SUZUKI
ECM 1.0
APPLICATION

(Except OBD II Vehicles)

Operator's Manual

tech 1®

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SOME THINGS YOU SHOULD KNOW

CAUTION: EXHAUST GAS

When performing any checks with the engine running in an enclosed space such as a garage, be sure there is proper ventilation. Never inhale exhaust gases; they contain carbon monoxide, a colorless, odorless extremely dangerous gas which can cause unconsciousness or death.

CAUTION:

To help avoid personal injury always set the parking brake securely and block the drive wheels before performing any checks or repairs on the vehicle.

DISCLAIMER

The TECH 1 is designed for use by trained service personnel only. It has been developed for the sole purpose of diagnosing and repairing automotive electronic systems. Every attempt has been made to provide complete and accurate technical information based on factory service information available at the time of publication. However, the right is reserved to make changes at any time without notice.

FCC COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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1.0 SUZUKI ECM 1.0 APPLICATION DESCRIPTION

The Suzuki ECM 1.0 Application is used with the TECH 1 to diagnose and troubleshoot the Engine Control Module (ECM) or Powertrain Control Module (PCM) system used on 1991-97 Suzuki vehicles. It takes full advantage of advanced diagnostic features introduced in 1991-97 vehicles.

The Suzuki ECM 1.0 Application and the TECH 1 team up to become a diagnostic tool which is both powerful and easy to use. With the TECH 1, you can select test modes which let you:

- read engine data parameters
- read diagnostic trouble codes
- clear diagnostic trouble codes
- diagnose intermittent problems by capturing and storing multiple samples of system data BEFORE AND AFTER THE PROBLEM OCCURS, then examining the data to determine the problem. This data is saved in the TECH 1 memory for at least one-half hour even if the power is removed from the TECH 1!
- control engine idle speed and EGR
- fix spark advance
- fix Idle Air Control Calibration (IAC CAL)
- print data and vehicle information

This information can be analyzed and displayed to assist service technicians in diagnosing engine and driveability problems.

The Suzuki ECM 1.0 Application is included in the Suzuki Mass Storage Cartridge . When used with the TECH 1 it is capable of monitoring and diagnosing the Suzuki Engine Control Module or Powertrain Control Module on the models listed in the chart on the following page.

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SUZUKI ECM 1.0 APPLICATION COVERAGE

OTHER THAN NORTH AMERICAN MARKET (1991-1997)

ECM NO.	MODEL	ENGINE SIZE	FUEL SYS. TYPE	TRANS. TYPE	ECM/PCM MFG.
1	SE416	1.6L	TBI	MT, AT	Mitsubishi ECM
2	SE416	1.6L	MFI	MT, AT	Denso ECM
3	SE416	1.6L	SFI	MT, AT	Mitsubishi ECM
	SZ416	1.6L	SFI	MT, AT	Mitsubishi ECM
4	SF SERIES	1.0/1.3/ 1.5/1.6L	TBI	MT, AT	Denso ECM
5	SY413/ SY415/ SY416	1.3/1.5/1.6L	MFI	MT, AT	Denso ECM
	SY413	1.3L	MFI	3AT	Denso PCM (ECM + TCM)
6	SH410	1.0L	TBI	MT, AT	Mitsubishi ECM
7	SV620	2.0L	SFI	MT, AT	Hitachi ECM
8	SY418	1.8L	SFI	MT, AT	Hitachi ECM
9	SH410	1.0L	MFI	MT, AT	Mitsubishi PCM (ECM + TCM)
10	SV620	2.0L	SFI	AT	Hitachi PCM (ECM + TCM)
11	SE416	1.6L	SFI	AT	Mitsubishi PCM (ECM + TCM)

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NORTH AMERICAN MARKET (1991-1995)

ECM NO.	MODEL	ENGINE SIZE	FUEL SYS. TYPE	TRANS. TYPE	ECM/PCM MFG.
1	SE416	1.6L	TBI	MT, AT	Mitsubishi ECM
3	SE416	1.6L	SFI	MT, AT	Mitsubishi ECM
4	SF SERIES	1.0/1.3/ 1.6L	TBI (Bypass Air Type)	MT, AT	Denso ECM
5	SF SERIES/ SW SERIES	1.0/1.3 L	TBI (Throttle Position Type)	MT, AT	Denso ECM
	SY413/ SY416	1.3/1.6L	MFI	MT, AT	Denso ECM

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HOW THE SUZUKI ECM 1.0 APPLICATION WORKS WITH THE TECH 1

The TECH 1 lets you monitor data and control ECM (or PCM) operation by communicating with the ECM (or PCM) via the serial data link connector (DLC) present in the vehicle. The TECH 1 consists of a microcomputer, which communicates with the ECM (or PCM) and controls its operation, a keypad to receive directions from you, and a display to provide the data you need to diagnose vehicle electronic problems. The TECH 1 communicates with the ECM by applying an electrical signal to the serial data link connector Diagnostic Enable pin, then reads the ECM (or PCM) data signal from one of the serial data link connector pins, and translates it into an intelligible data display. The Suzuki ECM 1.0 Application in the Suzuki Mass Storage Cartridge is the software program which performs all of the functions described in this operator's manual.

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2.0 GETTING STARTED

Before operating the Suzuki ECM 1.0 Application with the **TECH 1** the following steps must be performed:

1. Insert the Suzuki Mass Storage Cartridge that contains the Suzuki ECM 1.0 Application into the bottom slot of the **TECH 1**. Verify that no other master cartridge is installed in the top slot.

2. Make sure the vehicle ignition is OFF.

3. Connect the **TECH 1** Cable to the top of the **TECH 1**.

4. Locate the vehicle's serial Data Link Connector (DLC). It is usually under the dash on the driver's side. Refer to the vehicle service manual if you are in doubt.

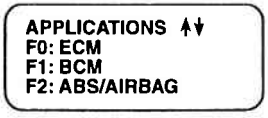
   Plug the **TECH 1** Cable into the vehicle's DLC.

5. Turn the ignition switch on.

   NOTE:
   For vehicles equipped with an Immobilizer control system, power is supplied to the **TECH 1** when the ignition switch is ON.

6. Verify that the tester displays the screen below.

7. Press **ENTER** to display the APPLICATIONS menu.



   Press the key to the left of ECM to select the Suzuki ECM 1.0 Application from the APPLICATIONS menu. If more than three applications are available, use ↑ or ↓ to scroll the display.

   If the **TECH 1** display informs you that the companion application is missing, contact your **TECH 1** distributor.

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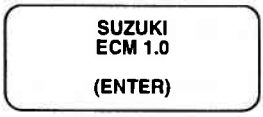
8. Verify that the tester displays the screen below, and then press ENTER.



9. After the application is selected, the Language Selection menu is displayed.

Press the function key to the left of the language you wish to select. After the language is selected, proceed to Section 4.0.

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3.0 OPERATING PRECAUTIONS

REMOVING THE CARTRIDGE WHILE POWER IS APPLIED

You should not remove or install master or auxiliary cartridges while power is applied. If you wish to change or add a cartridge, disconnect the power plug, install the cartridge, then reconnect the power plug.

REMOVING OR CHANGING MASTER CARTRIDGES CONTAINING SNAPSHOT DATA

SNAPSHOT data that has been captured by a master cartridge can be printed on a TECH 1 (or compatible) printer, transferred to a computer for further analysis, or displayed on a terminal. The SNAPSHOT data will be retained within the TECH 1 memory for at least one-half hour, even if the TECH 1 is disconnected from the vehicle. However, IF YOU POWER UP THE TECH 1 WITHOUT A MASTER CARTRIDGE OR WITH A DIFFERENT MASTER CARTRIDGE, THE SNAPSHOT DATA WILL BE LOST.

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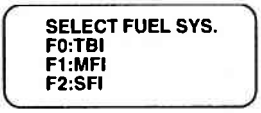
4.0 SELECTING THE VEHICLE

Once you've connected the TECH 1 to the vehicle and selected a language, turn the key to the RUN position. The next step is to identify the Fuel System Type, the ECM Manufacturer, and the Model of the vehicle you are testing. Depending on the Fuel Type selected, other information such as the ECU Type and Transmission Type may be required.

SELECTING THE FUEL SYSTEM TYPE

Press the key to the left of the Fuel System type of the vehicle you are testing.



CONFIRMING ECM MANUFACTURER

Once the Fuel System type is selected, the TECH 1 will ask you to identify the ECM manufacturer. Press the key to the left of the ECM Manufacturer to continue.

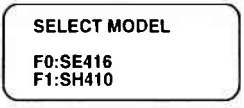
TBI FUEL SYSTEM

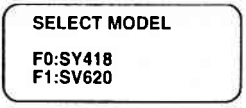
MFI FUEL SYSTEM

SFI FUEL SYSTEM

SELECTING THE MODEL

Next, the Select Model screen is displayed. If a menu is displayed, press the key for the Model you are testing.





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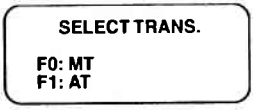
SELECTING THE IDLE CONTROL TYPE

For some models, the Idle Control Type must be selected. Press the key to the left of the Idle Control Type of the vehicle you are testing.

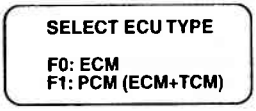
SELECTING THE TRANSMISSION TYPE

For some models, the Transmission Type must be selected. Press the key to the left of the Transmission Type of the vehicle you are testing.



SELECTING THE ECU TYPE

For some models, the ECU Type must be selected. Press the key to the left of the ECU Type of the vehicle you are testing.



SELECTING THE TEST MODES

After selecting the type of engine in the vehicle you are testing, the TECH 1 displays the Select Mode screen. Detailed operating instructions for the various test modes are given in Section 5.0 of this manual.

ACTIVE TECH 1 KEYS	
F0 - F9	Select a menu item.
YES & NO	Answer questions on the TECH 1 display.
EXIT	Return to previous display.

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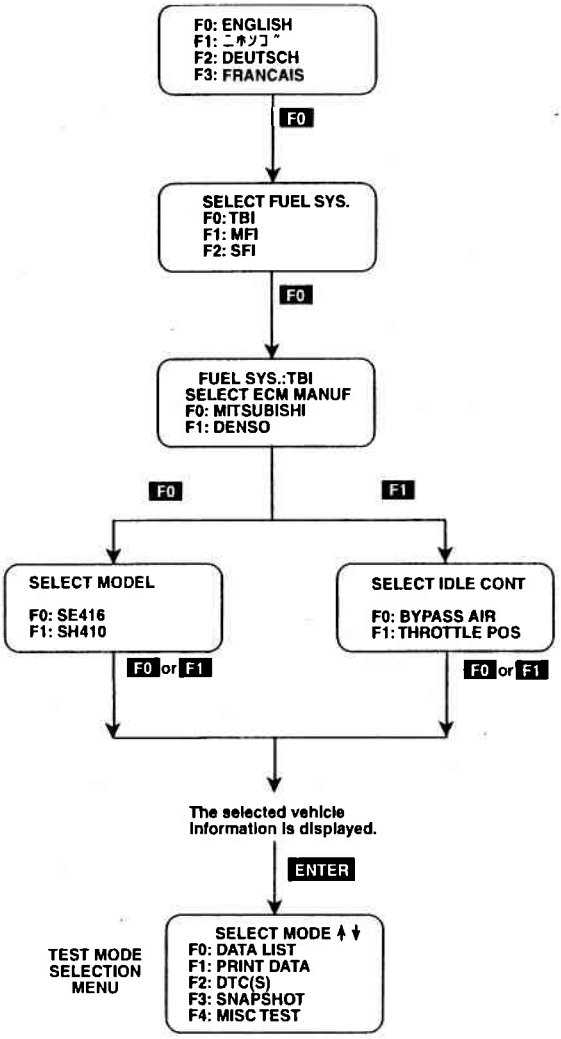
SELECTING A VEHICLE WITH A TBI FUEL SYSTEM



