

# GM Tech2 User Guide



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The Tech2 User's Guide provides a comprehensive overview of the Tech2 scan tool.

Everything contained in this manual is based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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## Customer Support Overview

Independent Repair Customers can obtain assistance with a question or problem concerning the operation of the Tech2 and its attached products, telephone the ACDelco Aftermarket Support Center.

### Before Calling

Before making a call to the ACDelco Aftermarket Support Center, be sure to have the following information ready:

- Business name, address and ACDelco TIS2Web login
- Telephone number where the technician may be reached

Prepare a brief description of the problem:

- Tell when the problem occurred
- List any error codes displayed
- Tell what accessories were being used when the problem occurred, and vehicle information

### Making the Call

Independent automotive customers with an authorized purchase of TIS2Web may contact the ACDelco Aftermarket Support Center for assistance with the TIS2Web application. The ACDelco Aftermarket Support Center telephone lines operate from 8:00 a.m. to 8:00 p.m. (Eastern Standard Time) Monday through Friday. In the United States and Canada to contact Customer Support, dial:

1.888.212.8959

## Declaration of Conformity

Tester: Tech2 Assembly, VTX

Tech2 Tester

F-00K-1040892

Type of product: Automotive Diagnostic Tester

Compliance with the harmonized Norms and Standards listed below proves the conformity of the Tester: Tech2 Assembly, VTX with the provisions of the EC directives, in particular;

DIN EN 61326:1997, with attachment 1:1998 and attachment 2:2001

The declaration certifies the conformity with the indicated directives and norms, but does not constitute a representation of properties. The safety hints of the product and product documentation have to be followed in any case.

Relevant Components:

02003214	Tech2 DLC cable
02002994 _001	Tech2 32 MB PCMCIA card
02002955	Tech2 J1962 16/19 pin adapter
02002953	Tech2 DLC loopback adapter
02002961	Tech2 NAO 12/19/pin adapter

Manufacturer's Name: Bosch Diagnostics

Manufacturer's Address: 2030 Alameda Padre Serra

Santa Barbara, CA 93103-1716

805 966.2100

## Important PC Hardware Guidelines

ACDelco provides IT guidelines to help users have a seamless experience when using TIS2Web software applications. To avoid unnecessary compliance issues with TIS2Web, please review and adhere to the stated infrastructure guidelines at the following link:  
<http://www.gmdesolutions.com/services/standards.php>

These guidelines for GM Dealers also apply to independent users, Professional Service Centers and Key Fleets using ACDelco Aftermarket subscriptions. For questions on these guidelines, contact 888-212-8959, prompt #2.

## Limited Warranty

**SOFTWARE:** Bosch Diagnostics/Vetronix warrants for a period of ninety (90) days from the date of purchase that the Bosch Diagnostics/Vetronix software product will execute its programming instructions when properly installed. Bosch Diagnostics/Vetronix does not warrant that the operations of the Bosch Diagnostics/Vetronix software will be uninterrupted or error free. In the event that this Bosch Diagnostics/Vetronix software product fails to execute its programming instructions during the warranty period, the remedy shall be a replacement of such software product.

**LIMITATION OF WARRANTY:** Bosch Diagnostics/Vetronix makes no other express warranty, whether written or oral with respect to this product. Any implied warranty of merchantability or fitness for or a particular purpose is limited to the 90-day duration of this written warranty. Some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you.

**EXCLUSIVE REMEDIES:** The remedies provided above are Customer's sole and exclusive remedies. In no event shall Bosch Diagnostics/Vetronix be liable for any direct, indirect, special, incidental or consequential damages (including lost profit) whether based on warranty, contract, tort or any other legal theory.

# Using This Manual

To increase their effectiveness with the Tech2, users should familiarize themselves with the format and information contained in this guide.

## Vehicle System Familiarity

While the Tech2 is a powerful tool, it cannot replace knowledge and skill. To obtain maximum benefit from the Tech2, service technicians must have a complete understanding of vehicle systems.

When using the Tech2 to diagnose a vehicle, it is recommended that service technicians also refer to the service manual and the latest service bulletins.

## Disclaimer

The Tech2 is designed for use by trained service personnel only. It has been developed for the sole purpose of diagnosing and repairing automotive systems with electronic controls and interfaces.

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.

## Things You Should Know

### CAUTION: EXHAUST GAS

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

### CAUTION: PARKING BRAKE

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.

### CAUTION: SPARKS

The Tech2 uses parts that can produce arcs or sparks. When used in a garage environment, the Tech2 must be located not less than 18 inches (460 mm) above the floor.

### NOTICE:

- DO NOT clasp battery clamps together when connected simultaneously to the vehicle's 12 volt cigarette lighter or power supply. Reverse polarity in the vehicle's cigarette lighter may be present. Damage could occur to the Tech2 or to the vehicle.
- If power is applied to the Tech2 and the display remains blank, reverse polarity in the cigarette lighter may be present. Damage to the Tech2 could occur. DO NOT connect the DLC cable to the vehicle. Verify that the center contact of the vehicle's cigarette lighter has +12 volts and that the outer contact is grounded.
- Turn off the power before inserting or removing the PCMCIA card. Continual removal and reinsertion of this card is not recommended.
- Align all cards and components carefully before inserting them into the Tech2
- Do not place the Tech2 so that the tilt stand can make contact with the vehicle battery terminal as this could short out the battery.

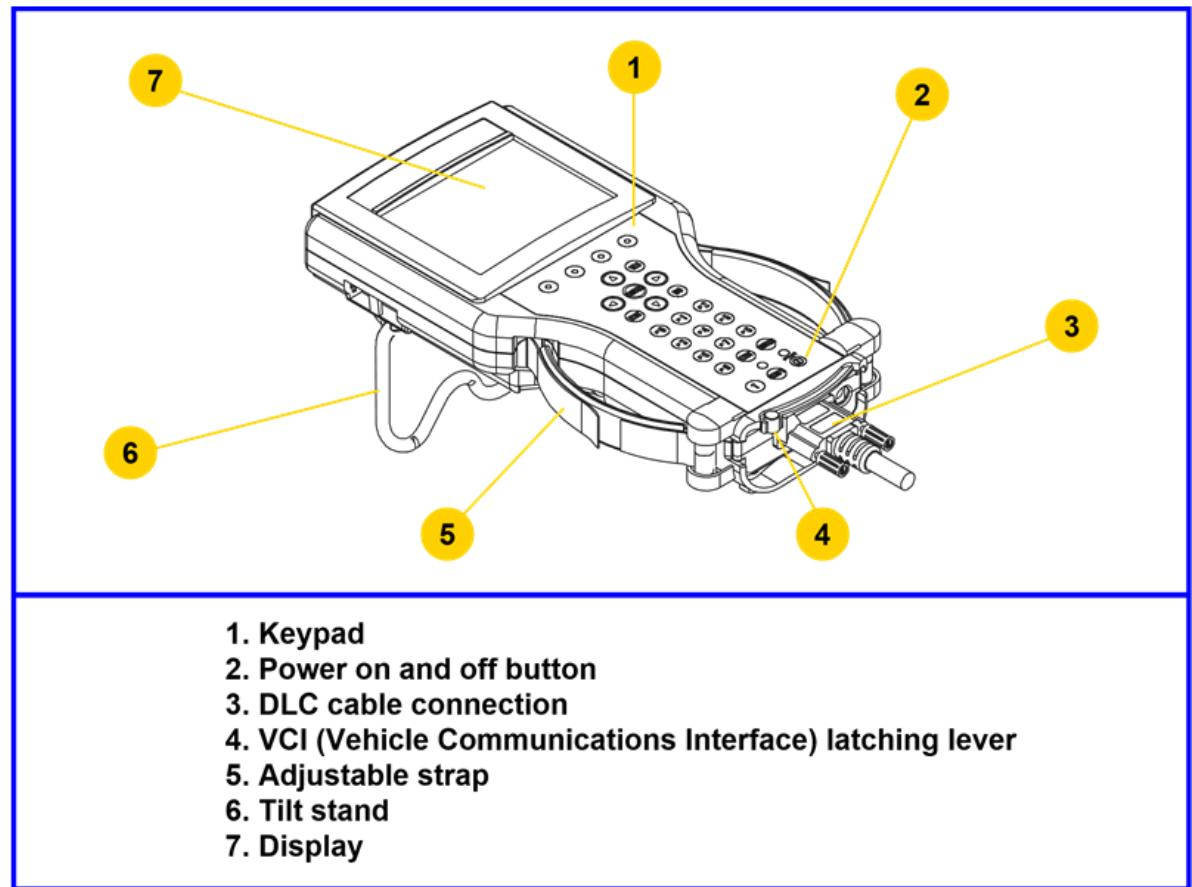
## Federal Communications Commission (FCC) Compliance

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. If not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference's in which case the user will be required to correct the interference at his or her own expense.

## Tech2 Overview

The Tech2 is a hand-held computer designed to aid in diagnosis and repair of automotive systems with electronic controls and interfaces.



**External Features of the Tech2 (front view)**

## Hardware

The Tech2 has been designed as a rugged, shop-ready tool by having:

- A sturdy case
- A sealed keypad
- Heavy-duty cables and connectors

You can expect years of trouble-free service if you take reasonable care of the Tech2 and follow the maintenance procedures outlined in Section II.

Your Tech2 will be composed of a base kit and a variety of the following subcomponents:

Product Number	Product Name
3000094	GM Tech2 Unit
Part Number	Base Kit

3000095	DLC cable
3000096	Cigarette lighter power cable
3000097	Battery power cable
3000098	SAE 16/19 pin adapter
3000109	DLC loopback adapter
3000110	RS-232 cable
3000111	RS-232 DB9 adapter
3000112	RS-232 loopback adapter
3000116	Storage case

Table listing Tech2 base kit part numbers and descriptions. See illustrations

Part Number	Adapter or Accessory
3000099	NAO 12/19 adapter
3000100	Opel 10/19 adapter
3000101	SAAB 10/19
3000102	Opel/Isuzu/Geo 3/19 adapter
3000164	CANdi* module
J-45211	Control module stand-alone programming adapter (Cadillac)
J42236-A	Serial data link tester (Corvette Star Tool)
J-42598-20	90-degree adapter kit (includes connectors J-42598-21 and J-42598-22)

**Note: Every Tech2 kit does not include every adapter listed.**

\*Controller Area Network diagnostic interface

## Power Supply

The Tech2 can be powered from:

- The automobile battery power cable
- The cigarette lighter power cable
- The Tech2 power supply
- The DLC (Data Link Connector) connection in most vehicles

<b>Part Number</b>	<b>Power Accessory</b>
3000113	NAO power supply
3000115	Universal power supply*
3000141	NAO power cable UL 125-127 volts AC/10 amps
3000142	Universal power cable IEC 250 volts AC/10 amps*
3000143	Universal power cable BS 250 volts AC/5 amps*
3000144	Universal power cable AS 250 volts AC/7.5 amps*
3000145	Universal power cable SI 250 volts AC/6 amps*
3000146	Universal power cable SI 250 volts AC/6 amps*
3000147	Universal power cable JIS 125 volts AC/12 amps*
3000148	Universal power cable SI 250 volts AC/6 amps*

\*European and international use

**Table listing part numbers for Tech2 power supplies and cables.**

### **Commands**

The Tech2 prompts you to enter commands via the membrane keypad for:

- Retrieving and viewing diagnostic information
- Selecting self tests
- Performing vehicle diagnostics

### **Data Storage**

The Tech2 contains electronic components called PCMCIA (Personal Computer Memory Card Industry Association) cards, which store diagnostic programs. The Tech2 can be updated as vehicle models change by reprogramming the PCMCIA card via the RS-232 connector.

<b>Part Number</b>	<b>PCMCIA Kit</b>
3000118	32 MB PCMCIA card User documentation

**Table showing the PCMCIA kit part number and description**

## Mechanical Dimensions

The dimensions of the Tech2 are as follows:

- Width – 6.1 inches (155 mm)
- Height – 11.8 inches (300 mm)
- Depth – 2.0 inches (55 mm)
- Weight – 2.2 pounds (1.0 kg)

## Environmental Specifications

CONDITIONS	SPECIFICATIONS
Temperature	Operating: 0 to 40°C (32 to 104°F )
	Non-operating: -40 to 70°C (-40 to 158°F )
Relative Humidity	Operating: 15 % to 95% at 40°C (non-condensing )
	Non-operating: 90% at 65°C (non-condensing )

## Warranty

The Tech2 is warranted against defects in materials and workmanship by the manufacturer for 24 months beginning five days after the date of shipment to your service center.

If your Tech2 must be sent in for repair, contact Vetriconix Corp. 1.800.321.4889, option 7. Use the package that the replacement arrives in to return the defective unit. You can contact the ACDelco Aftermarket Support Center at 1.888.212.8959 for the exact exchange procedure. If notification of defect is received during the warranty period, the part listed in figures I-2, I-3, I-4, or I-5 that is defective will be replaced. You must return the defective unit as directed, or you will be charged for the replacement.

**Important:** This warranty does not cover any part that has been abused, altered, used for purpose other than which it was intended, or used in a manner inconsistent with instructions regarding use. This includes, but is not limited to, removal of any Tech2 screws.

## Care & Cleaning

After using the Tech2, a few simple steps will insure that you get the most life out of this diagnostic tool.

**NOTICE:** Do not spray or pour cleaner anywhere on the Tech2. If the Tech2 should become dirty, clean it with a mild detergent or hand soap. Avoid using harsh solvents such as petroleum-based cleaning agents: acetone, benzene, trichlorethylene, etc. Harsh solvents can etch Tech2 plastic surfaces.

Although the Tech2 is water resistant it is not waterproof, so be sure to thoroughly dry off the Tech2 prior to usage and/or storage.

Maintenance of the Tech2 requires periodic inspection and cleaning of:

- The display window
- The keypad
- The cable assemblies and connectors

Make sure the Tech2 is not connected to a vehicle or other power source and follow the cleaning procedures detailed below.

### Cleaning the Display

The display collects dust and grime during normal use. Occasionally wipe the screen with a clean, soft, static-free cloth. Remove stubborn stains by applying a non-abrasive glass cleaner to a soft cloth and wipe cloth across display area.

### Cleaning the Keypad

Clean the keypad with a non-abrasive cleaner. Apply a small amount of cleaner on a soft cloth and wipe cloth across keypad area.

### Maintaining the Cable Assemblies and Connectors

Inspect cable assemblies during connection and disconnection to components. Watch for any cuts or abrasions along the cables. Check the connectors and connector pins for grease, dirt and corrosion. If contaminants are present, remove them with a mild soap solution.

### Storing the Tech2

- Store the Tech2 away from solvents and other liquids. It is NOT moisture proof.
- Store the Tech2 away from direct sunlight. Ultraviolet and infrared light will darken the display.
- Store the Tech2 in its plastic case. Otherwise, the high-impact plastic cover could become scratched.

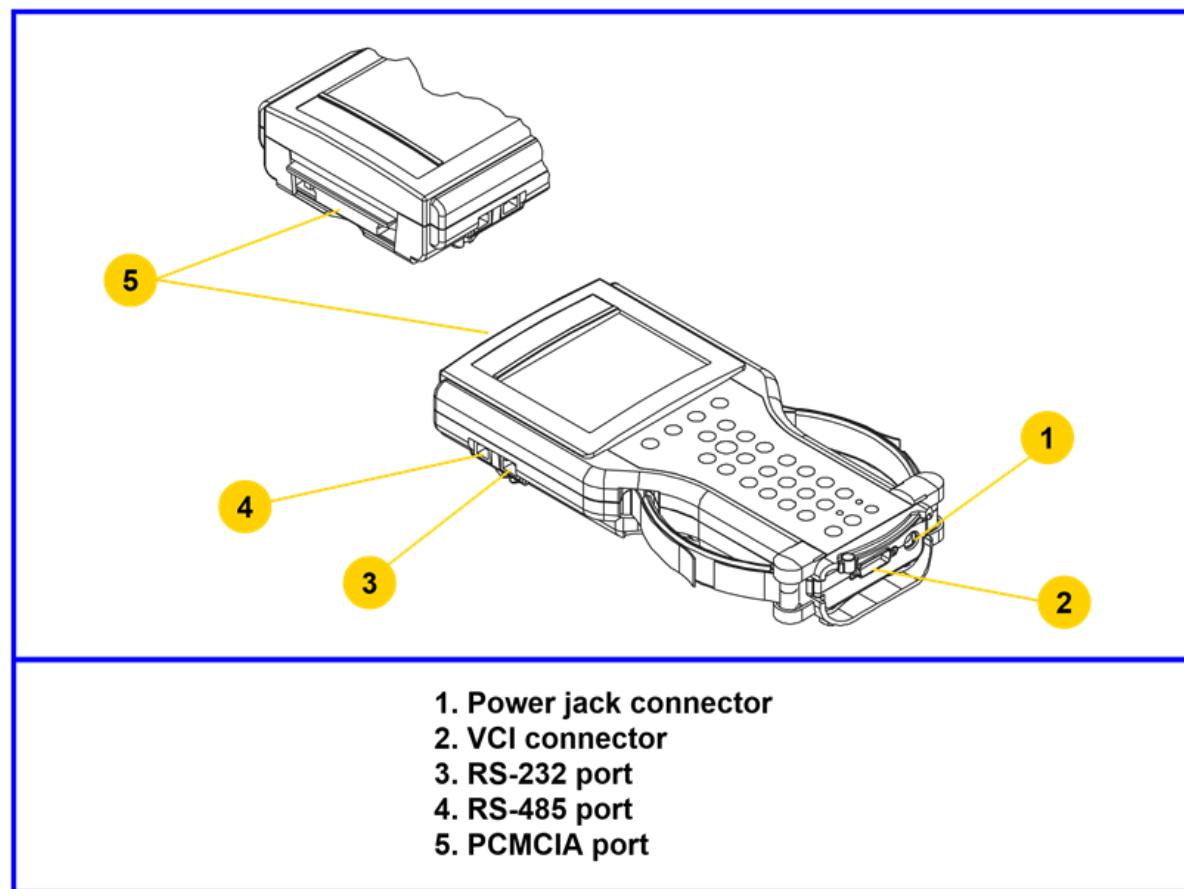
## Getting Started

This section covers all Tech2 vehicle applications. Therefore, some of the information provided may not be required for individual applications.

The Tech2 contains two serial communication ports: the RS-232 and the RS-485. Use the RS-232 port for downloading data from another computer to the Tech2. The RS-485 port is currently not used.

The Tech2 also contains two PCMCIA ports, a power jack connector, and a Vehicle Communications Interface (VCI) connector. One of the PCMCIA slots contains a memory card with diagnostic information. The power jack accepts power from the AC/DC power supply, battery, or cigarette lighter power cable. The VCI connector accepts the DLC cable or DLC loopback adapter.

**Notice:** When using the Tech2 for vehicle communications, the power jack must be connected to the Tech2 DLC loopback adapter

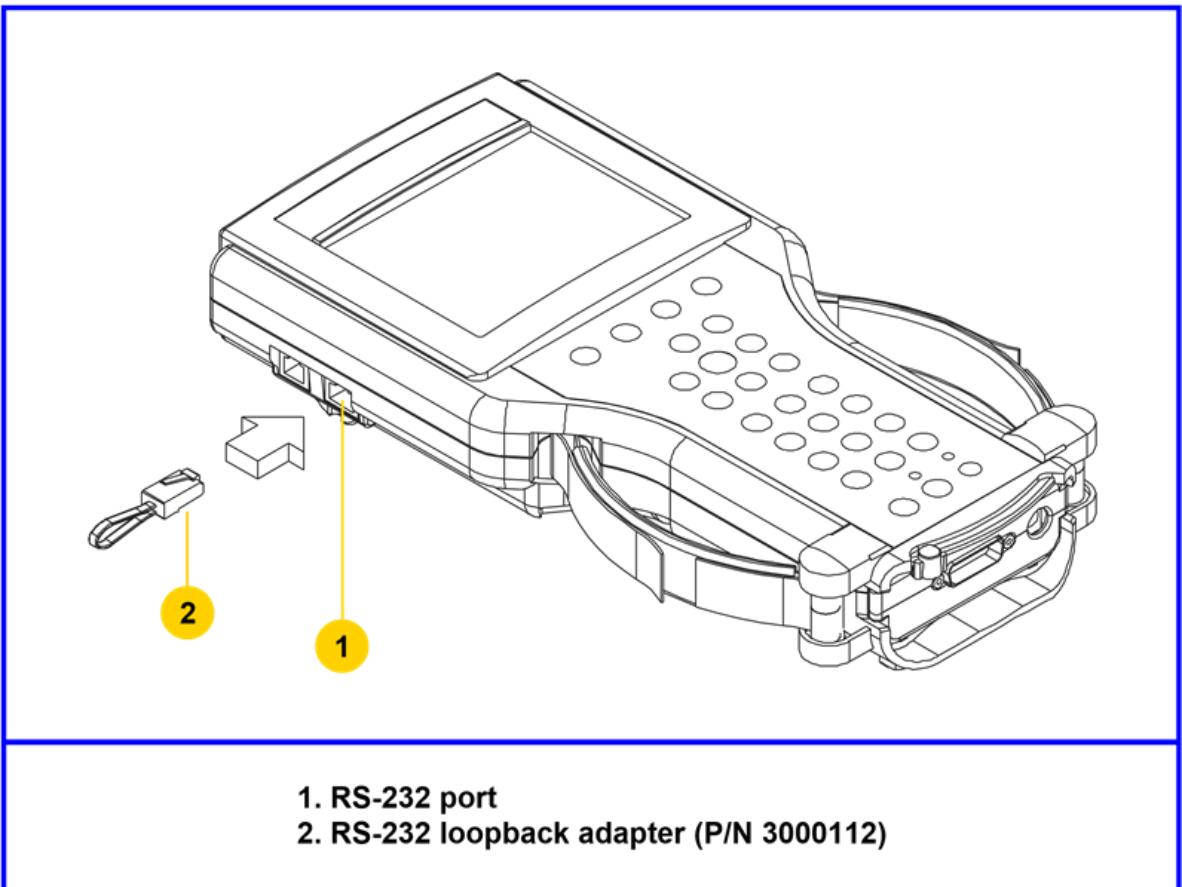


Identification of the Tech2's external ports

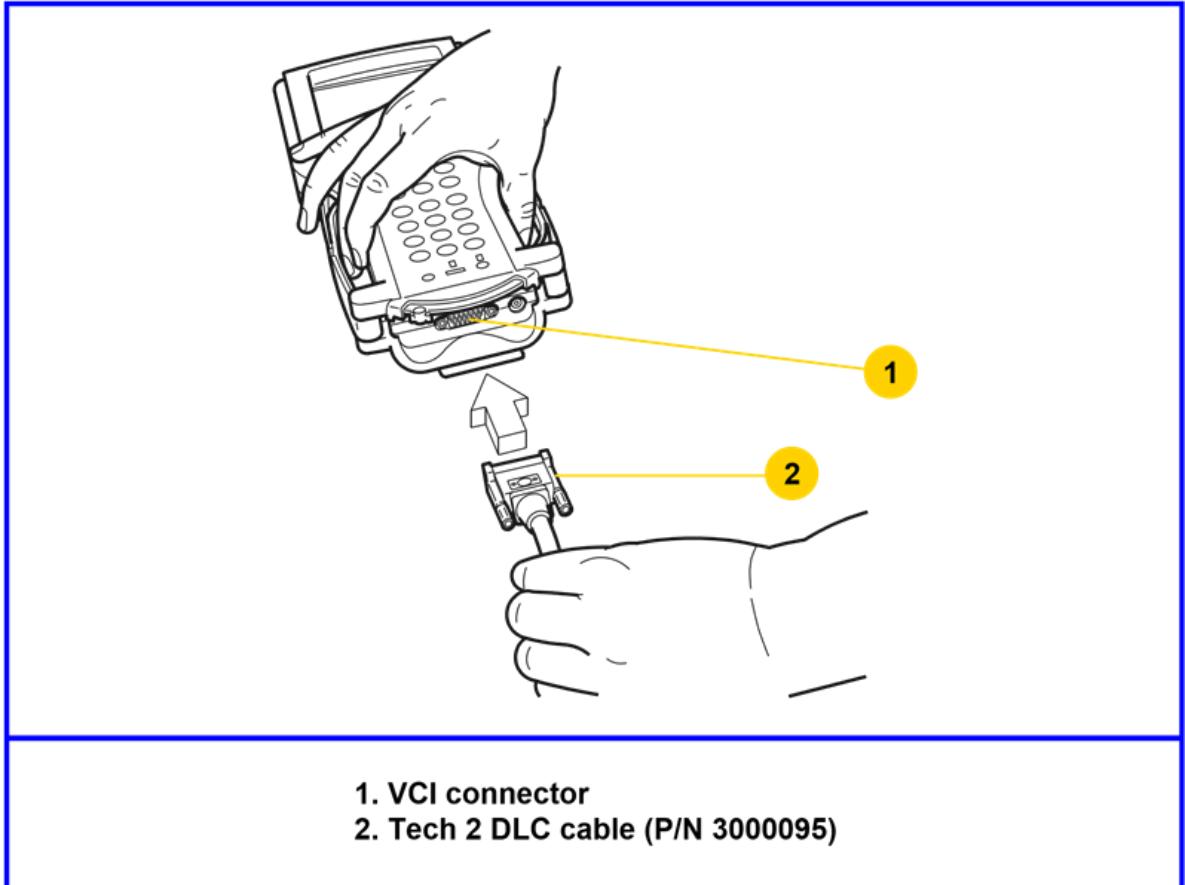
## Initial Hardware Installation

The Tech2 hardware initial installation requires the following seven tasks:

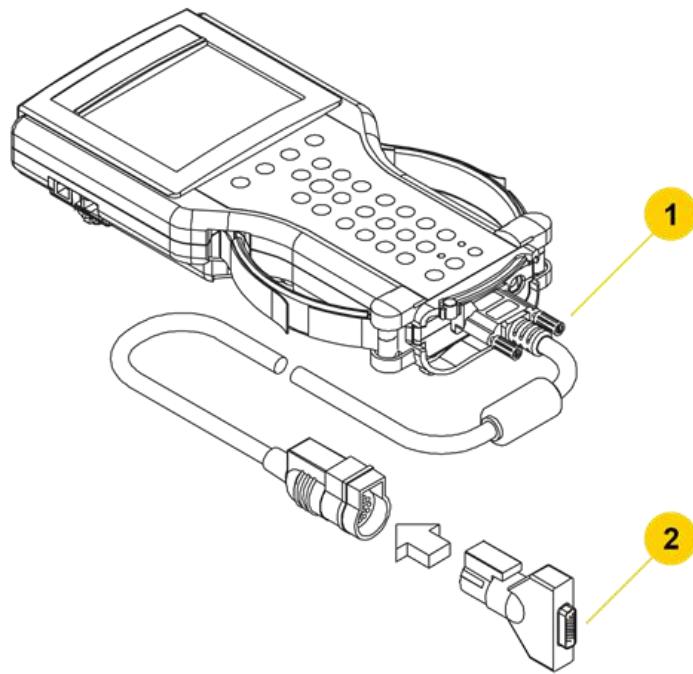
1. Remove the RS-232 loopback adapter (P/N 3000112) from the storage case (P/N 3000116). Plug it into the RS-232 port



2. Attach the Tech2 DLC cable (P/N 3000095) to the VCI connector

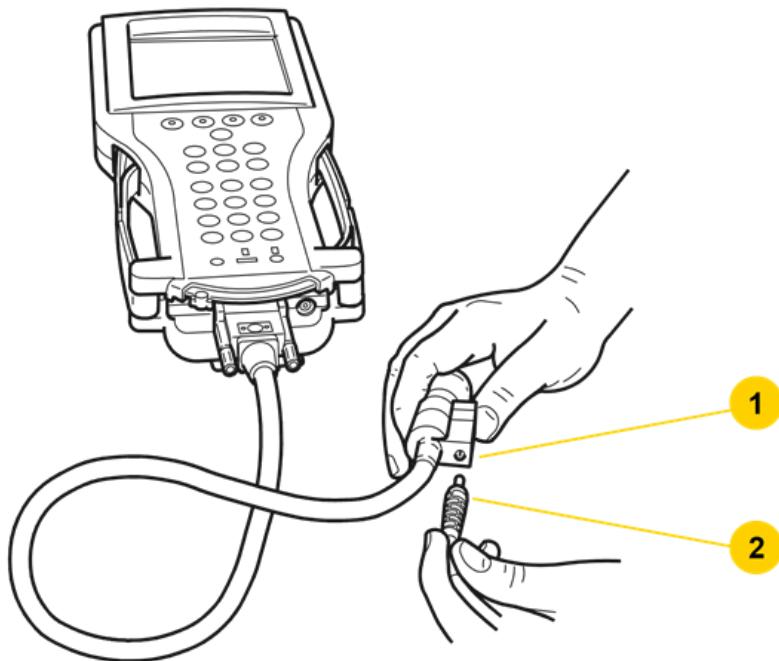


3. Locate the DLC loopback adapter (P/N 3000109) in the storage case. Attach it to the DLC cable



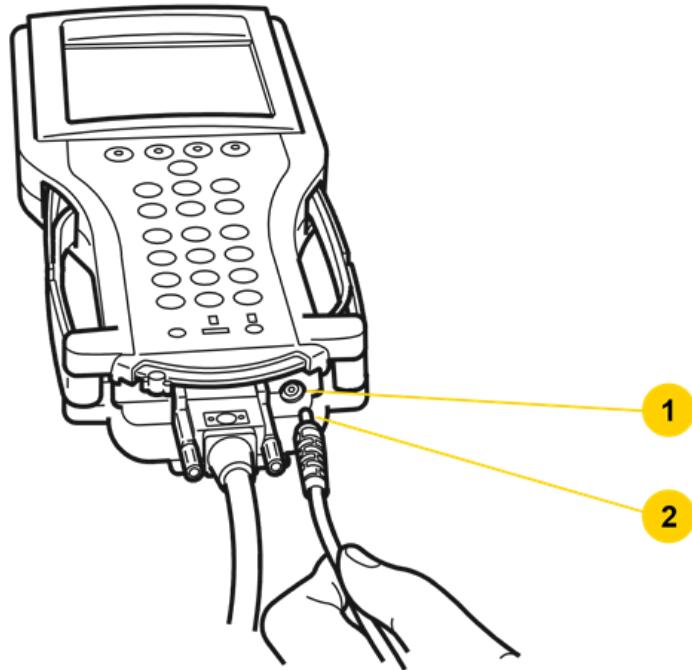
1. Tech 2 DLC cable (P/N 3000095)
2. DLC loopback adapter (P/N 3000109)

4. Locate the NAO (P/N 3000113) or Universal (P/N 3000115) power supply and appropriate power cord in the storage case. Insert the power jack into the Tech2 DLC cable or into the bottom of the Tech2 next to DLC cable connector.



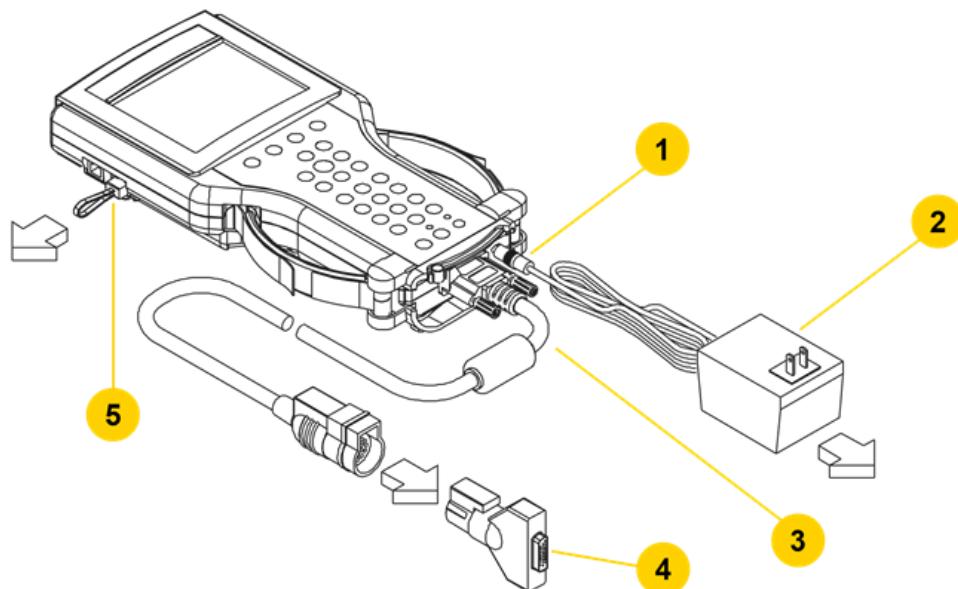
1. Tech 2 DLC cable power jack connector
2. Power jack (NAO or Universal power supply)

Connection of the power jack to the DLC cable



1. Tech 2 power jack connector
2. Power jack (NAO or Universal power supply)

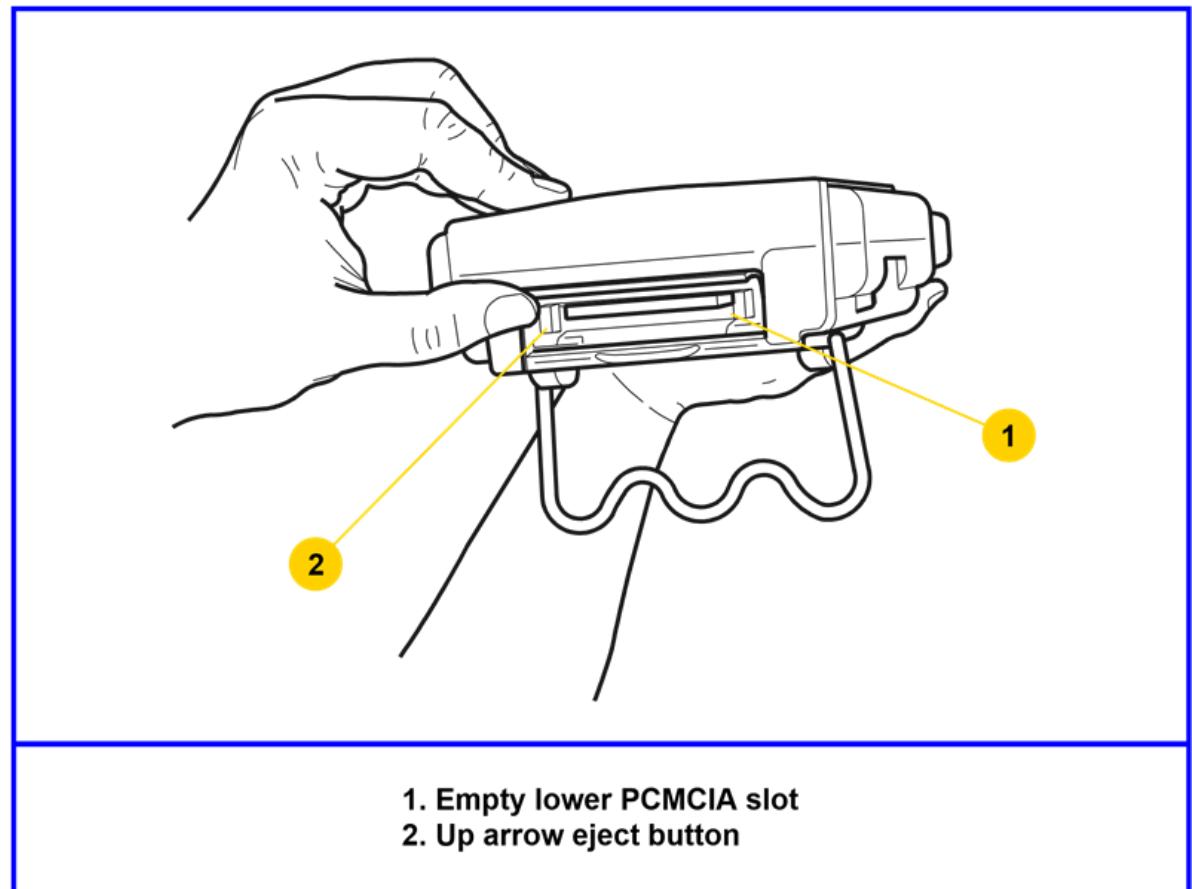
5. Turn on power by pressing the PWR button located on the Tech2 keypad.
6. Tech2 hardware will be verified automatically by the POST test. (For information on this program, Troubleshooting.)
7. Disconnect the RS-232 loopback adapter, the power supply, and the DLC loopback adapter and return to the Tech2 storage case.



