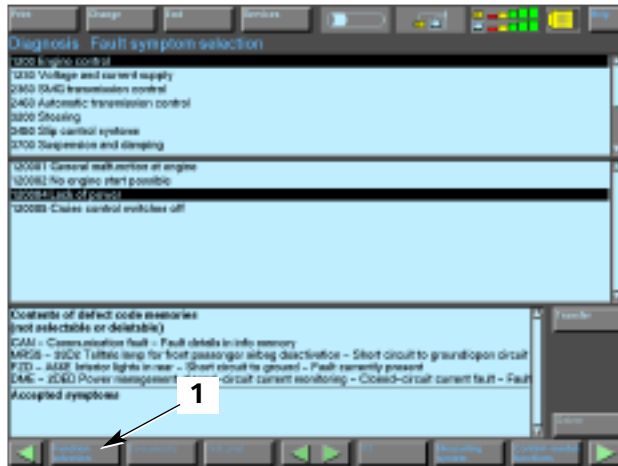


**ETM of front driver's door lock actuator circuit**



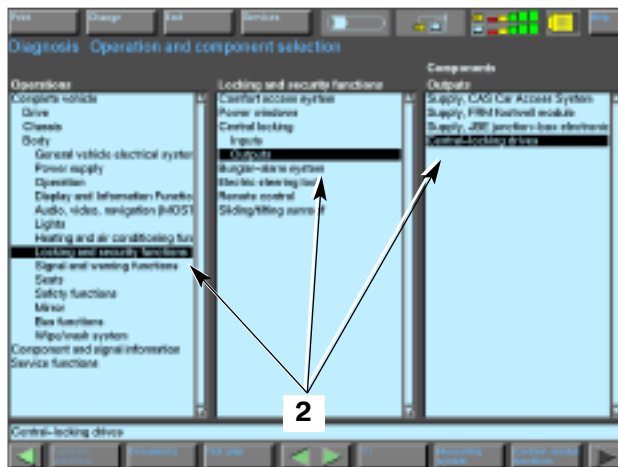
## Working with Schematics in the Diagnosis Program

Schematics for the BMW can be obtained from the DISplus/GT1 diagnosis program. ETMs are automatically selected and displayed in the test plan, however they can be viewed independently as well.

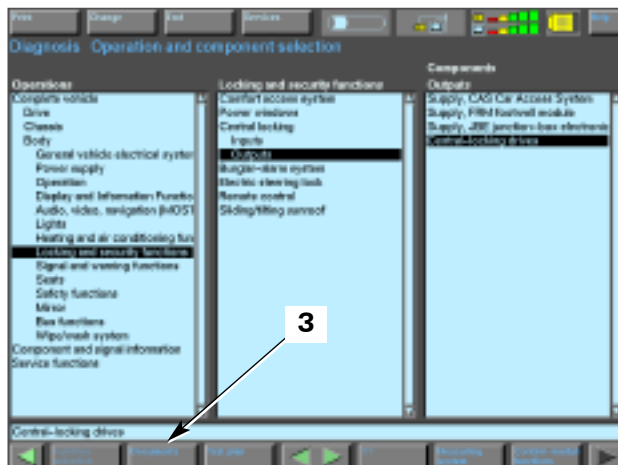


After a Series has been selected from the Start screen perform the Short Test. This will allow the DIS to find all of the modules installed in the vehicle. When the test is completed, arrow to the right to enter the Fault symptom selection screen and press the "Function Selection" button (1).

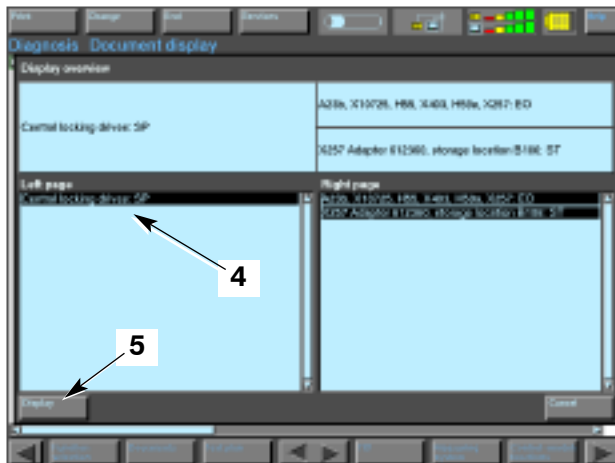
*Searching for the proper ETM is possible even if the vehicle is not present, but the only way to ensure that the absolute best diagram is displayed is via automatic determination.*



From the Operations and Component selection screen, select the system in the vehicle that is needed under Complete vehicle (2) and then highlight the desired component.



Once the desired system and component is highlighted press the "Document" button (3).