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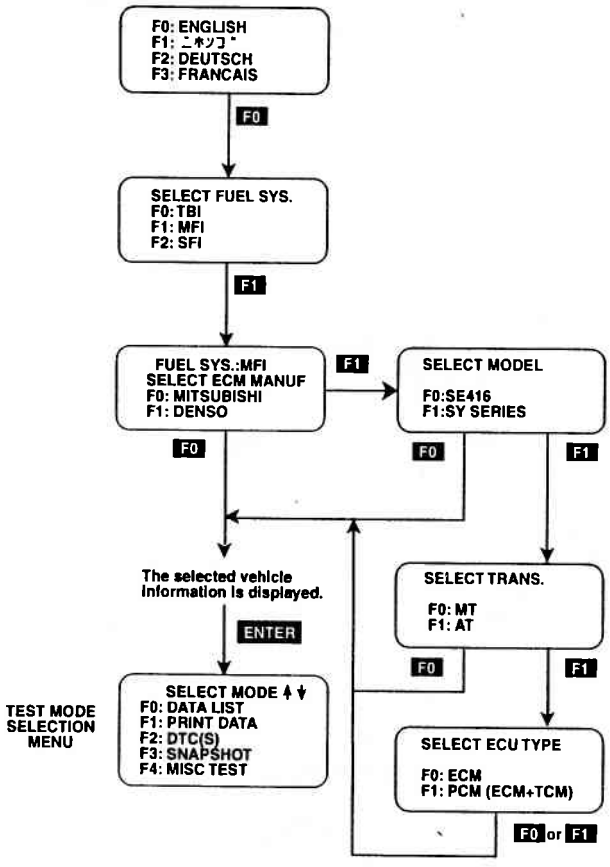
SELECTING A VEHICLE WITH A MFI FUEL SYSTEM



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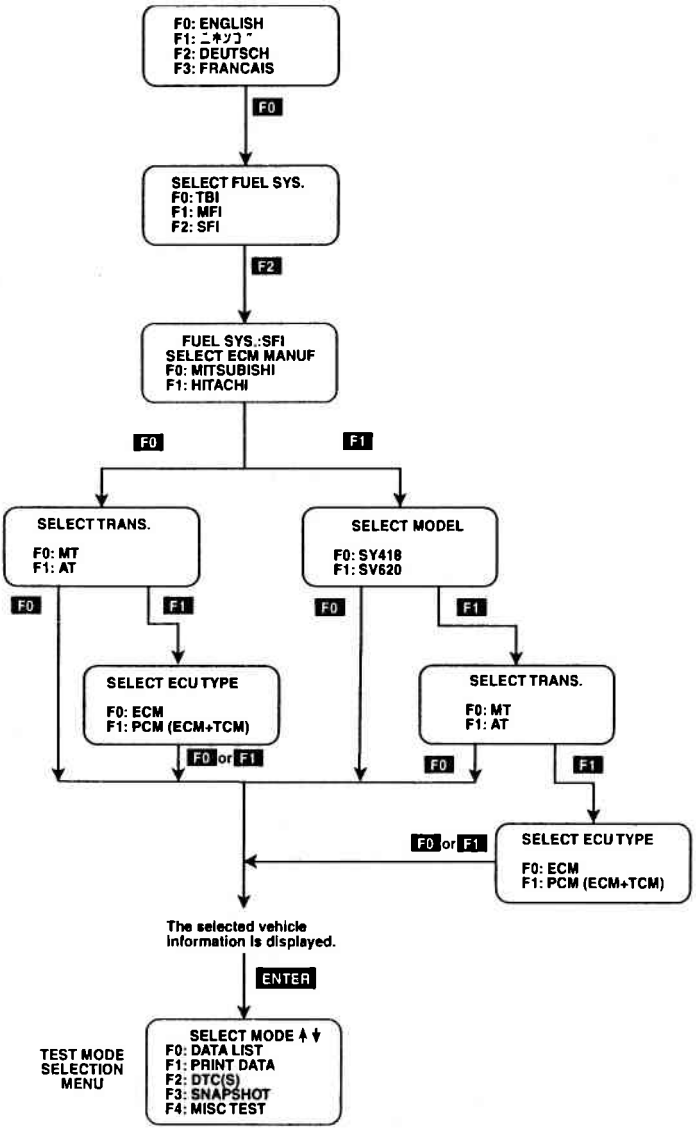
SELECTING A VEHICLE WITH A SFI FUEL SYSTEM



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5.0 SELECTING AND OPERATING THE TEST MODES

Press the function key to the left of the test you wish to perform. The TECH 1 will display test modes for the vehicle you have selected.

The following section contains a brief description of each test mode in the SUZUKI ECM 1.0 Application. A more detailed description of each test mode is given in the section discussing each test mode.

MODE F0: DATA LIST
Monitor data parameters from the ECM (or PCM).

MODE F1: PRINT DATA
Send one data stream of information to a serial printer, terminal or smart device.

MODE F2: DTC(S)
Display and clear stored Diagnostic Trouble Codes (DTC(S)).

MODE F3: SNAPSHOT
Capture and store ECM (or PCM) data parameters. Data is captured before and after a "trigger" point. Triggers can be on any DTC, a particular DTC, or manual TECH 1 key press. Captured data can then be displayed as well as DTC(S).

MODE F4: MISCELLANEOUS TESTS
Displays sub-modes to operate single tests.

While the* TECH 1 *is connected to the serial data link connector and conversing with the ECM (or PCM), the ECM (or PCM) ignores input signals from the TEST switch and the DIAG switch in the vehicle service connector.

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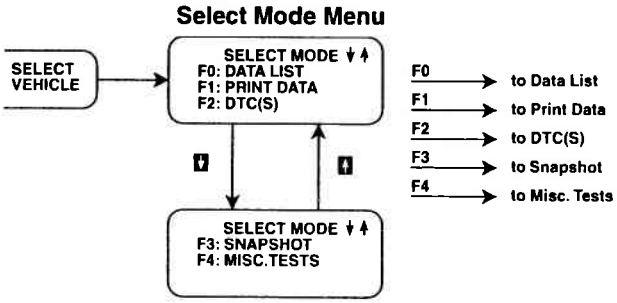
SELECTING TEST MODES

The TECH 1 makes selecting the test mode easy by displaying a list of tests (a test mode "menu"). The menu also displays which key is used to select each test mode. An example test mode menu is shown below.

To select a test mode, simply press the TECH 1 key listed to the left of the test mode on the menu. Since there are five test modes, the keys F0 - F4 are used.

The first three test modes are shown as soon as the ECM is selected. The other test modes will automatically scroll onto the display after three seconds. The display will automatically scroll between the two screens. To stop the automatic scrolling, press either the ↑ or ↓ key. The menu may then be manually changed by pressing either the ↑ or ↓ key. All menus of more than three items scroll in this way.

Regardless of which test modes are displayed, any test mode can be selected at any time from the menu



The Miscellaneous Test mode is used to select a submenu of tests. Pressing F4 displays the miscellaneous tests available. To return to the Select Mode menu just press EXIT.

ACTIVE TECH 1 KEYS	
F0 - F4	Select Test Mode.
↑ & ↓	Stop automatic menu scrolling, then used to manually control the menu display.
EXIT	Return to Vehicle Select step or return to Select Mode menu from Miscellaneous Tests menu.

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MISCELLANEOUS TESTS

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ECM NO.	MODEL	RPM CONT.	FIXED SPARK	IAC CAL.	EGR CONT.	STEPPING EGR CON.
1	SE416 (TBI)	•	•	•	•	
2	SE416 (MFI)	•	•	•		
3	SE416 (SFI) SZ416 (SFI)	•	•	•	•	
4	SF SERIES	•	•	•	•	
5	SY413/ SY415/ SY416 SY413 (PCM)	•	•		•	
6	SH410		•		•	
7	SV620	•	•	•		•
8	SY418	•	•	•	•	
9	SH410 (PCM)	•	•	•	•	
10	SV620 (PCM)	•	•	•		•
11	SE416 (PCM)	•	•	•	•	

NORTH AMERICAN MARKET (1991-1995)

ECM NO.	MODEL	RPM CONT.	FIXED SPARK	IAC CAL.	EGR CONT.	STEPPING EGR CON.
1	SE416 (TBI)	•	•	•	•	
3	SE416 (SFI)	•	•	•	•	
4	SF SERIES (TBI, Bypass Air Type)	•	•	•	•	
5	SF/SW SERIES (TBI, Throttle Position Type) SY413/SY416	•	•		•	

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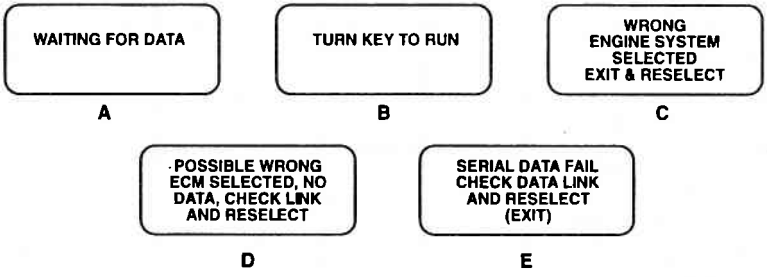
TECH 1-ECM COMMUNICATIONS STATUS DISPLAYS

Most TECH 1 test modes display data. Therefore, these test modes require the ECM to send data to the TECH 1. When you select a test mode, you may see one or more of the following TECH 1-ECM communications status displays.



DISPLAY A:
This means that the **TECH 1** cannot yet display data as it has not yet received a complete data message from the ECM. This display is sometimes seen right after selecting a test mode.

DISPLAY B:
This is a reminder that the ignition key needs to be in the RUN position for the TECH 1 to communicate with the vehicle.

DISPLAY C:
This occurs when the TECH 1 determines that the data stream it receives from the ECM does not match the vehicle that you have selected. If this happens, return to the vehicle select step by pressing **EXIT**. Double check your selection.

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DISPLAY D:
This occurs when the TECH 1 has not received any data from the ECM (or PCM). In this case, you should verify that the ignition is ON and check the serial data link connections. **An incorrect engine type selection may also cause this condition.**

Display E:
This occurs when communication with a vehicle has failed after communication has already been established.

ACTIVE TECH 1 KEYS	
EXIT	Return to vehicle select mode.

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MODE F0 | DATA LIST

The purpose of the DATA LIST mode is to passively monitor data which is being transmitted from the ECM during normal operation of the vehicle. This mode does not affect vehicle operation and you can use it to read data to see if it is correct, or at least reasonable. The current value of the parameter is displayed with the parameter units. This means you don't have to hunt through manuals to find out what is being displayed.

The data parameters are displayed in pre-programmed pairs. You can also create your own pairs through the process explained on the following pages.

OPERATING PROCEDURE:

1. Press **F0** to select the DATA LIST mode from the Select Mode menu.

2. Select the data parameters to be displayed by scrolling through the parameters with the **YES** and **NO** keys.

3. You may return to the Select Mode menu at any time by pressing **EXIT**.

Operation of the DATA LIST mode is summarized in the flow diagrams on the following pages.

ACTIVE TECH 1 KEYS FOR DATA LIST	
YES & **NO**	Scroll through displayed data parameters.
F0	Mark top displayed parameter as "fixed" for creating your own data pairs.
F1	Mark bottom displayed parameter as "fixed" for creating your own data pairs.
EXIT	Return to select mode menu.

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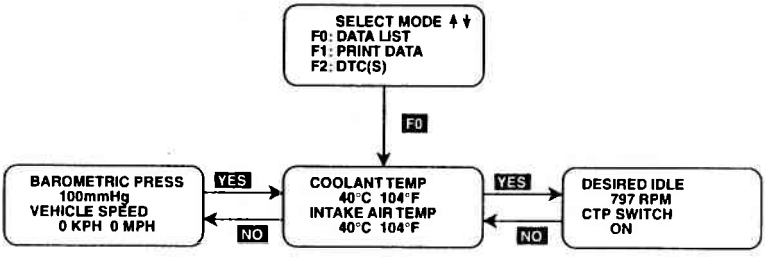
VIEWING ECM DATA PARAMETERS

In order to maximize the information that can be seen at one time, the TECH 1 displays data parameters in pre-assigned pairs. The first data pair displayed after you press **F0** is shown in the figure below. Also shown is how to scroll through the Data List with the **YES** and **NO** keys and how to create your own data pairs with the **F0** and **F1** keys.

To see other pre-assigned pairs, press either the **YES** or **NO** key. The **YES** key will cause the TECH 1 to scroll forward through the list of pre-assigned pairs, while the **NO** key will cause scrolling backwards.

Section 8.0 contains descriptions of all engine data parameters.



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MODE F0	DATA LIST

CREATE YOUR OWN DATA PAIRS

You can create data parameter pairs which are different from the preassigned pairs. Any two parameters can be displayed as a pair by simply scrolling either the bottom or top display parameter, while the other display parameter is fixed. To "fix" the top parameter press **F0**, an asterisk will appear by the fixed parameter. Press **F1** to "fix" the lower parameter. The TECH 1 will not allow both the top and bottom parameters to be fixed at the same time.

As an example, let's say you wish to create a pair with ENGINE SPEED and SPARK ADVANCE. To do so, scroll through the pre-assigned pairs with the **YES** and **NO** key until you find a pair with ENGINE SPEED. Fix the ENGINE SPEED by pressing the **F0** key if ENGINE SPEED is the top parameter, or the **F1** key if it is the bottom. Then scroll the other half of the display with either the **YES** or **NO** key until SPARK ADVANCE is displayed.