1. Power jack
2. NAO power supply (P/N 3000113)
3. Tech 2 DLC cable (P/N 3000095)
4. DLC loopback adapter (P/N 3000109)
5. RS-232 loopback adapter (P/N 3000112)

## PCMCIA Card Removal

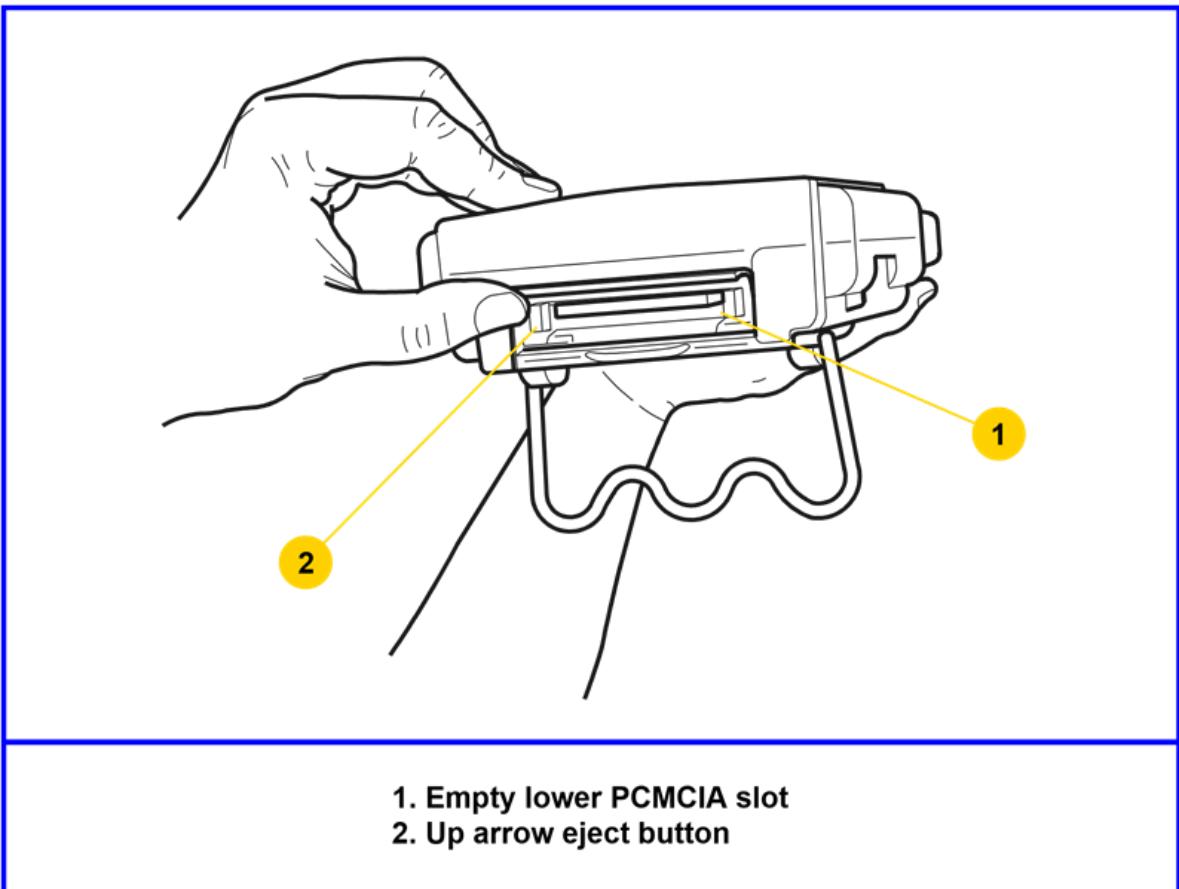
The PCMCIA Card is accessed by opening the hinged door located at the top of the Tech2. The card is found in the upper slot. The lower slot will be used for future enhancements. Press the arrow button (located beside the slot) to eject the card.



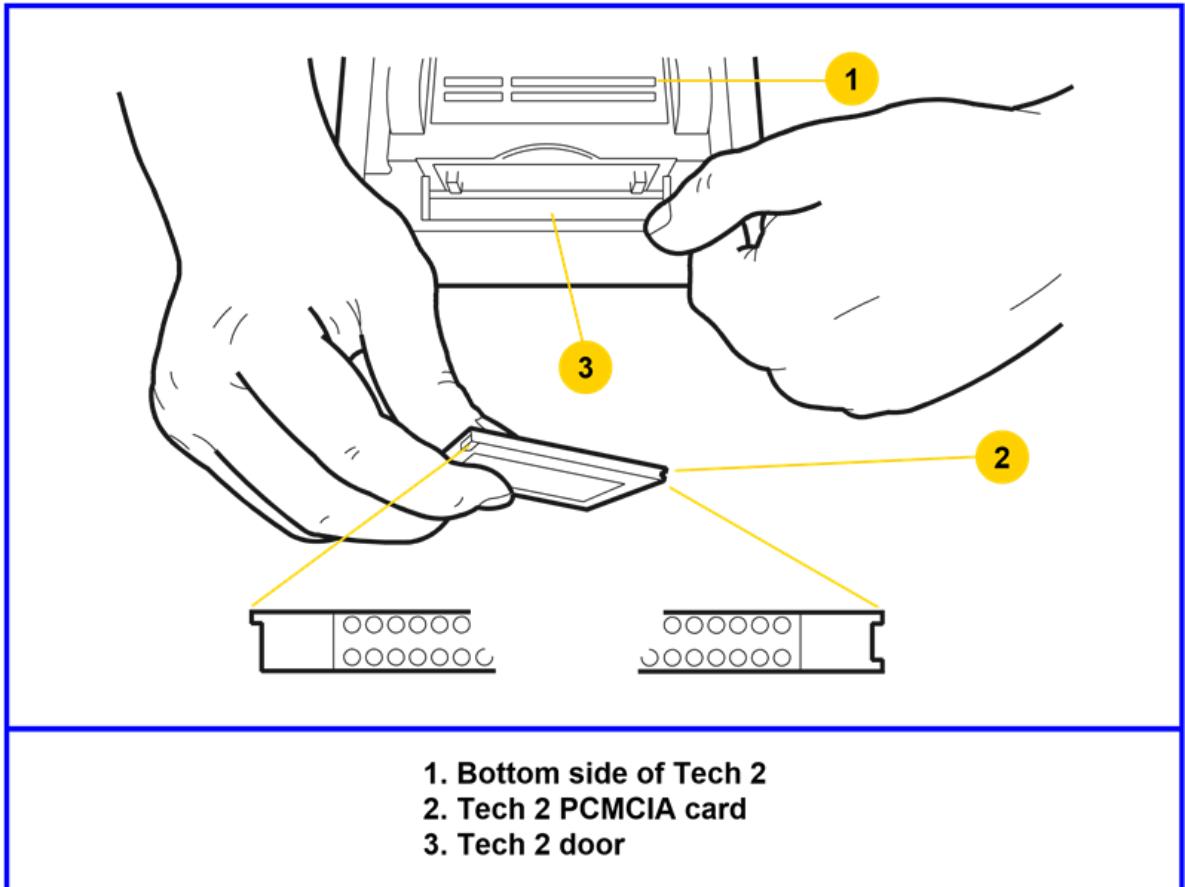
Ejection of PCMCIA card

## PCMCIA Card Insertion

The PCMCIA Card is keyed with two notches on one side and one notch on the other side. Make sure that the notches are in the correct position before inserting the card. Slowly insert the card until it clicks into place.



PCMCIA card keying



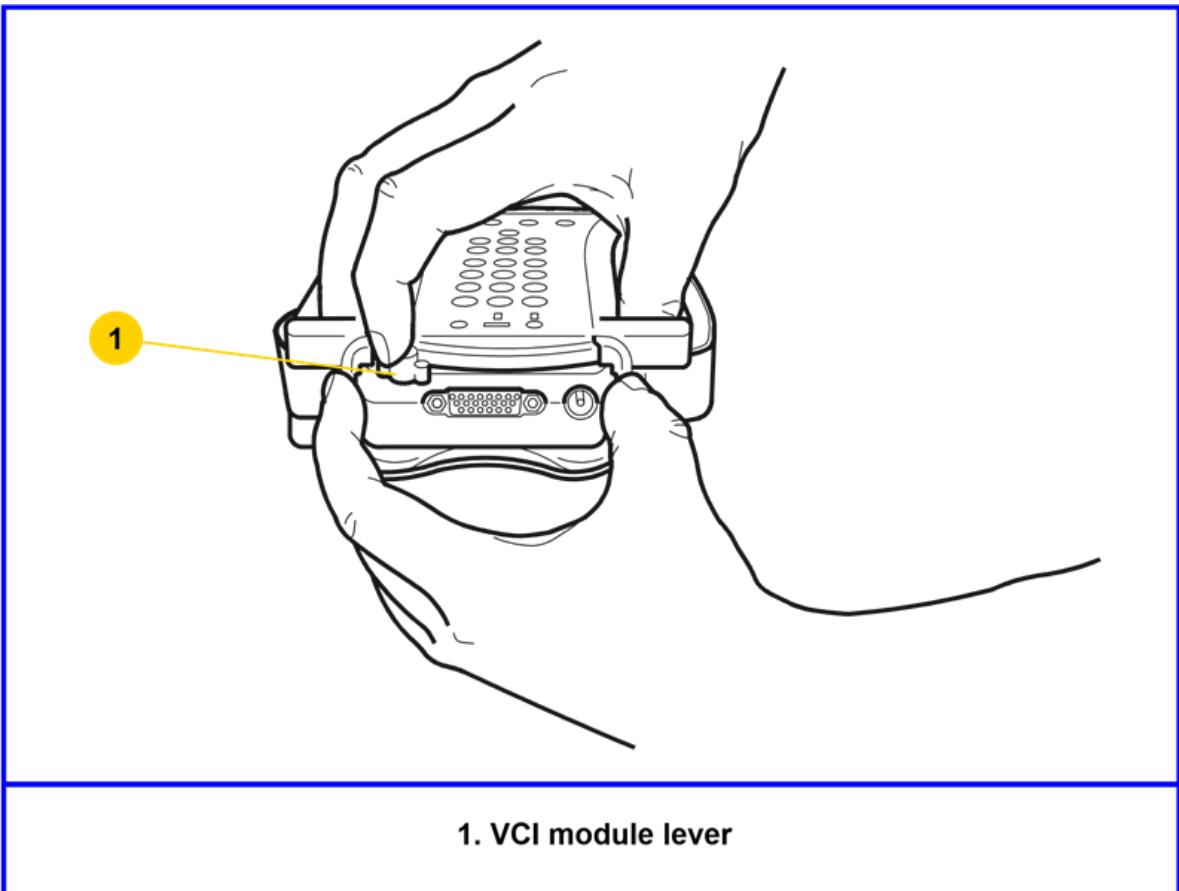
#### PCMCIA card insertion

**Notice:** Use only GM Service and Parts Operations supplied PCMCIA cards. The PCMCIA slots are designed to interface with 5-volts cards. Permanent damage to Tech2 could occur if a 3.3-volt card is inserted into the Tech2 PCMCIA connector.

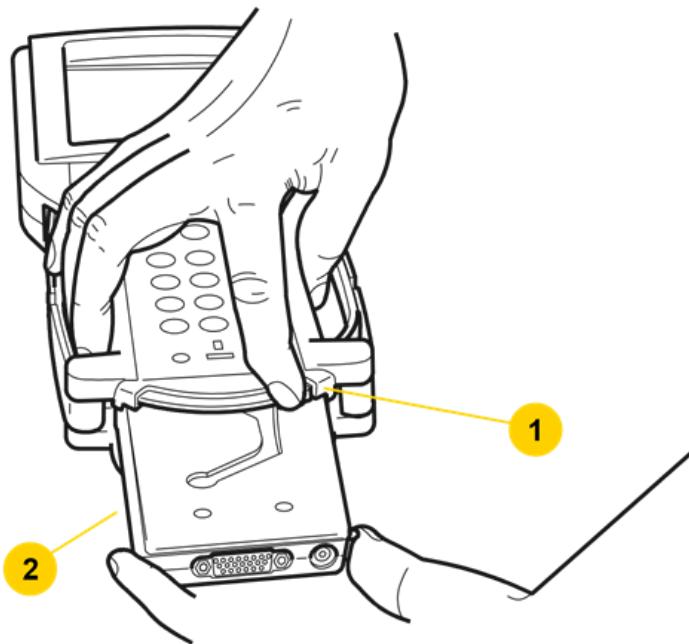
## Vehicle Communications Interface Module Removal

The Vehicle Communications Interface (VCI) module is located at the lower end of the Tech2. Removal of this module is required only if the VCI needs to be updated or replaced.

To remove the module disconnect Tech2 DLC cable if attached, move the lever all the way toward the right side of the Tech2. The VCI module can now be removed.



VCI module removal



1. VCI module lever (moved all the way to the right)
2. VCI module

VCI module removed

#### Hand Strap Adjustment

The Tech2 velcro hand straps may be adjusted for individual needs as shown in the illustration below.



Tech2 hand strap adjustment

## Tech2 Keypad

The Tech2 keypad consists of six major keypad operation areas:

1. Control keys (SHIFT, PWR)
2. Soft keys
3. Selection (arrow) keys
4. Action keys (YES, NO, ENTER, EXIT)
5. Function keys (F0 to F9)
6. Help (?) key

### Control Keys

The [PWR] key is used to turn the Tech2 on or off. The status indicator light above this key will be illuminated green when the Tech2 is operational.

The [SHIFT] key is used with the up and down arrow keys to change screen brightness and contrast. To adjust screen brightness and contrast, perform the following:

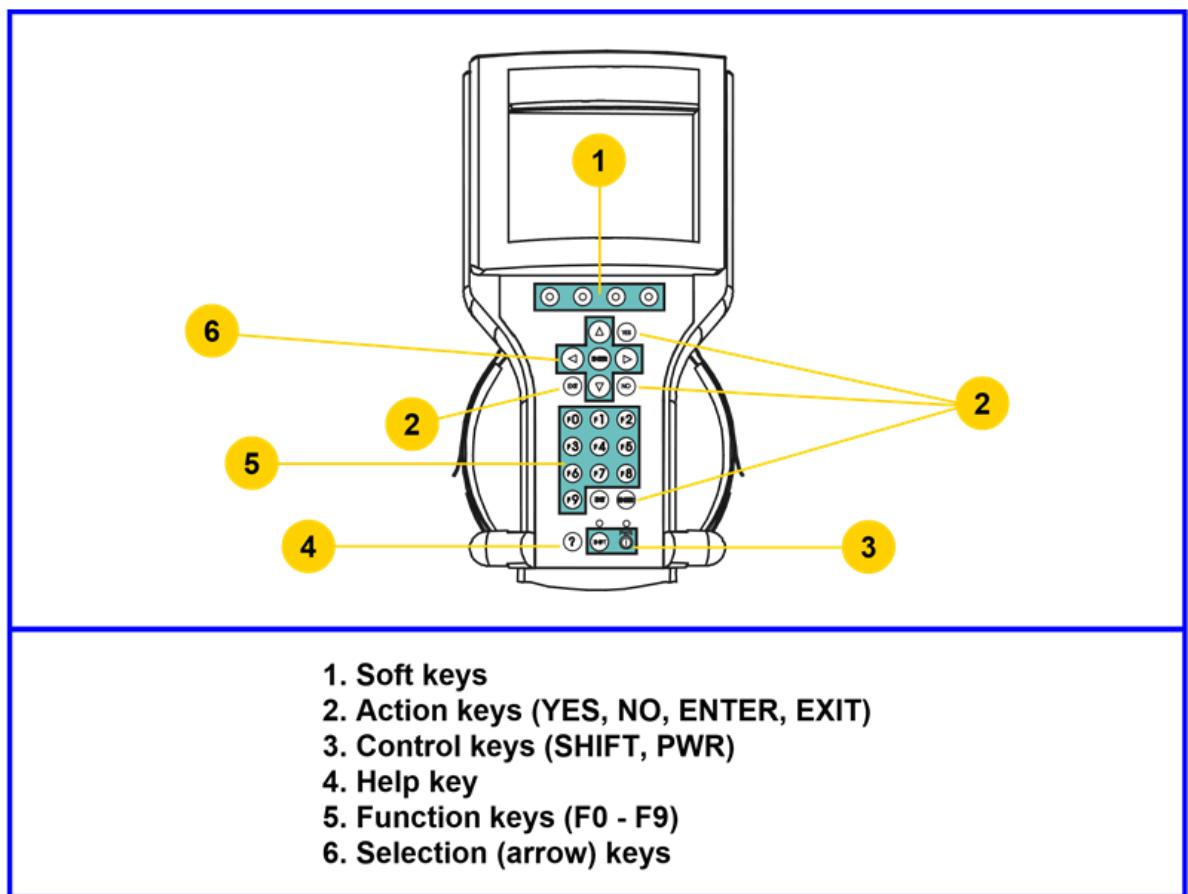
- Press the [SHIFT] key once (amber status indicator light above [SHIFT] should light up).

- Use up and down arrows to adjust screen brightness and contrast: Press up arrow key to increase screen brightness and contrast.

Press down arrow key to decrease screen brightness and contrast.

- Press [SHIFT] key again when desired brightness is reached (status indicator light above [SHIFT] should now be off).

The Tech2 should return to normal operation after following the above steps.



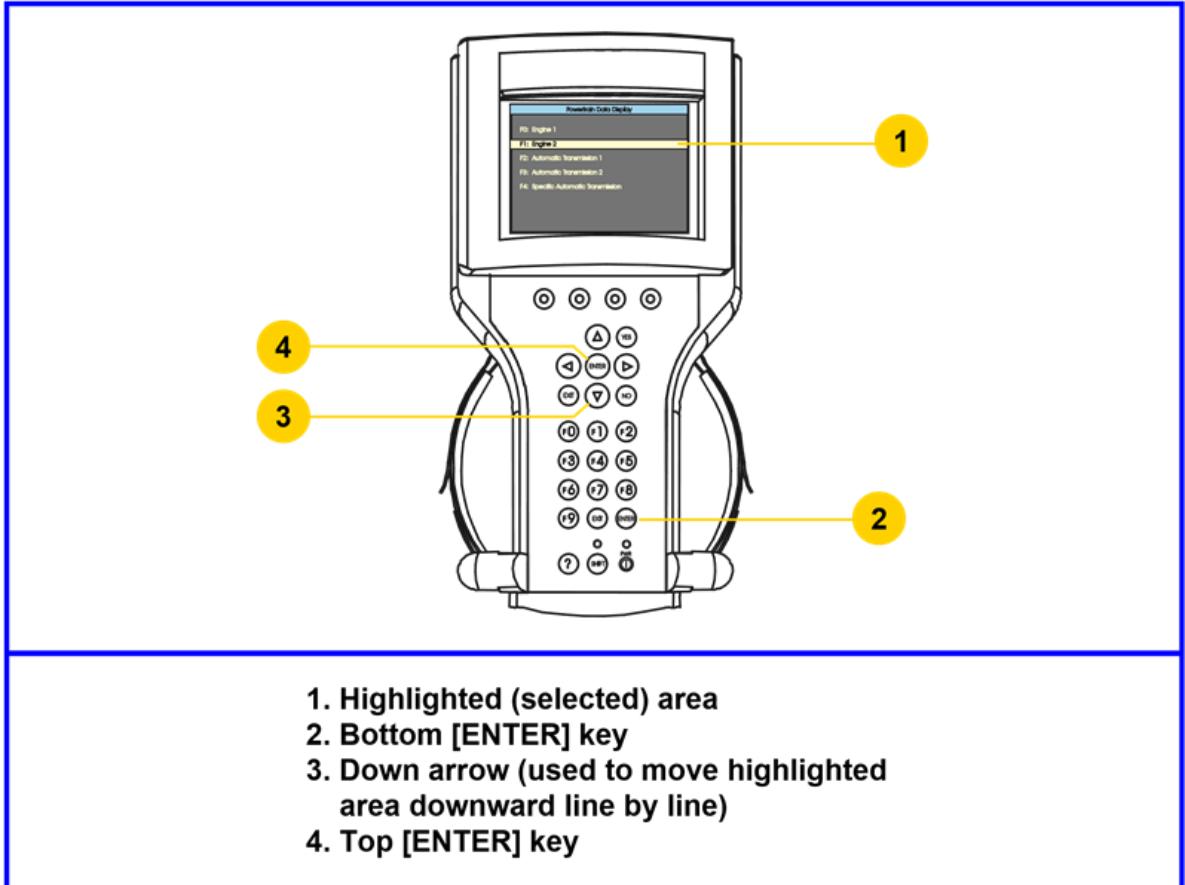
#### Tech2 keypad Location of control keys

#### Soft Keys

Four soft keys are located directly below the Tech2 screen. The soft keys correspond directly to the four possible selection boxes found at the bottom region of the Tech2 screen. These selections may change from screen to screen and are under the control of the application software. To make a screen selection, press the corresponding soft key. In the example shown, the first soft key was pressed to select [Display Time].

#### Selection Keys

The Tech2 selection keys are four directional arrow keys. Press the arrow keys to move the highlighted area to a selection on the screen or to scroll the screens if more than one. Once the desired selection is highlighted, press [ENTER] to activate the selection.



### Action Keys

Action keys are used to respond to a specific question, initiate an action, or to exit from the Tech2 program. Specific “yes or no” questions will often appear on the Tech2 screen. The [YES] and [NO] keys are used to respond to these questions. Either of the two [ENTER] keys may be pressed to activate a menu selection. Either of the two [EXIT] keys may be pressed to leave the current Tech2 screen and return to a previous screen.

### Function Keys

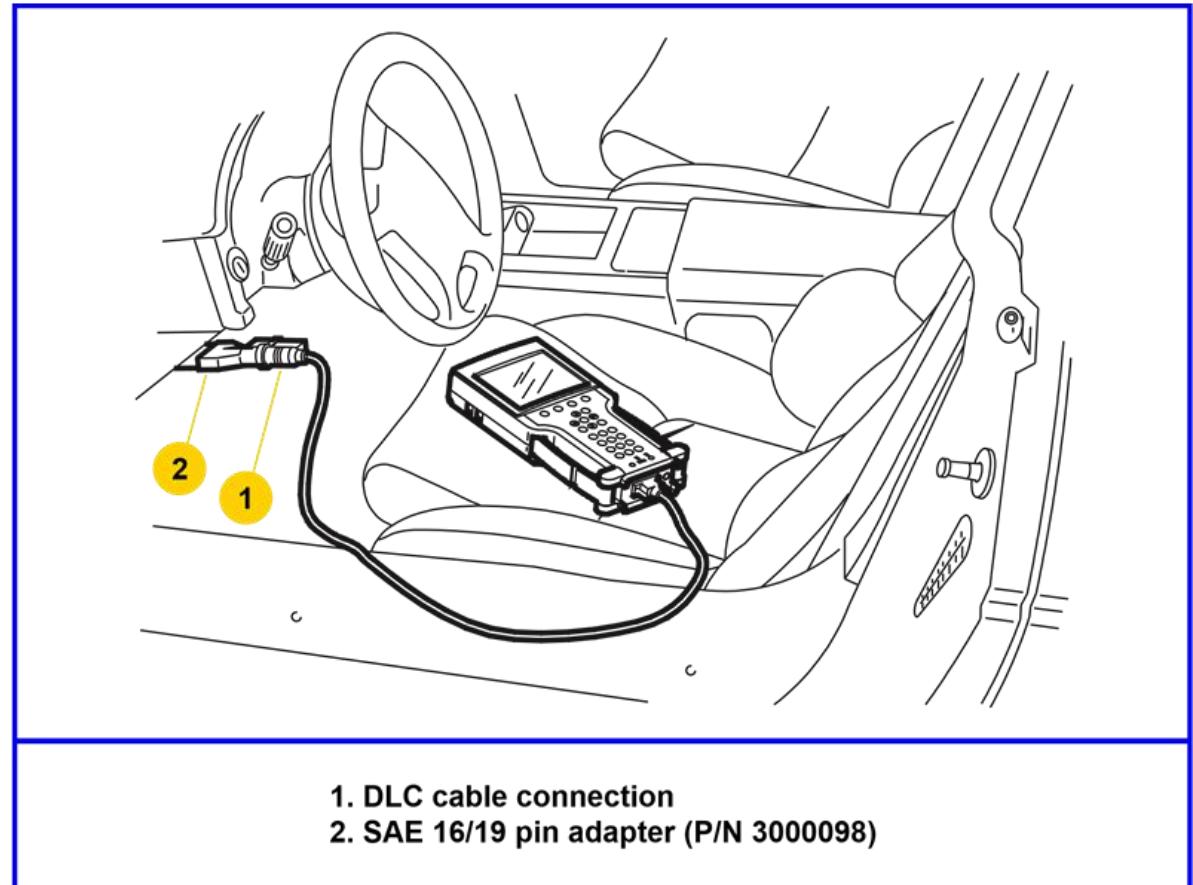
Ten function keys (F0 to F9) are located on the Tech2 keypad. A function key may be pressed to initiate a specific Tech2 function. In some cases the function keys are used for numeric data entry. The arrow keys and [ENTER] may also be used to initiate a function selection, but this will require multiple keystrokes as opposed to only one.

### Help Key

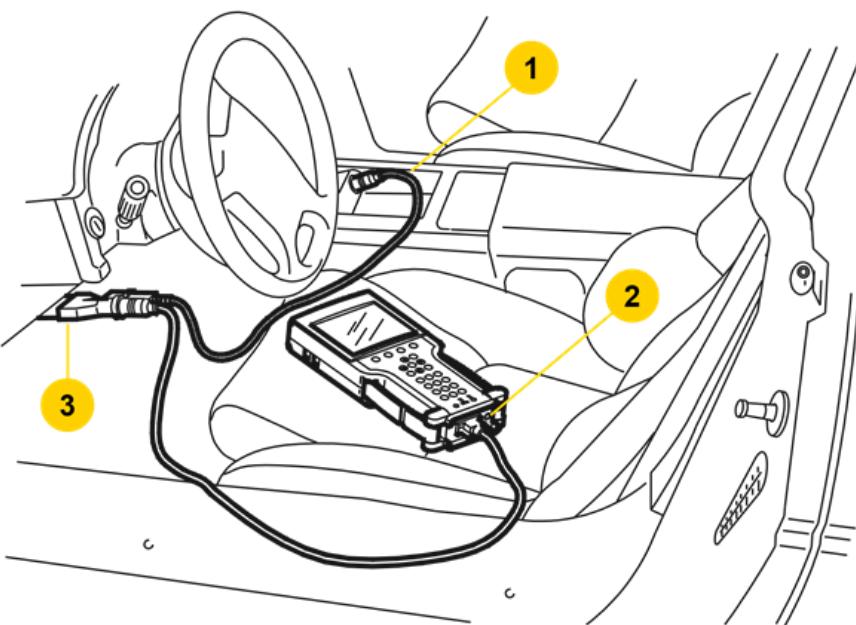
The help key [?] may be pressed at any time to obtain a help screen. The help screen will provide specific information relating to the operation of the Tech2.

## Tech2 Connection to Vehicle

The Tech2 receives power through the DLC cable connection to vehicles equipped with On-Board Diagnostics (OBD II). In the case of vehicles not equipped with OBD II, an external power source such as a vehicle cigarette lighter must be used.



Attaching the Tech2 to OBD II equipped vehicles



1. Cigarette lighter power cable (P/N 3000096)
2. **Do not use power jack connector while DLC is connected to a vehicle.**
3. Pin adapter 3/19, 10/19, 12/19, or 16/19 (see Section V)

#### Attaching the Tech2 to non-OBD II equipped vehicles

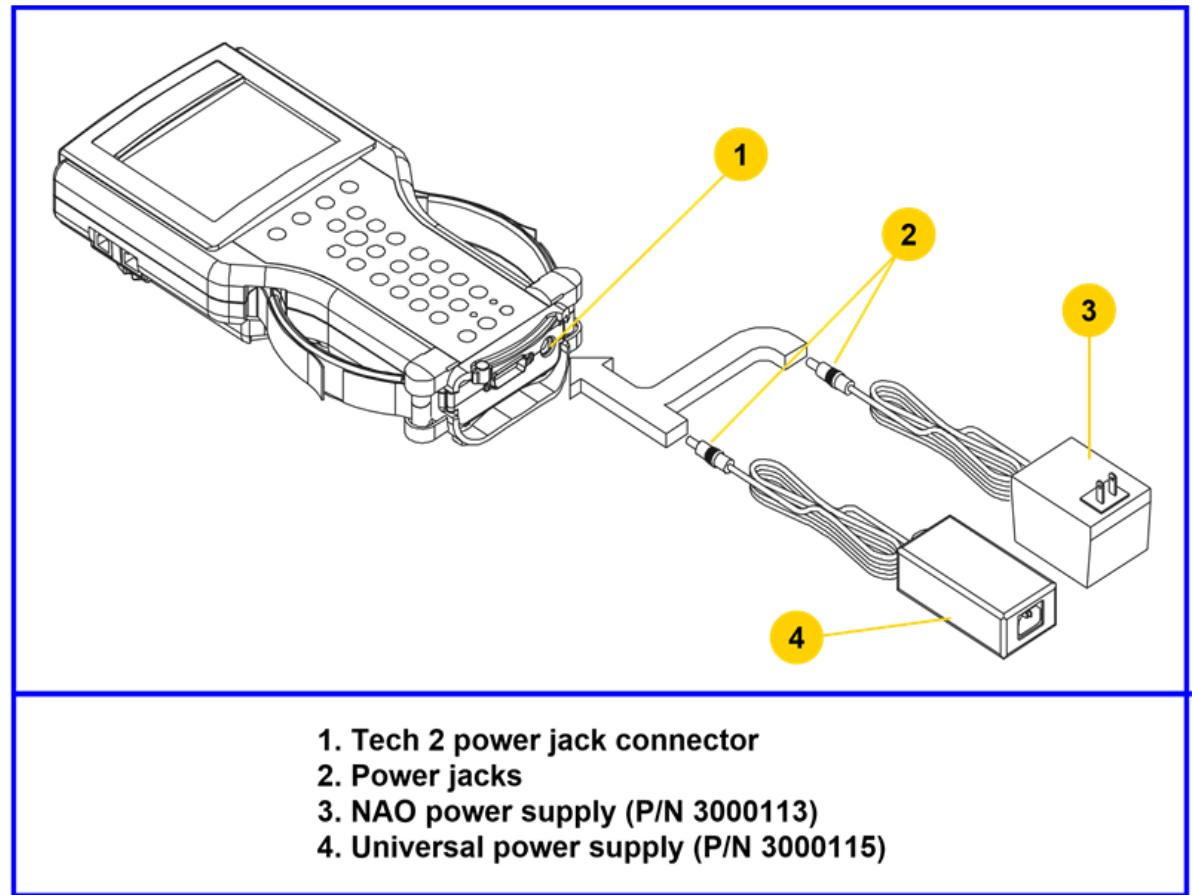
## Tech2 Connection to TIS2Web Computer

At times the Tech2 will need to be connected to a computer. Reasons for connection to a computer include the following:

- Transfer of vehicle data (calibration information, "snapshot," etc.) from the Tech2 to the computer
- Transfer of vehicle calibration data from the computer to the Tech2
- Transfer of data (software update, etc.) from the computer to the Tech2

Before connecting Tech2 to the computer, the following steps should be taken:

- Make sure the RS-232 cable (P/N 3000110) is attached to the Tech2 RS-232 port located on the left side of the Tech2.
- Make sure the appropriate power supply is connected to the DLC cable power jack connector, or to the power jack connector at the bottom of the Tech2.
- Make sure the PCMCIA card is fully inserted into the upper slot at the top of the Tech2.
- Make sure the CANdi module is not connected to the Tech2.



Power supply connections for communication with the computer.

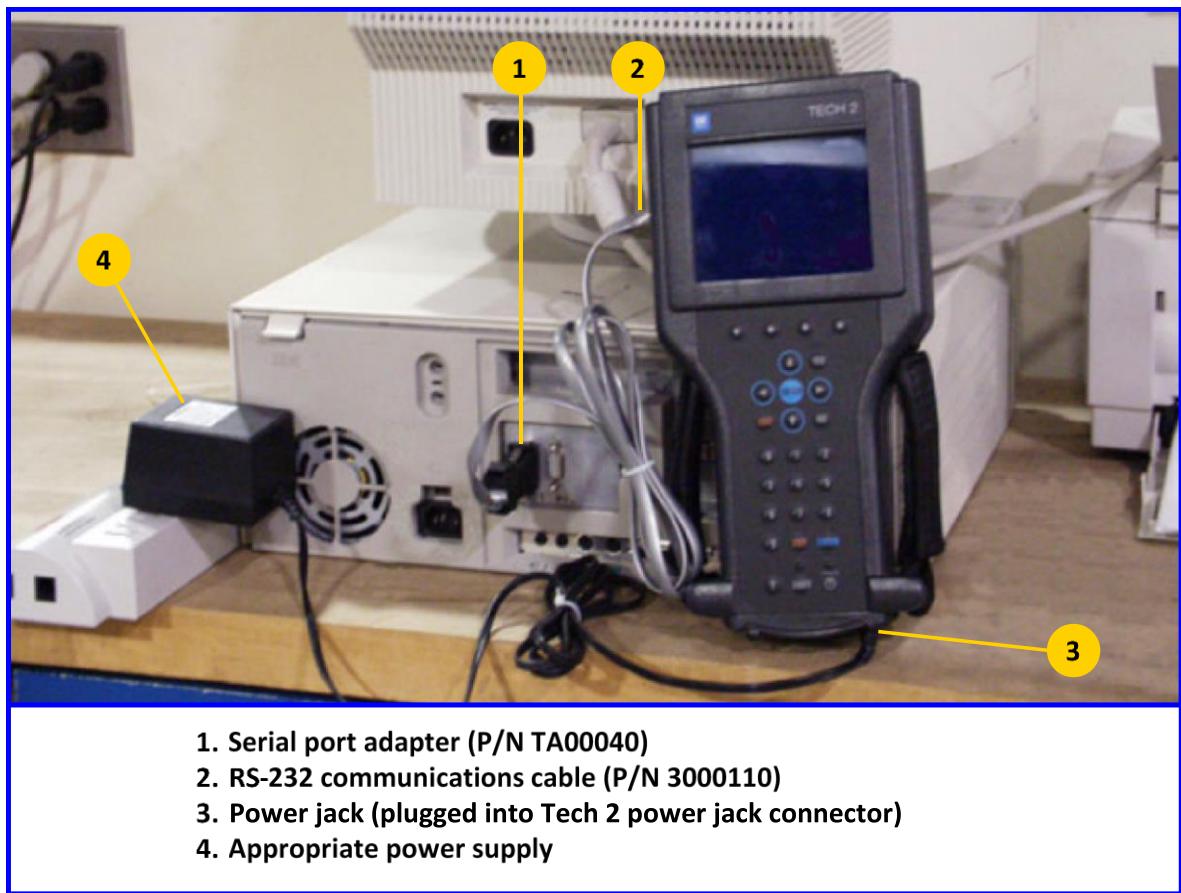
**Notice:** Always use the Tech2 NAO power supply (P/N 300113) when connecting the Tech2 to a computer. It is also acceptable to connect the power cable to the vehicle cigarette lighter.

## How to Connect the Tech2 to a Computer

Follow the steps below for the typical Tech2 connection to a computer.

1. Plug the serial port adapter (P/N TA00040) into the serial port marked "A" or "1" on the back of the computer or to the USB port using the USB serial adapter.
2. Plug the Tech2's RS-232 cable into the serial port / USB port adapter and connect the appropriate power supply.
3. After power is supplied to the Tech2 and the [PWR] button is pressed, the Tech2 start-up display should appear on the Tech2 screen.

**Note:** Not all USB to serial port adapters are compatible with the Tech2. ACDelco recommends using the Keyspan brand USB to serial port adapter.

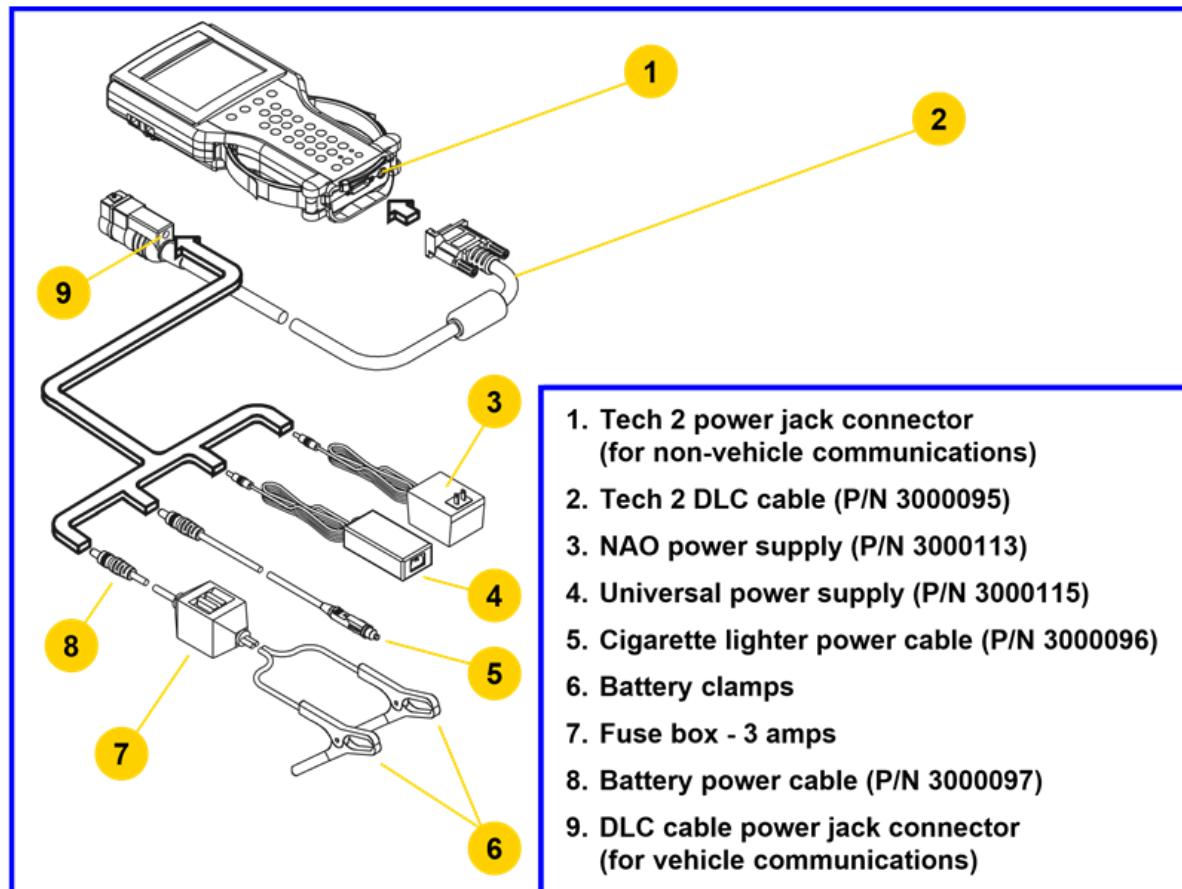


Typical Tech2 connection to a computer (rear view)

## Power Supplies

Power up the Tech2 using either:

- The power jack connector at the bottom of the Tech2 unit, or
- The DLC cable power jack connector behind the area where various DLC adapters are connected.