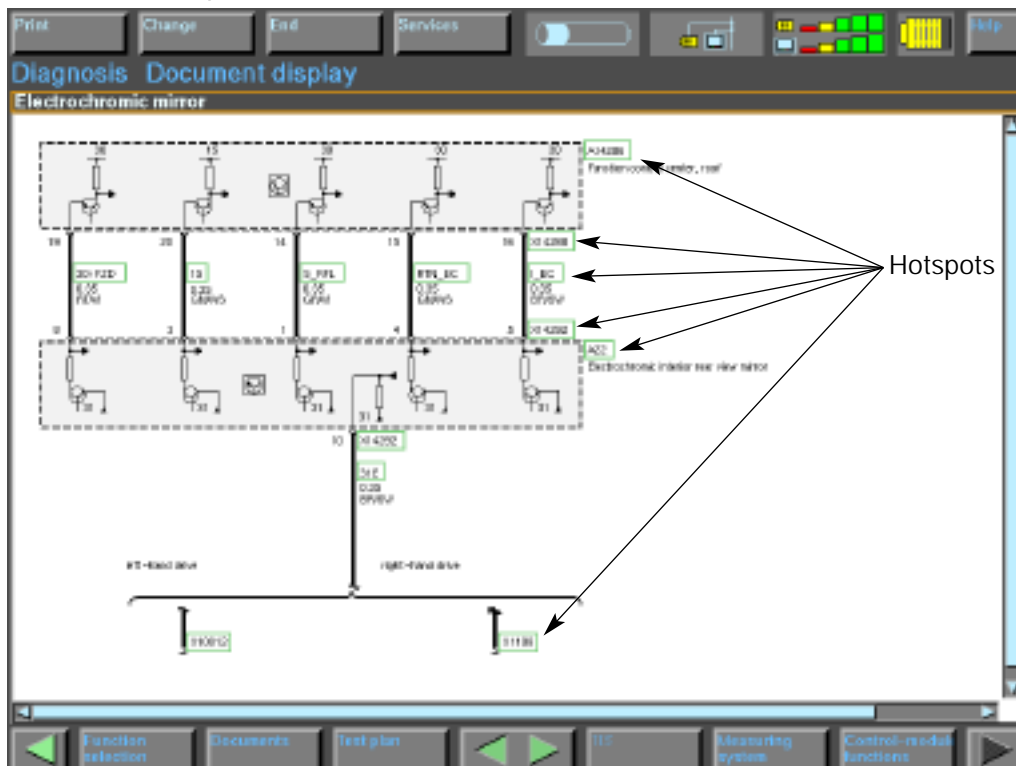
The Display overview is made up of three boxes: the upper box is an overview of what and how the documents will be displayed.

Schematics are in the left box only and can be displayed as full page or left half of the screen.

Only one schematic may be viewed at a time. Highlight the schematic (4) and press the "Display" button (5).

Linked pages to a diagram are accessed by highlighting a Hotspot. If the Hotspot changes color from green to amber then there is linked information available. The information is accessed by touching the Document button and selecting the "new" document. The information found via a Hotspot includes:

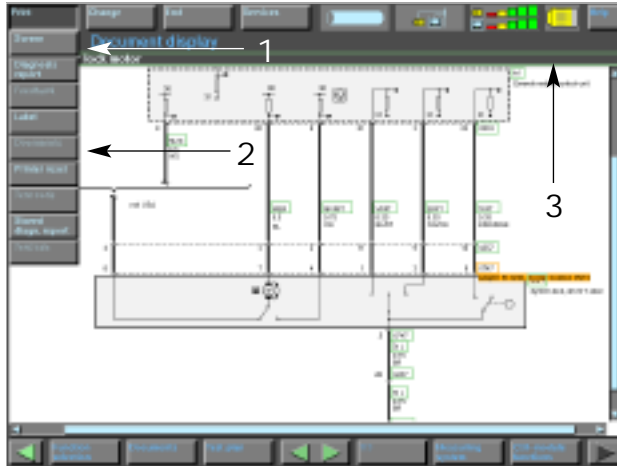
- Related Schematics
- Pin Assignments
- Connector Views
- Component Locations
- Fuse Assignments
- Functional Descriptions



## Printing a Schematic from the Diagnosis Program

If a printed copy of the schematic is desired, there are two options under the print “drop down” menu:

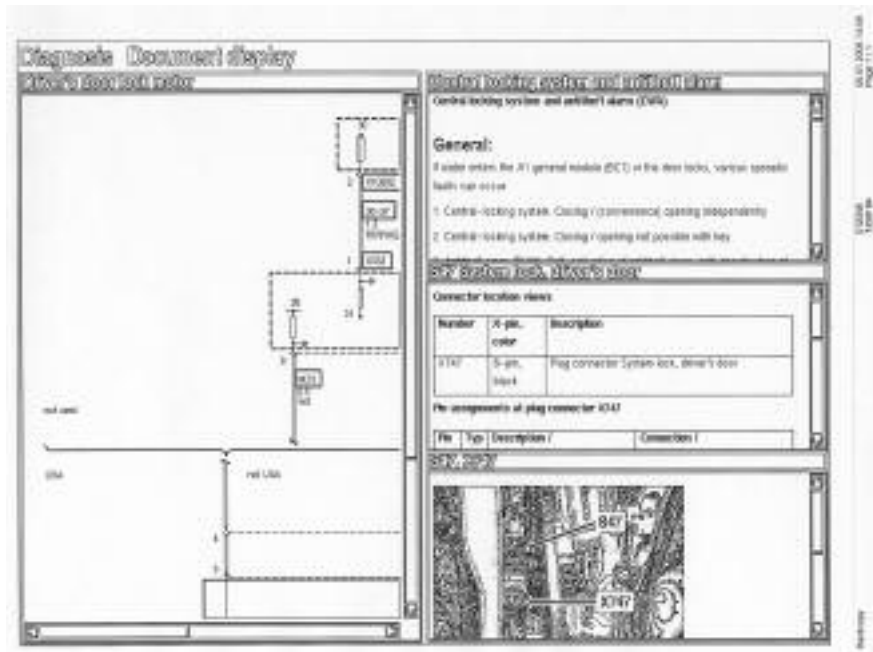
- Screen
- Document



The two options for printing a schematic are:

1. Screen
2. Documents (only if the top hotbox #3 is selected first)

**Note:** If the hotbox above a component location picture or pin assignment page is selected the entire contents of that box will be printed.



Sample of a printout using “print screen.”

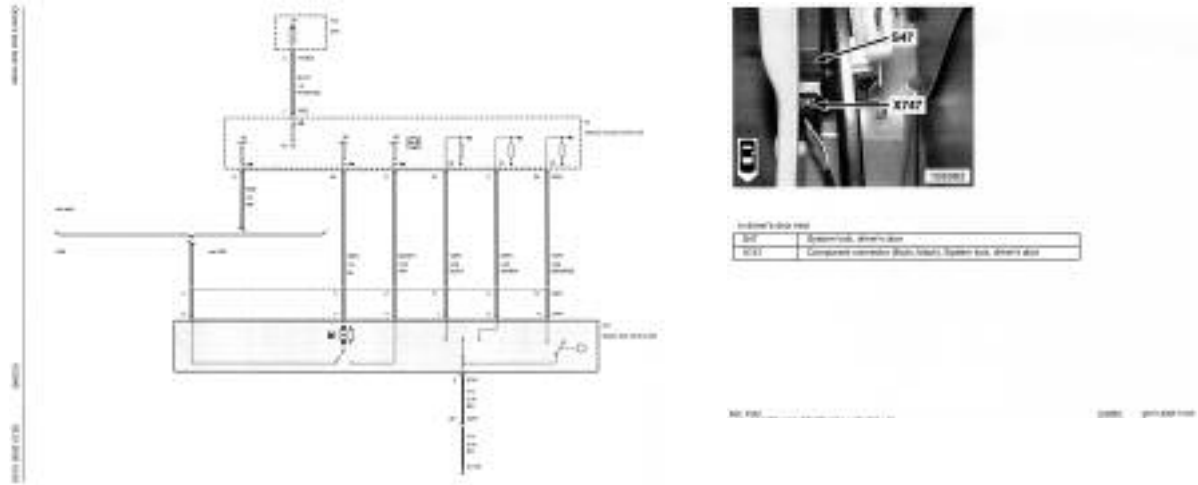
### ■ Print Screen

Printing the screen outputs a low resolution image of everything that is displayed on screen. If the schematic is larger than what is displayed, the entire diagram will not be printed.

**Note:** If a picture is displayed when print screen is selected, the picture output is very low resolution and can be illegible. The better way to print it out would be using the print document function.

## ■ Print Document

Highlight the green frame which is around the title of the schematic, component location, pin assignment page, etc. Then press the Print button and select Document (2). The printed schematic will include: the date, time, page number, description of the circuit and vehicle information.



**Samples of printouts using the “print document” feature.**

## Document Abbreviations

The following document abbreviations can be found in the header of the document window (2) or display boxes (1).

- BS: Block Diagrams
- MM: Measuring Equipment
- EO: Component Locations
- PB: Pin Assignments
- FB: Functional Descriptions
- SO: Set Points
- FP: Test Instructions
- SP: Schematics
- HI: Help Information
- ST: Connector View
- SB: Fuse Assignments