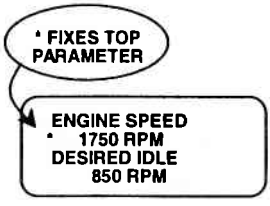

FIGURE A

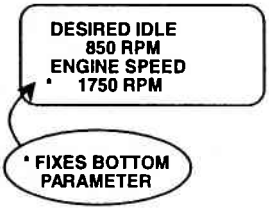

FIGURE B

PRINTING DATA

The currently displayed sample may be printed if the TECH 1 is equipped with an RS232C I/F Cartridge (P/N TK05030A) connected to a compatible printer. To print the data, press **F8**. The TECH 1 keyboard is disabled while data is being sent to the printer.

NOTE:
The RS232C I/F Cartridge is not required if you are using a TECH 1 Series A tester.

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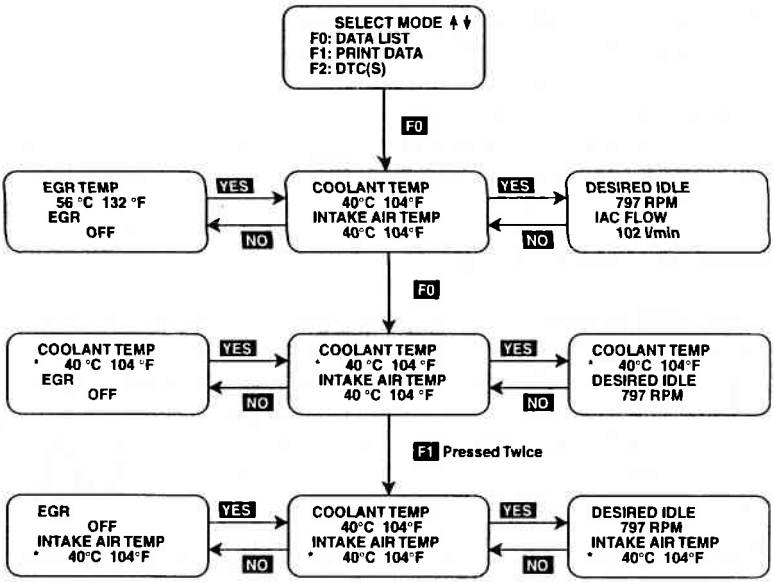
DATA LIST | MODE F0



ACTIVE TECH 1 KEYS FOR CREATING DATA PAIRS

YES , NO	Scroll through displayed data parameters.
EXIT	Return to the Select Mode menu.
F0 & F1	"FIX" the upper or lower parameter.

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MODE F1	PRINT DATA

PRINT DATA

When the RS232C I/F Cartridge is installed in the TECH 1, or if you are using a TECH 1 Series A tester, the Print Data mode allows you to print the VIN, engine type and Data List to a serial printer or terminal. This is the data list sent by the ECM (or PCM) to the TECH 1. The data list parameters can be printed without printing the VIN or engine type by pressing the **F8** key in the Data List or Snapshot Replay mode.

OPERATING PROCEDURE:

1. Press **F1** to select the Print Data mode from the Select Mode menu. The VIN entry screen is the first screen displayed in this mode. Only the last 6 digits of the VIN are entered on this screen. This information is then printed out as part of the header information that accompanies each data list print out. The VIN is entered via the numeric portion of the key pad and the **ENTER** key is pressed to move to the next section of the print function.

2. The next screen requires the **ENTER** key to be pressed to start printing the data. This screen allows the cable to be connected between the RS232C Cartridge and the receiving device.

3. When the **ENTER** key is pressed the "WAITING TO PRINT DATA" screen is displayed until printing begins. If this screen is displayed for more than a few seconds, something is wrong with the set up. Check that all connections are secure, and that any receiving device is turned on and in the proper receive mode.

4. As printing begins, the TECH 1 displays the % COMPLETE of the print procedure. After the printing is 100% complete, the VIN screen is immediately displayed with the previously selected VIN. Pressing the **ENTER** key twice from this screen will cause another data stream to be buffered for printing as soon as the current data stream is output from the TECH 1.

5. Pressing the **EXIT** key at any point will cause the select mode menu to be displayed. If the **EXIT** key is pressed before printing is completed, only the data that has already been sent to the RS232C Cartridge will be printed. SOME DATA WILL BE LOST.

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PRINT DATA VIN ENTRY SCREEN

SET UP RS232C CARTRIDGE

RS232C INTERFACE CARTRIDGE NOT CONNECTED

PRINT INITIALIZATION

PRINT IN PROGRESS SCREEN

ACTIVE TECH 1 KEYS TO PRINT DATA

ENTER	Move to the next section of the Print Data function.
0 - 9	VIN entry keys.
EXIT	Terminate the Print Data mode and return to the Select Mode menu.

PRINT SAMPLE

SUZUKI MOTOR CORPORATION
ENGINE TYPE: TBI
VIN: 123456
TECH 1 DATA LIST

NO.	DESCRIPTION	VALUE
1.	COOLANT TEMP	82°C 180°F
2.	INTAKE AIR TEMP	21°C 70°F
3.	DESIRED IDLE	875 RPM
4.	IAC FLOW	102 l/min
5.	IAC ADJUST MONI	2%

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MODE F2	DTC(S)

DIAGNOSTIC TROUBLE CODES DESCRIPTION

Diagnostic Trouble Codes or DTC(S) are set by the ECM (or PCM) when an abnormal condition is detected. They are a key to diagnosing many of the problems which can occur in the vehicle. The DTC(S) mode allows you quick access to trouble codes for initial vehicle checks and to check that a repair procedure has been successful. TECH 1 displays for the DTC(S) mode are shown on the following page.

The TECH 1 can clear all stored DTC(S) on 1991-97 vehicles except vehicles equipped with ECM Numbers 1 and 2 (SE416 (TBI) and SE416 (MFI)) as illustrated in the ECM Cartridge Coverage charts on Pages 1-2 and 1-3. To clear DTC(S) on vehicles equipped with ECM Numbers 1 and 2, turn the ignition switch OFF, then turn it ON again.

OPERATING PROCEDURE:

1. Press **F2** to select the DTC(S) mode from the Select Mode menu.

   If no DTC(S) are present, the TECH 1 will display a message to that effect.

2. If DTC(S) are present, the TECH 1 will automatically display each DTC for three seconds.

3. The DTC(S) will be continuously displayed, wrapping around to the first code automatically after the last code has been displayed. First a listing of all Current DTC(S) is displayed, followed by History DTC(S) with a Current vs. History indication.

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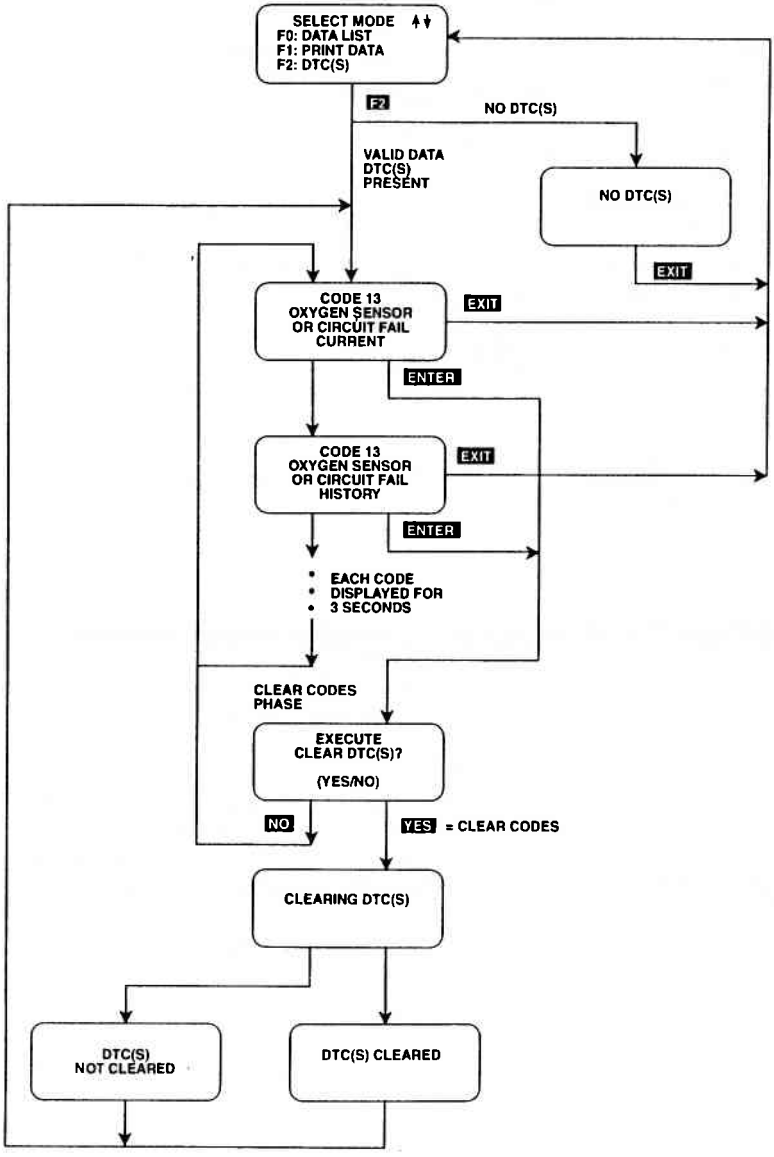

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MODE F2	DTC(S)

CLEAR CODES PHASE

4. To clear all stored DTC(S), press the **ENTER** key to go to Clear Codes Phase. When the TECH 1 displays "EXECUTE CLEAR DTC(S)?", select either the **YES** key for clearing DTC(S) or the **NO** key for not clearing them.

   When the **YES** key is pressed, TECH 1 will display a "CLEARING DTC(S)" message, followed by either a "DTC(S) CLEARED" or a "DTC(S) NOT CLEARED" message. After a few seconds the TECH 1 will automatically start displaying DTC(S) again. If no DTC(S) are present at this time the "NO DTC(S)" screen is displayed. When the **NO** key is pressed, the DTC(S) are retained in the ECM or (PCM) and the TECH 1 will start displaying DTC(S) again.

5. Pressing **EXIT** will terminate the DTC(S) mode returning you to the select mode menu.

NOTE

DTC(S) can also be displayed in SNAPSHOT mode.

DTC(S) can also be printed in a tabular format using the Screen Print feature if the RS232C I/F Cartridge is installed or if you are using a TECH 1 Series A tester. Screen Print is enabled by pressing **F6** until an "RS232 SET-UP" menu is displayed. Press **F1** to enable the Screen Print function. Refer to the RS232C I/F or TECH 1 Series A Operators Manual for more detail.

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ACTIVE TECH 1 KEYS FOR DTC(S)	
ENTER	Clear all stored ECM DTC(S).
YES	Clear all stored ECM DTC(S).
NO	Return to display DTC(S). DTC(S) are not cleared.
F6 (Hold)	Select "RS232C SET-UP" menu.
EXIT	Terminate the DTC(S) display and return to the select mode menu.

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MODE F3 | SNAPSHOT

The purpose of the SNAPSHOT test mode is to help you isolate an intermittent or transient problem by STORING ENGINE DATA PARAMETERS BEFORE AND/OR AFTER THE PROBLEM OCCURS.

When the TECH 1 is operating in SNAPSHOT mode, it is constantly storing information about data parameters and DTC(S). A time and position index for the stored information is also saved.

The TECH 1 stores all of the Data List parameters and DTC(S) for the vehicle selected. When the memory is full, the oldest (earliest) data collected is erased to make room for new information.

A "TRIGGER" tells the TECH 1 when to stop collecting data. You can specify a "TRIGGER CONDITION" so the TECH 1 collects data that will be most useful in diagnosing the current problem.

TRIGGER CONDITION

The trigger condition defines the specific circumstances under which you want the trigger to be set. The possible trigger conditions are:

1) ANY DTC: If any DTC is detected by the TECH 1, it will cause the trigger to be set.

2) SINGLE DTC: You can select a specific DTC that must be detected before the trigger will be set. Step 3 in the Operating Procedure tells you how to enter the code.

3) MANUAL TRIGGER: While operating the SNAPSHOT mode, you can always cause the trigger to be set by pressing the **ENTER** key.

Once the trigger occurs, the TECH 1 will retain data according to which trigger point you have selected.

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VIEWING CAPTURED DATA

By selecting F3: REPLAY DATA from the SNAPSHOT menu you have the option of bypassing the Data Capture phase and displaying previously captured data. All data captured during SNAPSHOT will be retained in the TECH 1 until it is overwritten by a new SNAPSHOT, or if the TECH 1 is disconnected from the serial data link connector or the cigarette lighter for at least one-half hour.

PRINTING CAPTURED DATA

In addition, you can print the captured data, providing a hard copy of any selected data sample. A TECH 1 printer is required to support this print function. See Step 11.