For non-vehicle communications, connect power source to either location.

For vehicle communications, connect the power source to the DLC cable power jack connector only. Proper grounding may not be present if power source is connected directly to Tech2.

When the Tech2 is connected to the DLC of an appropriate vehicle, the vehicle battery supplies power. When the Tech2 is not connected to the vehicle's DLC, the DLC cable power jack connector accepts power from the following:

- Cigarette lighter power cable
- Battery power cable
- NAO or Universal power supply

If the DLC and external power source are both connected, the power jack connection supplies current to the Tech2. In this instance, power from the vehicle's DLC connector is automatically disconnected from the Tech2 internal power supply.

## Cigarette Lighter Power Cable

This cable contains one fuse and two connectors. It has a cigarette lighter plug at one end and a power jack at the other. The power jack connects to the Tech2 DLC cable and carries power to the Tech2 when the selected vehicle adapter does not provide power.

## Battery Power Cable

This cable has red and black battery clamps attached to one end and a power jack attached to the other. The power jack connects to the Tech2 DLC cable and carries current to the Tech2 when the selected vehicle adapter does not provide power and there is no cigarette lighter adapter available.

**Important:** This cable contains two 3-amp fuses. If you need to replace them, use identical 3-amp fuses.

For information on fuse replacement, see Troubleshooting.

## NAO Power Supply

North American electrical supply is normally 110 volts. The Tech2 base kit includes an external AC to DC power supply with 110 V AC/60 Hz input. Output is 12 volts at 1.5 amps.

## Universal Power Supply

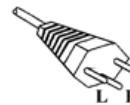
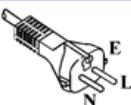
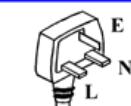
Wherever 220 current is required, use the 110/220 V AC/50 Hz external AC to DC power supply. A specific power cord is provided to permit connection to your area's power cord receptacle.

**CAUTION:** To avoid personal injury due to electric shock, use grounded outlet only. The NAO power supply is for North American use only. The Universal power supply is for use outside North America. These devices are intended for indoor use only.

## Power Cord Plugs

Various types of power cord plugs are available for the Tech2, depending on your geographic location.

A variety of power cord plugs are available for the Tech 2, as shown:

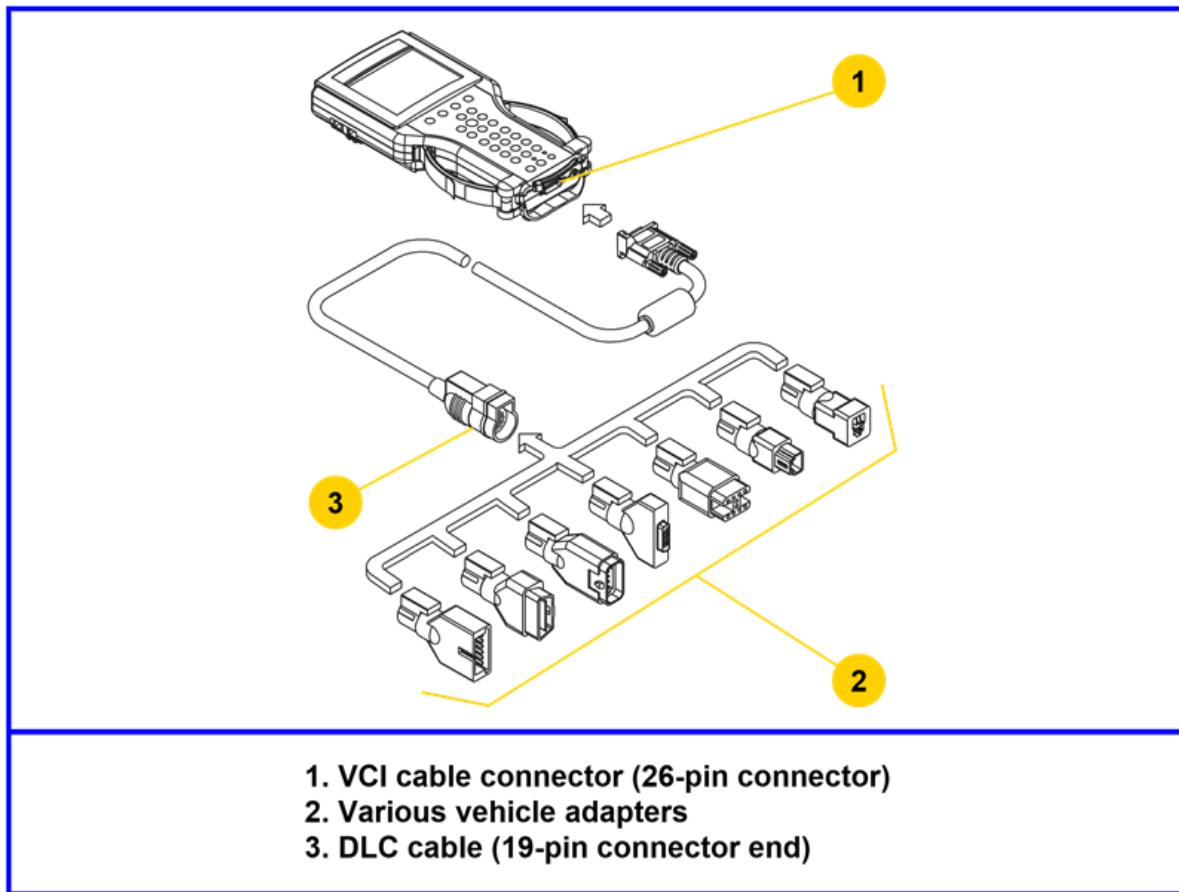
AC Plug Type	Voltage & Current	GM Part Number	AC Plug Type	Voltage & Current	GM Part Number
 NEMA 5-15P	125-127 Volts AC 10 Amps	3000141	 SEV 12	250 Volts AC 6 Amps	3000145
	125 Volts AC 12 Amps	3000147			
 CEE 7-7	250 Volts AC 10 Amps	3000142	 ASFNIT 107	250 Volts AC 6 Amps	3000146
 BS 1363A	250 Volts AC 5 Amps	3000143	 IEL 83-B1	250 Volts AC 10 Amps	3000148
 AS 3112	250 Volts AC 7.5 Amps	3000144	 SI 32	250 Volts AC 6 Amps	3000149

L = line or active conductor  
 N = neutral or identified conductor  
 E = earth or ground

Table showing various types of power cord plugs for the Tech2

## Adapters

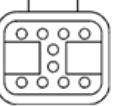
A number of adapters are available for the Tech2 which allow connection to many different vehicles. Specific adapters are included in the Tech2 base kit depending upon Tech2 configuration—NAO, International, Saab, Opel, Vauxhall, etc. Adapters not included in the base kit may be purchased separately from your tool distributor.



### DLC Cable

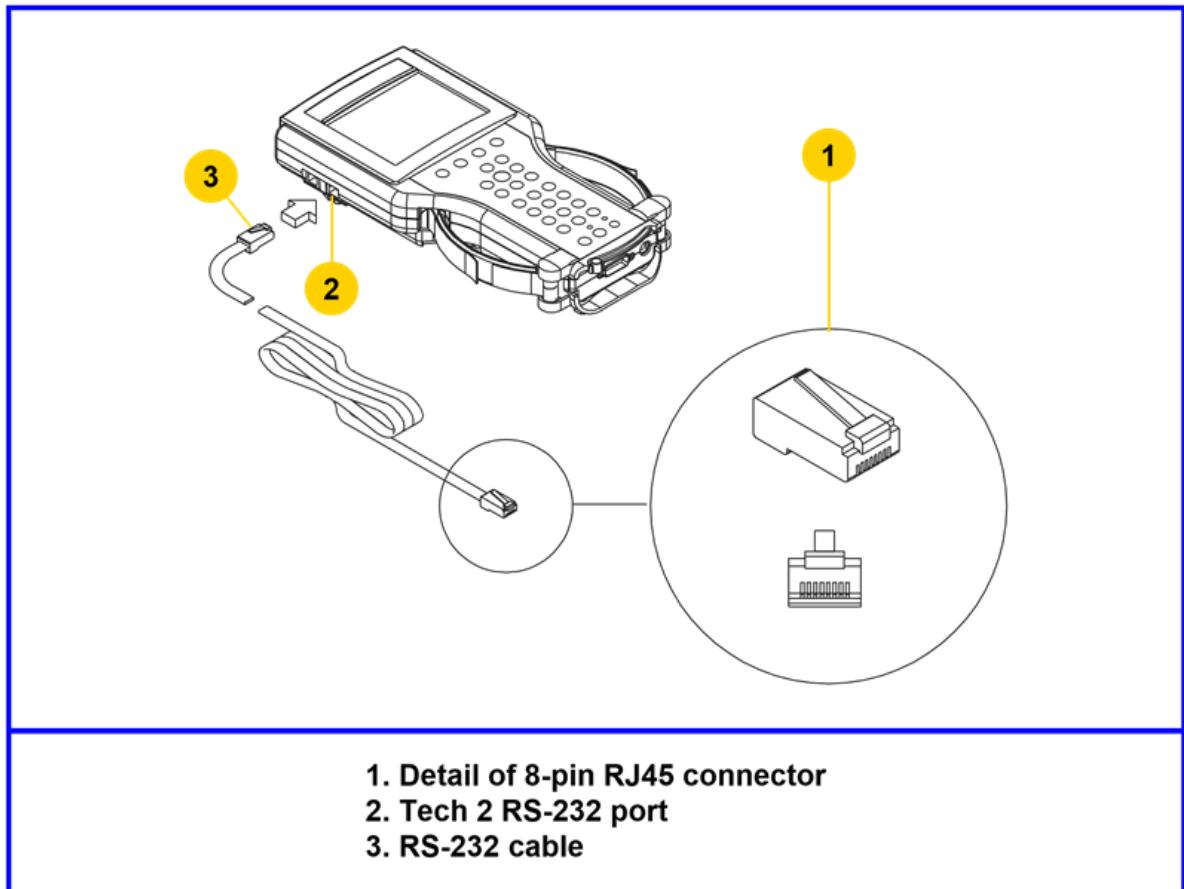
The DLC cable (P/N 3000095) has a 26-pin connector with thumb screws at one end that connects to the Tech2's VCI cable connector. At the other end is a 19-pin connector that connects to a variety of adapters.

A variety of adapters is available for the Tech 2, as shown:

Description	Function	Part No.	Description	Function	Part No.
SAE 16/19 Pin Adapter 	This adapter allows DLC connection to some 1994-1995 NAO vehicles and all NAO vehicles from 1996 onward.	3000098	Saab 10/19 Adapter 	This adapter allows connection for current Saab vehicles with a 10-pin connector.	3000101
NAO 12/19 Pin Adapter 	This adapter allows ALDL connection to some 1994-1995 NAO vehicles and all previous 1993 and earlier vehicles equipped with 12-pin ALDL connectors.	3000099	Opel / Isuzu / Geo 3/19 Adapter 	This adapter allows connection for Opel, Isuzu, and Geo vehicles that have a 3-pin horizontal connector.	3000102
Opel 10/19 Adapter 	This adapter allows connection for current Opel vehicles with a 10-pin connector.	3000100	Opel / Isuzu 3/19 Adapter 	This adapter allows connection for Opel and Isuzu vehicles with a 3-pin "T" connector.	3000103

### RS-232 Cable

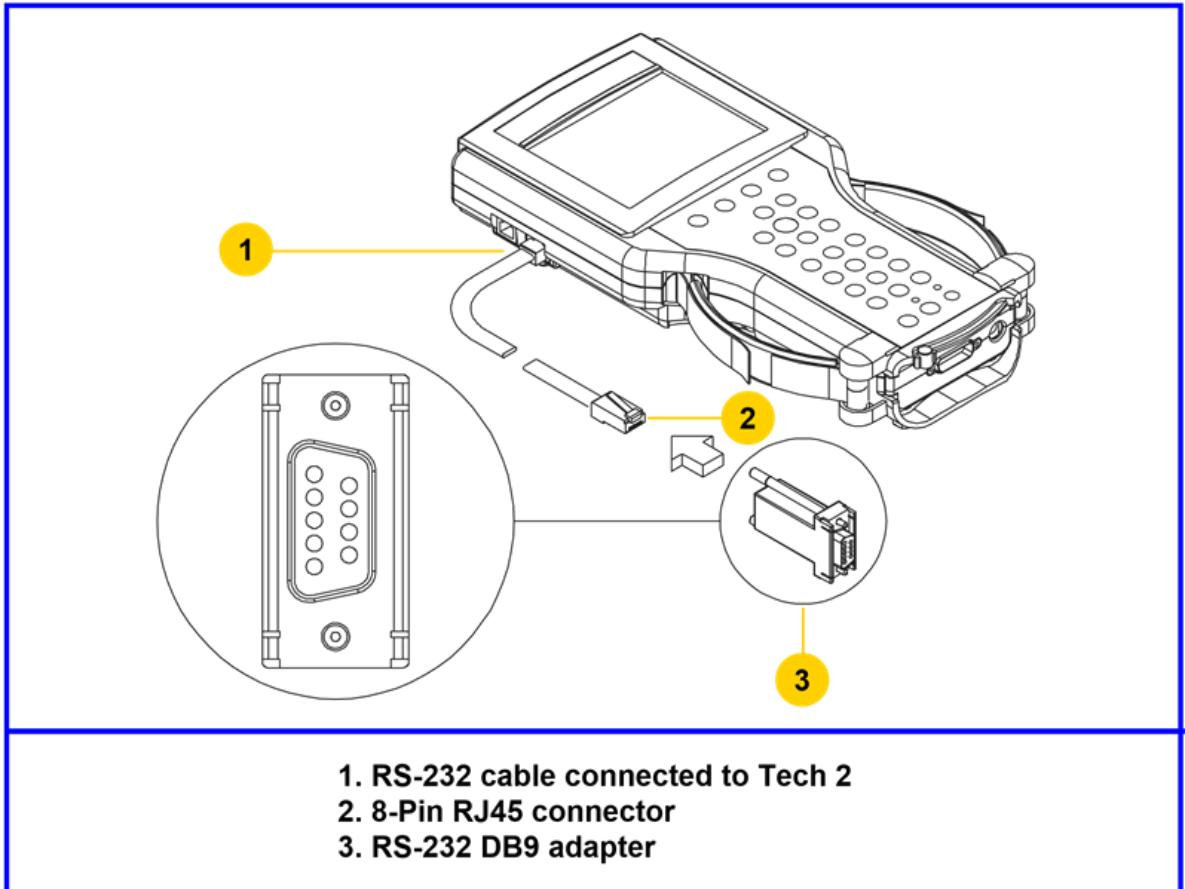
The RS-232 cable (P/N 3000110) has an 8-pin RJ45 plug connector at each end. This cable attaches to the Tech2 RS-232 port and is used to communicate with the TIS2Web computer.



RS-232 cable connections

## RS-232 DB9 Adapter

The RS-232 DB9 adapter (P/N 3000111) has an RJ45 connector at one end and a DB9 connector at the other. This adapter allows the connection of the Tech2 to some computers.



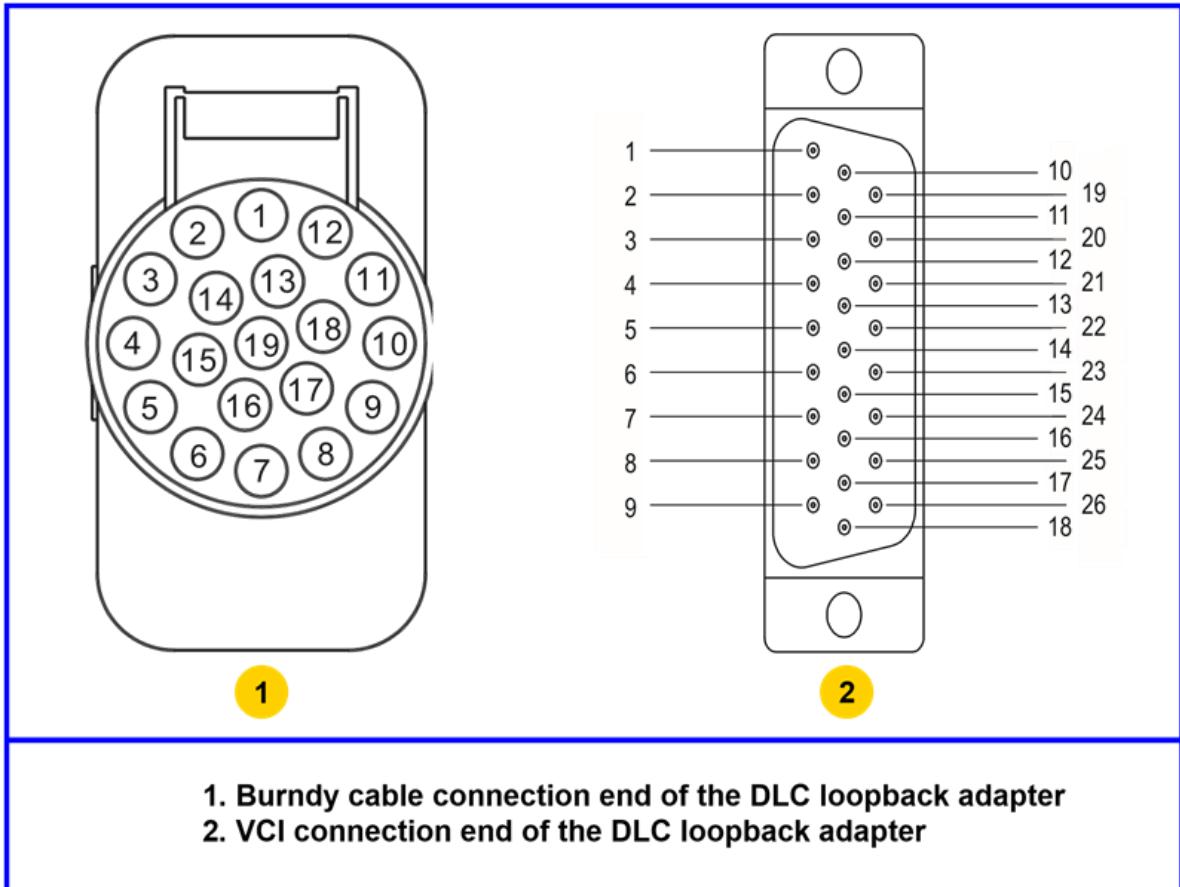
RS-232 DB9 adapter connections

### RS-232 Loopback Adapter

The loopback adapter (P/N 3000112) has an 8-pin RJ45 connector that attaches to the Tech2 RS-232 port. It is used to perform the Tech2 self test.

### DLC Loopback Adapter

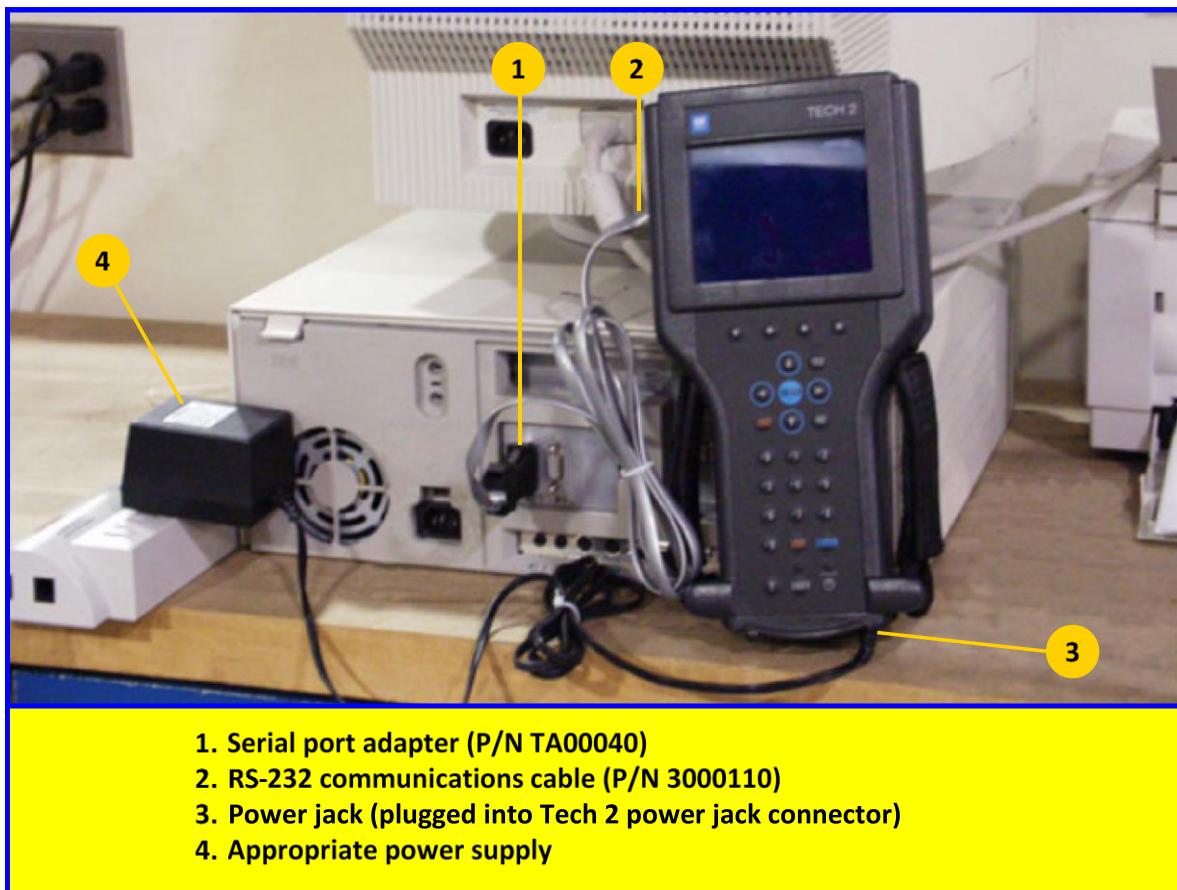
Various Tech2 applications require the DLC loopback adapter (P/N 3000109), which has a Burndy cable connection end and a VCI DB-26 connection end.



End views of the DLC loopback adapter

### USB to Serial Port Adapter

Not all USB to serial port adapters are compatible with the Tech2. ACDelco recommends using the Keyspan brand USB to serial port adapter.



Typical Tech2 connection to a computer (rear view)

## Troubleshooting

This is a general troubleshooting guide for all vehicle applications of the Tech2 scan tool. Some of the information may differ for your particular vehicle application.

If the Tech2 appears to be operating abnormally, refer to this section—particularly the diagnostic charts and troubleshooting tables—for probable causes and solutions.

The following two types of self tests are available on the Tech2:

- Power On Self Test (POST) checks the major functions of the Tech2 at power-up.
- Self Tests check the major and minor functions of the Tech2.

If errors are detected, a Tech2 malfunction is present which may result in vehicle misdiagnosis.

For customer support, refer to the Customer Support Overview on pages ii and iii of this user's guide.

**Notice:** The CANdi module should not be connected while running Tech2 and VCI self tests.

## Power On Self Test (POST)

Power On Self Tests run automatically each time the power [PWR] button on the Tech2 keypad is pressed on. The screen displays pass or fail results for each area tested. POST automatically checks the following:

- MC68332 processor
- External RAM (Random Access Memory)
- Flash memory
- Display controller and display
- Sound transducer
- MC68332 RAM
- Real-time clock
- Keypad controller and keypad
- Main UART (Universal Asynchronous Receiver/Transmitter)

Results of POST may include fatal errors that do not allow you to continue, or non-fatal errors that allow you to continue without full Tech2 operation. If normal Tech2 functions are stopped or limited, contact Customer Support to determine if service is required.

At completion of POST, the following audible signals indicate a pass or fail condition:

- One beep - No problem. Your Tech2 is operating normally.
- No beep - Sound transducer has failed. Contact Customer Support.
- Three short beeps - Tech2 has failed POST. Contact Customer Support.

In the United States and Canada to contact the ACDelco Aftermarket Support Center, dial 1.888.212.8959.

## Tech2 Self Tests

Tech2 self tests verify that the Tech2 is functioning normally. The self tests evaluate all critical areas of the Tech2 and display pass or fail messages for each subsystem tested. Self tests isolate user error from system hardware failures. The self tests should be performed periodically to insure that the Tech2 is operating properly.

The Tech2 must meet the following requirements in order to do a self test:

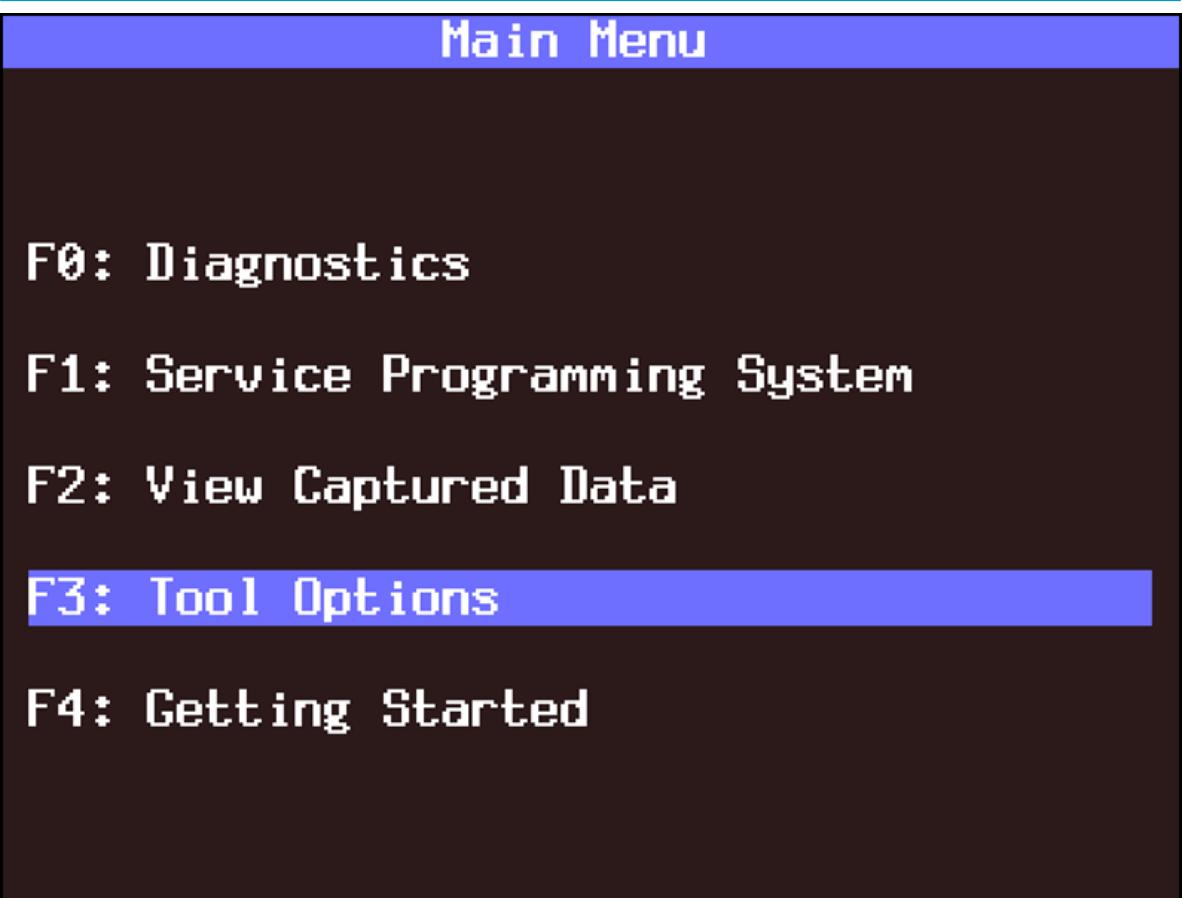
- Screen display must be fully readable
- Keypad must be operational

Begin the Tech2 self-testing program by following these steps:

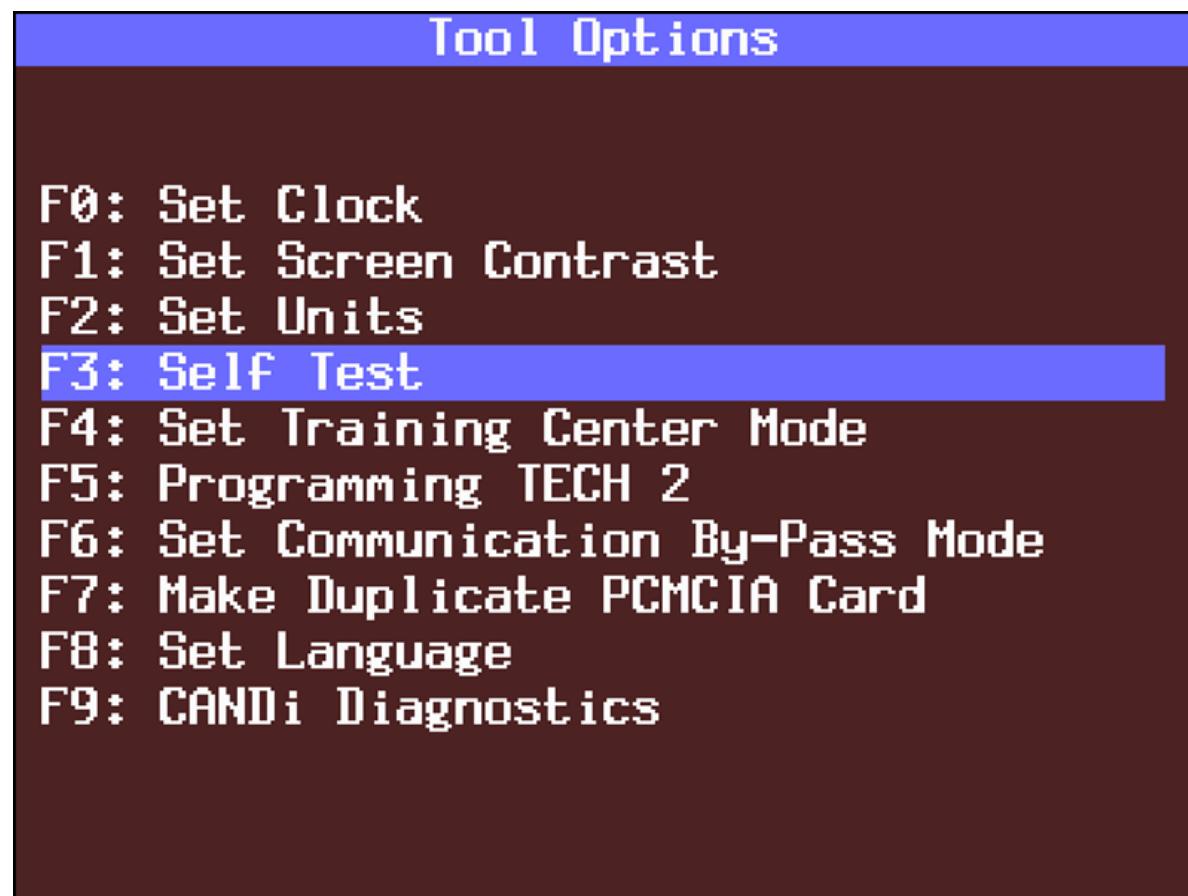
1. Press [ENTER] while viewing the Tech2 start-up screen.
2. Select F3: Tool Options from the Tech2 Main Menu.
3. Select F3: Self Test from the Tool Options menu.



Tech2 startup screen



Tools Options selected on Main Menu



Self Test selected on Tool Options menu

## Tech2 Self Test Main Menu

Each Tech2 Self Test main menu selection is explained in detail on the following pages. All users have access to all the options listed.

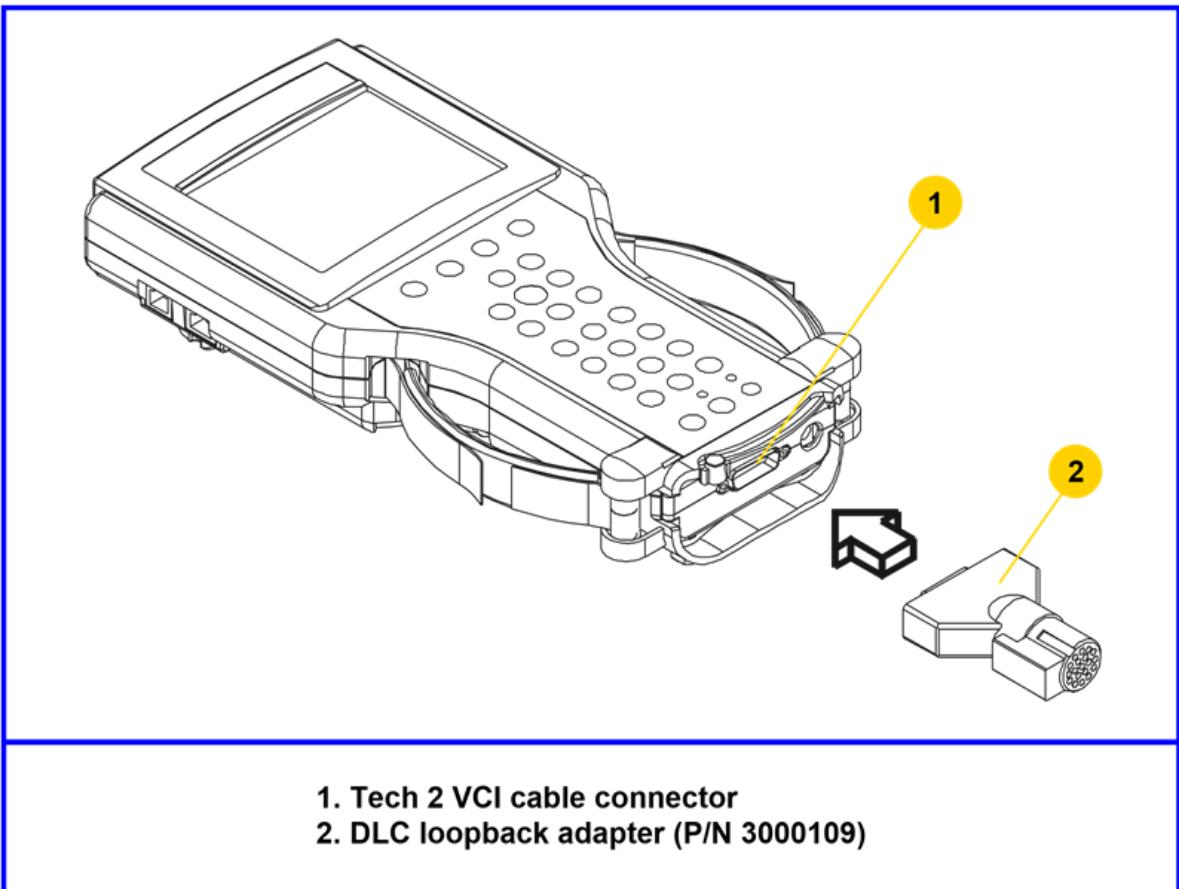
## Tool Options

- F0: Set Clock
- F1: Set Screen Contrast
- F2: Set Units
- F3: Self Test**
- F4: Set Training Center Mode
- F5: Programming TECH 2
- F6: Set Communication By-Pass Mode
- F7: Make Duplicate PCMCIA Card
- F8: Set Language
- F9: CANDI Diagnostics

Read all screen instructions and connect or disconnect the appropriate cables and loopback adapters. Screen messages will be displayed when external loopback connectors are connected.

### **F0: Automated Main PCB and VCI Test**

Selecting Automated Main PCB and VCI is a quick way to test the performance of the main Printed Circuit Board (main PCB—the Tech2 main circuit board) and the Vehicle Communications Interface (VCI). The Tech2 displays a test-in-progress screen while performing all the PCB and VCI tests in sequential order.