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MODE F3	SNAPSHOT

OPERATING PROCEDURE:

The operation of SNAPSHOT mode is divided into three phases: Set-Up (Steps 1-3), Data Capture (Steps 4-7), and Data Display (Steps 8-12).

SET-UP PHASE

1. Press **F3** to select the SNAPSHOT mode from the Select Mode menu.

2. The trigger condition and review data options are displayed next in a self-scrolling Snapshot Options menu.

   To select a trigger option, just press the Function Key displayed to the left of the desired trigger condition. To replay previously captured data, press **F3**.

3. To choose a specific ECM (or PCM) DTC, press **F1** in the Snapshot Options menu.

   When the TECH 1 screen displays "SNAPSHOT MODE, ENTER DTC TO TRIGGER ON xx", use numeric keys **0**-**9** to enter the two digit DTC number that you have selected, then press the **ENTER** key. The TECH 1 will continue to store data until the specified DTC is detected, or until you press the **EXIT** key. If the DTC you enter does not exist for the engine type being tested, an "INVALID DTC" message will be displayed and the code will have to be reentered.

ACTIVE TECH 1 KEYS IN SNAPSHOT SET-UP PHASE	
EXIT	Return to Snapshot Options menu.
F0 - **F2**	Select trigger condition.
F3	Select Replay Data.
0 - **9**	Select specific DTC.
ENTER	Enter selected DTC.

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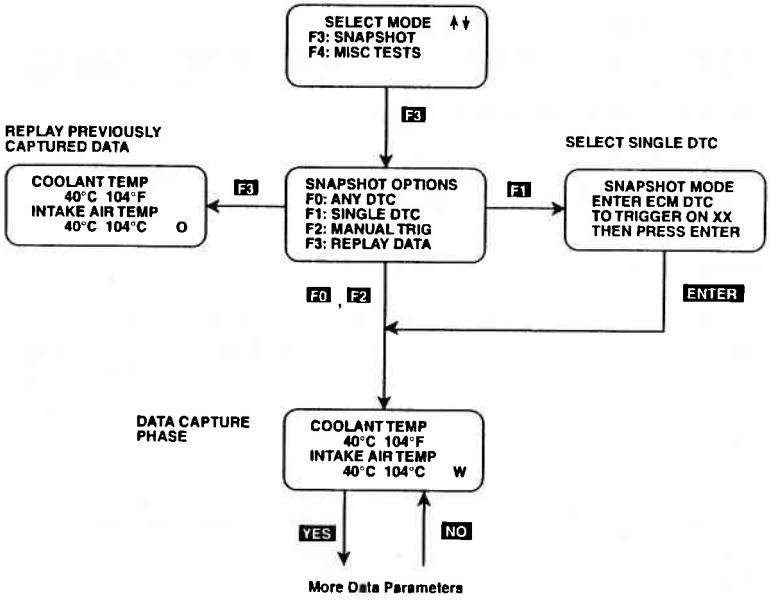
SNAPSHOT SET-UP PHASE (Select Trigger Condition or Display Previously Captured Data).

To select a trigger condition, press the function key to the left of the desired trigger condition. To bypass the Data Capture phase and review previously captured data, press **F3**.



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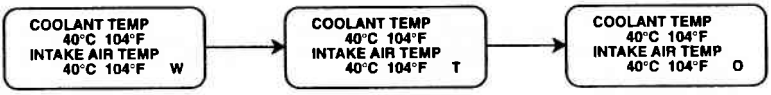
MODE F3 | SNAPSHOT

DATA CAPTURE PHASE

4. Once the trigger condition is specified, the TECH 1 begins storing engine (or transmission) data parameters and DTC(S) while displaying the Data List parameters.

5. The data is organized as a number of data 'samples'. The value or state of each parameter as well as all DTC(S) are saved for each sample. The data display will indicate the 'waiting for trigger' condition with a flashing 'W' in the lower right-hand corner of the display. While waiting for the selected trigger, the **ENTER** key can always be used to force a trigger.



Waiting for Trigger **Trigger Occurs** **Data Display Phase**

6. Once the trigger occurs, the TECH 1 will continue to save data samples until its memory is full. The data display indicates that the trigger has occurred by replacing the flashing 'W' with a flashing 'T'. As soon as the memory is full, the data capture terminates automatically and the TECH 1 goes to the Data Display phase.

7. Pressing **EXIT** will terminate the Data Capture phase. If the trigger has already occurred, the Snapshot mode will move to the Data Display Phase.

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ACTIVE TECH 1 KEYS IN SNAPSHOT DATA CAPTURE PHASE

YES & NO	Scroll through displayed data parameters.
F0	Mark top displayed parameter as "fixed" for creating your own data pairs.
F1	Mark bottom displayed parameter as "fixed" for creating your own data pairs.
ENTER	Manual trigger.
EXIT	Display captured data if trigger has already occurred.

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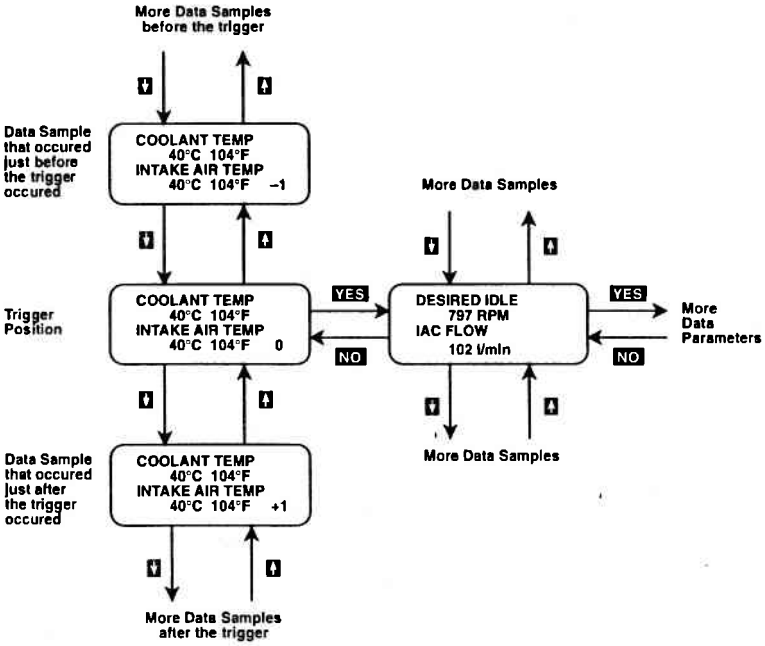
MODE F3	SNAPSHOT

DATA DISPLAY PHASE

8. The Data Display phase is indicated with a number (initially zero) in the lower right-hand corner of the display. Select the data to be displayed by using the YES and NO keys.

NOTE

During the Data Display phase, the DTC(S) present during each sample can be displayed by pressing F2.



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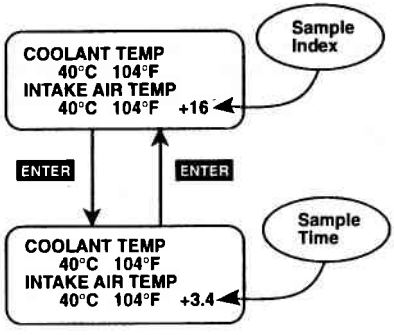
9. Use the ↑ and ↓ keys to select the desired sample. An index is displayed in the lower right-hand corner of the TECH 1 display. Sample "0" corresponds to the trigger sample; sample "–1" is the sample immediately preceding the trigger; sample "+1" is immediately after the trigger, and so on. The index range may be less than the maximum number of samples if not enough time was allowed for data capture before or after the trigger.

   You can advance directly to the first, last, or trigger sample with the press of a button.

   F4: Display first (earliest) sample
   F5: Display trigger sample (0)
   F6: Display last (most recent) sample

10. While in the data display phase, pressing ENTER will cause the TECH 1 to toggle between the sample index and sample time.



The sample time display gives the time in seconds (relative to the trigger sample) at which the TECH 1 received the currently displayed sample. For example, a sample time of +3.4 means the sample was received 3.4 seconds after the trigger sample. A sample time of –2.6 seconds means the sample was received 2.6 seconds before the trigger.

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11. The currently displayed sample may be printed if the tester is connected to a compatible printer. To print the data, press F8. The TECH 1 keyboard will be disabled while data is being sent to the printer.

    SNAPSHOT data can also be printed in a tabular format using the Screen Print feature if the RS232C I/F Cartridge is installed or if you are using a TECH 1 Series A tester. Screen Print is enabled by pressing F6 until an "RS232 SET-UP" menu is displayed. Press F1 to enable the Screen Print function. Refer to the RS232C I/F or TECH 1 Series A Operator's Manual for more detail.

12. When you are finished viewing the sampled data, press EXIT to return to the Snapshot Options menu. If you are finished with the SNAPSHOT mode, press EXIT again to return to the select mode menu.

ACTIVE TECH 1 KEYS IN SNAPSHOT DATA DISPLAY PHASE

YES & NO	Scroll through displayed data parameters.
↑ & ↓	Scroll through selected samples.
F0 & F1	Fix top or bottom display parameter respectively.
F2	Display DTC(S) for current sample.
F4	Advance to first (earliest) sample.
F5	Advance to trigger sample (sample 0).
F6	Advance to last (most recent) sample.
F6 (Hold)	Select "RS232C SET-UP" menu.
F8	Print current data sample (if equipped with RS232C I/F Cartridge or TECH 1 Series A and printer).
ENTER	Toggle between sample index and sample time display.
EXIT	Return to Snapshot Options menu.

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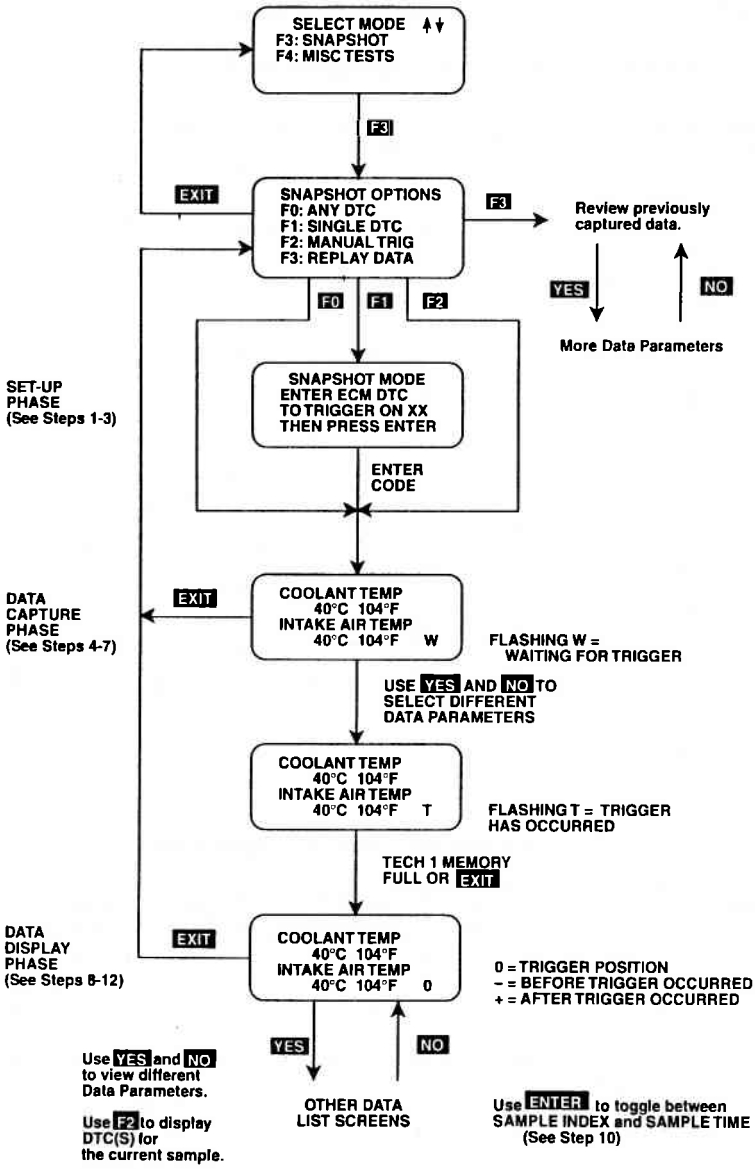
SNAPSHOT MODE FLOW CHART



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MODE F4	MISC TESTS

MISCELLANEOUS TESTS MODES

The following charts list the available Miscellaneous Tests.

OTHER THAN NORTH AMERICAN MARKET (1991-1997)

ECM NO.	MODEL	RPM CONT.	FIXED SPARK	IAC CAL.	EGR CONT.	STEPPING EGR CON.
1	SE416 (TBI)	•	•	•	•	
2	SE416 (MFI)	•	•	•		
3	SE416 (SFI) SZ416 (SFI)	•	•	•	•	
4	SF SERIES	•	•	•	•	
5	SY413/ SY415/ SY416 SY413 (PCM)	•	•		•	
6	SH410		•		•	
7	SV620	•	•	•		•
8	SY418	•	•	•	•	
9	SH410 (PCM)	•	•	•	•	
10	SV620 (PCM)	•	•	•		•
11	SE416 (PCM)	•	•	•	•	

NORTH AMERICAN MARKET (1991-1995)

ECM NO.	MODEL	RPM CONT.	FIXED SPARK	IAC CAL.	EGR CONT.	STEPPING EGR CON.
1	SE416 (TBI)	•	•	•	•	
3	SE416 (SFI)	•	•	•	•	
4	SF SERIES (TBI, Bypass Air Type)	•	•	•	•	
5	SF/SW SERIES (TBI, Throttle Position Type) SY413/SY416	•	•		•	

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MISC TESTS MODE ABORT CONDITIONS

The following chart lists the vehicle conditions that will cause the Miscellaneous Tests to abort (stop). If you are unable to perform the test or if the test aborts after it starts, confirm that none of the following conditions exists before starting the test again.

ECM NO.	OUTPUT CONTROL	CONDITION
1, 2, 3, 4, 5, 9, 11	RPM Control	Engine speed greater than 2000 RPM. Vehicle speed detected.
7, 8, 10	RPM Control	Engine Speed less than 500 RPM or greater than 2000 RPM. Coolant Temperature less than 70 °C. CTP Switch OFF.
1, 2, 3, 4, 5, 6, 9, 11	Fixed Spark	Engine speed greater than 2000 RPM. Vehicle speed detected.
7, 8, 10	Fixed Spark	Engine Speed greater than 2000 RPM. Coolant Temperature less than 70 °C. CTP Switch OFF.
1, 2, 3, 4, 9, 11	IAC CAL	Engine speed greater than 2000 RPM. Vehicle speed detected.
7, 8, 10	IAC CAL	Coolant Temperature less than 70 °C or greater than 105 °C. CTP Switch OFF.
1, 3, 4, 5, 6, 9, 11	EGR Control	Engine Speed less than 1500 RPM or greater than 4000 RPM. Coolant Temperature less than 55 °C.
8	EGR Control	Engine Speed less than 1500 RPM or greater than 4000 RPM. Coolant Temperature less than 70 °C. CTP Switch ON.
7, 10	Stepping EGR Control	Engine Speed less than 200 RPM. Coolant Temperature greater than 70 °C. CTP Switch OFF.

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MODE F4	MISC. TESTS
SUBMODE F0	RPM CONTROL

RPM Control is not an engine test, but it allows you to control the RPM. If an elevated RPM, minimum air adjustment or diagnosis of the IAC valve is required for any reason, this mode allows quick and easy control of the RPM from any area of the vehicle.

NOTICE:

THIS TEST SHOULD ONLY BE RUN WITH THE PARKING BRAKE ON AND THE WHEELS ADEQUATELY SECURED. ANY OTHER MODE OF OPERATION IS NOT RECOMMENDED AND IS UNSAFE.

OPERATING PROCEDURES

1. Press **F0** to select the RPM Control mode from the Miscellaneous Test menu. The RPM CONTROL instruction screen is displayed, followed by the BLOCK WHEELS screen.

2. Block the wheels, set the parking brake, put the transmission in Park or Neutral, then start the engine. Warm the engine to operating temperature (at least 70°C).

3. Press **ENTER** to begin the test.

4. The TECH 1 first automatically controls the engine speed to the current desired idle. When the RPM Control Testing Screen is displayed, you can increase the engine RPM by pressing the ↑ key. To decrease the RPM, press the ↓ key. Holding down either key will cause the RPM to change in the appropriate direction.

   If the TECH 1 detects any of the conditions listed on page 5-27, the test will be terminated and the cause will be displayed.

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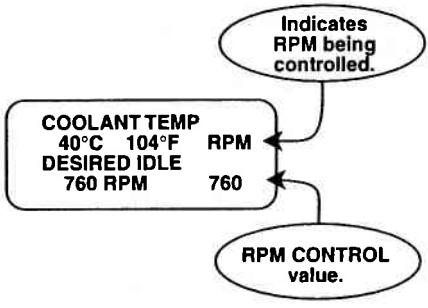
MISC. TESTS	MODE F4
RPM CONTROL	SUBMODE F0

5. While in the RPM CONTROL mode, parameters can be displayed as in the DATA LIST mode. RPM appears at the end of line two of the display, and the currently commanded value of RPM is displayed at the end of line four. Data parameters can be scrolled and fixed as in the DATA LIST mode.



RPM CONTROL TESTING SCREEN

6. To return to the initial desired idle control RPM, press the **ENTER** key.

7. Press the **EXIT** key to return control of the IAC valve to the ECM and to return to the Miscellaneous Tests menu.

ACTIVE TECH 1 KEYS FOR RPM CONTROL	
↑	Increase engine speed.
↓	Decrease engine speed.
YES & NO	Scroll through displayed data parameters.
F0 & F1	Mark top or bottom displayed parameter as fixed for creating your own data pairs.
ENTER	Return to initial desired idle RPM control.
EXIT	Terminate the RPM CONTROL mode and return to the Miscellaneous Test menu.

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MODE F4	MISC. TESTS
SUBMODE F1	FIXED SPARK MODE

The purpose of the Fixed Spark mode is to continuously monitor engine data parameters while commanding ECM (or PCM) operation in the fixed spark mode. The Fixed Spark mode allows you to set the engine timing.

The TECH 1 Fixed Spark mode allows monitoring of engine data parameters in a manner identical to that of the Data List mode. Fixed spark operation is indicated by the letters "FXS" in the lower right corner of the TECH 1 display as shown on the following page.

OPERATING PROCEDURE:

1. Press **F1** to select the Fixed Spark mode from the Miscellaneous Test menu.

2. Set the parking brake, block the wheels, then start the engine. Warm the engine to operating temperature (at least 70°C).

3. Press **ENTER** to begin the test.

4. Select the data parameters to be displayed by scrolling through the parameters with the **YES** and **NO** keys.

   If the TECH 1 detects any of the conditions listed on page 5-27, the test will be terminated and the cause will be displayed.

5. Press **EXIT** to terminate the Fixed Spark mode and return to the Miscellaneous Tests menu.

Operation of the Fixed Spark mode is summarized in the following flow diagram.

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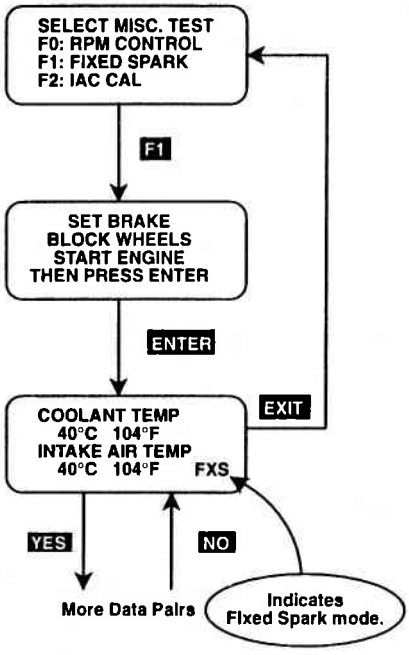
MISC. TESTS	MODE F4
FIXED SPARK MODE	SUBMODE F1



FIXED SPARK MODE

ACTIVE TECH 1 KEYS FOR FIXED SPARK MODE	
YES & NO	Scroll through displayed parameters.
F0	Mark top displayed parameter as "fixed" for creating your own data pairs.
F1	Mark bottom displayed parameter as "fixed" for creating your own data pairs.
EXIT	Return to Miscellaneous Test menu.

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MODE F4	MISC. TESTS
SUBMODE F2	IAC CAL

The purpose of the IAC CAL mode is to set the duty of the IAC valve to a certain value at idle speed. This is done by adjusting the Idle adjustment screw in the throttle body. The IAC CAL mode allows monitoring of engine data parameters in a manner identical to that in the DATA LIST mode.

OPERATING PROCEDURE:

1. Press **F2** to select the IAC CAL from the Miscellaneous Test menu.

2. Block the wheels, shift to Park and set the parking brake.

3. Make sure the vehicle is in Park with the parking brake engaged, start the engine unless it is already running. Warm the engine to operating temperature (at least 70°C).

4. Press **ENTER** to begin the test.

5. Select the data parameters to be displayed by scrolling through the parameters with the **YES** and **NO** keys. The letters "IAC" appearing at the end of line two of the display indicate that the IAC valve is being controlled. At the end of line four of the display, "CAL" (Calibrated Air) will be displayed.

   If the TECH 1 detects any of the conditions listed on page 5-27, the test will be terminated and the cause will be displayed.

6. Press **EXIT** to return to the Miscellaneous Tests menu and return control of the IAC system to the ECM or (PCM).

Operation of the IAC CAL function is summarized in the following flow diagram.

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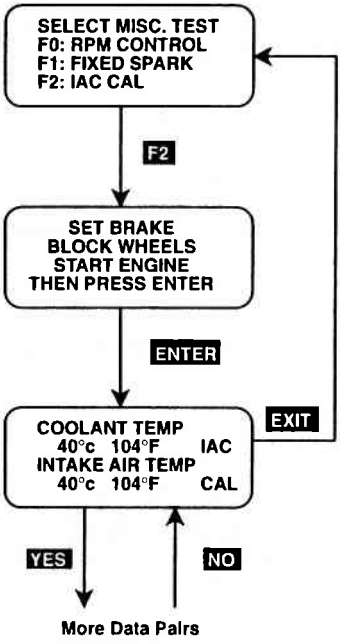
MISC. TESTS	MODE F4
IAC CAL	SUBMODE F2



IDLE AIR CONTROL CALIBRATION (IAC CAL)

ACTIVE TECH 1 KEYS FOR IAC CAL	
YES & NO	Scroll through displayed data parameters.
F0	Mark top displayed parameter as "fixed".
F1	Mark bottom displayed parameter as "fixed".
ENTER	Advance to IAC Control, provided vehicle is in Park or Neutral.
EXIT	Return to Miscellaneous Test menu.

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MODE F4	MISC. TESTS
SUBMODE F3	EGR CONTROL

The EGR Control mode allows you to continuously monitor Data List parameters while commanding the EGR control ON. When EGR control is ON, exhaust gas is introduced into the intake manifold. The engine should be warmed to control operating temperature before performing the EGR Control mode test.

OPERATING PROCEDURE:

1. Press **F3** to select the EGR Control mode from the Miscellaneous Test menu.

2. Set the parking brake, block the wheels, then start the engine. Warm the engine to operating temperature (at least 70°C).

3. Control the engine speed to 1500-4000 RPM, then press **ENTER**.

4. Select the data parameters to be displayed by scrolling through the parameters with the **YES** and **NO** keys. "EGR" is displayed at the end of line 2 and "ON" is displayed at the end of line 4 indicating that the EGR system is being controlled.

   If the TECH 1 detects any of the conditions listed on page 5-27, the test will be terminated and the cause will be displayed.

5. The test begins with the EGR on. To control the EGR off, press the ↓ key. To control EGR on again press the ↑ key. The Data List display for monitoring the engine's response is available while the EGR is being controlled.

6. Press **EXIT** to return to the Miscellaneous Test menu and return EGR Control to the ECM or (PCM).

Operation of the EGR Control mode is summarized in the following flow diagram.

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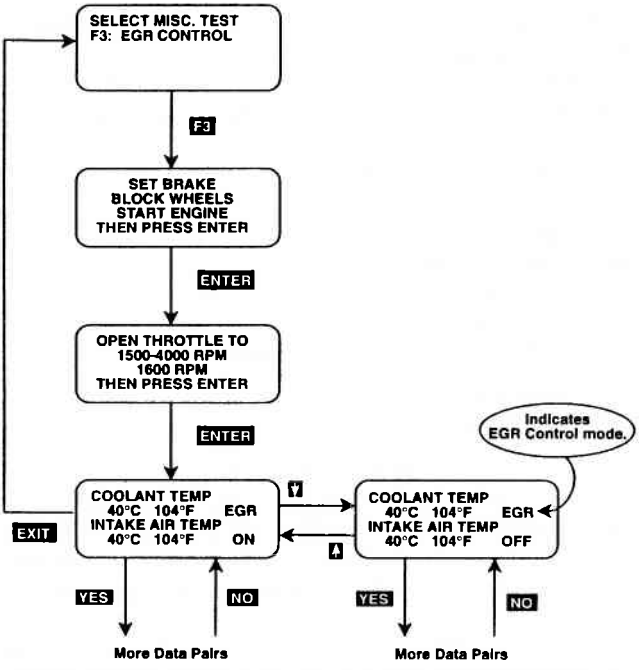
MISC. TESTS	MODE F4
EGR CONTROL	SUBMODE F3



ACTIVE TECH 1 KEYS FOR EGR CONTROL MODE

YES & NO	Scroll through displayed data parameters.
F0	Mark top displayed parameter as "fixed".
F1	Mark bottom displayed parameter as "fixed".
ENTER	Advance to EGR Control, provided vehicle is in Park or Neutral.
↑	Switch EGR control on while viewing parameters.
↓	Switch EGR control off while viewing parameters.
EXIT	Return to Miscellaneous Test menu.