Connection of DLC loopback adapter to the Tech2 VCI connector

# Tech 2 Self Test

## Version 6.40

- F0: Automated Main PCB and VCI
- F1: Automated Main PCB
- F2: Automated VCI
- F3: Selectable Main PCB
- F4: Selectable VCI
- F5: Power On Self Test Results

Automated Main PCB and VCI test selected on Tech2 Self Test main menu

DAY	MONTH	DATE	YEAR	TIME : :
<b>Test Complete</b>			<b>Test Status</b>	
<b>Main PCB Self Test</b>			<b>PASS</b>	
<b>VCI Self Test</b>			<b>PASS</b>	
<b>Total Pass.....</b>			<b>1</b>	
<b>Total Failures .....</b>			<b>0</b>	
<b>PCMCIA Cards Present ....</b>			<b>1</b>	
		<b>Main Details</b>		<b>VCI Details</b>

**Test Status**

DAY	MONTH	DATE	YEAR	TIME : :
Test Complete				Test Status
RAM / ROM .....				Pass
RS-485 .....				Missing LoopBack
RS-232 .....				Pass
Keypad .....				Pass
PCMCIA Slot 1 .....				Pass
PCMCIA Slot 2 .....				Card Not Present
Display .....				Pass
Sound Transducer .....				Pass
Real-Time Clock .....				Pass

Test Pass

DAY	MONTH	DATE	YEAR	TIME : :
<b>Test Complete</b>				
MUX.....	Pass	ADC.....	Pass	
SIPO 8.....	Pass	SIPO 20.....	Pass	
DLC 1.....	Pass	DLC 2.....	Pass	
TPU .....	Pass	HBCC .....	Pass	
CCD.....	Pass	Dual Uart .....	Pass	
J1708 .....	Pass	Gnd FET .....	Pass	
Level Shifters .....				
Cross Point .....				
Short L and M.....				
Test I/01-I/016 .....				
LoopBack.....				

**Test Complete**

The Automated Main PCB portion tests the following components:

- RAM / ROM
- RS-485 loopback (This test requires the connection of a loopback adapter to the Tech2.)
- RS-232 loopback (This test requires the connection of a loopback adapter to the Tech2.)
- Keypad
- PCMCIA slot 1
- PCMCIA slot 2
- Display controller
- Sound transducer
- Real-time clock

If the Tech2 passes all Automated Main PCB and VCI tests, you will not need to run any more tests to verify that the Tech2 is working properly.

The following test results will be displayed:

Total Pass..... 1 - indicates that Tech2 passed test  
0 - indicates a test failure

Total Failures.....0 - indicates that Tech2 passed test

1 - indicates a test failure

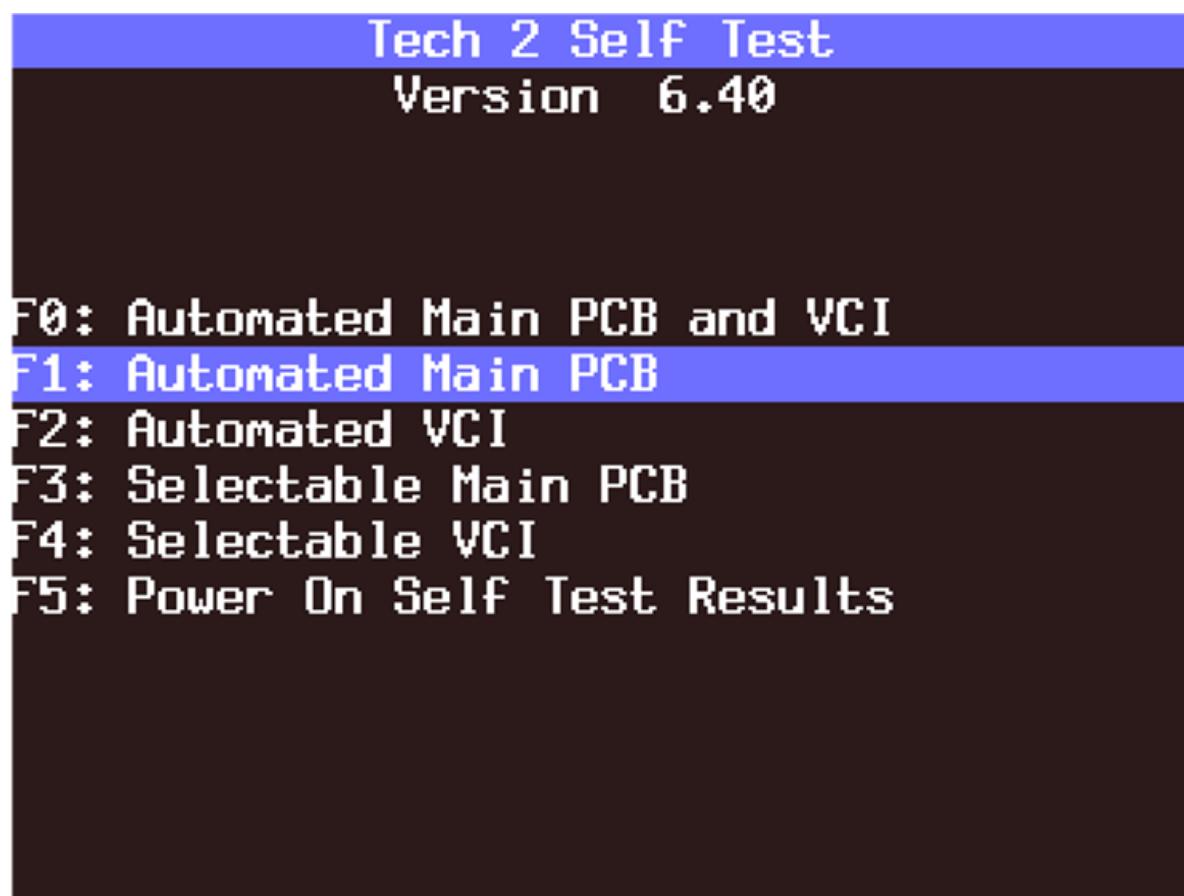
PCMCIA Cards Present.....1 or 2 indicates how many cards present in Tech2

Once tests are complete, select the soft keys Main Details or VCI Details to review the results of the main PCB or VCI tests.

If any failures occur, select F3: Selectable Main PCB or F4: Selectable VCI from the Self Test main menu to further isolate the failure. Report failure information to Customer Support.

F1: Automated Main PCB Test

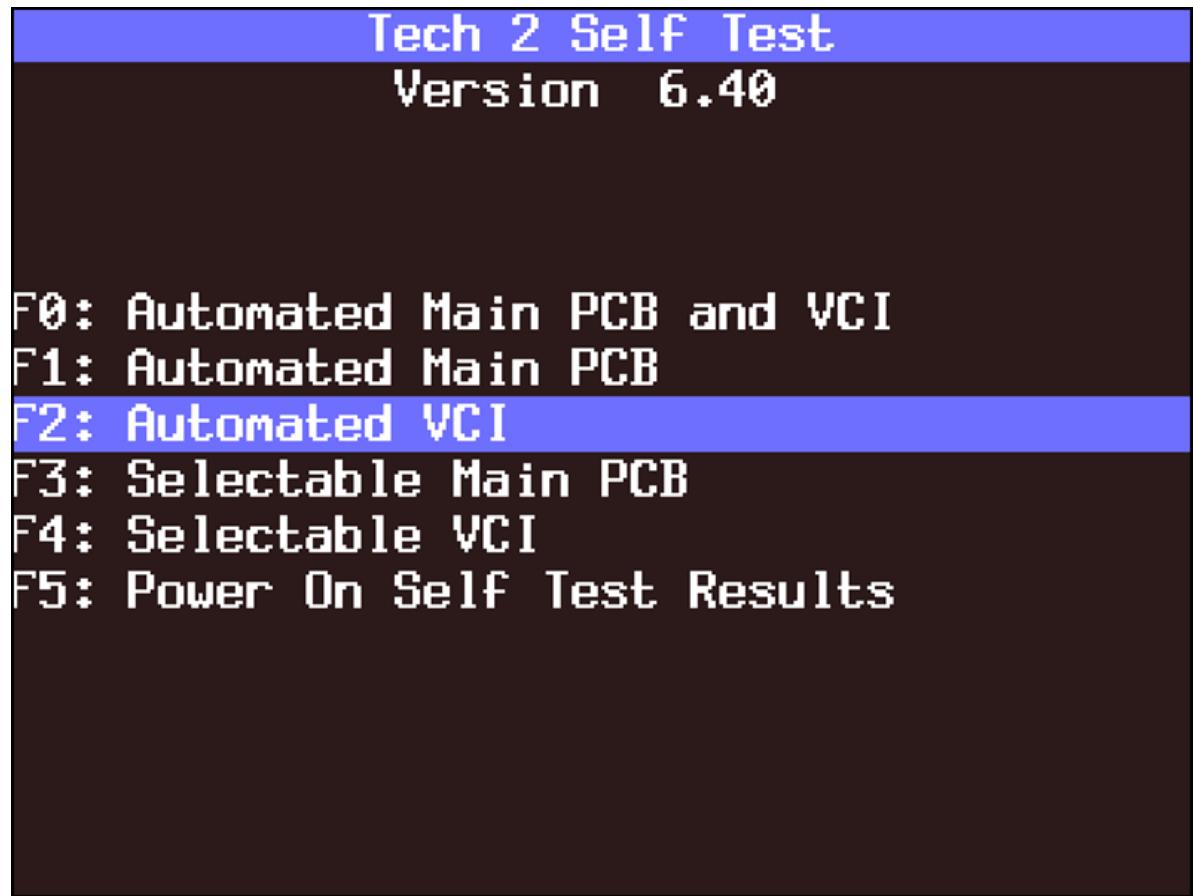
This test works the same as the Automated Main PCB and VCI test, except the VCI portion of the test is not included.



F1: Automated Main PCB Test

**F2: Automated VCI Test**

This test works the same as the Automated Main PCB and VCI test, except the PCB portion of the test is not included.



**F2: Automated VCI Test**

<b>PCB Diagnostic Chart</b>		
<b>Test</b>	<b>Results</b>	<b>Solution</b>
RAM/ROM	0 – Pass 1 – ROM read fail 2 – RAM read fail 3 – RAM write and read do not compare	Record type of failure. Cycle Tech2 power (press [PWR] and retest). If problem persists, contact Customer Support
RS-485 loopback	Pass Fail – Loopback may not be connected	Check loopback connection. If problem persists, contact Customer Support
RS-232 loopback	Pass Fail – Loopback may not be connected	Check loopback connection. If problem persists, contact Customer Support
Keypad	Test successful Keypad failed Exiting the test before all keys are pressed results in a failed keypad test.	Cycle Tech2 power and retest If problem persists, contact Customer Support
PCMCIA (Tests both card slots)	Card detected Card not present Fail	Check that card is inserted properly. Cycle Tech2 power and retest If problem persists, contact Customer Support
Display controller (Contrast and Characters)	User determines if display is correct.	If the display shows a noticeable failure during tests, contact Customer Support
Sound transducer	User determines if transducer is working	If no sound is emitted by repeatedly selecting Automated Test or Sound On, contact Customer Support
Real-time clock	Time is displayed correctly. Invalid values are displayed for date, year, hour, minute, or second	Reset clock. Cycle Tech2 power and retest. If time is not retained, contact Customer Support

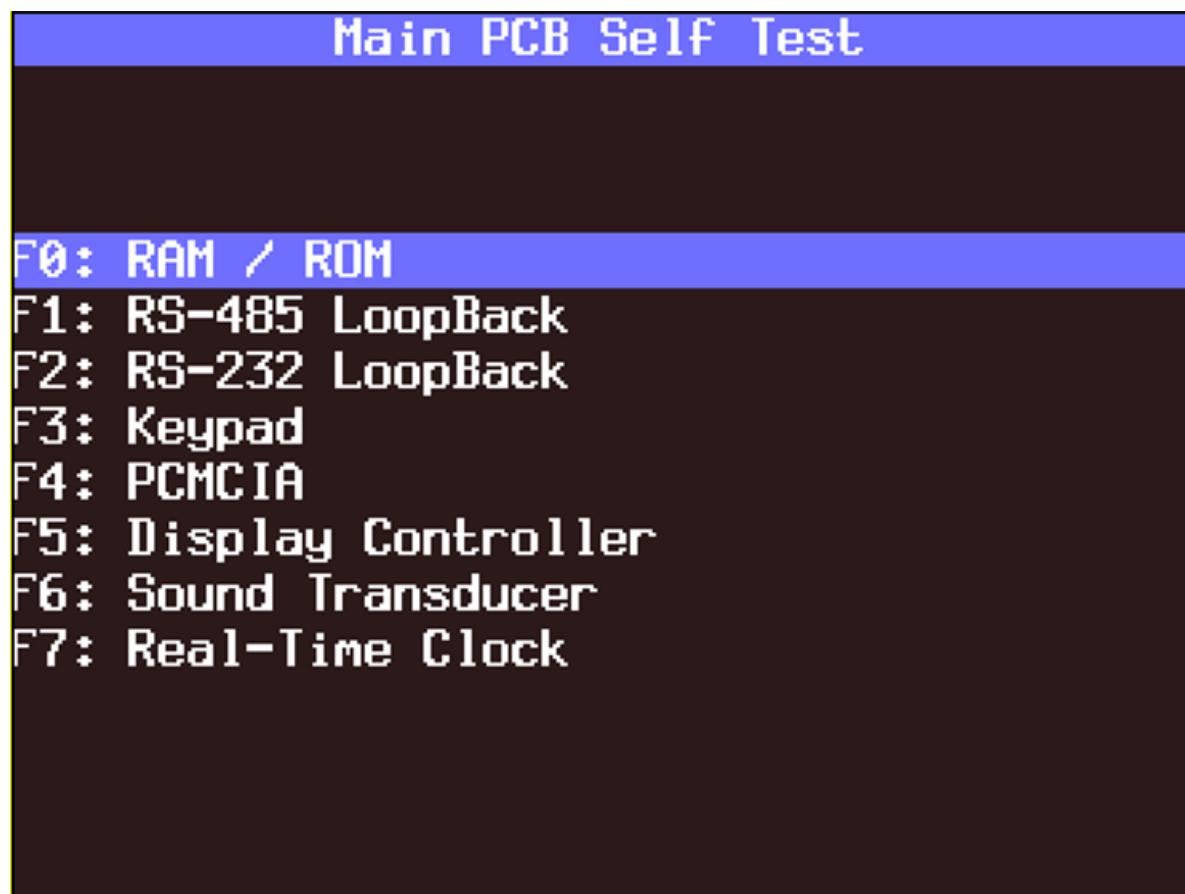
Diagnostic chart for Tech2 Main Printed Circuit Board (PCB)

<b>VCI MODULE DIAGNOSTIC CHART</b>		
<b>Test</b>	<b>Results</b>	<b>Solution</b>
MUX (Multiplexer)	MUX A: S5 & S14 pass/fail MUX B: S1 & S3 pass/fail	If MUX A or B fails, cycle Tech2 power and retest. If problem persists, contact Customer Support.
VCI adapter ID (performed only during selectable VCI test)	Recognized adapter Cannot identify adapter	If adapter fails second test, contact Customer Support.
VCI ADC (Analog to digital converter)	Channel A - pass/fail Channel B - pass/fail	If channel A or channel B fail, cycle Tech2 and retest. If problem persists, contact Customer Support.
Cross point	Pull up - pass/fail TPU5, TPU1, and TPU0 - pass/fail (results from selectable VCI test)	If a failure occurs, cycle Tech2 and retest. If problem persists, contact Customer Support.
SIPO (Serial In Parallel Out)	Pass/fail for each area tested	If a failure occurs, cycle Tech2 and retest. If problem persists, contact Customer Support
DLC (Data Link Connector)	DLC1 - DLC2 pass/fail count DLC2 - DLC1 pass/fail count	If a failure occurs, cycle Tech2 and retest. If problem persists, contact Customer Support.
CCD (Chrysler Collision Detection)	CCD - pass/fail CCD - loopback not connected	Connect loopback and retest if loopback not connected. If test fails, disregard results. Test is not for GM vehicles (other than Saab) at this time.

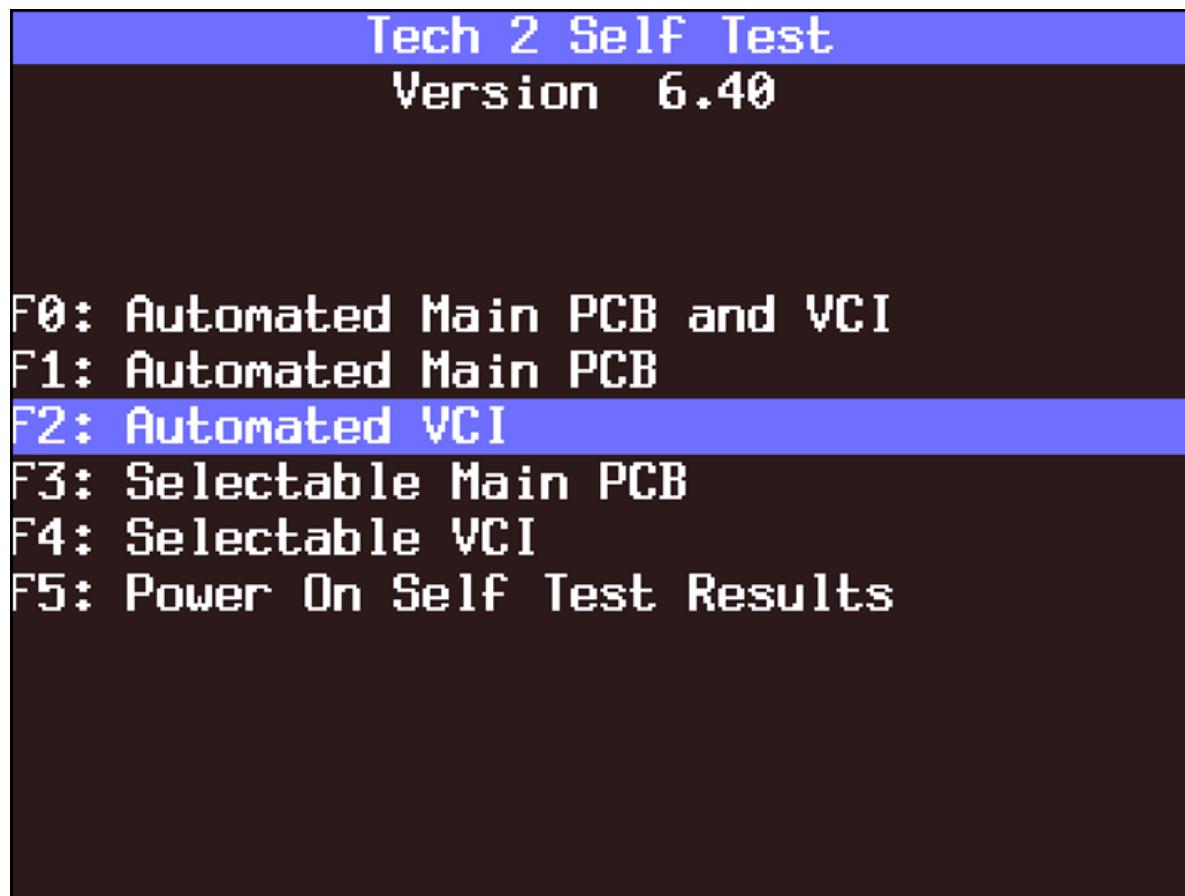
<b>VCI MODULE DIAGNOSTIC CHART (continued)</b>		
<b>Test</b>	<b>Results</b>	<b>Solution</b>
GND FET (Ground Field Effect Transistor)	GND FET – pass/fail	Check loopback adapter to make sure it is connected, cycle Tech2 and retest. If problem persists, contact Customer Support
VCI HBCC (Hosted Bus Control Chip)	HPCC – pass/fail	If HBCC chip fails, cycle Tech2 and retest. If problem persists, contact Customer Support.
VCI DUART (Dual Universal Asynchronous Receiver Transmitter)	Channel A – pass/fail Channel B – pass/fail	If channel A or channel B fail, cycle Tech2 and retest. If problem persists, contact Customer Support.
VCI I/O 1 – I/O 16 Test	Pass/fail messages will be displayed for each of the I/O lines (results from selectable VCI test).  If test fails, was loopback installed?	Once an error has been detected on one of the I/O lines, you can test the specific line by selecting F3 or F4 tests. If the test fails continuously or intermittently, contact Customer Support.
VCI loopback	Pass/fail message for each I/O loopback test.	For any failure, make sure the loopback is connected. Use F1: Check ID to verify that the loopback is found. Cycle Tech2 and retest. If problem persists, contact Customer Support
VCI short L&M	Open I/O 7 – pass/fail Open I/O 9 – pass/fail Hi I/O 7 – pass/fail Hi I/O 9 – pass/fail Lo I/O 7 – pass/fail Lo I/O 9 – pass/fail	For any failure, cycle Tech2 and retest. If problem persists, contact Customer Support.

<b>VCI MODULE DIAGNOSTIC CHART (continued)</b>		
<b>Test</b>	<b>Results</b>	<b>Solution</b>
VCI J1708	Internal transceiver – pass/fail Differential – pass/fail Differential – pass/fail (results from selectable VCI test)	For any failure, cycle Tech2 and retest. If problem persists, contact Customer Support.
VCI TPU (Time Processor Unit)	TPU0 - pass/fail TPU1 - pass/fail TPU5 - pass/fail TPU12 & TPU15 - pass/fail (or not tested if no loopback) TPU13 & TPU14 - pass/fail (or not tested if no loopback)	For any failure, cycle Tech2 and retest. If problem persists, contact Customer Support.
VCI level shifters	MUX A 2.5 V Hi - pass/fail MUX A 2.5 V Lo - pass/fail MUX A 5.0 V Hi - pass/fail MUX A 5.0 V Lo - pass/fail (results from selectable VCI test)	For any failure, cycle Tech2 and retest. If problem persists, contact Customer Support.

Diagnostic chart for Tech2 Vehicle Communications Interface (VCI) module



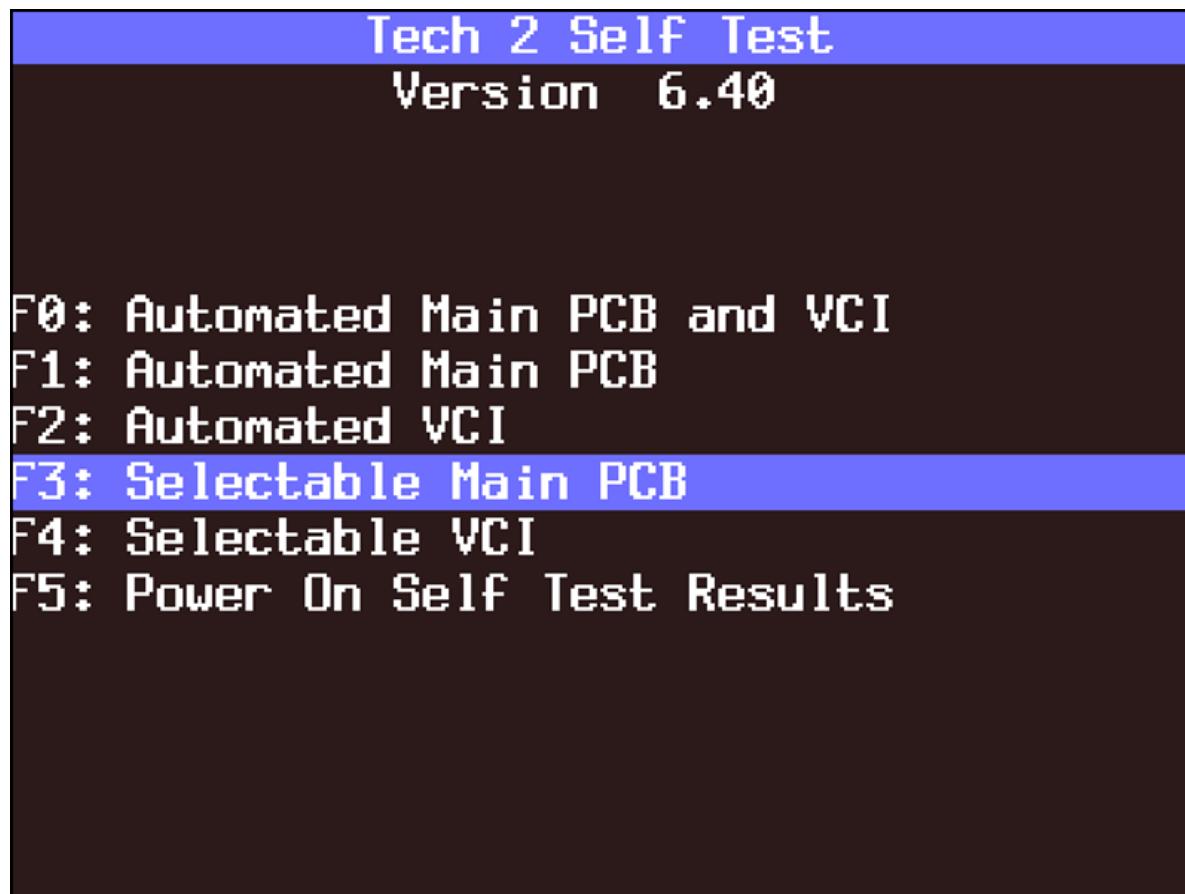
Automated Main PCB test selected on Tech2 Self Test main menu



Automated VCI test selected on Tech2 Self Test main menu

#### **F3: Selectable Main PCB Test**

Choose F3: Selectable Main PCB after a fail message has been displayed during the Automated Main PCB and VCI or Automated Main PCB tests. When you choose F3: Selectable Main PCB, a screen like the one shown in is displayed. You may then select individual tests for failed components. For specific information on failed components, refer to the Main Printed Circuit Board (PCB) Diagnostic Chart.



Selectable Main PCB test selected on Tech2 Self Test main menu

#### F4: Selectable VCI Test

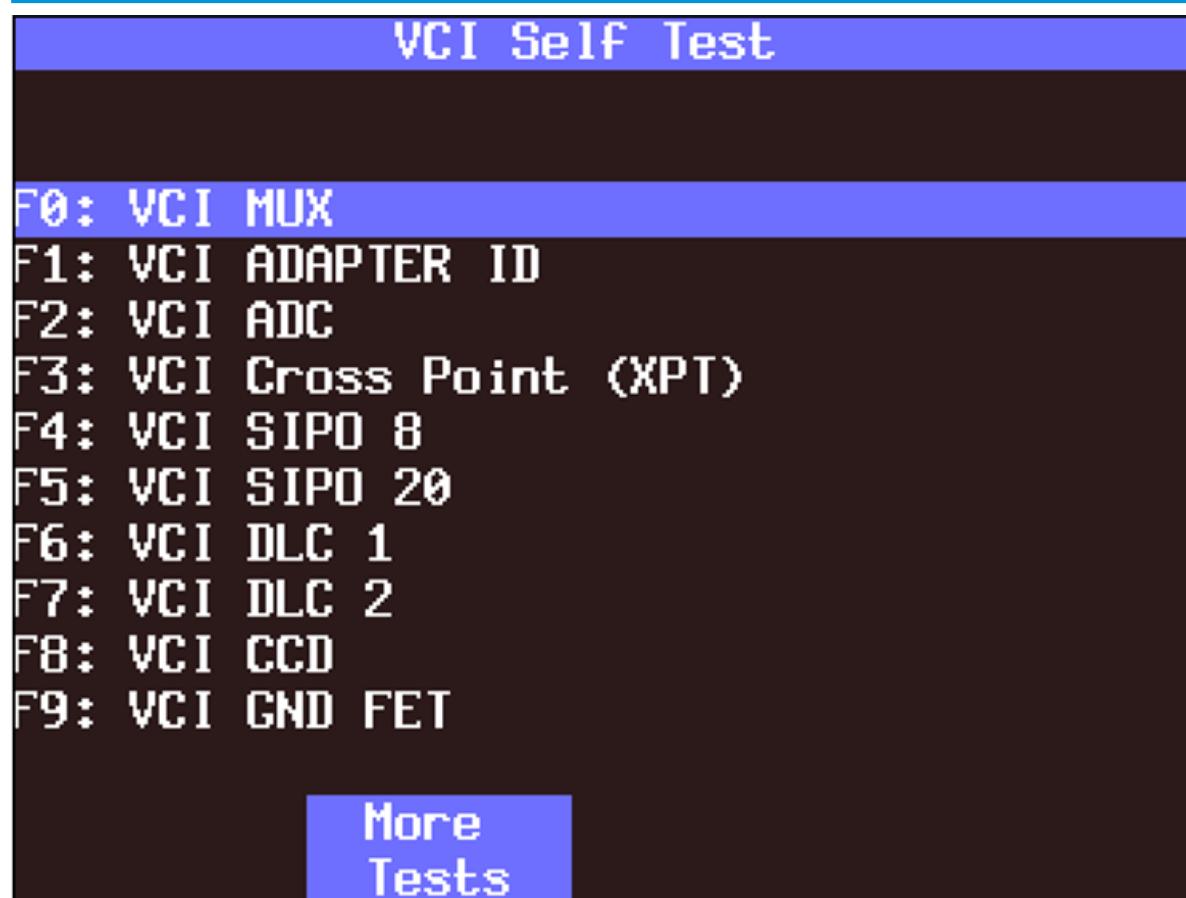
Choose F4: Selectable VCI after a fail message has been displayed during the Automated Main PCB and VCI or Automated VCI tests. When you choose F4: Selectable VCI, a screen is displayed where you may select individual tests for failed components. For specific information on failed components, refer to the Vehicle Communications Interface (VCI) Module Diagnostic Chart.

# Tech 2 Self Test

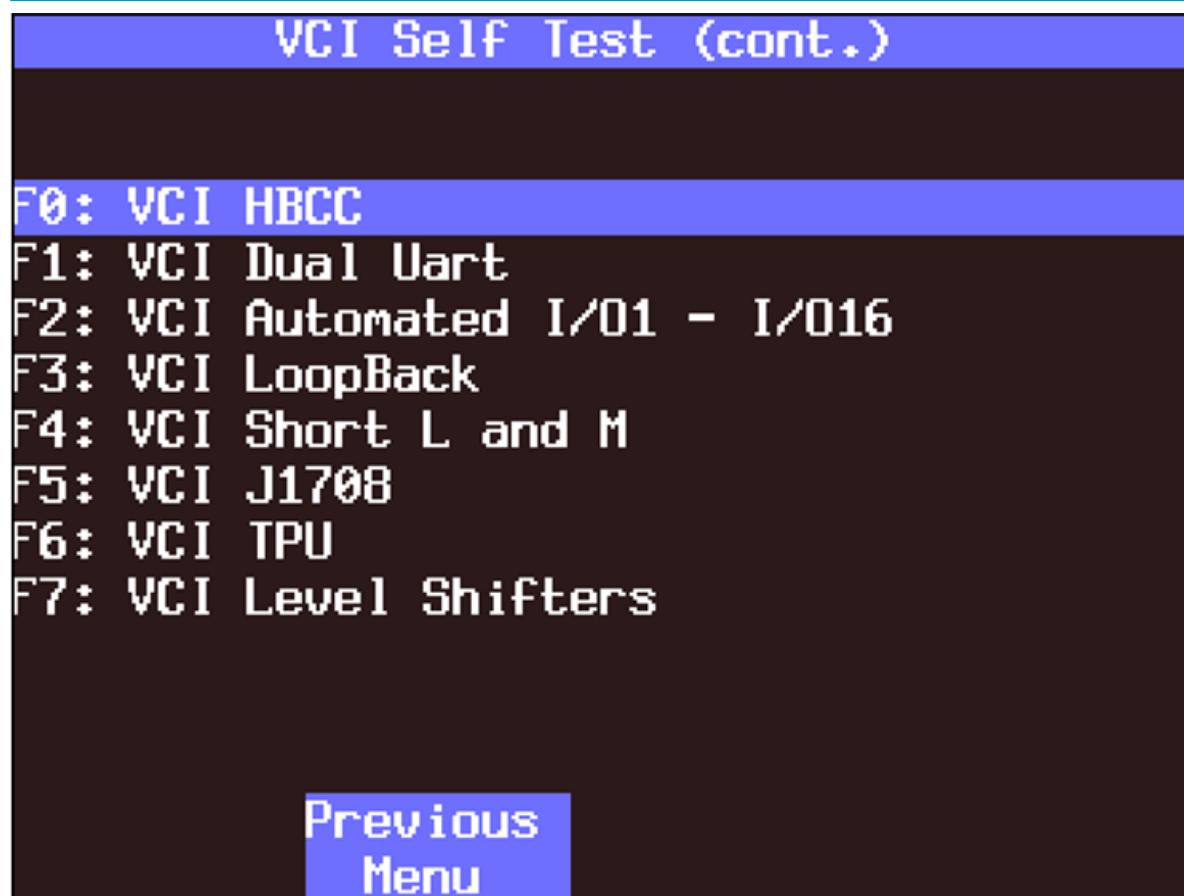
## Version 6.40

- F0: Automated Main PCB and VCI
- F1: Automated Main PCB
- F2: Automated VCI
- F3: Selectable Main PCB
- F4: Selectable VCI**
- F5: Power On Self Test Results

Selectable VCI test selected on Tech2 Self Test main menu



First selectable VCI Self Test screen



Second selectable VCI Self Test screen

#### **F5: Power On Self Test Results**

Choose F5: Power On Self Test Results after a fail message has been displayed during the Power On Self Test (POST). Specific information on the failure will be displayed on the screen. Select F0, F1, F2, F3, or F4 to further isolate the specific fault.

# Tech 2 Self Test

## Version 6.40

- F0: Automated Main PCB and VCI
- F1: Automated Main PCB
- F2: Automated VCI
- F3: Selectable Main PCB
- F4: Selectable VCI
- F5: Power On Self Test Results**

Power On Self Test Results selected on Tech2 Self Test main menu

## No Power to Tech2 Troubleshooting Tables

Use the following tables to diagnose, isolate, and correct power source problems that may cause a No Power condition to your Tech2 scan tool. To help determine power supply source, see Power Supplies section.

<b>Power Source: DLC Cable</b>			
<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Does vehicle support power through DLC cable connection exclusively? (If you are not sure, consult your service manual.)	Go to Step 2	Use alternate power
2	Using a digital multi-meter (DMM), verify vehicle battery voltage. Is battery fully charged?	Go to Step 3	Charge battery
3	Verify connection at vehicle DLC connector for loose or damaged pin(s). Did you find a problem?	Repair connector. (Consult vehicle service manual.)	Go to Step 4
4	1. Disconnect DLC cable from vehicle.  2. Power on Tech2 using alternate power source at DLC cable power jack connection.  Did your Tech2 power on?	Problem with vehicle. (Consult vehicle service manual)	Go to Step 5
5	Remove DLC cable from Tech2 and attach alternate power supply at VCI power jack connection located at bottom of Tech2.  Does Tech2 power on?	Replace DLC cable.	Problem with Tech2. Contact Customer Support.

Troubleshooting table for DLC cable “No Power”

<b>Power Source: DLC Cable</b>			
<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	1. Unplug cigarette lighter power cable from DLC cable. 2. Using a digital multi-meter (DMM), verify voltage output at cigarette lighter power cable power jack. Do you have battery voltage output?	Go to Step 2	Go to Step 3
2	1. Remove DLC cable from Tech2. 2. Plug in cigarette lighter power jack to the VCI power jack connector located at bottom of Tech2. Does the Tech2 power on?	Replace DLC cable.	Problem with Tech2. Contact Customer Support.
3	Using a DMM, verify voltage output at battery. Do you have battery voltage output?	Go to Step 4	Charge battery.
4	Disconnect cigarette lighter power cable from vehicle and verify voltage output at vehicle cigarette lighter socket. Do you have battery voltage output?	Go to Step 5	Problem with vehicle. Consult vehicle service manual.
5	Check fuse in cigarette lighter power cable Does fuse need replacing?	Replace fuse.	Replace cigarette lighter power cable.