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MODE F4	MISC. TESTS
SUBMODE F4	STEPPING EGR CONTROL

The Stepping EGR Control mode allows you to regulate the Stepping EGR opening in increments from 0 to 100, and displays the stepping EGR monitor value as a percentage. The TECH 1 initializes the Stepping EGR opening to the current value (=0%).

OPERATING PROCEDURE:

1. Press **F4** to select the STEPPING EGR Control mode from the Miscellaneous Test menu.

2. Set the parking brake, block the wheels, put the transmission in Park or Neutral, then start the engine.

3. Press **ENTER** to begin the test.

4. The test begins with the Stepping EGR at 0%. "EGR" is displayed at the end of line 2 and the Stepping EGR value is displayed at the end of line 4. Press the ↑ key to increase the Stepping EGR value. To decrease the Stepping EGR value, press the ↓ key. The Stepping EGR value is displayed as a percentage (%).

   If the TECH 1 detects any of the conditions listed on page 5-27, the test will be terminated and the cause will be displayed.

5. Press **EXIT** to return to the Miscellaneous Test menu.

Operation of the Stepping EGR Control mode is summarized in the following flow diagram.

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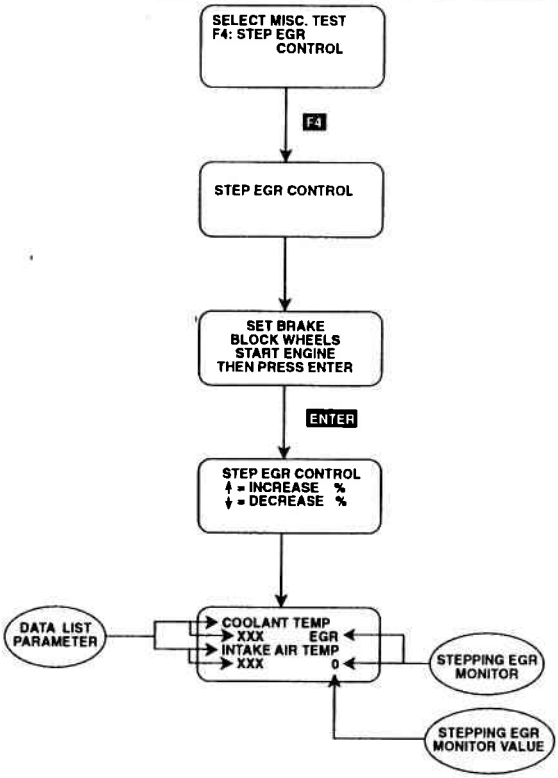
MISC. TESTS	MODE F4
STEPPING EGR CONTROL	SUBMODE F4



ACTIVE TECH 1 KEYS FOR STEPPING EGR CONTROL MODE

YES & NO	Scroll through displayed data parameters.
ENTER	Advance to STEPPING EGR Control provided vehicle is in Park or Neutral.
↑	Increase STEPPING EGR control value while viewing parameters.
↓	Decrease STEPPING EGR control value while viewing parameters.
EXIT	Return to Miscellaneous Test menu.

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6.0 FINISHING UP

After using the Suzuki ECM 1.0 Application, a few simple steps will insure that you get the most life out of your diagnostic tool.

First, remove power to the TECH 1 by disconnecting the serial data link cable from the serial data link connector. You may want to inspect the cable and connector for any damage or corrosion.

Next, unplug the cartridge and store it and the cable in the travelling case.

If the TECH 1 should become dirty you may wipe it off with a clean cloth and mild detergent or hand soap. Avoid using harsh solvents such as petroleum based cleaning agents, Benzene, Trichloroethylene, etc. Although the TECH 1 is water resistant it is not waterproof so be sure to thoroughly dry off the TECH 1 prior to storage.

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7.0 DTC(S)

Listed below is a brief description for all DTC(S) that can be displayed with the Suzuki ECM 1.0 Application.

ECM TROUBLE CODE	TECH 1 DISPLAY DESCRIPTOR	TROUBLE CODE DESCRIPTION
12	NO CODES	No Codes.
13	OXYGEN SENSOR OR CIRCUIT FAIL	Oxygen sensor or Oxygen sensor or circuit malfunction.
13	OXYGEN SENSOR B1 OR CIRCUIT FAIL	Bank 1 Oxygen Sensor or circuit malfunction.
14	ECT SENSOR OR CIRCUIT OPEN	Engine coolant temperature sensor or circuit open.
15	ECT SENSOR OR CIRCUIT SHORT	Engine coolant temperature sensor or circuit short.
21	TP SENSOR VOLTAGE HIGH	Throttle position sensor signal voltage too high. Throttle position sensor or circuit failure.
22	TP SENSOR VOLTAGE LOW	Throttle position sensor signal voltage too low. Throttle position sensor or circuit failure.
23	IAT SENSOR OR CIRCUIT OPEN	Intake air temperature too low. Intake air temperature sensor or circuit open.
24	VSS NO SIGNAL	Vehicle Speed Sensor signal not received by the ECM (or PCM). Vehicle speed sensor circuit fail ure.
24	VSS (METER) NO SIGNAL	Vehicle Speed Sensor signal from the Meter Cluster not received by the ECM (or PCM).
25	IAT SENSOR OR CIRCUIT SHORT	Intake air temperature too high. Intake air temperature sensor or circuit short.

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ECM TROUBLE CODE	TECH 1 DISPLAY DESCRIPTOR	TROUBLE CODE DESCRIPTION
26	OXYGEN SENSOR B2 OR CIRCUIT FAIL	Bank 2 Oxygen Sensor or Circuit malfunction.
31	MAP SENSOR VOLTAGE HIGH	Manifold Absolute Pressure sensor signal voltage too high. MAP sensor or circuit failure.
31	MAP SENSOR VOLTAGE LOW	Manifold Absolute Pressure sensor signal voltage too low. MAP sensor or circuit failure.
32	MAP SENSOR VOLTAGE LOW	Manifold Absolute Pressure sensor signal voltage too low. MAP sensor or circuit failure.
32	MAP SENSOR VOLTAGE HIGH	Manifold Absolute Pressure sensor signal voltage too high. MAP sensor or circuit failure.
33	AIR FLOW SENSOR VOLTAGE HIGH/LOW	Volume Air Flow sensor voltage too high or too low. VAF sensor or circuit failure.
33	MAF SENSOR VOLTAGE HIGH	Mass Air Flow sensor voltage too high. MAF sensor or circuit failure.
34	MAF SENSOR VOLTAGE LOW	Mass Air Flow sensor voltage too low. MAF sensor or circuit failure.
41	IGNITION SIGNAL FAIL	Ignition signal not received by the ECM. Ignition system problem.
42	CMP SENSOR NO SIGNAL	Camshaft Position sensor signal not received by the ECM. CMP sensor or circuit failure.

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TROUBLE CODE	TECH 1 DISPLAY DESCRIPTOR	TROUBLE CODE DESCRIPTION
44	CTP SWITCH OR CIRCUIT OPEN	CTP Switch failure or circuit open.
45	CTP SWITCH OR CIRCUIT SHORT	CTP Switch failure or circuit short.
46	ISC SYSTEM FAIL	Idle Speed Control system failure.
51	EGR SYSTEM FAIL	Exhaust gas recirculation system malfunction.
51	EGR SYSTEM FAIL EGRT SENS. SHORT	Exhaust gas recirculation temperature sensor or circuit short.
51	EGR SYSTEM FAIL EGRT SENSOR OPEN	Exhaust gas recirculation temperature sensor or circuit open.
51	EGR VALVE CIRCUIT OPEN	EGR valve circuit open.
52	INJECTOR FAIL	Fuel Injector failure.
53	ECM WRONG ASSEMBLY	Improper ECM installation. ECM other than California (USA) Version installed.
53	GND CIRCUIT OPEN/ ECM WRONG ASSEM	Ground circuit for 1991-93 California spec. vehicle is open. Wrong ECM installed in a 1994 USA spec. vehicle.
61	SHIFT SOLENOID NO. 1 OPEN	Shift solenoid No. 1 circuit open.
62	SHIFT SOLENOID NO. 1 SHORT	Shift solenoid No. 1 circuit short.

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TROUBLE CODE	TECH 1 DISPLAY DESCRIPTOR	TROUBLE CODE DESCRIPTION
63	SHIFT SOLENOID NO. 2 OPEN	Shift solenoid No. 2 circuit open.
64	SHIFT SOLENOID NO. 2 SHORT	Shift solenoid No. 2 circuit short.
65	TCC SOLENOID OPEN	Torque Converter Clutch circuit open.
66	TCC SOLENOID SHORT	Torque Converter Clutch circuit short.
72	TRANS. RANGE SWITCH FAIL	Transmission Range switch failure
75	VSS (TRANS) NO SIGNAL	Signal of the Vehicle Speed Sensor in transmission not received by ECM (or PCM).

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8.0 DATA LIST PARAMETER DESCRIPTIONS

The TECH 1 is capable of displaying a wide variety of ECM (or PCM) parameters in Data List, Snapshot, RPM Control and Output Test modes. The ECM (or PCM) sends the TECH 1 information regarding the state of the engine as the ECM (or PCM) sees it. The TECH 1 'translates' and displays this information in the form of parameters selected by the service technician. This section describes those parameters.

There are two basic types of parameters: discrete and analog. Discrete parameters are 'bits' of information and can be in only one of two distinct states (on/off, open/closed, etc.). Switches and solenoids are examples of discrete parameters. Analog parameters are used to represent quantities and are displayed as a value with appropriate units. Examples of analog parameters include Engine Speed, Coolant Temperature, Oxygen Sensor Voltage, etc.

Parameters are grouped by ECM (or PCM) function. The categories are:

1) General and Electrical

2) Fuel Delivery and Spark Control

3) Emissions & Driveability

4) Transmission

5) Miscellaneous

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CATEGORY DESCRIPTIONS

1) General Parameters are those that effect or are affected by many different ECM (or PCM) systems. Included are: Engine Speed, Vehicle Speed, Engine Coolant Temperature and Charging Efficiency related parameters.

   Electrical Parameters can be used to help diagnose vehicle electrical problems and include Battery Voltage, Electric Load.

2) Fuel Delivery Parameters describe the ECM or (PCM) fuel control system in action. After the engine has warmed up, the ECM (or PCM) controls the air/fuel mixture ratio based on the values of certain engine sensor inputs. Examples of such inputs include Intake Air Temperature and Pressure, and Oxygen Sensor Voltage. The output signals of the fuel control system depend on the fuel delivery system.

   Spark Control Parameters are associated with spark timing calculations. Engine sensor values are used by the ECM (or PCM) to increase or decrease (retard) spark advance.

3) Emissions & Driveability refer to all parameters that are related to improvements in performance or air pollution reduction.

   Systems included are:
   Idle Air Control/Idle Speed Control
   Exhaust Gas Recirculation
   Evaporative Emission Control

4) Transmission Parameters represent signals from the transmission to the ECM (or PCM).

5) The Miscellaneous Parameters include the states of various switches.

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DESCRIPTOR FORMAT

Following is a description of every parameter that can be displayed with the Suzuki ECM 1.0 Application. Included is: 1) a listing of all the parameters available for each category; 2) a description, the units, and the range of the analog parameters.

GENERAL
Charging Efficiency
Engine Coolant Temperature
Engine Speed
Vehicle Speed
VSS (METER)

ELECTRICAL
Battery Positive Voltage
Electric Load

SPARK CONTROL
Spark Advance

FUEL DELIVERY
Air Flow
Barometric Pressure
Fuel Pump
Injector Pulse Width, B1, B2
Intake Air Temperature
Manifold Absolute Pressure
Mass Air Flow
Mixture Control Dwell, B1, B2
Mixture Control Learn, B1, B2
Mixture Control Monitor, B1, B2
O2S Activation, B1, B2
Oxygen Sensor, B1, B2
Rich and Lean Monitor, B1, B2
Throttle Angle
Throttle Opener Sol Vac Valve
Throttle Position Sensor

TRANSMISSION PARAMETERS
4WD-L Switch
Gear Position
Mode Select Switch
O/D OFF Switch
Shift Solenoid #1 CON, MON
Shift Solenoid #2 CON, MON
TCC Solenoid CON, MON
Throttle Position Level
Trans Range
Trans. Range
VSS (TRANS)

EMISSIONS & DRIVEABILITY PARAMETERS
Canister Purge Solenoid
Closed Throttle Position
CTP Switch
Desired Idle Speed
EGR Temperature
EGR
EVAP Purge Duty
EVAP SP Valve
IAC Adjust Monitor
IAC Flow
IAC/ISC Duty
Power Steering Pressure (PSP) Switch
Power Steering Solenoid Vacuum (PS SV) Valve

MISCELLANEOUS PARAMETERS
A/C Control Signal
A/C Switch
Brake Switch
Radiator Fan

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GENERAL PARAMETERS

CHARGING EFFICIENCY

UNITS	RANGE
%	0 - 100

Charging efficiency is calculated using data from the mass air flow and camshaft position sensors. A higher charging efficiency indicates a larger engine load.