Troubleshooting table for cigarette lighter power cable "No Power"

<b>Power Source: Battery Power Cable</b>			
Step	Action	Yes	No
1	1. Unplug battery power cable power jack from DLC cable. 2. Using a digital multi-meter (DMM), verify voltage output at battery power cable power jack. Do you have battery voltage output?	Go to Step 2	Go to Step 3
2	1. Remove DLC cable from Tech2. 2. Plug in battery power cable power jack to the VCI power jack connector located at bottom of Tech2. Does the Tech2 power on?	Replace DLC cable.	Problem with Tech2. Contact Customer Support.
3	Using a DMM, verify voltage output at battery. Do you have battery voltage output?	Go to Step 4	Charge battery.
4	Check fuse(s) in battery power cable. Does fuse(s) need replacing?	Replace fuse(s)	Replace battery power cable

**Troubleshooting table for battery power cable "No Power"**

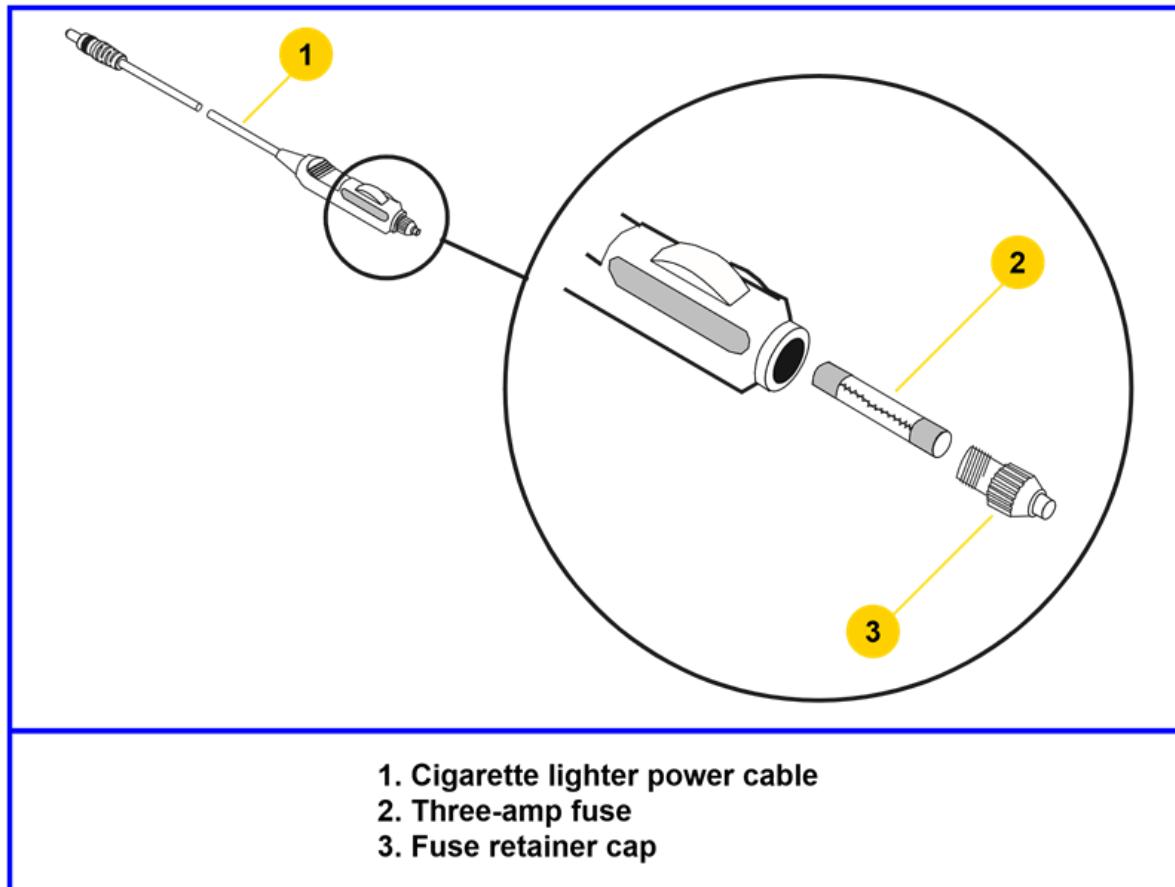
<b>Power Source: NAO or Universal Power Supply</b>			
<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	1. Unplug NAO (or Universal) power supply jack from DLC cable. 2. Using a digital multi-meter (DMM), verify voltage output at power jack. Do you have battery voltage output?	Go to Step 2	Replace NAO or Universal power supply.
2	1. Remove DLC cable from Tech2. 2. Plug in NAO (or Universal) power supply power jack to the VCI power jack connector located at bottom of Tech2. Does the Tech2 power on?	Replace DLC cable.	Problem with Tech2. Contact Customer Support.

Troubleshooting table for NAO or universal power supply “No Power”

## Cigarette Lighter Power Cable 3-Amp Fuse Replacement

A three-amp removable fuse is located in the cigarette lighter power cable (P/N 3000096) connector. When required, check or replace the fuse by performing the following steps:

1. Ensure cigarette lighter power cable is not connected to vehicle or Tech2.
2. Unscrew fuse retainer cap and remove three-amp fuse.
3. Inspect fuse for damage and replace with identical three-amp fuse if required.
4. Verify by connecting cigarette lighter power cable to Tech2 and vehicle.

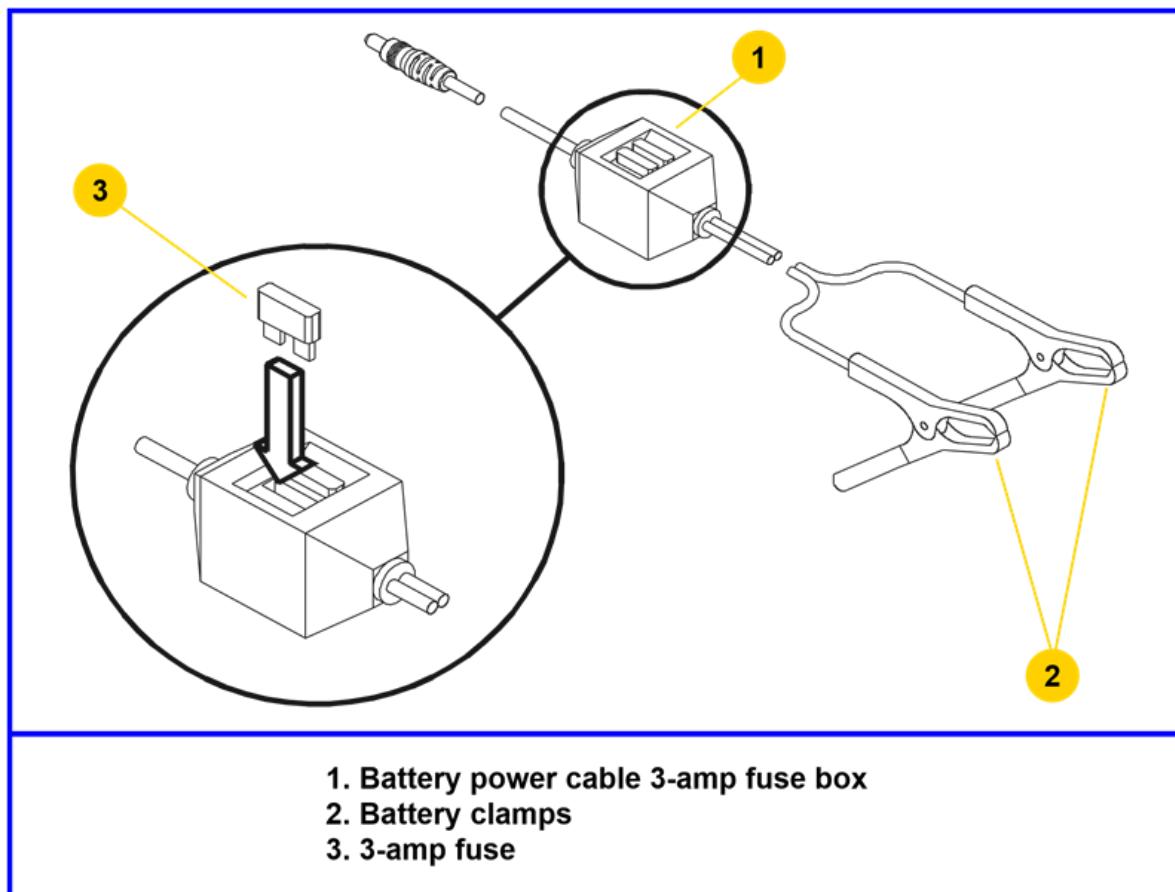


Cigarette lighter power cable three-amp fuse replacement

## Battery Power Cable 3-Amp Fuse Replacement

Two three-amp fuses are located in the battery power cable (P/N 3000097) three-amp fuse box. When required, check or replace the fuse(s) by performing the following steps:

1. Ensure battery power cable is not connected to vehicle battery or Tech2.
2. Use a standard fuse puller to remove the fuse(s) from the fuse box.
3. Inspect fuse(s) for damage and replace with identical 3-amp fuse(s) if required.
4. Verify by connecting battery power cable to Tech2 and vehicle battery.



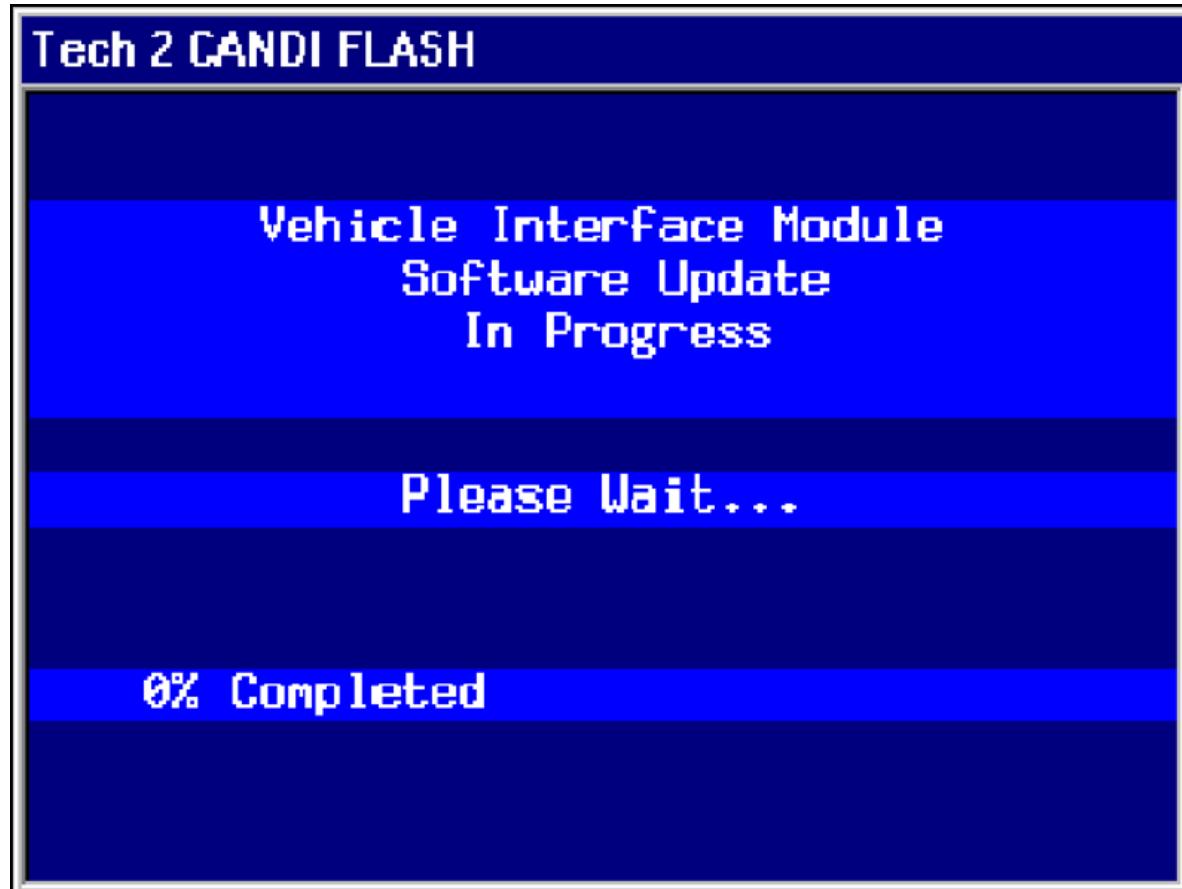
#### Battery power cable three-amp fuse replacement

**CAUTION:** To help avoid personal injury by electric shock, make sure the battery power cable is not connected to the vehicle's battery before removing the fuse(s).

## CANdi Module Troubleshooting

The following troubleshooting information applies only to the CANdi module. This application is unavailable for most vehicles at the time of writing.

If the Tech2 loses power during programming, the CANdi module will not be properly programmed. The CANdi module will be automatically reprogrammed when power is available.



**CANdi module programming screen**

If a fault occurs during reprogramming, a fault screen may appear. If this occurs, power off the Tech2 and attempt to reprogram the CANdi module again. If the problem persists, incorrect CANdi software may be present on the Tech2 PCMCIA card. Connect the Tech2 to the TIS2Web computer and download a new version of the software.

## Tech 2 CANDI FLASH\_ER

Vehile interface module software  
update failed.

Please turn off your Tech2 and reboot.  
If problem persist,  
contact your local support center.

### CANDI Fault Screen

**NOTE:** Do not perform a VCI self-test while the CANDI module is connected. If the CANDI module is connected and an error screen occurs, disconnect the CANDI module from the Tech2 and perform the test again.

The screen shown below is displayed when the Tech2 does not detect the CANDI module. This can occur under the following conditions:

- The CANDI module is not connected to the Tech2, or
- A problem occurred during start-up that prevented the Tech2 from configuring the CANDI module.

If this occurs, power the Tech2 off and start again. If the problem persists, follow the troubleshooting tests.

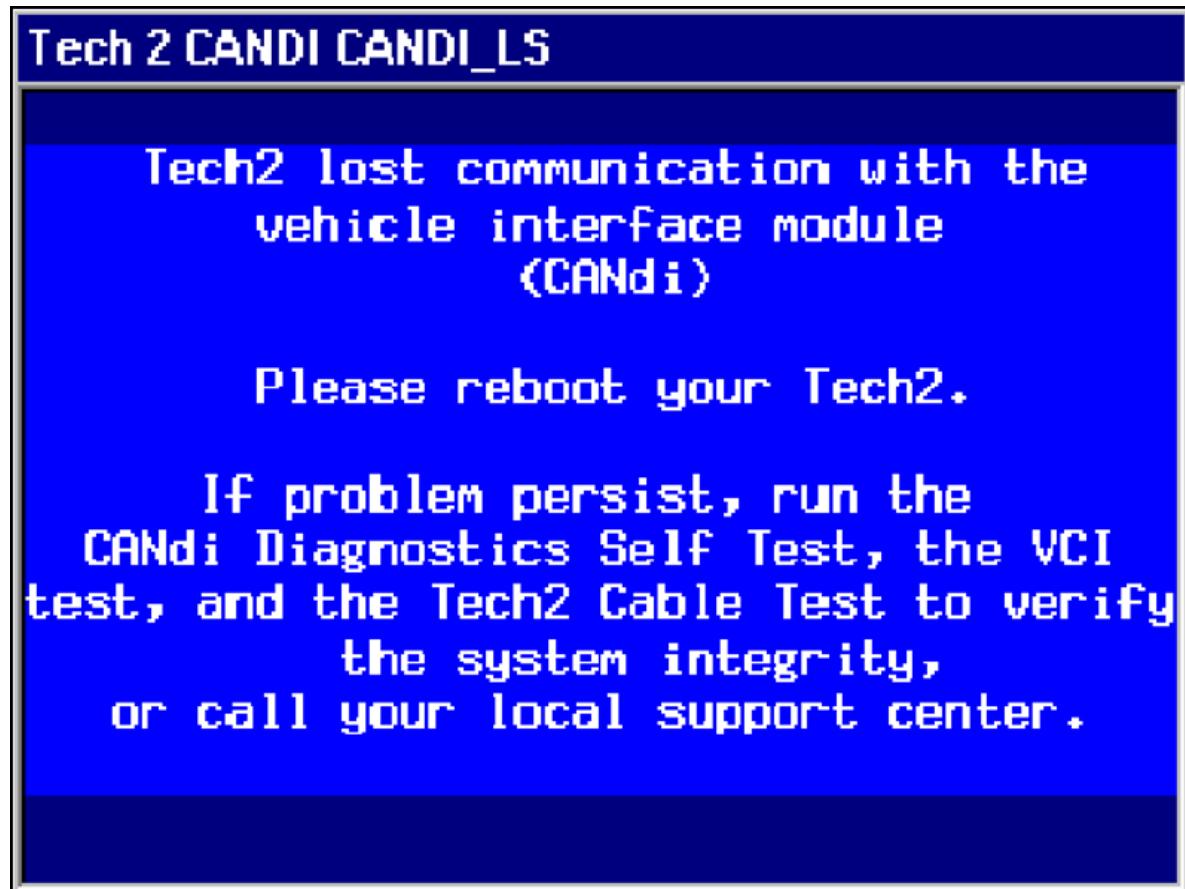
It is also possible to connect a CANDI module after the Tech2 has been powered up via the VCI. If this occurs, the Tech2 will not detect CANDI module and will not properly communicate, even if the LED is flashing on the CANDI module. Power off the Tech2 and start again.

The screen displayed in occurs when the Tech2 loses communication with the CANDI module. This could be a result of the following:

- VCI not properly seated in the Tech2 slot

- DLC cable not properly connected
- Poor Burndy cable connection to the CANdi module
- Worn or damaged cable that results in a poor connection between the CANdi module and the VCI If this occurs, check all Tech2 and CANdi module connections, power off the Tech2 and start again.

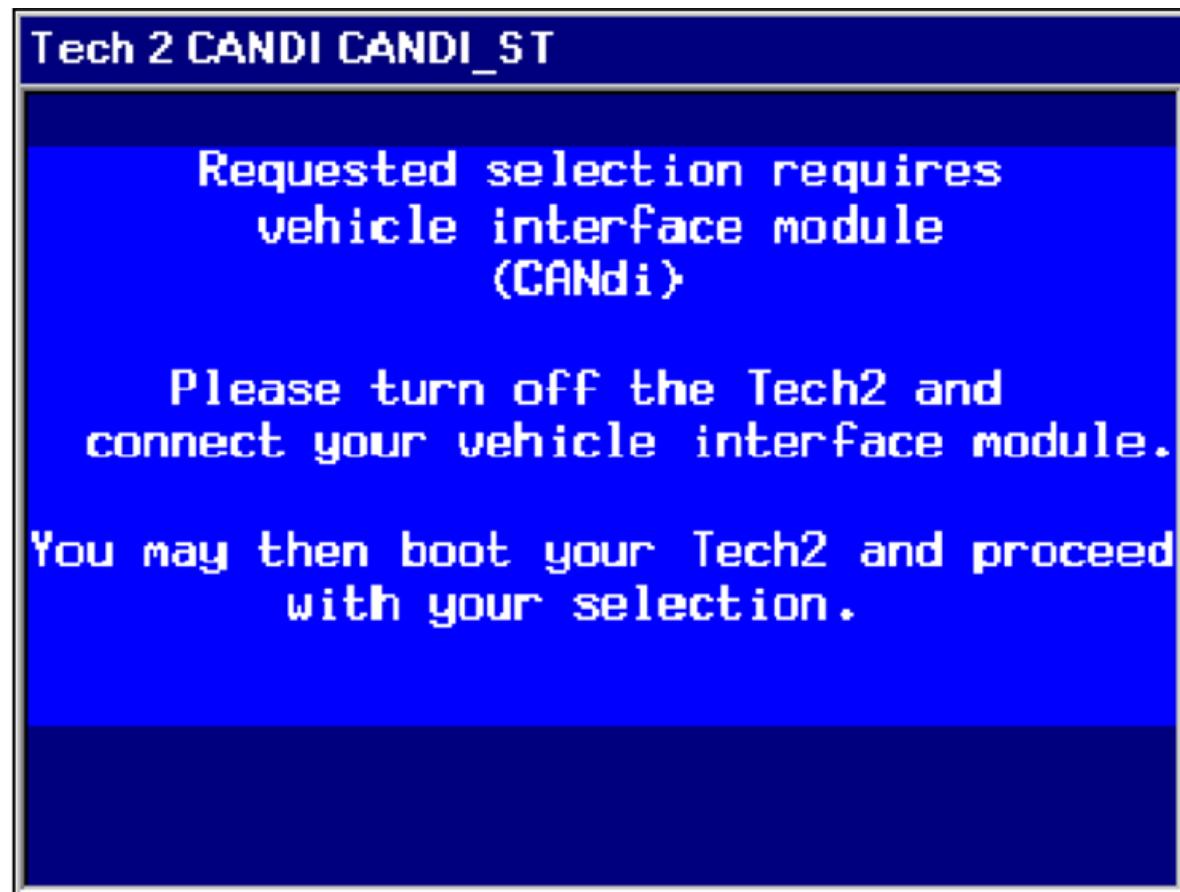
If problem persists perform the troubleshooting tests at the F4 Option - on the self-test menu.



Tech2 lost communication with the CANdi module screen

## CANDI Module Diagnostics

Select “CANDI Diagnostics” from the Tech2’s Tools Options menu. If the CANDI module is not connected a screen will appear.

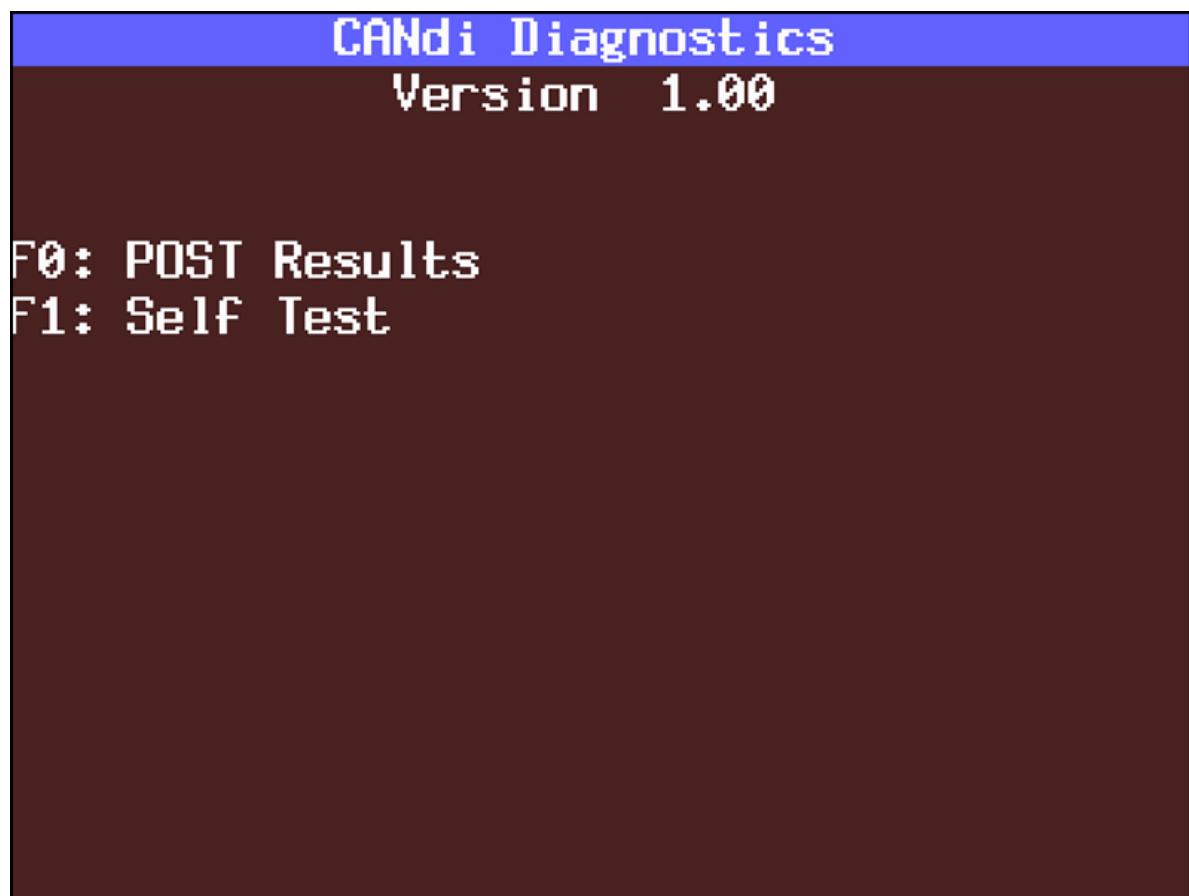


CANDI module not detected screen

## Tool Options

- F0: Set Clock
- F1: Set Screen Contrast
- F2: Set Units
- F3: Self Test
- F4: Set Training Center Mode
- F5: Programming TECH 2
- F6: Set Communication By-Pass Mode
- F7: Make Duplicate PCMCIA Card
- F8: Set Language
- F9: CANdi Diagnostics**

CANdi Diagnostics selected on Tool Options menu

**CANDI Diagnostics menu: "POST Results" or "Self Test"**

When you select "POST Results" from the CANDI Diagnostics menu, a results screen appears. You can use the information to determine if the CANDI module had any problems during its start-up sequence. Software and hardware revision numbers are identified and displayed.

**CANDI POST Results screen**

CANDI POST Results	
Test In Progress	Test status
CANDI Present	Waiting
Boot S/W Revision	0.00
App. S/W Revision	0.00
Hardware Revision	0.00
CANDI RAM	Waiting
CANDI Boot	Wai
UART Data Link	

Selecting “Self Test” from the CANdi Diagnostics menu initiates a complete test of the CANdi module. When testing is complete, all results are displayed.

CANdi Self Test Results	
Test In Progress	Test status
CANdi Present	Waiting
Boot S/W Revision	0.00
App. S/W Revision	0.00
Hardware Revision	0.00
CANdi RAM	Waiting
CANdi Boot	Waiting
CANdi Resident	Waiting
CANdi Application	Waiting
Low Speed Data Link	Waiting
Med. Spd. Data Link	Waiting
High Speed Data Link	Waiting

CANdi Self Test Results screen

## CANdi Module Troubleshooting Guide

If a CANdi module is not functioning properly, please perform the following tests:

1. Make sure the CANdi module is properly grounded by connecting to a vehicle or by using the 12-pin ALDL connector, which has the signal and chassis ground shorted.

**IMPORTANT:** If not properly grounded, the CANdi module will appear to be defective when it is not. The CANdi module will fail due to improper grounding if you use the 16-pin DLC (J-1962) connector and power the Tech2 from an AC/DC power supply. The adapter you use must have a GM part number. Although PVI adapters are similar to GM adapters, they will not work with the CANdi module.

2. Verify that the Tech2 passes all stand-alone self-tests. Replace the Tech2 if it fails. If the Tech2 passes, proceed to step three. The CANdi module must be disconnected to run self-tests. If the CANdi module is connected, a message will appear instructing you to disconnect the module.
3. Verify that the VCI passes self-tests. Replace the VCI if it fails. If the VCI passes, proceed to step four. The CANdi module must be disconnected to run self-tests. If the CANdi module is connected, a message will appear instructing you to disconnect the module.

When performing this test, you must also perform the Selectable VCI test (option F4 on the self-test menu). First install the Burndy loopback adapter into the VCI 26-pin connector, which does not require the cable. Once you select "Selectable VCI," select the "More Tests" soft key. In the new submenu, select "F6: VCI TPU". If the VCI passes the test, all the TPU channels will display a Pass indicator as shown in the example at the top of the next page.

Testing	Status
TPU0	Pass
TPU1	Pass
TPU5	Pass
TPU12 and 15	Pass
TPU13 and 14	Pass

The two TPU inputs that the CANdi module requires are TPU12 and TPU15, which enable the module and detect its presence. If TPU12 and 15 do not appear on the screen, then they are defective in the VCI module and the VCI is failing to properly enable the CANdi module. If the above test passes, you must repeat the same test with the Burndy loopback adapter at the end of the cable. The setup is the same as if you were plugging into a vehicle without the CANdi module connected and with the loopback adapter at the end of the cable. Then you must run the VCI TPU test. If the example above appears (TPU13 and 14 are missing in this test because these I/Os don't go through the cable), then the cable is also fine. However, if TPU12 and 15 are missing, then the cable is defective.

4. Verify that the DLC cable (also known as the ALDL, J-1962, or OBDII interface cable) is functioning properly and then proceed to step five. Replace the DLC cable if it does not function properly. Call the ACDelco Aftermarket Support Center at 1-888-212-8959 for more information if you have trouble with this test.
5. Connect the CANdi module to the Tech2. Connect the system (Tech2 and CANdi module) to a vehicle and power on the Tech2. Verify that the LED on the CANdi module is flashing.
  - If the LED does not flash or light up at all, it may be defective and you should proceed to step six.
  - If the LED is not flashing but illuminated, a bad ground may exist somewhere. The grounding problem could be due to a defective ALDL (J-1962) female interface on the vehicle. Power the Tech2 through an AC/DC power supply and connect the 12-pin ALDL connector. If this fixes the problem with the CANdi (the LED is flashing), then the vehicle has a grounding problem and the CANdi module is OK.
  - If the LED is flashing while connected to the vehicle, but the CANdi module still has a problem, proceed to step six.
6. If problems persist with the CANdi module, and the Tech2 recognizes the interface, perform self-test diagnostics on the CANdi module. Select CANdi Diagnostics from the Tool Options menu to see the CANdi Diagnostics menu. This menu allows you to display POST results, or request the CANdi module to perform a self-test. Refer to the main PCB self test for more information.

If a diagnostic test fails, contact the ACDelco Aftermarket Support Center at 1-888-212-8959 before returning the CANdi module. If a known problem with a software version is identified, ACDelco Support will inform you to update Tech2 software with the correct

software version number. If there is no known problem with the Tech2 software, you will be directed to contact the hardware manufacturer.

## CANDI Module Repair

If CANDI fails and the ACDelco Aftermarket Support Center (888-212-8959) has verified that it needs repair, you may contact a Bosch Diagnostics/Vetronix repair center to discuss the options available to you.

Bosch Diagnostics/Vetronix Warranty Repair Centers:

1-855-267-2483 prompt #1

United States and Latin America

Bosch Diagnostics/Vetronix

153 Castilian Drive

Goleta, CA 93117

U.S.A.

Canada

Custone Electromotive Inc.

1150 Champlain Court

Whitby, ON L2N 6A8 Canada

Part numbers - CANDI module: J-45289 (SPX), 3000164 (GM), 02003039 (Bosch Diagnostics/Vetronix) Connectors: 12-pin #3000099 and loop back #3000109

## Additional CANDI Troubleshooting Tips

Transformer voltage output test using DVOM:

- Set DVOM to Volt setting.
- Probe cable end inside and outside the computer.
- Twelve volts is the minimum.

## Updating the CANdi module:

**IMPORTANT:** You must use a 32-megabyte (32-MB) PCMCIA card in the Tech2, not a 10-megabyte (10-MB) card.

You must update the 32-MB PCMCIA card before connecting the CANdi module to the Tech2. Always disconnect the CANdi module from the Tech2 before downloading software updates to the PCMCIA card.

The CANdi module is capable of storing up to three different software versions.

### Will the CANdi module require updates?

Possibly. The CANdi module ships complete with software, but possibly not the most current version.

- Be sure to update the Tech2 with the latest software before using the CANdi module. The CANdi module will compare software and look for a possible update from the Tech2. When you update the Tech2, any software updates for the CANdi module will download to the PCMCIA card. The CANdi module will automatically receive updates each time it is connected to the DLC and Tech2 at power-up. Therefore, it is very important that you always run the latest available software version when using the CANdi module.

## Software

Software related to the Tech2 is described in four subsections:

- A) Tech2 Main Menu and Live Plot
- B) TIS2Web – Web-based Technical Information System (TIS)
- C) Service Programming System (SPS)
- D) Controller Area Network Diagnostic Interface (CANdi)

**IMPORTANT:** Proper PCMCIA updates are required and are essential for successful vehicle diagnoses. Refer to the Programming Tech2 function under Tool Options, and the Tech2 PCMCIA Card in the TIS2Web subsection

## Tech2 Main Menu

Five primary functions or “paths” are available on the Tech2’s Main Menu:

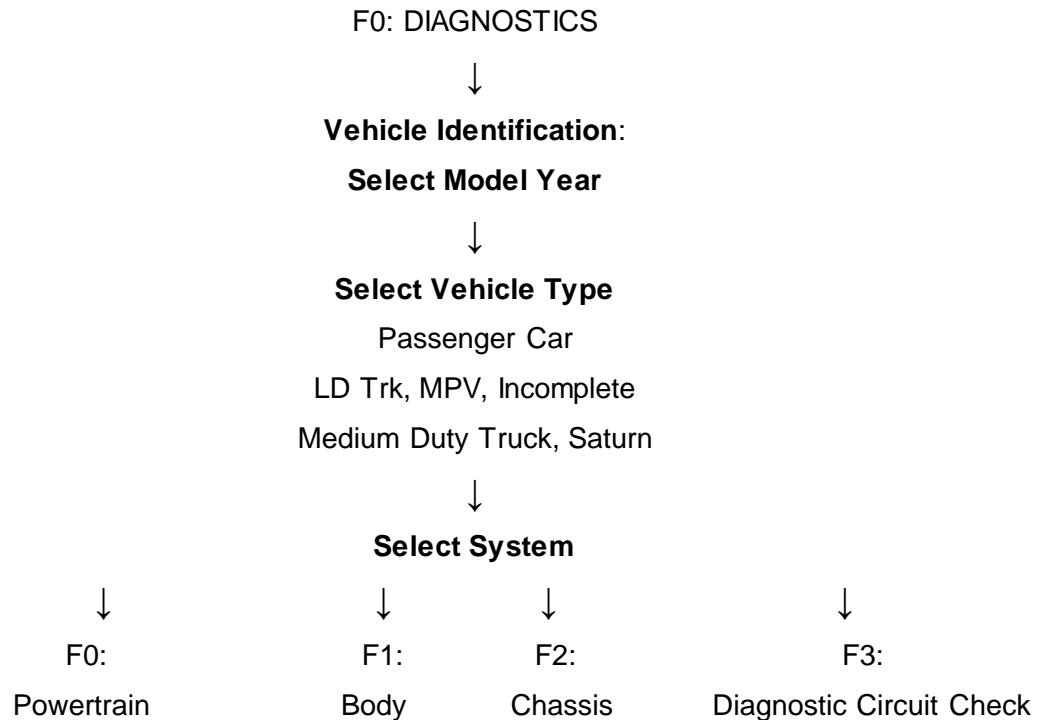
Diagnostics, Service Programming System, View Captured Data, Tool Options, and Getting Started are all described in more detail on the following pages.



Tech2 Main Menu

## Diagnostics

Selecting Diagnostics from the Tech2 Main Menu and identifying the vehicle as shown below gives you access to four major systems: Powertrain, Body, Chassis, and Diagnostic Circuit Check.



**System Selection Menu**  
**(1) 2001 Passenger Car**

**F0: Powertrain**

**F1: Body**

**F2: Chassis**

**F3: Diagnostic Circuit Check**

**System Selection Menu**

## Service Programming System

Selecting Service Programming System from the Tech2 Main Menu leads to selections shown below.

### F1: SERVICE PROGRAMMING

(for remote programming only)



Request Info.



Continue (soft key) with Instructions



Vehicle Identification:

Salesmake(s)



Model Year(s)



Vehicle Type(s)



Model (body, style)



Continue (soft key) with Instructions



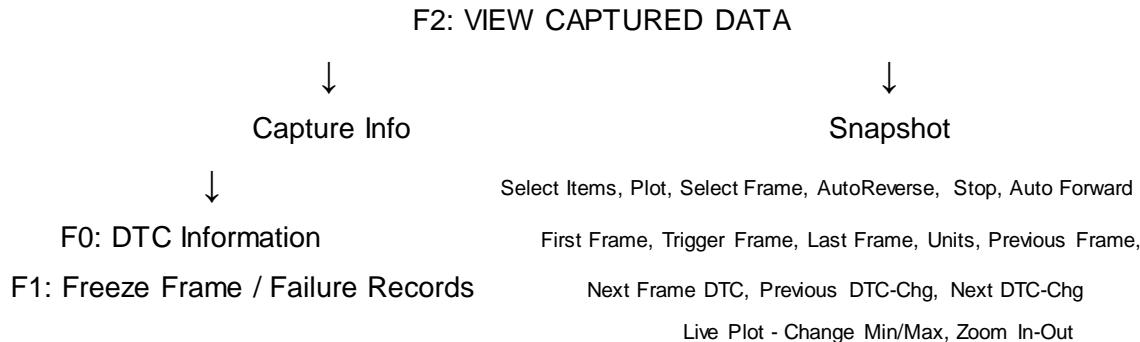
VIN Verification (Y/N)



Procedural Instructions Screen

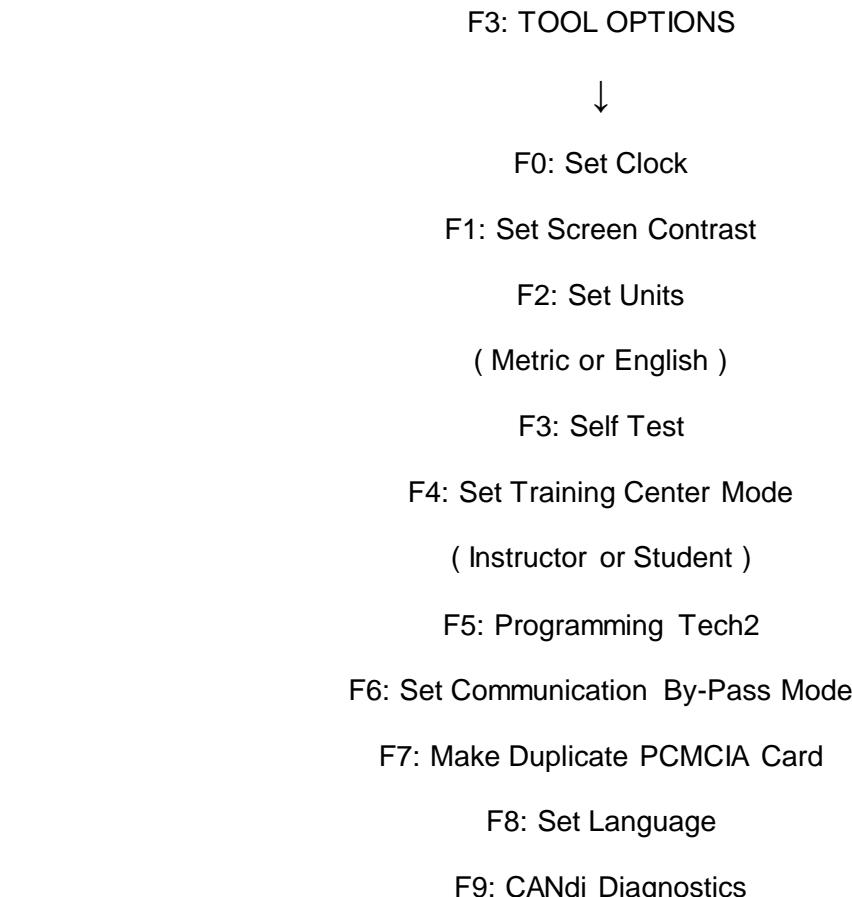
## **View Captured Data**

Selecting View Captured Data from the Tech2 Main Menu results in the selections shown below.

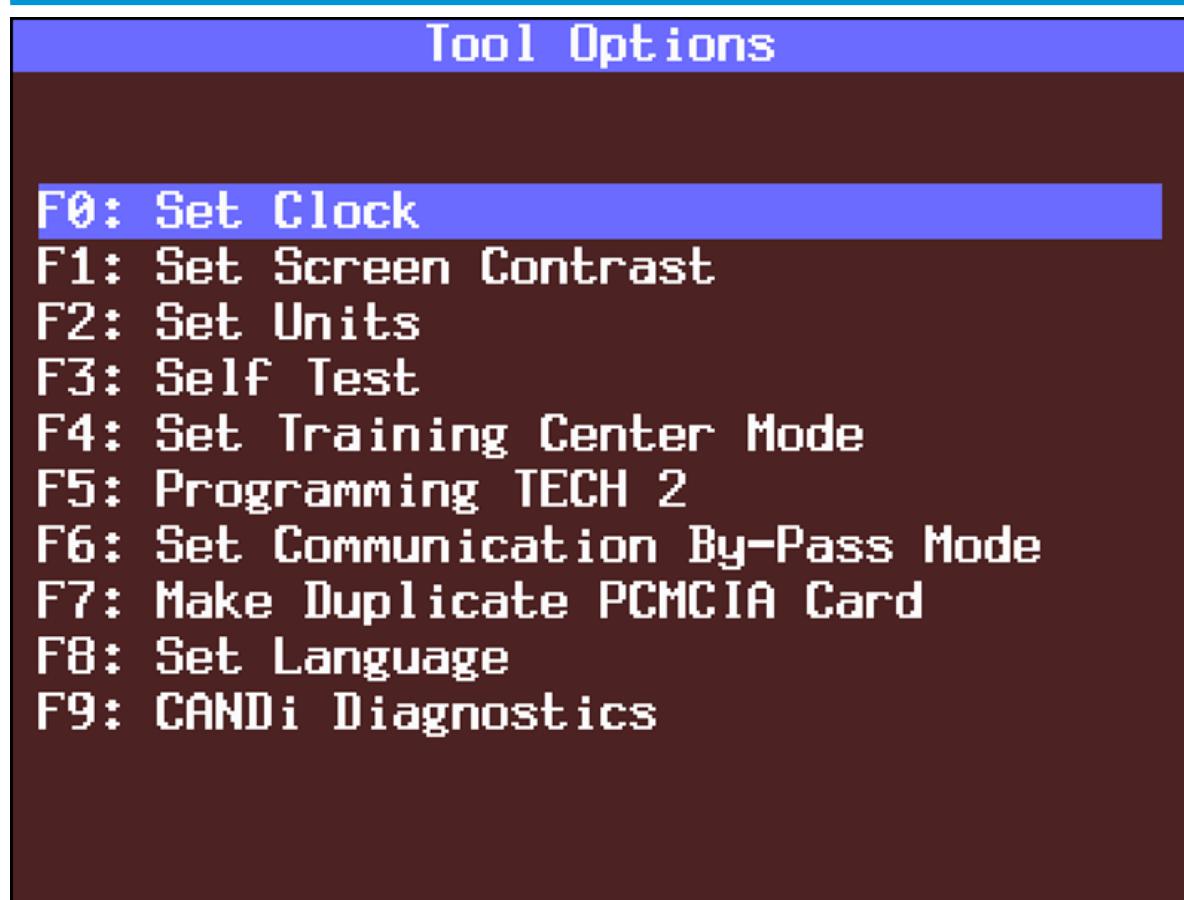


## **Tool Options**

Selecting Tool Options from the Tech2 Main Menu gives you the Tool Options menu, leading to 10 major selections, as follows:



These features—described in more detail on the following pages—are useful for controlling various Tech2 settings including the self tests and CANdi diagnostics.

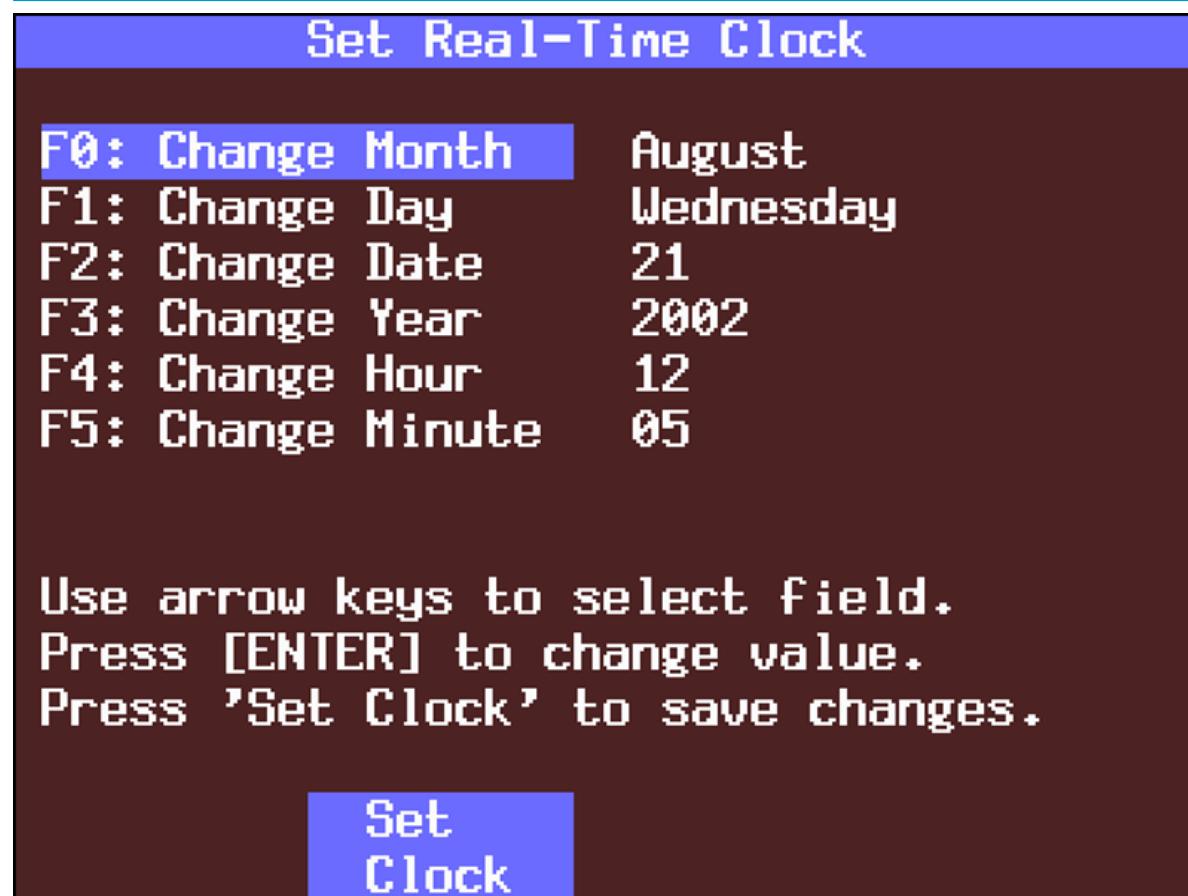


Tool Options menu

#### F0: Set Clock

After you select F0: Set Clock from the Tool Options menu and the Set Real-Time Clock menu appears, you can set the internal Tech2 real-time clock in two ways:

1. Use the up and down arrow keys to move the cursor to desired selection. Press [ENTER] to change the value. Each time [ENTER] is pressed the value will be increased by one unit until a preset maximum unit is reached. Once all correct values are entered, press the Set Clock soft key to save all changes.
2. Use the function key of the desired selection to change an incorrect value. Each time the function key is pressed the value will be increased by one unit until a preset maximum is reached. Once all correct values are entered, press the Set Clock soft key to save all changes.



Set Real-Time Clock menu

**F1: Set Screen Contrast**

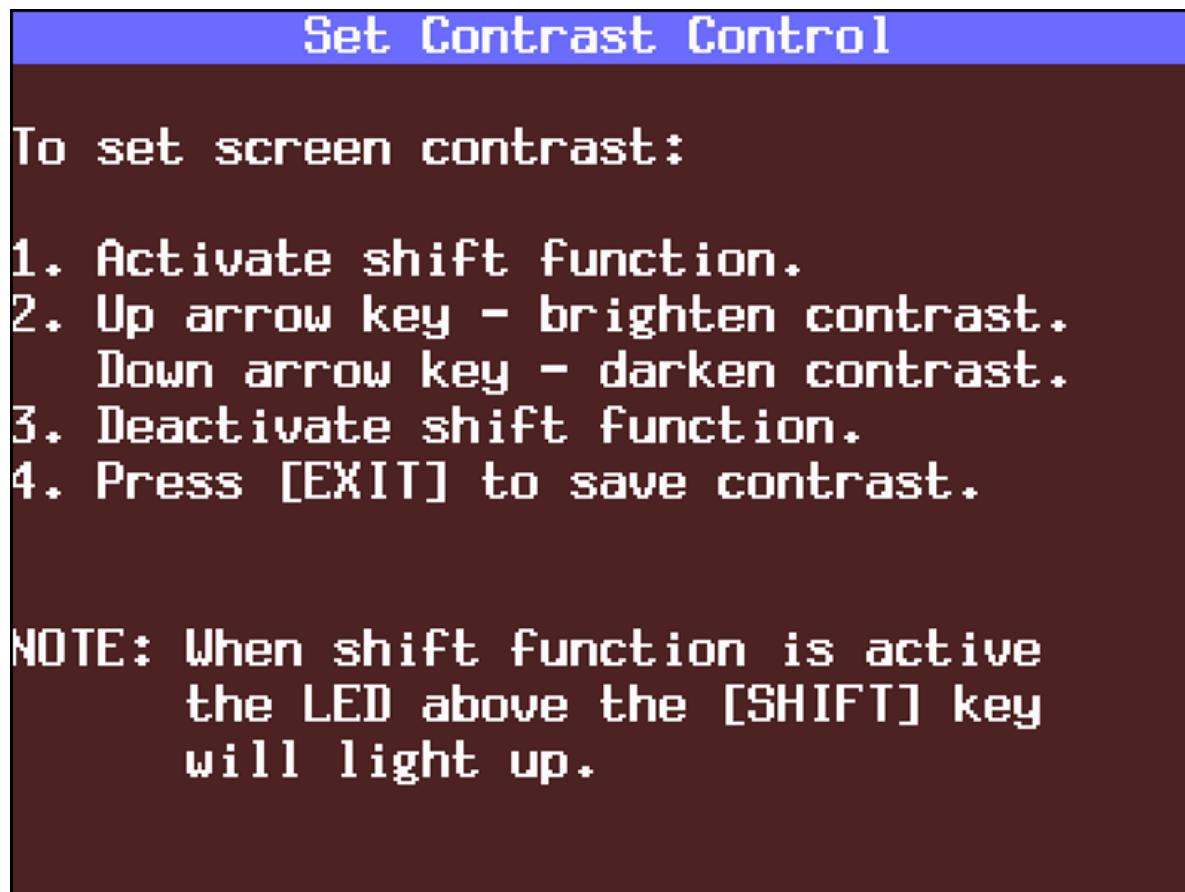
Selecting F1: Set Screen Contrast reveals a Set Contrast Control screen that instructs you on how to set and save the screen contrast to optimize the tool's visibility in your lighting conditions.

**Important:** The Set Contrast Control tool option adjusts the permanent default contrast setting of Tech2 display

Because of the nature of the LCD (Liquid Crystal Display), you will experience some contrast variance.

When the temperature of the Tech2 increases the display will brighten slightly. As the temperature of the Tech2 decreases, the display will darken. This variance is a characteristic of an LCD screen and should be considered normal operation.

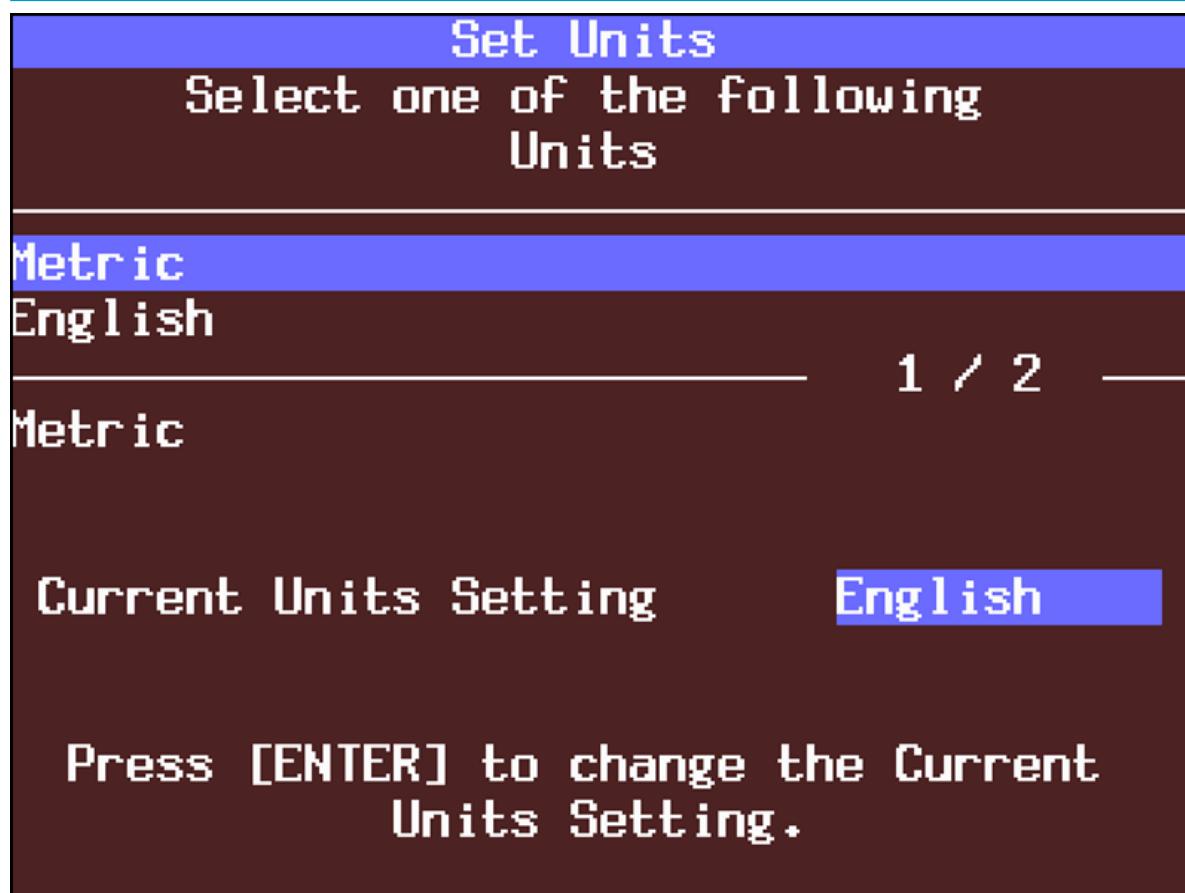
The screen contrast control setting described above may not account for the entire variance of operating temperatures. Set a default setting which is mid-range between the operating temperatures. Screen contrast may be adjusted during any function by pressing the SHIFT key and using the up and down arrows for adjustment. Periodic adjustments may be necessary, but settings outside of this application are only retained during the current power-up session.



**Set Contrast Control screen**

#### **F2: Set Units**

When you select the F2: Set Units option, a Set Units screen will appear. Use the up and down arrow keys to change the Current Units Setting from English to Metric or vice versa, if desired. Press [ENTER] to save your setting as the default.

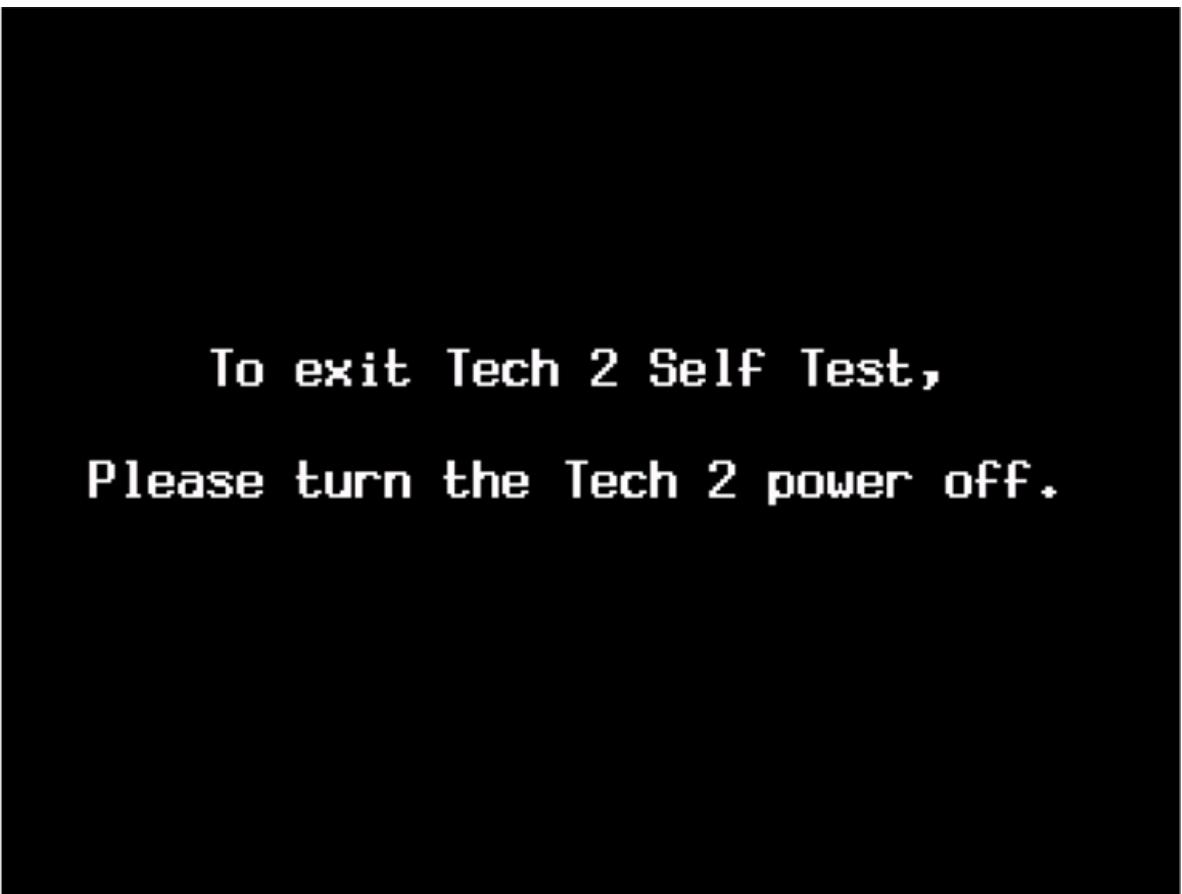


Set Units screen

### F3: Self Test

Selecting F3: Self Test gives you access to the Tech2 Self Test menu screen, which will help you to verify that the Tech2 is functioning normally. Refer to Section VI - Troubleshooting for more information on this area.

Power Down Screen. After completion of any Self Test, return to the Tech2 Self Test menu screen. After pressing [EXIT], a screen will appear instructing you to turn the Tech2 power off. Turn off the Tech2 and turn back on to continue.



**Tech2 power down screen**

F4: **Note:** This function is for Training Centers with an instructor only.

#### **F5: Programming Tech2**

After you select F4: Programming Tech2, you can follow the on-screen instructions for downloading from a PC to the Tech2 scan tool via the RS-232 cable. Refer also to Software Download, Tech2 PCMCIA Card, and Tech2 Update Procedure later in this section.

## Programming Tech 2

Attach communications cable from PC to RS-232 port of Tech 2.

Power up Tech 2.

When Tech 2 logo screen appears software may be downloaded from PC to Tech 2.

Refer to User's Manual supplied with host PC.

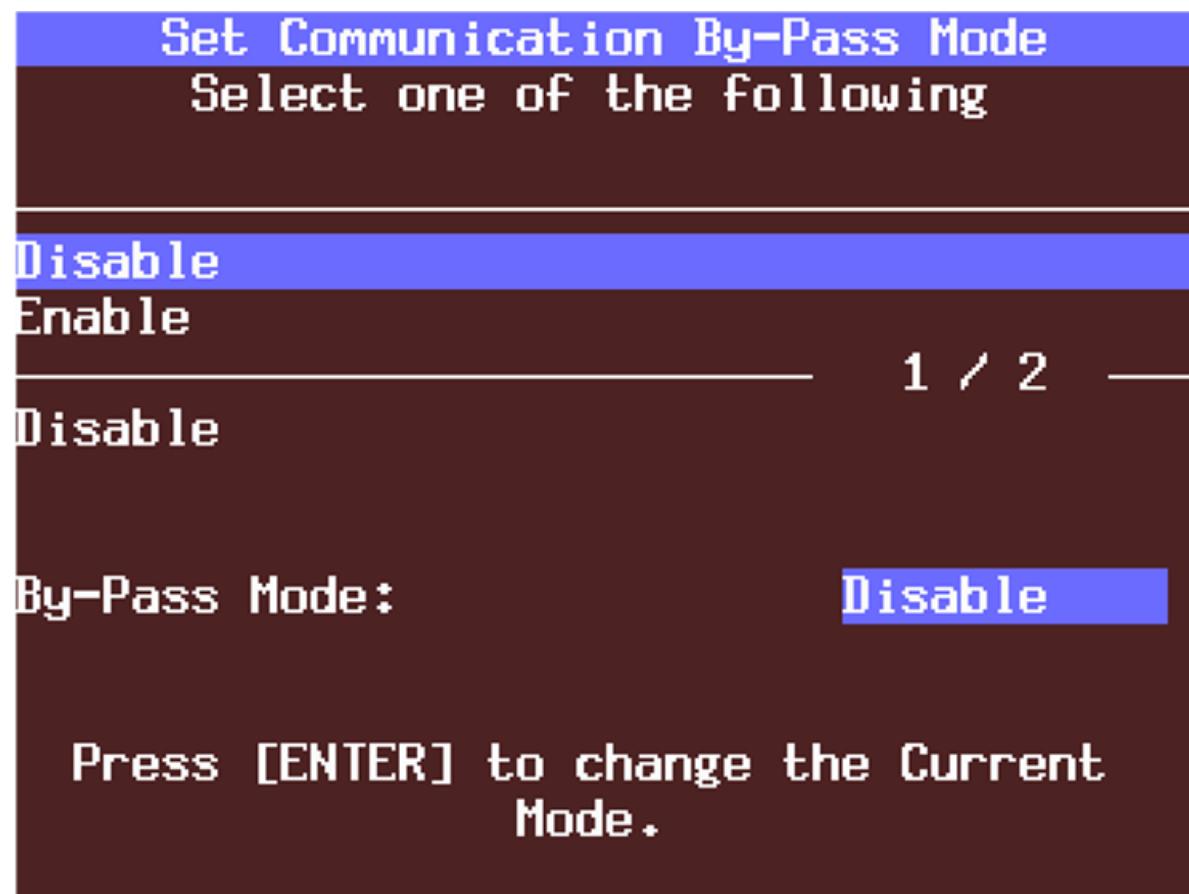
Press [EXIT] key to return to menu or the [Reset Tech 2] soft key to return to Logo Screen.

Reset  
Tech 2

Programming Tech2 screen

### F6: Set Communication By-Pass Mode

When you select F5: Set Communication By-Pass Mode, the upcoming screen offers Disable and Enable options. By enabling the by-pass mode, the Tech2 bypasses error handling and allows the user to view data display information without being connected to a vehicle. Highlight the desired setting using the up or down arrow keys, then press [ENTER] to change the current mode. The Tech2 will default to the Disable mode after it has been powered off.



Set Communication By-Pass Mode screen

#### F7: Set Language

The F6: Set Language option enables you to set your language preference.

#### F8: CANdi Diagnostics

When you select F7: CANdi Diagnostics (a function limited to certain vehicles), the CANdi Diagnostics screen appears and you may perform a complete diagnosis of the CANdi module.

Refer back to CANdi diagnostics section for more information.

## Getting Started

Selecting Getting Started - from the Tech2 Main Menu there is an on-line overview of the Tech2 and useful operation information.

The following options are available from the Getting Started Menu.

F0: Tool Controls - Selecting an option from the Tool Controls Menu will give you information on Tech2 help functions, key pad layout, screen contrast control, and soft keys.

F1: Hardware - The Hardware Menu offers information on screen display, VCI module removal, PCMCIA card removal and installation, cables/adapters and power connections, prop rod and hand straps, and RS-232 and RS-485 ports.

F2: Tech2 Features - This selection displays a vehicle information entry sequence for a fictitious vehicle.

F3: Programming Tech2 - This option provides instructions for downloading from a PC to the Tech2 scan tool. Due to a specific sequence of events in the evolution of the Tech2, this option duplicates the Programming Tech2 function of the Tool Options Menu.



**Getting Started Menu**



Tool Controls Menu

## Hardware Menu

- F0: Screen Display
- F1: VCI Module Removal
- F2: PCMCIA Card Removal & Installation
- F3: Cables/Adapters & Power Connections
- F4: Prop Rod & Hand Straps
- F5: RS-232 port & RS-485 port

Hardware Menu

## Tech 2 Features

This section displays a navigation sequence from a fictitious vehicle. The questions can be answered by pressing the F-keys (if displayed) or by moving the highlighted bar with the [Up Arrow] or [Down Arrow] keys and then pressing the [ENTER] key.

Press [Example Screen] soft key to run example.

Press [EXIT] key to return to menu.

### Example Screen

#### Tech2 Features screen

1. Select F0: Diagnostics from the Tech2 Main Menu, “build” the vehicle, and select a system—powertrain, body, or chassis.
2. From Data Display, select the ‘More’ soft key twice to bring up the Live Plot soft key.
3. Once up to three parameters are selected, select Accept to see a graph of the data.

### Live Plot

Live Plot is a Tech2 feature that allows data display parameters to be graphed in real time as it happens. The Live Plot function will allow up to three parameters to be plotted on a graph at one time. The data of these parameters will be plotted as the information is received on the Tech2 from the vehicle. This may aid in the diagnosis of an intermittent vehicle condition by enabling the user to view data from the vehicle graphically. Any spikes or drops on the graph can be analyzed immediately. Previously, data had to be captured before it could be plotted. The Live Plot application is available from the Data Display, Quick Snapshot, and Snapshot applications on the Tech2.

#### Screen Display Samples:

1. Select F0: Diagnostics from the Tech2 Main Menu, “build” the vehicle, and select a system—powertrain, body, or chassis.
2. From Data Display, select the ‘More’ soft key twice to bring up the Live Plot soft key.
3. Once up to three parameters are selected, select Accept to see a graph of the data.

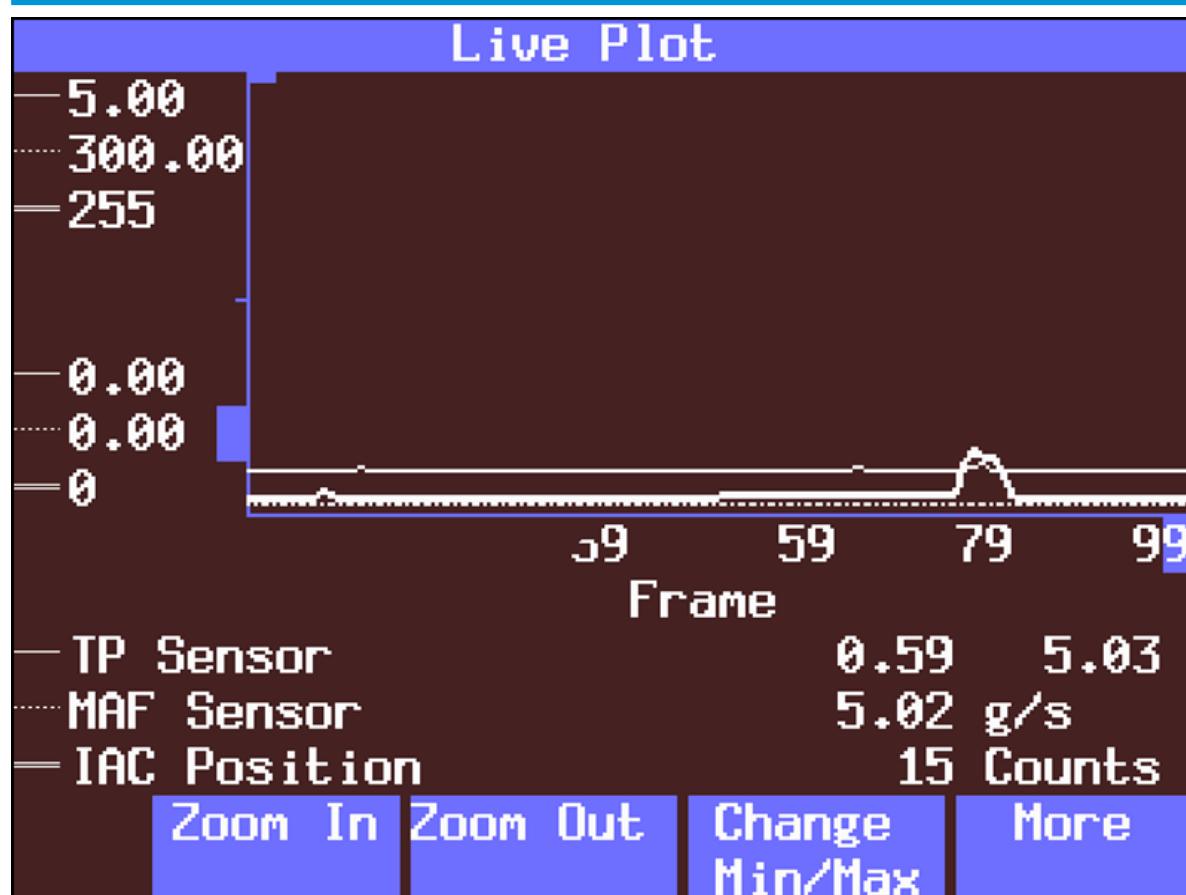
4. All of the features on the resulting graph are available while Live Plot is functioning.  
Pressing the More soft key leads to options that allow the user to zoom in and out on the plotted graph 50 frames at a time and change the min/max values of a highlighted data parameter.

Engine Data 1	
Engine Speed	651 RPM
IAC Position	8 Counts
TP Sensor	0.51 Volts
Desired Idle Speed	648 RPM
ECT Sensor	199 °F
IAT Sensor	80 °F
MAF Sensor	4.35 g/s
Engine Load	1 %
TP Sensor	0 %
1 / 37 -▼	
Desired Idle Speed	
Live Plot	More

"Live Plot" soft key on data screen

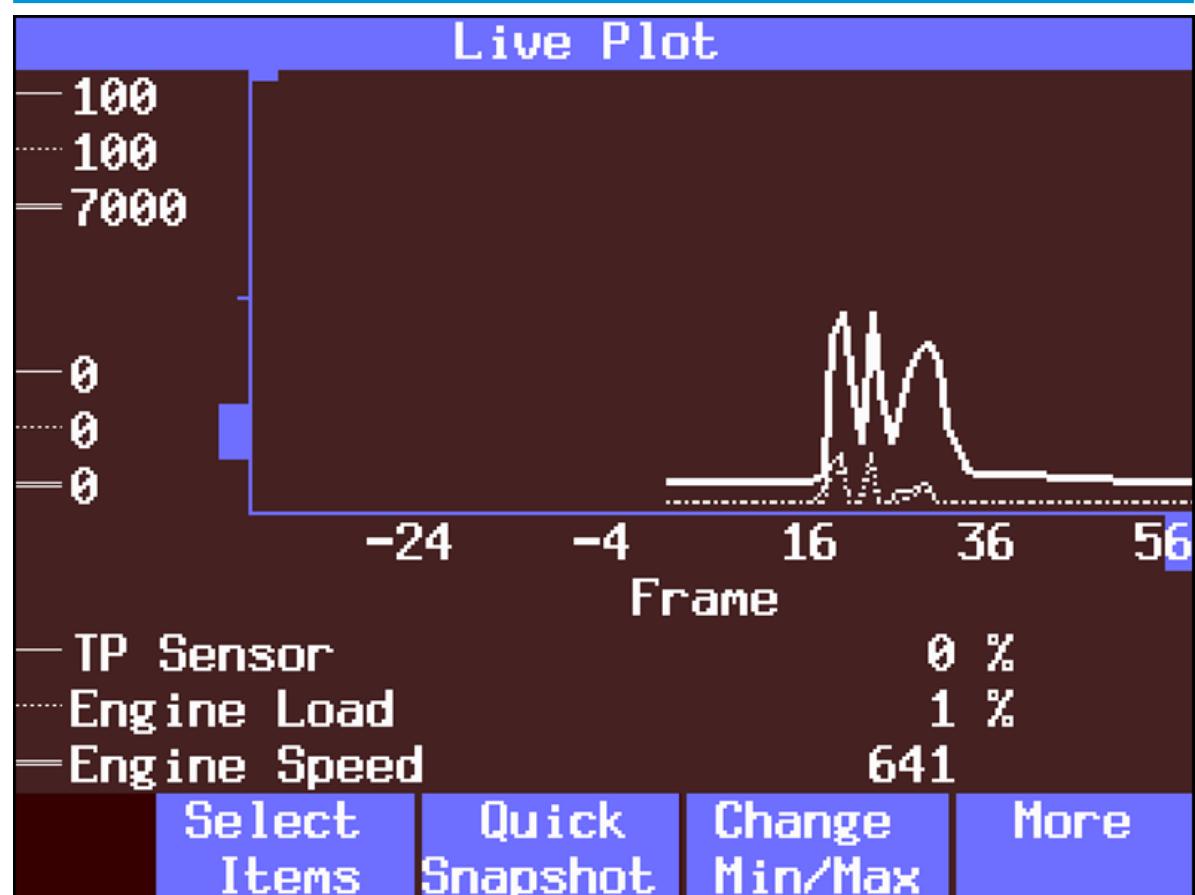
Engine Data 1	
* Engine Speed	RPM
* Desired Idle Speed	RPM
IAC Position	Counts
* ECT Sensor	°F
IAT Sensor	°F
MAF Sensor	g/s
Engine Load	%
TP Sensor	Volts
TP Sensor	%
1 / 41 -▼	
Engine Speed	
Accept	Clear All

“Accept” soft key on data screen



#### Live Plot screen soft key options

5. Using soft keys, the min/max values of a highlighted data parameter can be edited in several ways.
  - a. Selecting Change Min/Max allows the minimum and maximum values of a data parameter to be changed.
  - b. Edit Min and Edit Max enables the keypad to be used to set the minimum and maximum values respectively. The value also can be assigned a positive or negative value.
  - c. Selecting Learn and Learn All allows the Tech2 to learn the min/max values of a highlighted parameter or of all selected parameters.
  - d. Selecting Restore Default restores the default min/max values of the highlighted parameter.
6. To stop the plot function for analysis, select Pause. Resume will restart the Live Plot.
7. To switch the display mode from Live Plot display back to a text display, select the 'More' soft key twice from the Live Plot graph and then select Data List.
8. From the Snapshot standby mode, the Live Plot function also is available by selecting the 'More' soft key. While viewing Live Plot, a snapshot also can be triggered the same way it is in the Snapshot mode.