ENGINE COOLANT TEMPERATURE

UNITS	RANGE
DEGREES C	–40 - 120
DEGREES F	–40 - 250

Engine Coolant Temperature is an analog input to the ECM (or PCM). The Coolant Temperature sensor is a temperature variable resistor in series with a fixed resistor in the ECM (or PCM) and biased with a reference voltage. The ECM (or PCM) reads the voltage across the Coolant Temperature sensor and converts this voltage into temperature.

ENGINE SPEED

UNITS	RANGE
RPM	0 - 9999

Engine speed is an ECM (or PCM) internal parameter. It is computed by reference pulses from the Camshaft Position Sensor and is used by virtually all ECM (or PCM) systems.

VEHICLE SPEED VSS (METER)

UNITS	RANGE
KPH	0 - 250
MPH	0 - 156

Vehicle Speed Sensor (VSS) parameter is an ECM internal parameter. It is computed by timing pulses coming from the vehicle speed sensor. Vehicle speed is used for the IAC/ISC control in the ECM (or PCM).

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ELECTRICAL PARAMETERS

BATTERY POSITIVE VOLTAGE

UNITS	RANGE
VOLTS	0.0 - 20.00

Battery Positive Voltage is an analog input signal read by the ECM. This parameter is used for voltage correction of the fuel injection quantity.

ELECTRIC LOAD

STATES
OFF/ON

The electrical system load affects the engine load, which causes variations in engine speed. The Electric Load parameter will read ON or OFF depending on the state of certain electrical components (such as the radiator fan motor, head lights, parking lights, blower fan motor, rear defogger, brake lights, etc.) The ECM (or PCM) uses the ON or OFF signal to compensate for variations in engine load by controlling the IAC valve/ISC motor.

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FUEL DELIVERY PARAMETERS

AIR FLOW

UNITS	RANGE
L/min	0 - 2200.0

The Air Flow sensor measures the rate of volume air flow into the intake manifold in liters per minute.

BAROMETRIC PRESSURE

UNITS	RANGE
mmHg	0 - 950

This parameter represents a measurement of barometric air pressure and is used for altitude correction of the fuel injection quantity and IAC valve control.

FUEL PUMP

STATES
OFF/ON

ON is displayed when the ECM (or PCM) activates the fuel pump via the fuel pump relay switch.

INJECTOR PULSE WIDTH
INJECTOR PULSE WIDTH B1
INJECTOR PULSE WIDTH B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

	UNITS	RANGE
MITSUBISHI/NIPPONDENSO	mSEC	0 - 65.534
HITACHI	mSEC	0 - 99.99

The Pulse Width is the length of time (in milliseconds) the ECM (or PCM) is commanding the fuel injectors on. Injector 'on' time is how EFI systems control fuel mixture. A longer 'on' time yields a richer mixture.

INTAKE AIR TEMPERATURE

UNITS	RANGE
DEGREES C	–40 - 120
DEGREES F	–40 - 250

Intake Air Temperature is needed to determine the amount of air passing into the intake manifold as air density varies with temperature.

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FUEL DELIVERY PARAMETERS

MANIFOLD ABSOLUTE PRESSURE

UNITS	RANGE
mmHg	0 - 950

The Manifold Absolute Pressure sensor voltage is read by the ECM (or PCM) and is used (among other things) to compute engine load.

MASS AIR FLOW

	UNITS	RANGE
MITSUBISHI	g/sec.	0.0 - 670.0
HITACHI	g/sec.	0.0 - 450.0

Certain engines have a Mass Air Flow (MAF) sensor which measures air flow into the intake manifold. This data is used by the ECM (or PCM) in determining engine load.

MIXTURE CONTROL DWELL
MIXTURE CONTROL DWELL B1 & B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

	UNITS	RANGE
NIPPONDENSO	NONE	–0.25 - 0.25
MITSUBISHI/HITACHI	NONE	–1.00 - 1.00

Mixture Control Dwell value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction. If "****" appears in the tester screen, the vehicle being tested is not equipped with this sensor.

MIXTURE CONTROL LEARN
MIXTURE CONTROL LEARN B1 & B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

	UNITS	RANGE
NIPPONDENSO	NONE	–0.25 - 0.25
MITSUBISHI/HITACHI	NONE	–1.00 - 1.00

The Mixture Control Learn Value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction. If "****" appears in the tester screen, the vehicle being tested is not equipped with this sensor.

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FUEL DELIVERY PARAMETERS

MIXTURE CONTROL MONITOR
MIXTURE CONTROL MONITOR B1 & B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

	UNITS	RANGE
NIPPONDENSO	NONE	–0.25 - 0.25
MITSUBISHI/HITACHI	NONE	–1.00 - 1.00

The value of Mixture Control Monitor is obtained by combining the values of the Mixture CONTROL DWELL and MIXTURE CONTROL LEARN values. This value indicates the necessary correction to keep the air/fuel mixture stoichiometrical.

If "****" appears in the tester screen, the vehicle being tested is not equipped with this sensor.

O2S ACTIVATION
O2S B1 ACTIV
O2S B2 ACTIV
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

STATES
ACTIVATION/DEACTIVATION

ACTIVATION is displayed when the oxygen sensor is operating within the activation temperature range and producing the expected output over a certain period of time. The oxygen sensor is deactivated by the ECM (or PCM) and DEACTIVATION is displayed if it does not reach the activation temperature or if it does not produce an adequate reading over a certain period of time.

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FUEL DELIVERY PARAMETERS

OXYGEN SENSOR
O2S B1
O2S B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

UNITS	RANGE
mV	0 - 5000

The Oxygen Sensor, located in the exhaust stream, is the primary input to the fuel delivery system. A high voltage indicates a rich mixture while a low voltage indicates a lean mixture. After the ECM (or PCM) is in the closed loop mode of operation the fuel mixture is adjusted based upon the voltage of this sensor.
If "****" appears in the tester screen, the vehicle being tested is not equipped with this sensor.

NOTE: The oxygen sensor must be hot (>260 deg C, >500 deg F) before it will function properly.

RICH/LEAN MONITOR
RICH/LEAN MONITOR B1
RICH/LEAN MONITOR B2
B1:BANK1 (LH BANK)
B2:BANK2 (RH BANK)

STATES
RICH/LEAN

This parameter tells whether the oxygen sensor voltage is above or below a programmed threshold. The threshold is normally computed to be the oxygen sensor voltage corresponding to an intake air/fuel ratio of 14.7 or about 450 mV. An Oxygen sensor voltage reading above the threshold means the intake mixture is rich whereas an oxygen sensor voltage below the threshold corresponds to a lean mixture.

THROTTLE ANGLE

UNITS	RANGE
DEGREE	0 - 90

The Throttle Angle parameter displays the throttle position related to the fully closed position. 0-0.5 refers to a fully closed throttle while about 80 is a wide open throttle.

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FUEL DELIVERY PARAMETERS

THROTTLE OPENER SOLENOID

STATES
ON/OFF

The Throttle Opener Solenoid Vacuum Valve improves starting ability by opening the throttle valve slightly at the engine start. When this signal is ON, the solenoid valve turns ON to open the throttle valve. Once the engine has started, the solenoid valve turns OFF and the throttle valve closes completely after a programmed time.

THROTTLE POSITION SENSOR

UNITS	RANGE
V	0 - 5.00

The Throttle Position Sensor reading provides throttle valve opening information in the form of voltage. This information is used for correction, such as enrichment correction during acceleration.

The voltage reading should increase as the throttle is opened. 0 V indicates a broken or shorted sensor.

SPARK CONTROL

SPARK ADVANCE

	UNITS	RANGE
MITSUBISHI	DEGREES	–28 - 61 BTDC
NIPPONDENSO	DEGREES	–12 - 78 BTDC
HITACHI	DEGREES	–10 - 60 BTDC

Spark Advance refers to the total spark advance being commanded by the ECM (or PCM). The actual ignition timing should be checked by using the timing light.

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CANISTER PURGE SOLENOID

UNITS	RANGE
%	0 - 100

The Canister Purge Solenoid parameter displays the degree to which the purge valve is either open or closed. 0% means that the purge valve is completely closed while 100% is fully open valve.

CLOSED THROT POS

STATES
ON/OFF

The Closed Throttle Position parameter indicates whether the throttle position is in the idle state or not. "ON" means that the throttle position is within the range for the idle state and "OFF" indicates that the throttle position is not within the idle state range.

CTP SWITCH

STATES
ON/OFF

The CTP Switch parameter will read ON when the throttle valve is fully closed, or OFF when the throttle is not fully closed.

DESIRED IDLE SPEED

UNITS	RANGE
RPM	0 - 2000

The Desired Idle Speed is an ECM (or PCM) internal parameter which indicates the ECM (or PCM) requested idle. If the engine is not running, this number is not valid.

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EGR

STATES
ON/OFF

For vehicles with ECM Numbers 1, 7, and 10, as described in the ECM Cartridge Coverage chart on Pages 1-2 and 1-3: ON is displayed when the EGR valve is not fully closed (when EGR gas flows into the intake manifold), and OFF is displayed when the EGR valve is fully closed (when EGR gas does not flow into the intake manifold. The EGR gas flow is regulated according to driving conditions by the stepper motor, which is operated by signals from the ECM.

For all other vehicles: ON is indicated when the EGR SV valve turns on (when EGR gas flows into the intake manifold), and OFF is displayed when the EGR SV valve turns off (when EGR gas does not flow into the intake manifold). The EGR gas flow is regulated according to driving conditions by the EGR modulator and the solenoid vacuum valve, which switches the vacuum passage to the diaphragm of the EGR valve.

EGR TEMPERATURE

UNITS	RANGE
DEGREES C	0 - 240
DEGREES F	32 - 470

EGR Temperature is an internal ECM (or PCM) parameter. The EGR temperature sensor is installed on the EGR valve. When the EGR valve opens and EGR gas flows, the temperature parameter should rise. If the temperature does not rise, the EGR system is faulty.

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EMISSIONS & DRIVEABILITY PARAMETERS

EVAP PURGE DUTY

UNITS	RANGE
%	0 - 100

The EVAP Purge Duty is used to control the EVAP solenoid purge valve. 0% means that the purge valve is completely closed while 100% is a fully open valve.

EVAP SOLENOID PURGE (SP) VALVE

STATES
ON/OFF

The EVAP Canister is used to trap gasoline vapors from the fuel tank. When the EVAP Solenoid Purge Valve is ON, gas fumes can flow from the canister to the intake manifold. When the solenoid valve is OFF, fumes are trapped in the canister.

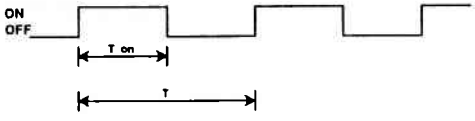
IAC/ISC DUTY

UNITS	RANGE
%	0 - 100

BYPASS AIR TYPE

The IAC Valve uses a duty solenoid valve. It controls the engine idle speed by varying the valve open time within a certain set cycle and thus controls the amount of by-pass air.

Idle Air Control Duty is obtained by using T on ÷ T x 100 (%)



THROTTLE POSITION TYPE

For ISC systems, engine idle speed is controlled by the ISC motor which is attached to the throttle body. The ISC motor moves the throttle valve by the ECM based on engine speed and throttle opening signals . The ISC DUTY parameter indicates the opening of the throttle valve in terms of percentage to the opening controllable by the ISC motor.

Idle Speed Control Duty is obtained by using

ISC DUTY = (TAS –10*) ÷ TAMAX x 100 (%)

TAS:	Throttle Angle for ISC
TAMAX:	Controllable opening
10*:	Offset

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EMISSIONS & DRIVEABILITY PARAMETERS

IAC ADJUST MONITOR

UNITS	RANGE
%	0 - 100

For the TBI system engine, IAC flow must be adjusted to a specified standard when adjusting idle speed. The IAC adjust monitor indicates the amount by which the current IAC flow is deviated from its standard value for idle adjustment. This value is effective only in the idle adjust mode (IAC CAL MODE). Therefore, 0% indicated in any other mode than IAC CAL MODE is meaningless.