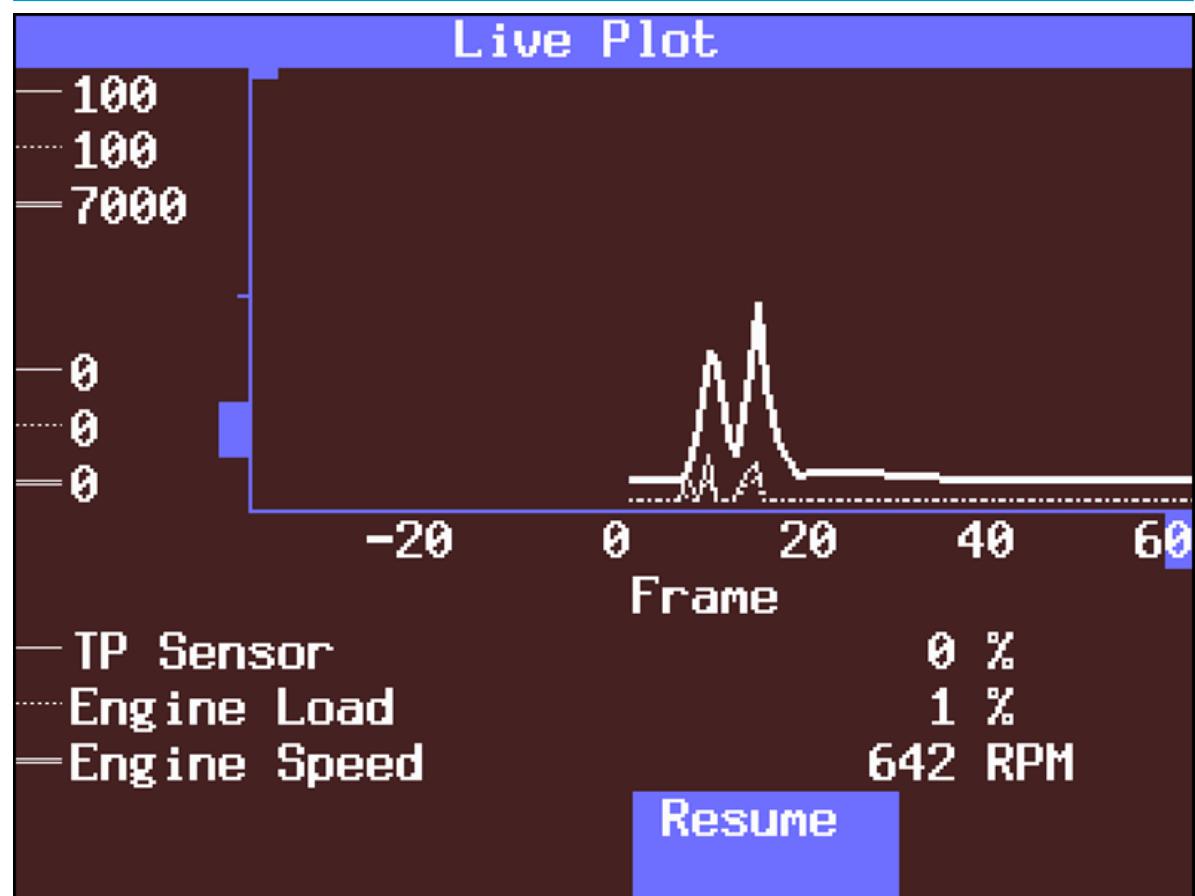
Live Plot Screen with selectable items

Min/Max Adjustment		
IAC Position	15	Counts
Min	0	
Max	255	
Engine Load	1	%
Min	1	
Max	1	
TP Sensor	0.53	Volts
Min	0.53	
Max	0.53	
IAC Position		
	Edit Min	Edit Max
		More

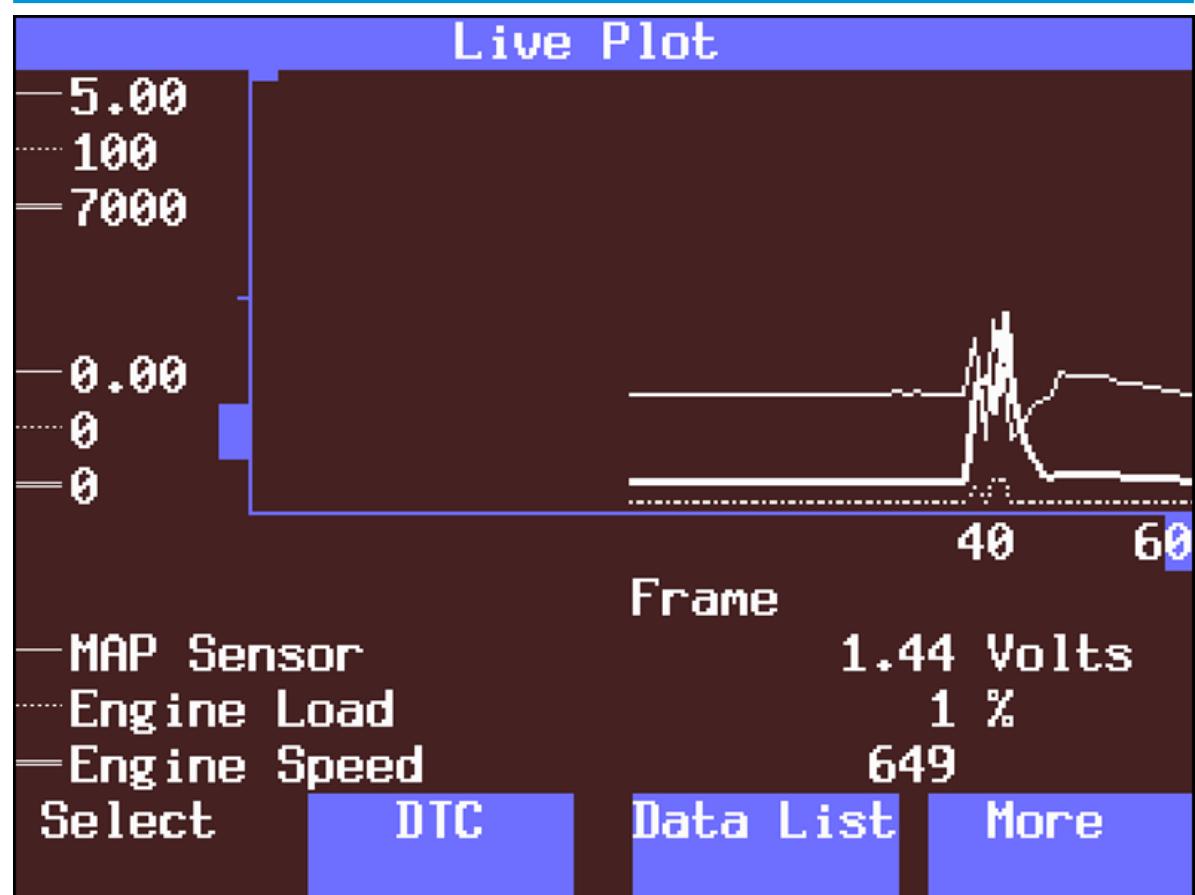
Min/Max Adjustment screen

Min/Max Adjustment		Recording
Engine Speed		806 RPM
	Min	0
	Max	7000
IAT Sensor		114 °F
	Min	-40
	Max	248
MAF Sensor		5.07 g/s
	Min	0.00
	Max	300.00
Engine Speed		
<b>Learn</b>		<b>Learn All</b>
<b>Restore Default</b>		<b>More</b>

“Learn” and “Learn All” soft keys on Min/Max Adjustment screen



Live Plot “Resume” soft key



Live Plot “Data List” soft key

Engine Data 1	
Snapshot Record	
Engine Speed	828 RPM
Desired Idle Speed	800 RPM
IAC Position	20 Counts
ECT Sensor	102 °C
IAT Sensor	30 °C
MAF Sensor	5.70 g/s
Engine Load	16 %
TP Sensor	0.59 Volts
1 / 42 -▼	
<b>Engine Speed</b>	
<b>Units</b>	<b>Live Plot</b>
<b>More</b>	

Data Snapshot Record screen

**NOTE:** Be sure to update your Tech2 with the latest TIS2Web software as soon as it is available.

## TIS2Web

TIS2Web is the Technical Information System (TIS) available through an online subscription service. It is a component-oriented service information delivery system that allows technicians to perform SPS, update the Tech2, and view Tech2 snapshot data in a Windows environment.

### TIS2Web Application Selection

TIS2Web has six major applications:

- Software Download (SWDL)
- Service Programming System (SPS)
- Calibration Information (SPS Info)
- Security Access (Security)
- Snapshot (Snap)

- Global Diagnostic System (GDS)

## Software Download

The Software Download function of TIS2Web is used to update the Tech2 scan tool software to the latest version. Like all computers, the Tech2 scan tool stores software that determines how it runs and what it can do. This software allows the scan tool to perform diagnostic routines on or for the following vehicle applications: Powertrain, Body, Chassis, and Service Programming.

Scan tool software is regularly updated to reflect changes in vehicle engineering or diagnostics. Scan tool software updates can include new vehicle and system coverage, updates to original application releases, and fixes to known software concerns.

## Tech2 PCMCIA Card

**Notice:** The PCMCIA card is sensitive to magnetism and static electricity. Use care when handling.

**IMPORTANT:** The PCMCIA card is accessed through a door on top of the Tech2, and should only be removed if instructed by the ACDelco Aftermarket Support Center. The card is ejected by pushing the arrow button pointing to card to be removed. Cards are notched to allow insertion only one way. When reinserting the card make sure that it fully seats into the Tech2. The PCMCIA card fits into Slot 1, which is closest to the screen. The second slot is identified as Slot 2.

The Tech2 software is stored on a Personal Computer Memory Card Industry Association (PCMCIA) card.

All of the applications share a single database on the PCMCIA. See screen captures for ejection of PCMCIA card, PCMCIA card keying, and PCMCIA card insertion.

The card can store at least two snapshots and one Capture Info data file. This allows analysis of intermittent conditions on a vehicle being serviced.

A write-protect slide mechanism is on the top edge of the card—usually under a white plastic CPA-type device on new cards. If the write-protect slide mechanism is in the locked position, you will not be able to store snapshots or captured information, and service programming will not work. The correct position is at the middle of the card (unlocked).

## J-45080 32-MB PCMCIA Card

### Background:

When the Tech2 was introduced in 1996, it was equipped with a 10-MB (10-megabyte) PCMCIA card, which had 10 times the capacity of the original mass storage cartridge of the Tech 1. The 10-MB card was installed in Slot 1, closest to the screen, with Slot 2 reserved for future use.

Vehicle on-board computer capabilities multiply with each new model year, and the Tech2 has had to keep pace. The capacity of the 10-MB card reached its limits, and it was time to expand again.

**Why a larger memory card was needed:**

The memory card contains diagnostic and reprogramming applications, and space for vehicle calibrations. As the functions of the Tech2 expand, more space is needed for new diagnostic applications.

For convenience, coverage of the 1991 to 2003 vehicles is being retained, and capacity is being added to accommodate upcoming model years.

Acquiring additional memory cards:

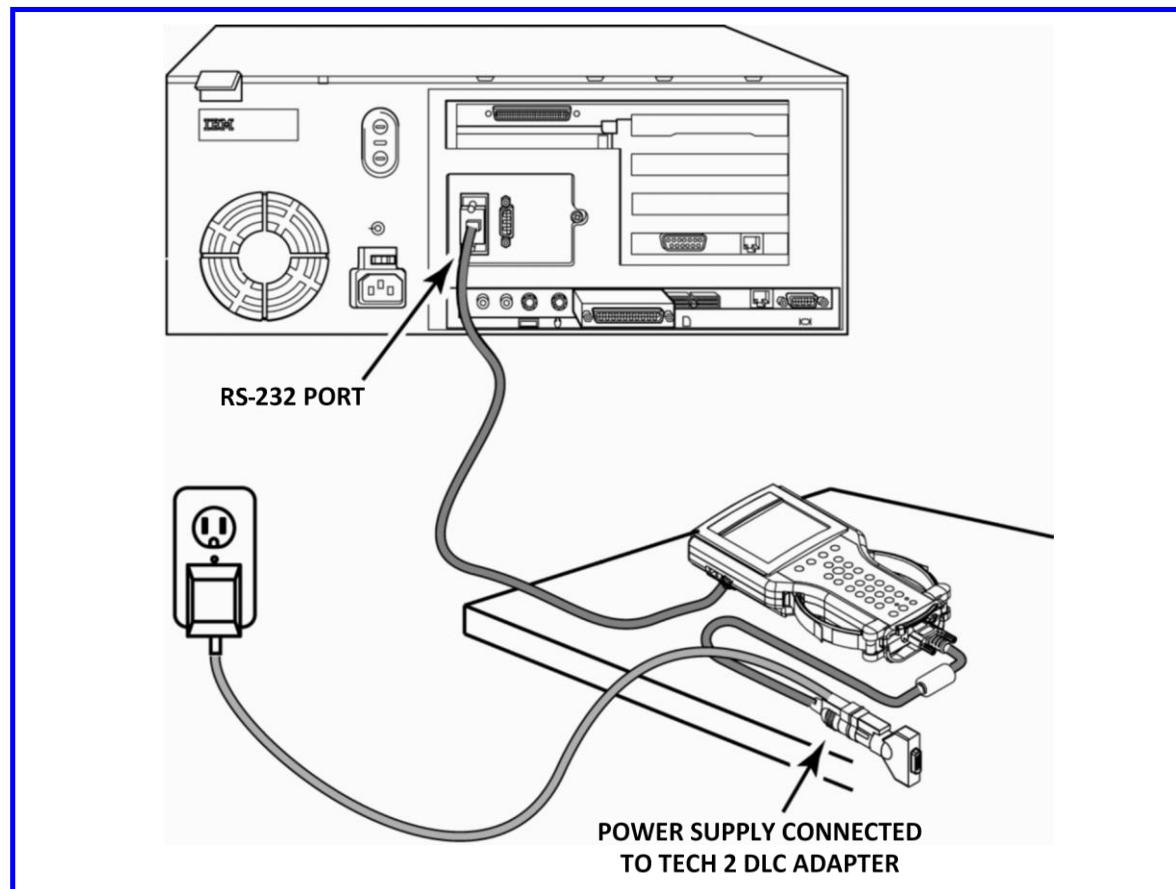
Call Kent-Moore Tools at 1-800-345-2233 to order replacement cards for additional units, or to obtain further information about this product.

**IMPORTANT:** The Tech2 requires a 32-MB card called a linear flash card. The low-priced 32-MB cards called "strata flash cards"—available on Internet sites—will not work in the Tech2.

**Tech2 Standard Update Procedure**

To perform a standard Tech2 update:

1. Connect the scan tool to the PC using the RS-232 cable.
2. Power up the scan tool using the AC power supply that came with the tool.



3. At the PC, launch TIS2Web.
4. From the TIS2Web main screen, select Software Download.

5. At the “Select Diagnostic Tool for Download” screen, select Tech2 and “Standard” to install the newest software on the scan tool. After confirming the selection, select Next. A message will appear indicating the PC is reading the contents of the diagnostic tool.
6. The PC will display a “Confirm Software Change” screen showing what the Tech2 currently contains and what it will contain after the download. Click Next to continue.

**Important:** Clicking NEXT at the “Confirm Software Change” screen will initiate the download. Be sure the correct file has been selected before clicking NEXT.

7. A “Performing the Software Download” screen appears to display the progress of the download.
8. When the download is complete, a “Download Finished” screen appears. Select Close to close the application. The scan tool now contains the latest software.

## Tech2 Custom Update Procedure

To perform a custom Tech2 update to backdate the scan tool or install different language software:

1. Connect the scan tool to the PC using the RS-232 cable.
2. Power up the scan tool using the AC power supply that came with the tool.
3. At the PC, launch TIS2Web.
4. From the TIS2Web main screen, select Software Download.
5. At the “Select Diagnostic Tool for Download” screen, select Tech2 and “Custom” to allow backdating or installing of non-NAO software on the scan tool. After confirming the selection, select Next. A message will appear indicating the PC is reading the contents of the diagnostic tool.
6. A “Select the Applications” screen appears. The left side of the screen lists software release numbers. Select the “+” sign to see the list of languages for each release.
7. Select the desired software version and language either by double-clicking on it or by highlighting the desired language file; then click Select in the middle of the screen. The selected software will appear in the right side of the screen. Click on the tabs to compare the current and selected scan tool software. Click Download to proceed.
8. A “Performing the Software Download” screen appears to track the download status.
9. When the download is complete, a “Download Finished” screen appears. Click Close to close the application.

## Snapshot Upload / Display

The Snapshot Upload/Display function of TIS2Web provides a means for viewing scan tool snapshot data, as well as freeze frame and capture info data on the PC. This data can be analyzed in a variety of ways to determine when and where a fault may have occurred.

Using the Snapshot display feature involves three steps:

1. Capture snapshot(s) with the scan tool.
2. Upload the snapshot(s) to the computer.
3. View the snapshot(s) using the TIS2Web Snapshot Upload/Display function.

The following procedures describe how to capture, upload and view a snapshot.

### Capturing a Snapshot of the Vehicle Data Stream

1. Connect the Tech2 to the vehicle Data Link Connector (DLC).
2. Power up the Tech2 and press the ENTER key at the title screen.
3. From the Main Menu select F0: Diagnostics.
4. Enter all vehicle information as requested on the scan tool's display (powertrain, body, chassis).
5. From the application menu, select F3: Snapshot.
  - At the next screen, select the desired system to snapshot (e.g. Engine, Transmission, ATC).

- At the next screen, select the desired data list (e.g. Engine Data 1, Engine Data 2, EGR Data).
- At the next screen, select trigger type and trigger point, as described on the next page. Note that your choices may be limited depending on the application.

**Trigger Type (F0 - F3 function keys) determines how the snapshot is triggered:**

F0: Manual Trigger triggers a snapshot when you press the Trigger soft key.

F1: Any Code triggers a snapshot whenever any current trouble code is stored. This event occurs when the first code is stored in the vehicle controller memory.

F2: Single Code triggers a snapshot when a user specified trouble code is stored.

F3: Automatic Trigger (chassis applications only) automatically triggers a snapshot.

Trigger Point (F4 - F6 function keys) is the exact point at which the trouble code (fault) or manual trigger occurs within the snapshot period. It helps to know the trigger point when you are looking for changes in data parameters. Trigger point may be set for:

F4: Beginning causes the Tech2 to start recording information from the trigger point until snapshot storage is full. This choice is useful if the fault is predictable.

F5: Center is the most commonly used trigger point because it stores information leading up to and following the trigger point. This function allows comparison of events before, during, and after a fault.

F6: End sets the trigger point at the end of the snapshot recording and therefore shows only information leading up to and including the fault.

6. Press the Record Snapshot soft key. The Tech2 screen will display the flashing message “standby.”
  - When the fault occurs, press the Trigger soft key.
  - The Tech2 will display the message “triggered.”
  - Allow the scan tool to record a sufficient amount of data, then press [EXIT] to store the snapshot data.
  - Press the Continue soft key when the snapshot trigger type screen is displayed.
7. Exit to the Main Menu, then power down and disconnect the Tech2 from the vehicle.

**Uploading the Snapshot to the PC**

After a snapshot has been successfully captured, perform the following steps to upload it from the scan tool to the computer.

1. Launch TIS2Web.
2. Select Snapshot Upload/Display from the TIS2Web main screen.
3. Select the “Upload from Handheld” box in the center of the screen, or select the Upload from Handheld icon on the Snapshot toolbar.
4. Select Tech2 on the “Upload from a Handheld Device” window, verify that the Tech2 is connected to the computer, and then select OK.
5. Select the snapshot to be uploaded, then select OK.
6. After the snapshot uploads, a list of data parameters will display on the monitor.

## Viewing the Snapshot

After a snapshot has been uploaded (either from disk or the scan tool), it can be viewed and analyzed in a variety of ways.

## Replaying the Snapshot

To replay a snapshot, use the row of icons in the lower left-hand corner of the screen. The selections and their functions are as follows:

- First Frame. Displays the first frame of the snapshot, regardless of which frame was displayed prior to selection.
- Reverse One Frame. Displays the frame immediately preceding the one currently displayed.
- Play in Reverse. Causes the snapshot to continuously play in reverse until the first frame is displayed.
- Trigger Frame. Causes the display to move to the exact frame when the snapshot was triggered, regardless of which frame was displayed before the item was selected.
- Play Forward. Causes the snapshot to continuously play forward until the last frame is reached.
- Forward One Frame. Moves the snapshot forward to the next frame.
- Last Frame. Displays the last frame in the snapshot.
- Stop Play. Stops a continuous play snapshot at the frame displayed at the time of selection.

## Single-Column vs. Two-Column Display

The two-column and single-column icons in the toolbar change the appearance of data parameters.

- Two-Column Mode displays a double list. When using the two-column mode, the maximum number of characters of any one line is 80.
- Single-Column Mode lists data parameters in a single column using larger type, which makes the data easier to read at a distance.

A default (single- or two-column mode) can be set by selecting Options from the menu bar.

## Displaying Diagnostic Trouble Codes

The View Diagnostic Trouble Code Information mode displays all relevant trouble code information for each individual frame. Note that when replaying a snapshot, every frame of the snapshot may not have a stored DTC.

To use the DTC display feature:

1. Select the View DTC Information icon on the Snapshot toolbar. A box will appear near the top of the screen listing DTC information. The following information is provided:
  - The first line indicates how many codes are in the frame—e.g. “1 of 2,” “2 of 2,” etc. This is not the total number of DTCs stored in the entire snapshot, just in the individual frame being displayed.

- Below the first line is the number and name of the DTC.
  - Diagnostic test status tells whether the test ran and whether it passed or failed.
  - DTC status lists the DTC information. This is the status of the tests that were run and the related DTC messages that can be viewed by the technician. This information is based only on the DTC information listed, since some DTC information will not be available on all applications.
2. If more than one DTC is set for a frame, scroll bars will appear at the right side of the DTC window. To view other DTCs click-and-drag the scroll box or use the scroll arrows.
  3. To determine exactly when a DTC set during a snapshot, use the “Play Forward” and “Play in Reverse” selections to play the snapshot with the DTC window still in view. DTC information will continue to display for all the frames during which the DTC was set.
    - This information can be useful for diagnosing DTCs by displaying related data parameters at the point in time when the code was set.

**TIP** The View DTC Information icon will be highlighted if a code was set during a snapshot. Select the View DTC Information icon. This will show any and all DTCs set during the snapshot, since DTCs are stored for the duration of the snapshot

4. When a frame is reached for which a diagnostic trouble code does not exist, the DTC window will display a blank.

**TIP** In most snapshots, DTCs set near the trigger frame. To quickly locate the frame where a DTC occurred, click on the “Trigger Frame” selection. Then use the “Forward One Frame” or “Reverse One Frame” selections to view the frames just before and after the trigger frame. Chances are the DTC will appear within these frames. If not, continue viewing the snapshot using the “Play Forward” or “Play in Reverse” selections.

### Diagnostic Trouble Code Change Mode

This feature allows the user to move from trouble code to trouble code within the snapshot. If you select the View DTC Information icon, when in a snapshot the Snapshot application will display a split screen. This screen will consist of the DTC information on the upper half of the screen and the parameter data display on the lower half of the screen.

If the DTC was not set in the selected frame of the snapshot, the DTC information will not display until the snapshot is advanced to the first frame in which the DTC was set. Select the Diagnostic Trouble Code Change icon to advance to the first frame of the DTC. In DTC change mode, selecting the forward or reverse arrows will move the application to only the frames in which a DTC was set.

## Displaying Graphs

Graph display modes give you the ability to view snapshot parameters in graph form. This allows you to see how a parameter functions over time. It also allows easy visual comparison of up to six parameters at a single time. The two graph display modes are three-graph and six-graph.

## Three-Graph Display

To access the three-graph display mode:

1. Click the Display Graph (three) icon.
2. Click on the first graph icon at the top of the Graph Parameters window, then select a parameter from the list in the lower portion of the box. The parameter name will appear next to the first graph icon.
3. Repeat this procedure for the second and third graphs.

**IMPORTANT:** When selecting parameters to be graphed, it is important to consider the values used to measure the parameter, and to correctly plot these on the graphs. This is done in the “Min Y Axis Value” and “Max Y Axis Value” fields. These may need to be adjusted to reflect the normal range of values for the parameter — for example, 0 to 5 volts for MAP sensor.

4. When one to three desired parameters have been selected, click OK.
5. The screen changes to display the chosen parameters in graph form.
  - Using the navigation icons, move through the parameters.
  - Click and drag on the arrow along the bottom of each graph to move through the graph. This arrow represents the current frame being viewed. It is useful for pinpointing precisely when a parameter change indicates a fault.
  - A data value corresponding to the frame the arrow is pointing to will be displayed in the upper left corner of each graph.
6. To select a different parameter to be graphed, simply click and hold on the parameter name in the data list, then drag the cursor over one of the existing graphs and release the mouse button. The new parameter will be graphed in place of the old one.
7. To view a graph at full-screen size, move the cursor over the graph. When the cursor changes to a magnifying glass, click on the graph. The graph will appear at full-screen size. Click on the full-size graph to return to the three-graph display.

## Six-Graph Display

Up to six parameters can be displayed on a single graph. Parameters are selected in the same manner as described for three-graph display. Each parameter is color-coded, and you can change the background color to improve visibility.

## Lock / Unlock Parameters

The Lock/Unlock Parameters function is used to isolate specific parameters so they can be viewed and compared more easily than if they were part of the larger parameters list. To use this function:

1. Select (highlight) the desired parameter, then click the Lock/Unlock Parameters icon. The selected parameter will appear at the top of the data list, above a “lock line”.
2. To add other parameters, follow the same procedure. The “locked” parameters can then be viewed together to compare their data values. Parameters can also be locked by double-clicking on them in the data list.
3. To remove an item from the locked list, select it, then click the Lock/Unlock Parameters icon. The item will be removed from the list.

**TIP** Display modes can be used in various combinations to provide the most useful diagnostic capability. It is even possible to view DTC information, locked parameters, and graphed parameters simultaneously. In multi-display mode, replay selections can be used, as previously described, to move through the snapshot.

## Viewing Capture Info Data

Capture Info is a feature that allows the Tech2 to retrieve DTCs, Freeze Frame and Failure Records from the vehicle's control module. This is a different function than snapshot display. Capture Info files consist of only one frame of data, whereas snapshots typically contain multiple frames of data.

When Capture Info is selected, the scan tool displays a menu selection that allows data from the control module to be stored to the Tech2 PCMCIA card, or to refresh the PCMCIA card with new data from a control module.

**Important:** A single code may be counted as two different codes in a Capture Info file if it exists both in freeze frame and failure records.

To view DTCs, freeze frame or failure record data through TIS2Web software:

1. Use the Tech2 Capture Info function to retrieve data from a vehicle's control module.
2. Connect the Tech2 to the computer and go to the Tech2 start-up screen.
3. Launch TIS2Web.
4. Select the Snapshot Upload/Display application.
5. Click the "Upload from Handheld" icon on the toolbar.
  - Select Tech2, then click OK.
  - Select Capture Data from upload selection menu, then click OK.
6. The data will display on screen. The top of the screen lists DTCs that were stored in the control module. The lower portion of the screen lists captured freeze frame or failure record data for the selected DTC.
  - Notice that the navigation selections at the bottom of the screen are gray (cannot be selected) because the data record consists of only one frame.
7. If more than one DTC is present, selecting a DTC in the list changes the data list to match that DTC.
8. Capture Info can be stored and printed by the PC.
9. The user may toggle on/off the DTC(s) at the top of the screen in order to view only the freeze frame or fail record data by selecting the Show/Hide Failure Record Information icon on the toolbar. This icon is only active for the Capture Info Data function.

## Saving a Snapshot to Disk

If you wish to save a file that you've opened, click the Save Snapshot icon on the toolbar. You then have the option of saving the file to the computer's hard drive.

## Printing a Snapshot

Printing can be accomplished in three ways:

1. Using the “Print” command in the File menu.
2. Using the “Print screen dump” icon on the TIS2Web toolbar.
3. Using the “Print” icon on the snapshot toolbar.

The “Print” commands produce a text listing of data parameters. The “Print screen dump” icon produces a full-page representation of what’s displayed on the monitor.

## The Service Programming System (SPS)

The Service Programming System (SPS) updates the flash calibration files that are stored in a vehicle onboard controller (e.g. PCM, ABS, VTD). The calibration file custom-tailors a module to a certain vehicle. The calibration file contains data for things such as spark curves and fuel control. When troubleshooting a driveability condition, diagnosis may call for reprogramming the controller with newer calibration information to correct a customer concern.

The ECM/PCM controller can generally use four types of serial communications:

- UART (Universal Asynchronous Receive and Transmit)
- Class 2
- Keyword
- CAN – GM LAN (recent communications application currently available only on a few limited applications)

### VCI Number

A Vehicle Configuration Index (VCI) is a number representing a valid combination of parts and systems built in a vehicle, including optional equipment. GM Service and Parts Operations uses VCI numbers to identify a unique calibration or group of calibrations.

You will need a VCI number to access vehicle calibrations when reprogramming if the VIN of the vehicle is not part of the TIS2Web data, depending on the vehicle, if it has been reconfigured from its original build specifications. Keep in mind that many calibrations for reconfiguring vehicles (adding/changing options, such as fog lamps) are selectable in TIS2Web and a VCI number is not necessary.

If the VIN is not part of the TIS2Web data that is currently loaded, a TIS2Web error message will state that the VIN is incorrect or a VCI number is needed. If this is the case, make sure that the appropriate software version is loaded to your computer.

A VCI number also allows you to program a vehicle that has been reconfigured from its original configuration. This includes changes in tire sizes and axle ratios. When selecting Reconfigure from the “Supported Controllers” screen in TIS2Web, the calibrations that support various configurations are presented as information only. To access those calibrations, you’ll need a VCI number.

The VCI number provides access to all of the latest calibrations available for the vehicle based on its VIN.

A VCI number does not allow you to access calibrations that are designated “Not Selectable.” It is important to ensure you have the correct VCI number to access the calibrations before reprogramming.

### Selecting the Right Calibration

When reprogramming a vehicle, selecting the right calibration is critical. You will only see calibrations that are valid for the VIN entered. Be sure to check the history of each calibration. The history lists an explanation of the calibration file, telling what the calibration is for and whether it supersedes any other calibrations. It is helpful to read the latest bulletins to stay up to date on why certain calibrations have been released. Related bulletin numbers are sometimes listed along with the calibration files.

Based on the calibration history and bulletins, select the appropriate calibration file. For many vehicles equipped with VCMs, you'll also need to complete the multiple tab selections. Each tab is for a distinct calibration file contained in the VCM. An unchecked box on a system tab indicates that a necessary selection has not been made.

If you need a VCI number, contact the ACDelco Aftermarket Support Center 888.212.8959. Once you have the VCI number, it must be entered in the entry screen when requested by the SPS.

The two main SPS methods are:

- Remote Programming
- Pass-Thru Programming

Regardless of the vehicle involved, the general three-part process for SPS programming is as follows:

1. Check the vehicle's control module to determine which, if any, calibration file is currently stored.
2. Determine if an update is required.
3. Transfer the selected data to the vehicle's control module.

**NOTICE:** Prior to performing SPS, it is important to heed the following precautions:

- Using an outdated version could damage vehicle modules. The Tech2 and the computer must have the latest software.
- Make sure the vehicle battery is fully charged. Battery voltage for SPS should be between 12 and 14 volts. However, a battery charger must not be connected to the vehicle when using the Tech2.
- Make sure the cable connections are secure. A disconnected cable could cause controller failure.
- If you use a laptop computer for pass-thru programming, ensure that the power supply is properly connected. If powered by AC and the power cord becomes disconnected, it could interrupt programming and cause damage to the control module. If the laptop is operating from its internal power source (batteries), then make sure it is adequately charged to complete the SPS process.

## Remote SPS Programming

The Remote SPS method is a three-step process that involves:

1. Connecting the scan tool to the vehicle and obtaining information from the module.
2. Connecting the scan tool to the PC and downloading a new calibration file from the PC to the scan tool's memory.
3. Reconnecting the scan tool to the vehicle and uploading the new calibration file to the module.

## Performing Remote SPS

**Notice:** ECU to be programmed must be installed in the vehicle before beginning this process. Make sure battery is fully charged.

Perform remote SPS using TIS2Web as follows:

**STEP 1: Obtain Vehicle Information (Request Info) from new ECU or an ECU to be programmed.**

- 1.1 With the Tech2 and vehicle both off, connect the Tech2 to the vehicle DLC.
  - 1.2 Power on the Tech2. At the Tech2 title screen, press [ENTER].
  - 1.3 Turn the vehicle ignition to the on position (engine off).
  - 1.4 At the Tech2 Main Menu, select Service Programming System.
  - 1.5 Select "Request Info" on the Tech2.
- Important:** If a VIN was previously stored in the Tech2, press Request New Info (soft key), and follow the on screen directions.
- 1.6 Follow the on-screen instructions. After the vehicle description is entered, turn off all power consuming devices, then press Continue (soft key).
  - 1.7 The Tech2 reads the VIN, then displays the VIN and calibrations. The Tech2 will ask "Is this VIN correct?" Select Yes. (If the answer is No, write down the VIN number.)
  - 1.8 When finished, press [EXIT], power down, and disconnect the Tech2 from the vehicle. Turn the vehicle ignition off.

**STEP 2: Transfer Data from the PC to the Tech2**

- 2.1 Connect the Tech2 to the computer.
- 2.2 At the computer, launch TIS2Web.
- 2.3 From the TIS2Web main screen, select the Service Programming System icon.
- 2.4 At the Select Diagnostic Tool and Programming Process screen, make the appropriate selection for your procedure:
  - Under "Select Diagnostic Tool," select Tech2.

(You would select Information Only/PROM data to get calibrations for a particular vehicle without using the Tech2, or to get PROM data for vehicles that

- cannot be programmed. You would select Pass-Thru to perform SPS without disconnection from the vehicle or the computer.)
- Under “Select Programming Process,” select Reprogram ECU or Replace and Program ECU, depending on whether you are reprogramming an existing module or replacing a module.
  - Under “Select ECU Location,” select Vehicle or Off Board Programming Adapter (OBPA), depending on whether you are performing on-vehicle or off-board programming.
- 2.5 After making selections, select Next.
- 2.6 Confirm connections and select Next on the Preparing for Communication screen.  
**IMPORTANT:** If you answered NO to the VIN in step 1.7, a box may appear stating “The ECU could be a service ECU.” Click OK.
- 2.7 A Validate VIN screen will appear. After confirming and/or entering the correct VIN, select Next.
- 2.8 A Supported Controllers screen will appear asking you to identify the type of controller being programmed. Some vehicles may have more than one programmable controller — examples include PCM, BCM, IPC. Select the appropriate controller for the vehicle being serviced.
- After selecting the controller to be programmed, identify the type of programming to be performed:
- Normal is used for updating an existing calibration or programming a new controller.
  - For newer vehicles that do not have VINs in the database, VCI (Vehicle Configuration Index) is used for updating an existing controller or programming a new controller. For these vehicles, you will need to contact ACDelco Aftermarket Support at 1-888-212-8959 for assistance.
  - Reconfigure is used to reconfigure a vehicle, such as a truck, for changes in tire size & axle ratios.
- 2.9 After making selections, select Next.
- IMPORTANT:** If bulletins are listed together with the calibration files, refer to these service bulletins before performing service programming
- IMPORTANT:** Select Cancel if you receive a message stating that the calibration selected is already the current calibration in the control module, and reprogramming with the same software calibrations is not allowed.
- 2.10 A Calibration Selection screen will appear showing the calibration file history for the vehicle or controller being serviced. The screen displays a description for each calibration file. Select the appropriate file based on these descriptions.  
Then select Next.
- 2.11 After making the necessary selections, a Summary screen will appear allowing you to confirm your selection. Select Next to continue.

Note: If calibrations are the same, the NAODRUI Control box appears stating that the calibrations selected are already the current calibrations in the control module. Click OK and Back out or click Cancel on the Summary screen.

- 2.12 The application will automatically initiate the download of the new calibration file to the Tech2, and a Transfer Data screen will track the progress of the download.
  
- 2.13 After the download is complete, a Program Controller screen will appear with instructions for connecting the Tech2 to the vehicle to complete the programming process. Close the application to return to the TIS2Web Application Selection screen, then power down and disconnect the Tech2 from the PC.

### ***Controller Specific Instructions***

If “Crankshaft Position Variation Relearn Procedure” appears under “Controller Specific Instructions,” you must perform this procedure after reprogramming the PCM/VCM.

### **STEP 3: Transfer Data from the Tech2 to the Control Module**

- 3.1 With the Tech2 and vehicle both off, connect the Tech2 to the vehicle DLC.
  - 3.2 Power on the Tech2. At the Tech2 title screen, press [ENTER].
  - 3.3 Turn the vehicle ignition to the “on” position (engine off).
  - 3.4 At the Tech2 Main Menu, select Service Programming System.
  - 3.5 Select "F1: Program ECU" on the Tech2. The Tech2 will display the new programming data — VIN and software numbers. Verify, then select the soft key Continue. The Tech2 will display the "Programming in Progress - Downloading calibration file" screen.
  - 3.6 When the transfer is complete, the Tech2 will display the message “Programming Was Successful.” Press the Continue soft key to exit the program. Turn the vehicle ignition off first, then turn the Tech2 off and disconnect it from the vehicle.
- Be sure to verify successful reprogramming.

## **Verifying Reprogramming**

After any kind of control module programming, verify that programming was successful:

Turn the ignition off, wait at least 30 seconds, then start the vehicle to confirm that reprogramming was successful. If the vehicle does not start or starts but runs rough, repeat the SPS procedure.

**Important:** Some vehicles will require that Idle Learn, TP Learn, Theft Deterrent Relearn, or Crankshaft Variation Learn procedures be performed after programming. Consult the appropriate service information for these procedures.