IAC FLOW

UNITS	RANGE
l/min	0 - 255

This parameter represents the quantity of the bypass air flow in liters per minute through the IAC valve.

POWER STEERING PRESSURE (PSP) SWITCH

STATES
ON/OFF

The Power Steering Pressure Switch parameter displays ON when the steering wheel is cranked all the way to the right or left.

POWER STEERING SOLENOID VACUUM (PS SV) VALVE

STATES
ON/OFF

The PSP ON signal is fed to the ECM (or PCM), which actuates the IAC Valve and PS SV for compensating idle speed. This control is effective at both idling and driving.

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TRANSMISSION PARAMETERS

4WD-L SW

STATES
OFF/ON

This parameter indicates the state of the 4-wheel drive low gear switch. ON indicates the Low or Neutral position, and OFF indicates the 4WD high or 2WD high position. This signal is used to prevent the gear change into Overdrive and TCC lock-up.

GEAR POSITION

STATES
1st / 2nd / 3rd / 4th / INVALID

This parameter indicates the A/T gear position which is computed on signals from the Transmission Range Switch, VSS, TP Sensor, and 4WD Low Switch.

MODE SELECT SWITCH

STATES
POWER/NORMAL

This parameter indicates the position of the Power/Normal change switch and is used to select the automatic gear shift schedule, Power or Normal mode.

O/D OFF SW

STATES
OFF/ON

This parameter indicates the state of the O/D OFF Switch (Overdrive cut switch). When this switch is ON, the gear position is not shifted to 4th.

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TRANSMISSION PARAMETERS

SHIFT SOL #1 - CON
SHIFT SOL #2 - CON

STATES
OFF/ON

This parameter indicates the PCM has commanded the shift solenoid ON or OFF.

SHIFT SOL #1 - MON
SHIFT SOL #2 - MON

STATES
OFF/ON

The monitor result of the shift solenoid circuit is displayed.
ON: Electricity is being passed to the shift solenoid or circuit open.
OFF: Electricity is not being passed to the shift solenoid or circuit short.

TCC SOL - CON

STATES
OFF/ON

This parameter indicates that the PCM has commanded the Torque Converter Clutch (TCC) Solenoid ON or OFF.

TCC SOL - MON

STATES
OFF/ON

The monitor result of the TCC solenoid circuit is displayed.
ON: Electricity is being passed to the TCC solenoid or circuit open.
OFF: Electricity is not being passed to the TCC solenoid or circuit short.

THROTTLE POS LEVEL

UNITS	RANGE
NONE	0 - 7

This parameter indicates the level (zone) of the throttle valve opening. The throttle opening is divided into 8 levels (zones) from "0" (about idle position) to "7" (about full open) and signals are assigned to each opening level (zone). The PCM controls the automatic gear changes of the automatic transmission by using these signals according to the signal from the TP sensor.

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TRANSMISSION PARAMETERS

TRANS RANGE

STATES
D RANGE/P-N RANGE

The Trans Range parameter reads D RANGE when the transmission is shifted to any drive range (R, D, 2, or L range). This signal informs the ECM (or PCM) that a load has been applied to the engine so the ECM (or PCM) can adjust fuel compensation and IAC accordingly.

The Trans Range shift signal is also indicated for manual transmissions but should be ignored.

TRANS. RANGE

STATES
P / R / N / D / 2 / L

This parameter indicates the position of the transmission range switch. It is used as one of the signals to control the fuel injector, IAC valve and automatic transmission.

VSS (TRANS)

UNITS	RANGE
KPH	0 - 250
MPH	0 - 156

The PCM controls the automatic gear changes of the automatic transmission by using these signals according to the signal from the Vehicle Speed Sensor (VSS) in the automatic transmission.

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MISCELLANEOUS PARAMETERS

A/C CONTROL SIGNAL

STATES
OFF/ON

This parameter indicates the state of the A/C Control Signals, that is, ON when outputting A/C ON command and OFF when not outputting.

A/C SWITCH

STATES
OFF/ON

This parameter indicates the state of the A/C ON signal which is input to the ECM.
ON is displayed when all of the A/C related switches (A/C switch, fan switch, pressure switch, etc.) are turned ON.
OFF is displayed when one of the above switches is turned OFF.

BRAKE SWITCH

STATES
OFF/ON

This parameter indicates the state of the Brake Switch.

RADIATOR FAN

STATES
OFF/ON

This parameter indicates the state of the Radiator Fan.

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APPENDICES

A. UNDERSTANDING SUZUKI ECMs

B. IF YOU'RE HAVING A PROBLEM

C. GLOSSARY OF TERMS

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A. UNDERSTANDING SUZUKI ECMs

The serial data link uses message-oriented transmissions with a UART type data format. The communication is via a single-wire half-duplex bus using a master/slave protocol. The serial data link can be used for communications during normal operation or as an interface to a test device for diagnostic operations. If there is no requirement for data sharing between the vehicle's components during normal operation, the link can be implemented as a diagnostics only link. Numerous diagnostic modes provide a maximum of system flexibility.

Interface to the serial data link can be implemented using standard UART type devices communicating at a 7812 or 15625 baud rate. The interface devices required for this phase are available as stand-alone devices or integrated with CPU's (or MPU's) in a large number of micro-controllers.

Network access is via a master/slave protocol. The serial data link can have at most one device functioning as the master at any point in time. The TECH 1 controls all communications on the serial data link. A slave device (ECM) can transmit data only after it has been interrogated by the master device. A typical operating scenario is for the master device to periodically send a polling message to one or more of the slave devices. The slaves can then send a response message (containing, for example, the states of the slave's inputs or internal parameters) back to the master.

Once the TECH 1 has gotten control of the serial data link, it can perform diagnostics on any of the devices connected to serial data link which support serial data diagnostics. It is important to note that the tester can only perform diagnostics which were provided for in the design of the various components. "Hooks" in the software of the on-board components must be provided in order to allow diagnostics to be performed. The more "hooks" that are provided, the more sophisticated the diagnostics which can be performed. Some components might implement minimum diagnostics such as trouble code and diagnostic parameter readout. Other components might implement high-end diagnostics including provision for extensive control over the operation of the component and override of internal parameters. This can be used to exercise specific circuits in order to assist in the isolation of faults.

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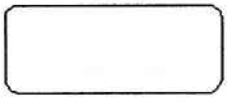
B. IF YOU'RE HAVING A PROBLEM

Although the TECH 1 was designed to give you years of trouble-free service, occasional problems may occur that require special attention. Some of these problems may be corrected with a few simple steps. Examples of most of the displays which you might see under abnormal conditions are shown. In addition, the most likely cause for the condition is given as well as other possible causes and recommendations on how to isolate or eliminate the problem. If the problem appears to be in the TECH 1, perform the Self-test (described in the TECH 1 Operators Manual.)

1.



Blank Screen

MOST LIKELY CAUSE:
- Ignition switch OFF.

OTHER POSSIBLE CAUSES:
- Faulty cable.
- TECH 1 power supply is malfunctioning.
- No power is applied to the TECH 1.

RECOMMENDATIONS:
- Plug the TECH 1 into another vehicle to verify proper operation.

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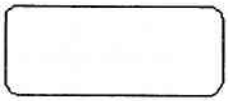
2.



MOST LIKELY CAUSE:
- Two master cartridges are installed.

OTHER POSSIBLE CAUSES:
- Master cartridge is malfunctioning.
- TECH 1 is malfunctioning.

RECOMMENDATIONS:
- Make sure that only one master cartridge is installed in the TECH 1.
- Remove all cartridges and see if "MASTER CARTRIDGE MISSING OR MALFUNCTIONING" message is displayed. If it is, try installing another master cartridge.

3.

MOST LIKELY CAUSE:
- Master cartridge is not installed.

OTHER POSSIBLE CAUSES:
- Dirty contacts on the master cartridge connector.
- Two master cartridges installed.

RECOMMENDATIONS:
- Verify that a master cartridge is installed.
- Clean contacts on master cartridge connector with alcohol.
- Try a different master cartridge.

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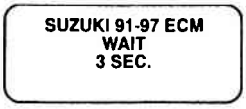
4.



or

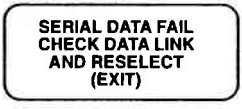
Keyboard or display locked up or program sporadically returns to first page

MOST LIKELY CAUSE:
- Serial data link cable loose or bad.

OTHER POSSIBLE CAUSES:
- Master Cartridge loose or dirty contacts.
- TECH 1 malfunction.

RECOMMENDATIONS:
- Cycle power to the TECH 1 (unplug & replug the serial data link connector).
- Check TECH 1 cartridge socket and cartridge edge connector.
- Check serial data link cable & connector for wear or corrosion.

5.



TECH 1 is not receiving data

MOST LIKELY CAUSE:
- ECM (or PCM) serial data link connector cable problems.

OTHER POSSIBLE CAUSES:
- Serial data link cable loose or bad or connector pins loose or corroded.
- Bad ECM (or PCM).

RECOMMENDATIONS:
- Verify a good serial data link cable connection.
- Cycle power to the TECH 1.
- Run the TECH 1 Self-test.

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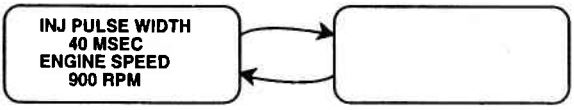
6.



Data List parameters flash on and off.

MOST LIKELY CAUSE:
- Serial data link cable loose or bad.

OTHER POSSIBLE CAUSES:
- Serial data link cable connector pins loose or corroded.
- ECM (or PCM) serial data link connector cable problems.
- Intermittent ECM (or PCM) problem.

RECOMMENDATIONS:
- Verify a good serial data link cable connection.
- Cycle power to the TECH 1.

7.

MOST LIKELY CAUSE:
- ECM Application is not installed in the Mass Storage Cartridge.

OTHER POSSIBLE CAUSES:
- Mass Storage Cartridge is not installed correctly.
- Wrong cartridge is installed in the tester.

RECOMMENDATIONS:
- Confirm that the Suzuki Mass Storage Cartridge is correctly installed in the bottom cartridge slot of the tester.
- Confirm that no other Master or Mass Storage Cartridge is installed in the top cartridge slot.
- Contact your **TECH 1** distributor to have the application installed in the Mass Storage Cartridge.

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C. GLOSSARY OF TERMS

A/C	Air Conditioning
A/T	Automatic Transmission
BTDC	Before Top Dead Center
C	Centigrade
CAL	Calibration
CMP	Camshaft Position
CON	Control
CONTR	Control
CTP	Closed Throttle Position
DEG	Degrees
DLC	Data Link Connector (SDL connector)
ECM	Engine Control Module
ECT	Engine Coolant Temperature
EFI	Electronic Fuel Injection
EFFI	Efficiency
EGR	Exhaust Gas Recirculation
EGRT	Exhaust Gas Recirculation Temperature
EVAP	Evaporative Emission
F	Fahrenheit
FCC	Federal Communications Commission
FXS	Fixed Spark Mode
g	Grams
GND	Ground
IAC	Idle Air Control
IAT	Intake Air Temperature
INJ	Injector
ISC	Idle Speed Control
KPH	Kilometers Per Hour (km/h)
L/min	Liters Per Minute
MAF	Mass Air Flow
MANI	Manifold
MAP	Manifold Absolute Pressure
MC	Mixture Control
MFI	Multiport Fuel Injection
mmHg	Millimeters of Mercury
MON	Monitor
MONIT	Monitor

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MPH	Miles Per Hour
MPU	Micro Processing Unit
mSEC	Milliseconds
mV	Millivolt
O2S	Oxygen Sensor
O/D	Overdrive
PCM	Powertrain Control Module (= ECM + TCM)
POS	Position
PRESS	Pressure
PSP	Power Steering Pressure
PS SV Valve	Power Steering Solenoid Vacuum Valve (Power Steering Vacuum Switching Valve, PS VSV)
RL	Rich Lean
RPM	Revolutions Per Minute
RS232C	Standard Serial Communication interface
SDL	Serial Data Link
SEC	Seconds
SENS	Sensor
SFI	Sequential Fuel Injection
SOL	Solenoid
SP valve	Solenoid Purge Valve
SPEC	Specification
SPD	Speed
SW	Switch
TBI	Throttle Body Fuel Injection
TCC	Torque Converter Clutch
TCM	Transmission Control Module
THROT	Throttle
TP	Throttle Position
TRANS	Transmission
UART	Universal Asynchronous Receiver Transmitter
V	Volts
VAF	Volume Air Flow
VIN	Vehicle Identification Number
VSS	Vehicle Speed Sensor

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