## **Tech2 SPS User Interface Screens and Functionality**

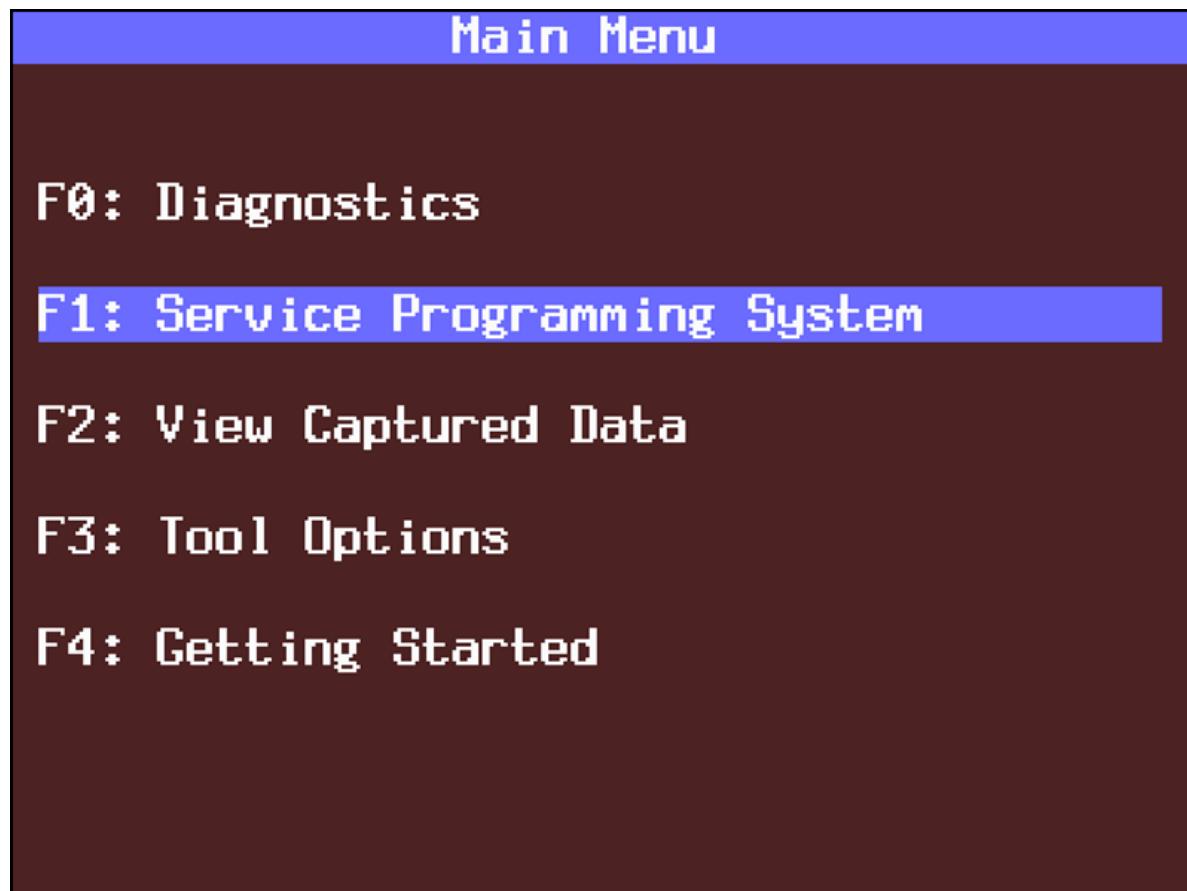
### **Overview**

This section is a representation of the Tech2 Service Programming System (SPS) user interface screen application. User interface screens that could be encountered during the

execution of Tech2 remote SPS are shown. The Tech2 screen information is organized into two sections: Requesting Information and Programming. Follow the steps to perform remote SPS using the Tech2 scan tool and TIS2Web software.

### Requesting Information

1. At the Tech2 title screen, select Enter. To execute the SPS application, press F1 on the Tech2 keypad or highlight Service Programming System on the Main Menu screen, then press Enter.



2. At the Request Information screen, press F0 or Enter.

Note: ECU to be programmed must be installed before requesting information.

# Service Programming System (SPS)

## Version 1.013

F0: Request Info.

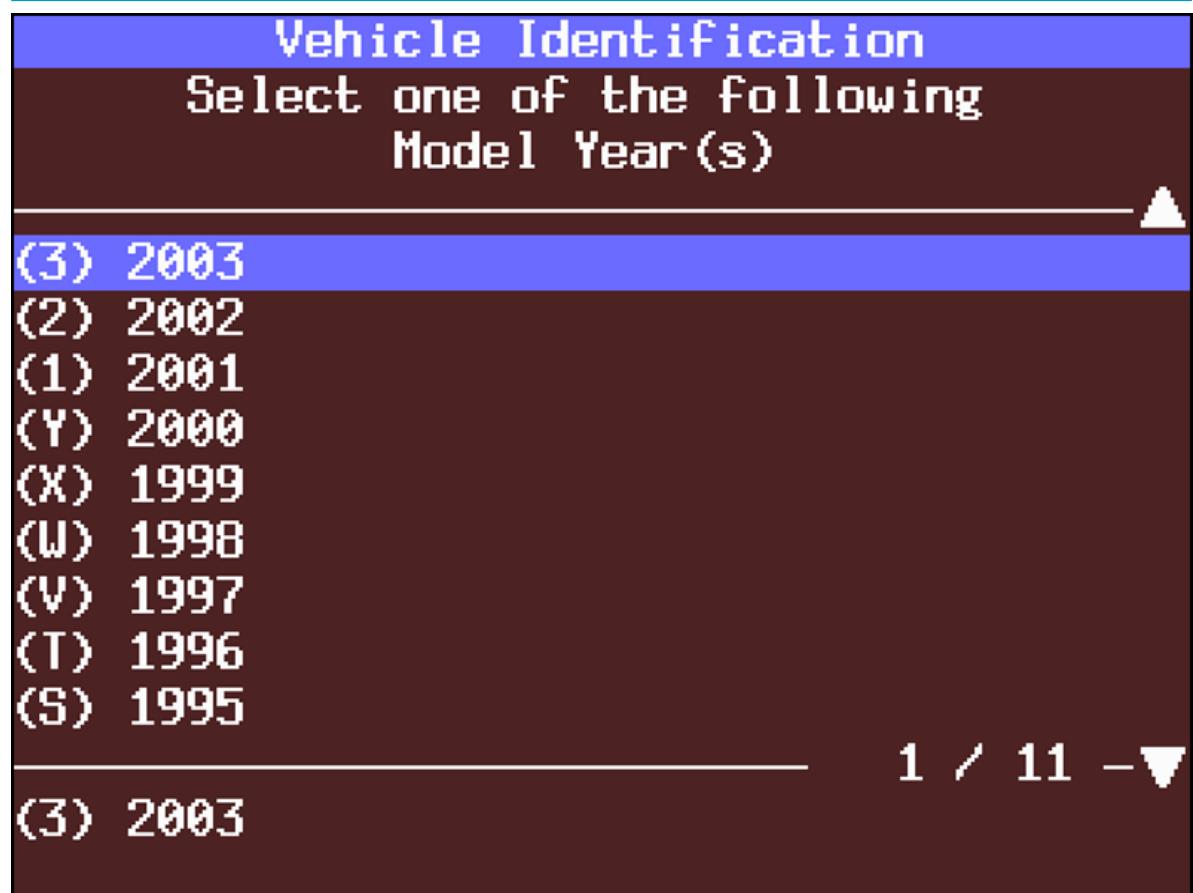
ECU to be programmed must be installed  
before request info.

TECH 2 is ready to request data from the  
ECU.

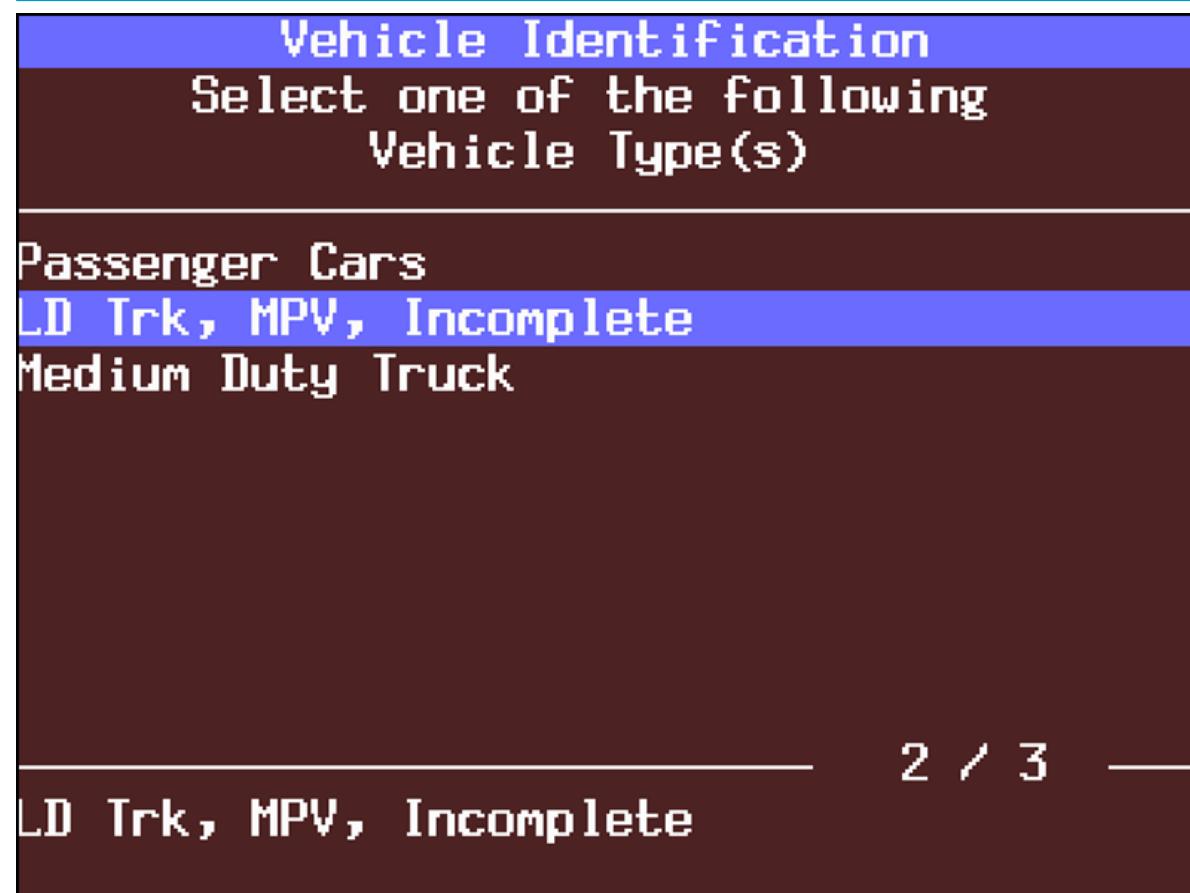
3. At the Salesmake(s) screen, highlight one of the salesmakes, then select Enter.  
Note: Information entered incorrectly may result in programming errors.



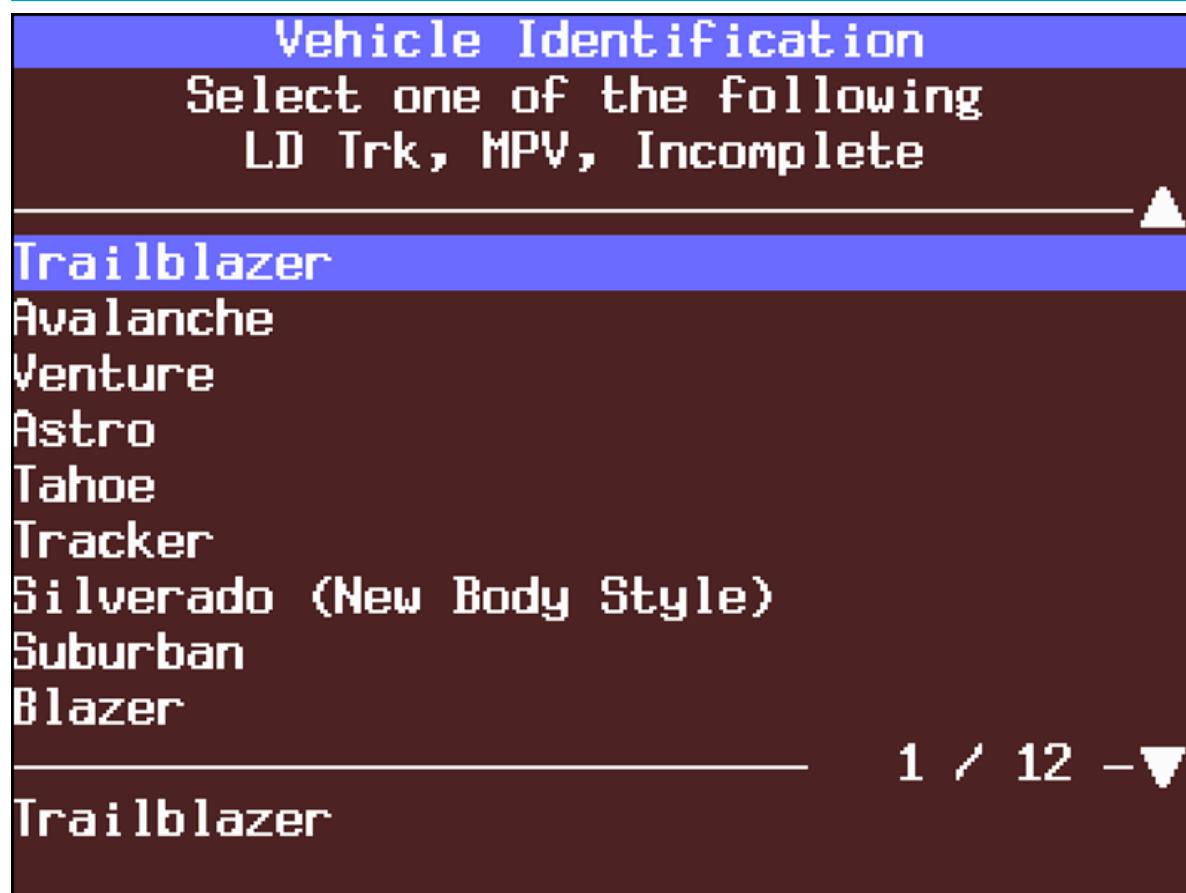
4. At the Model Year(s) screen, highlight the appropriate year, then select Enter.



5. At the Vehicle Type(s) screen, highlight the vehicle type, then select Enter.



6. At the Vehicle Identification screen, highlight the vehicle type, then select Enter.  
Note: Some vehicle builds may have additional option screens.



7. There is a Tech2 procedure screen. Follow the on-screen instructions. Failure to do this may result in programming errors. After following on-screen instructions, press the Continue softkey.

# Service Programming System (SPS)

## Version 1.013

Turn off all power consuming devices.

Turn on ignition with engine off.

Be sure battery is fully charged.

Continue

8. The Existing ECU Data screen displays a VIN and software calibration number(s). It also asks if the VIN is correct. Select either Yes or No using the Tech2 keys. In this example, Yes is selected.

Note: If No is selected, follow all on-screen instructions. After going to the PC, continue with step 10.

# Service Programming System (SPS)

## Version 1.015

### Existing ECU Data

VIN: 5GRGN23U33H100639  
Software: 12578125

Is this VIN correct?

9. There is a Tech2 Existing ECU Data information screen. Follow the on-screen instructions: Turn off the ignition. Disconnect the Tech2 from the vehicle and connect it to the PC.

# Service Programming System (SPS)

## Version 1.015

### Existing ECU Data

VIN: 5GRGN23U33H100639  
Software: 12578125

**Turn off ignition. Disconnect TECH 2 from Vehicle and connect it to PC.**

## Programming

10. After downloading information from the PC to the Tech2, return to the vehicle. At the Tech2 title screen, select Enter. To execute the SPS application, press F1 on the Tech2 keypad or highlight Service Programming System on the Main Menu screen, then press Enter. Select F1 or highlight Program ECU, then select Enter.

# Service Programming System (SPS)

## Version 1.015

F0: Request Info.

**F1: Program ECU**

ECU to be programmed must be installed  
before request info.

TECH 2 is ready for ECU programming.

11. The New Programming Data screen that appears next contains VIN and software calibration numbers. Verify that the VIN is correct, then press the Continue softkey.

# Service Programming System (SPS)

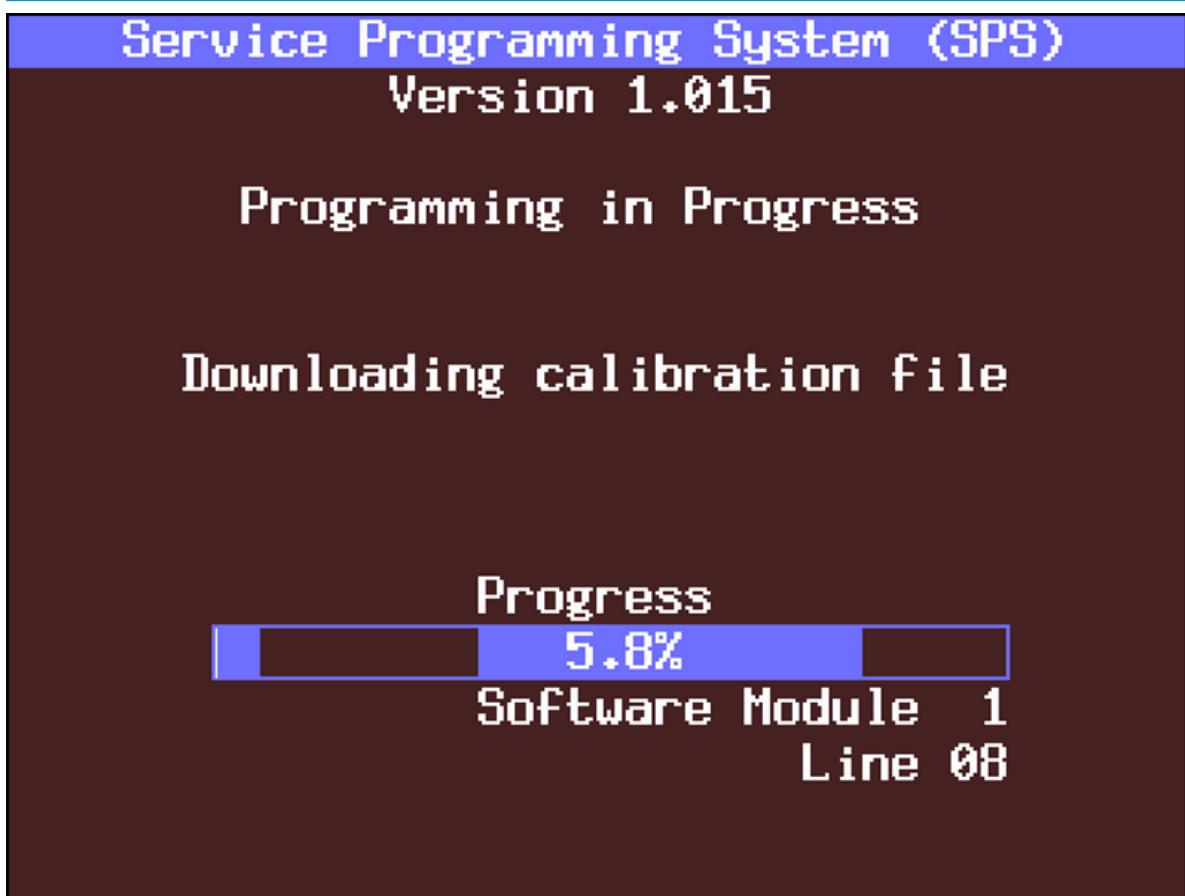
## Version 1.015

### New Programming Data

VIN:	5GRGN23U33H100639
Software:	12579405      12577849
	12577848      12576583
	12576636      12571205
	12579509      12571210

**Continue**

12. At the next Tech2 SPS screen, follow the on-screen instructions: Turn off all power consuming devices. Turn the ignition on with the engine off. Make sure the battery is fully charged. Then press the Continue softkey.



13. "Please wait," may briefly appear as programming begins. A percentage bar will track the progress of the download.

# Service Programming System (SPS)

## Version 1.015

Programming Was Successful

Turn Off Ignition

Continue

14. When programming is complete, the Programming Was Successful screen appears. Turn off the ignition and press the Continue softkey.

**NOTE:** Error screens you may encounter are shown here.

# Service Programming System (SPS)

## Version 1.015

**Programming failed!**

Utility	12570560	
Line 01	Operation 27	Errorcode FD
Line 01	Operation 27	Errorcode FD
Line 01	Operation 27	Errorcode FD
Line 14	Operation EE	Errorcode 00
Line 00	Operation 00	Errorcode 00

Press [Program] to retry or press  
[Exit].

**Program**

Programming Failed Screen

# Service Programming System (SPS)

## Version 1.013

Error

No Communications with Vehicle

Check Diagnostic Link Connector

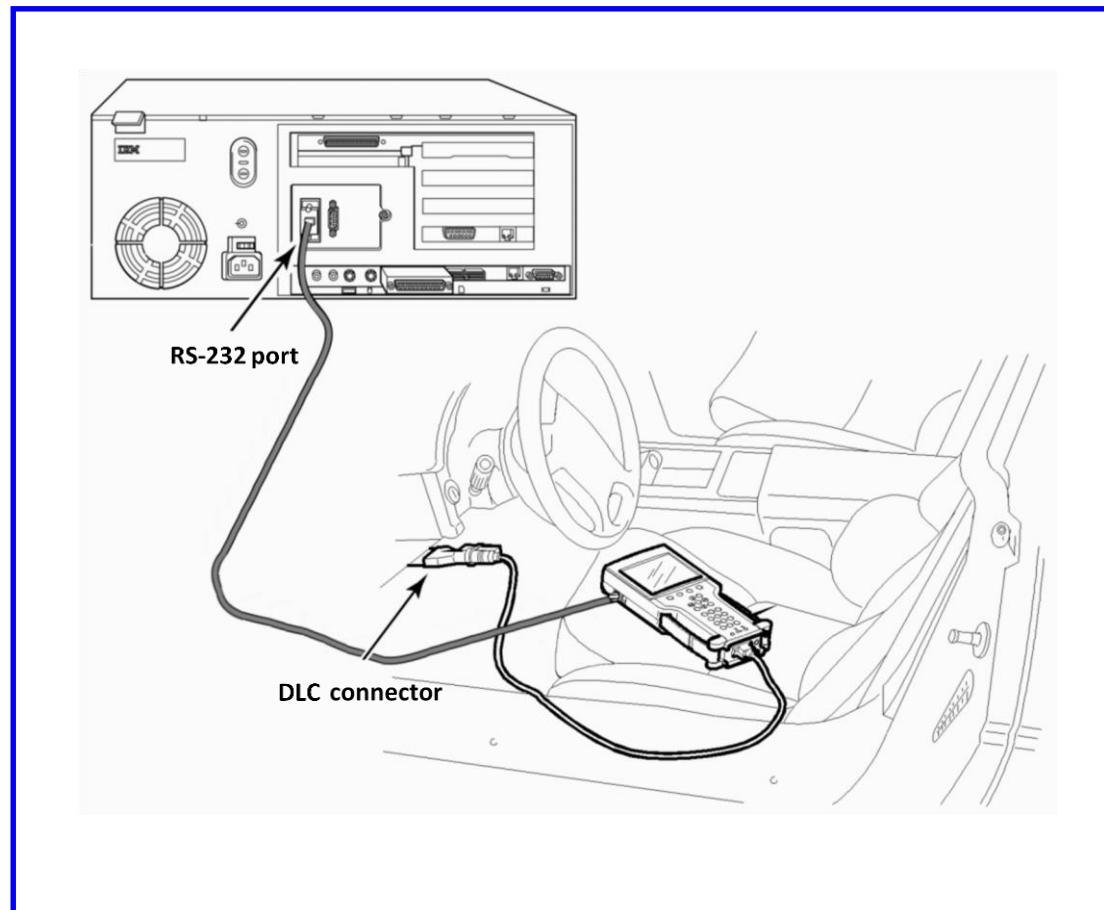
Check Ignition (On/Off)

Continue

Tech2 SPS Error - No Communications with Vehicle instructional screen

## Performing Pass-Thru Programming

Pass-thru programming allows the scan tool to remain connected to the computer and to the vehicle throughout the programming process. The vehicle must be in close proximity to the computer while using pass-thru programming.



**Vehicle to computer pass-thru connection**

## Pass-Thru Programming Procedure

1. Launch TIS2Web.
2. From the TIS2Web main screen, select the Service Programming System icon.
3. At the Select Diagnostic Tool and Programming Process screen:
  - Select Pass-Thru under “Select Diagnostic Tool.”
  - Under “Select Programming Process,” select Reprogram ECU or Replace and Program ECU, depending on whether you are reprogramming an existing module or replacing a module.
  - Under “Select ECU Location,” select Vehicle or Off Board Programming Adapter (OBPA), depending on whether you are performing on-vehicle or off-board programming.
  - Select Next.

Select Diagnostic Tool and Programming Process screen showing selections appropriate for pass-thru
4. At the Preparing for Communication “Determine Vehicle” screen, complete all computer directed data until Next is highlighted (vehicle data will vary). Select Next.  
**IMPORTANT:** In order to reduce the potential for signal loss, the RS-232 cable should not be more than 25 feet long.
5. Follow the instructions on the Preparing for Communication screen, then select Next.
6. Verify the VIN at the Validate Vehicle Identification Number (VIN) screen. Select Next.  
 If the option screen appears: Enter all information, then select Next.  
**IMPORTANT:** If the vehicle identification number (VIN) does not appear correctly, the correct VIN must be entered
7. At the Supported Controllers screen:
  - Select the appropriate control module under “Select Controller,” e.g. PCM/VCM Powertrain/Vehicle Control Module. Options available in the Select Controller box will vary depending upon the VIN number entered at the previous screen.
  - Select the appropriate programming type (Normal, VCI, or Reconfigure).
  - Select Next.

**IMPORTANT:**

When selecting the vehicle configuration index (VCI) programming type, a valid VCI number for the vehicle must be entered. This number may be obtained from the ACDelco Aftermarket Support Center.

The correct tire size and axle ratio must be highlighted and a valid VCI number entered if you select Reconfigure for your programming type.

Select Cancel if you receive a message stating that the calibration selected is already the current calibration in the control module and reprogramming with the same download is not allowed.

- If you select VCI for your programming type, the VCI number entry box appears. Enter a valid VCI number for this vehicle (obtained from Customer Support) and select OK.
  - If you select Reconfigure for your programming type, the Reconfigure box appears. Select the correct tire size and axle ratio, then select OK. The VCI number entry box appears. Enter a valid VCI number for this vehicle and select OK.
8. At the Calibration Selection screen:
- Select the appropriate calibration(s).
  - Make sure all folder tabs have a green check mark.
  - Select Next.
9. At the Summary screen:
- Verify current calibration(s) with selected calibration(s).
  - Select Next.
- IMPORTANT:** Some vehicles will require that Idle Learn, TP Learn, Theft Deterrent Relearn, or Crankshaft Variation Learn procedures be performed after programming. Consult the appropriate service information for these procedures.
- If calibrations are the same, the NAODRUI Control box will appear. Select OK.
  - On model year 1996 and newer controllers, a Crankshaft Position notice may appear under “Controller Specific Instructions” on the Program Controller screen. Select OK.
  - The Transfer Data screen appears as reprogramming begins, finishing when the percentage bar reaches 100 per cent. This may take up to 30 minutes.
10. The Program Controller “Programming Complete” screen appears. Select Close. The program will return to the TIS2Web main screen. Be sure to verify successful reprogramming. Refer to Verifying Reprogramming.
11. Turn off the Tech2.
12. Disconnect the Tech2 from the vehicle.

## CANDI Module

This section applies only to GM vehicles equipped with the new GM LAN/CAN (General Motors Local Area Network/Controller Area Network). Please disregard this section if you do not currently have any vehicles supported by this application.

GM vehicles use class 2, low-speed (10.4 K baud rate) systems. A limited number of vehicle platforms (e.g. Saturn Ion, Cadillac XLR) are equipped with the new GM LAN/CAN system. This type of application has a single-wire CAN bus for body controls, a medium-speed CAN bus for information and entertainment, and a high-speed CAN bus for powertrain (OBD II compliant modules). A new diagnostic interface—the Controller Area Network diagnostic interface (CANDI) has been developed to address these needs. The CANDI module serves as an enhancement to the Tech2 and completes the interface necessary to communicate with future on-board computer systems.



Controller Area Network diagnostic interface (CAndi) module

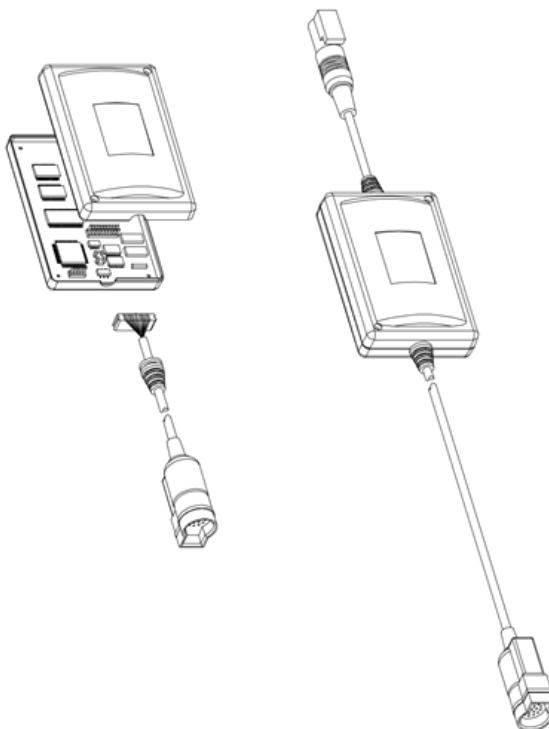


Illustration of CANDI module showing wiring

## Basic Operation

The CANDI is an in-line cable module that works with existing Tech2 components including the VCI, cables and adapters. Installed, the CANDI module is fully compatible with current and past Tech2 software. The module powers up in a way that makes it transparent to the user. This allows the existing Tech2 software to be used with no changes when the CANDI module is installed. If a vehicle requires the use of a CANDI module, the Tech2 will enable features specific to the module.

The primary function of the CANDI module is to add CAN (controller area network) capability to the Tech2. The following list summarizes the basic characteristics of the CANDI module:

Supports simultaneous communications on three CAN buses

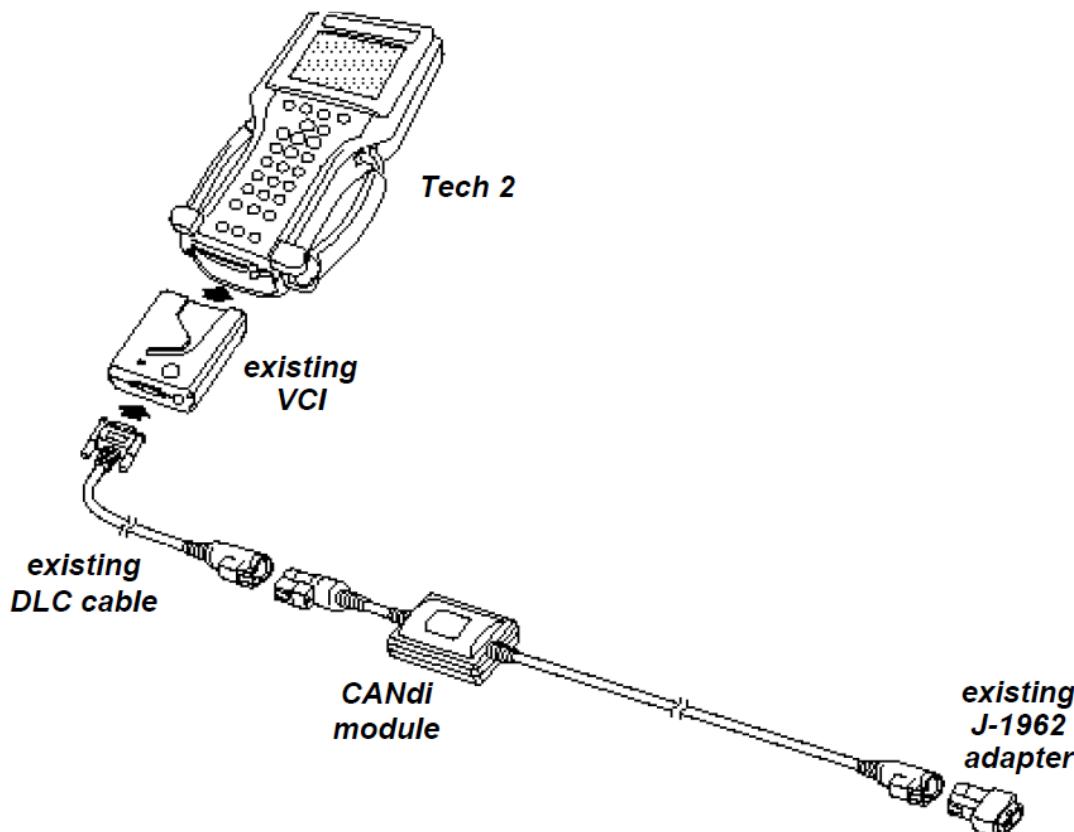
Provides high-speed UART communications with the Tech2

The Tech2 controls CANDI module operation. When installed, the CANDI module does not interfere with any diagnostic procedure currently performed by the Tech2. Use of the module does not require any physical changes to the Tech2, cables, or adapters. The module operates transparently until activated by the Tech2. Upon activation, the CANDI module operates under control of the Tech2. Tech2 application software loaded on the Tech2 PCMCIA card determines all functionality.

**IMPORTANT:** When functioning properly the CANDI's LED will flash. If a problem occurs, the LED will be constantly illuminated. If the module's light is constantly illuminated, refer to the troubleshooting section in this manual.

## Connection of CANdi Module to Tech2

The CANdi module connects to the Tech2 by the existing Burndy data link connector (DLC). The vehicle side connection remains unchanged using the existing adapter to interface between the DLC cable and the SAE J-1962 adapter.



**CANdi module connections**

### Tech2 - VCI - Cable Test

Before using the CANdi module, perform the Tech2 - VCI - cable test to verify the integrity of the system.

**IMPORTANT:** To ensure accurate test results, you must install Tech2 software version 23.005 (August 2003) or later.

Necessary components are:

1. Tech2 with VCI module installed
2. DLC Burndy cable
3. AC/DC power source
4. DLC loopback adapter (P/N 3000109), connected directly to the VCI module.

1. Ensure the connection of the DLC (VCI) loopback adapter (Part Number 3000109) to the VCI module of the Tech2.
2. Navigate to the self test option: At the Tech2 Main Menu, select F3: Tool Options, and then choose Self Test.
3. Select the test F2: Automated VCI. Screen 1 (shown below) should appear if the test passes. (Note: If failures are noticed on the CCD test and the HBCC test, these will not affect diagnostics on GM vehicles.)
4. Select F4: Selectable VCI and press the More Test soft key. Choose F1: VCI Dual Uart. Screen 2 appears if the test passes.
5. Select F5: VCI J1708, and Screen 3 will display.
6. Select F6: VCI TPU, and Screen 4 will display.

**NOTE:** When performing the TPU test, it is critical that TPU12 and TPU15 indicate "Pass." If these two TPU channels indicate "Fail," or if they are not present in the above list, then the VCI module for the Tech2 is possibly damaged.

7. Insert the DLC Burndy cable into the Tech2/VCI and the DLC loopback adapter at the end of the cable and repeat the tests listed above. (Note: When running the VCI TPU test, TPU12 and TPU15 must show up as pass. If they indicate, "fail," or if they are not present on the screen, then the cable might be damaged. This is assuming that TPU12 and TPU15 passed with the VCI loopback adapter connected directly into the VCI. Also, when performing the VCI TPU test, TPU13 and TPU14 will not appear on the screen when running this test with the DLC Burndy cable inserted into the Tech2/VCI and the loopback adapter at the end of the cable.)

## CANDI Module Software Updates

**IMPORTANT:** You must update the PCMCIA (32-megabyte) card first before connecting the CANDI module to the Tech2. Always disconnect the CANDI module from the Tech2 before downloading any software updates to the PCMCIA card.

The CANDI module has the capability to store three different software versions.

Software updates for the CANDI module are stored on the 32-megabyte PCMCIA card. The CANDI module will be automatically updated when it is connected to the vehicle's DLC and the Tech2 is powered on. When a CANDI module is updated, a screen will be displayed.

Software update progress will be displayed on the Tech2 screen. If any problems occur concerning the update, they will be displayed on the Tech2. (Refer to the Troubleshooting.)

After a successful update, the current CANDI software version can be obtained by selecting:

F9: CANDI Diagnostics - from the Tool Options menu.

F0: POST Results - from the CANDI Diagnostics menu.

The CANDI POST Results screen can also be used to determine if the module had any problems during the software update or start-up sequence. Customer Support may also use the information from the CANDI POST Results screen, if you encounter any problems during an update.

The latest CANdi software version will be included in TIS2Web software and will be automatically downloaded to the PCMCIA card during a software update. Make sure you have the latest version of TIS2Web software on your computer.

### CANdi Warranty and Repair

Warranty period:

- Two years
- No extended warranty available at this time

Warranty card:

Send in registration card to Bosch Diagnostics Repair Center (or other supplier depending upon country location) as soon as you receive the CANdi connector.

This card provides phone numbers to call.

For technical assistance, contact the ACDelco Aftermarket Support Center 1.888.212.8959.

To repair defective modules, send modules to the nearest repair facility:

U.S.A. Repairs:

Bosch Diagnostics Repair Center

Vetronix Corporation

153 Castilian Drive

Galeta, CA 93117

Canada Repairs:

Custone Electromotive Inc.

1150 Champlain Court

Whitby, ON L2N 6A8 Canada