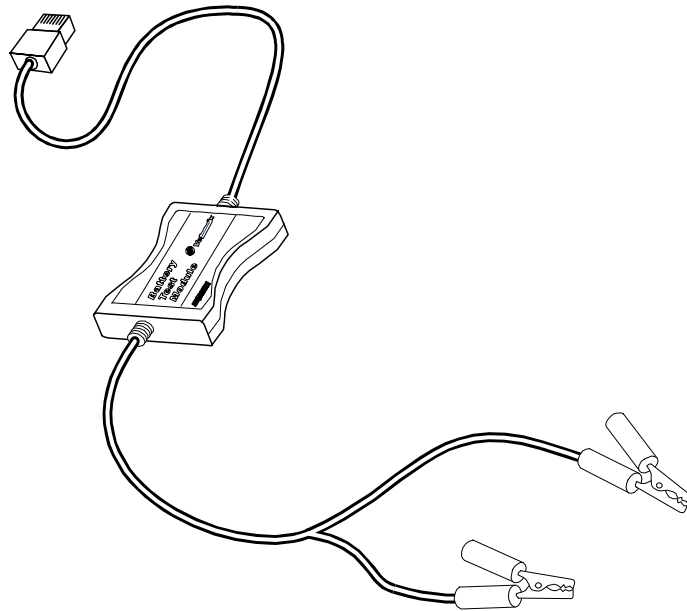


# BATTERY TEST MODULE

## Operator's Manual



## **PATENTS**

The Battery Test Module is made in the U.S.A. by Midtronics, Inc. and is protected by one or more of the following U.S. Patents: 6,586,941, 6,323,650; 6,316,914; 6,304,087; 6,249,124; 6,163,156; 6,091,245; 6,051,976; 5,831,435; 5,821,756; 5,757,192; 5,592,093; 5,585,728; 5,572,136; 4,912,416; 4,881,038; 4,825,170; 4,816,768; 4,322,685; Canadian patents: 1,280,164; 1,295,680; United Kingdom patents: 0,417,173; 0,672,248; German patents: 689 23 281.0-08; 693 25 388.6; 93 21 638.6; and other U.S. and Foreign patents issued and pending. This product may utilize technology exclusively licensed to Midtronics, Inc. by Johnson Controls, Inc. and/or Motorola, Inc.

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## SOME THINGS YOU SHOULD KNOW

### WARNING!



### EXHAUST GAS

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

### WARNING!



### AVOIDING INJURY

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.

### WARNING!



### ELECTRICAL

Do not allow anything to rest on the cable assembly. Do not allow the cable assembly to be pinched. Keep the cable assembly away from contact with heat, oil, sharp edges, or moving parts. Replace damaged cables immediately. Damaged cables increase the risk of electric shock.

To reduce the risk of electrical shock, do not disassemble the Battery Test Module. There are no user-repairable components inside the equipment.

### WARNING!



### AVOIDING INJURY

Read and understand all instructions in this manual. Use appropriate personal safety equipment, including hearing and eye protection when using the scanner in or near the vehicle engine compartment. Failure to comply can result in accidents involving fire, electrical shock, or serious personal injury.

## DISCLAIMER

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

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## **FCC COMPLIANCE**

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

## **USE AND CARE**

- Stay alert, pay attention to what you are doing, and use common sense when operating the Battery Test Module. Some tests require the engine to be running. Keep all children and visitors at a safe distance from the work area.
- Keep the Battery Test Module dry, clean, and free from oil and grease. Use a mild detergent on a clean cloth to wipe the outside of the test equipment when necessary.
- Only use accessories that are recommended by Vetronix.

## **SERVICE**

Service must only be performed by Vetronix repair personnel. Service or repair by unqualified personnel may result in risk of injury and/or damage to the test equipment, and may void your warranty. Refer to the [Product Warranty Policy](#).

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## PRODUCT WARRANTY POLICY

- Vetronix warrants to its customers that, on the date the Products are delivered, they shall be free from defects in manufacture. Your receipt is your proof of purchase and will be required to receive service under this warranty.
- This warranty shall apply only to defects that appear within 365 days, and which are reported to Vetronix within 455 days, following the date the Products are delivered.
- New replacement Products are warranted as new.
- Reconditioned replacement Products and repaired Products are warranted as new for the longer of the remainder of the original warranty period or 90 days from the date of delivery of the repaired or replaced Product.
- This warranty does not cover defects caused by abuse, mishandling, accident, improper installation or application, the malfunction of another component or part of any device in which the Products installed or with which the Product interfaces, or extend to Products which have been modified or repaired by anyone except Vetronix or its authorized service representative, or to a Product with respect to which the serial numbers or identification marks have been altered or removed.
- Vetronix makes no other warranties other than those expressly stated herein.
- Vetronix's customers' exclusive remedy under this warranty is repair or replacement at Vetronix's option and such repair or replacement shall satisfy Vetronix's warranty obligation to its customers whether in contract, tort, negligence, strict liability or otherwise.
- Prior to returning a Product for warranty adjustment, Vetronix shall require a return authorization and will issue a return authorization number. The return authorization number shall be placed conspicuously on the outer package-shipping label. Products returned to Vetronix shall be accompanied by the proof of purchase, a written description of the reasons for return, the circumstances under which the defect became apparent and the date the defect occurred or, if not known, the date the defect was discovered.
- If a returned Product is found not to be defective, Vetronix shall return the product and invoice for the costs of testing and return shipment.
- If a returned Product is found to contain a defect which is not covered by this warranty, Vetronix shall provide a written quotation showing the estimated cost of repair or the price of a replacement. In the event instructions as to the disposition of the product are not received within 30 days from receipt of such estimate or quotation, Vetronix shall return the product and invoice for the cost of testing and return shipment.
- If a returned Product is found to be defective and such defect is covered by this warranty, Vetronix shall at its option and at no charge to the customer, with valid proof of purchase, repair or replace the Product. Following such repair or replacement, Vetronix shall return the Product at Vetronix's expense.

### Return for Repair

If it becomes necessary to send the Battery Test Module back to us for repair, contact Vetronix at 1-800-321-4889, ask for an RMA number, then send the product and copy of proof of purchase to:

Vetronix  
2030 Alameda Padre Serra  
Santa Barbara, CA 93103

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# 1. BATTERY TEST MODULE DESCRIPTION

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The Battery Test Module is an optional accessory that enables your MTS 3100 to determine the state of health of 12-volt automotive batteries. Using conductance technology, the Battery Test Module can detect weak batteries before they fail. The Battery Test Module also functions as a voltmeter with a range of 0 to 19.99 volts.

With an I/P cable that connects to your MTS 3100 and clamps that attach to the battery posts, the Battery Test Module is easy to set up and use.

## BATTERY TEST MODULE FEATURES

- Supports CCA, CA, DIN, and EN battery ratings.
- Requires just two connections to the battery positive (+) and negative (-) terminals.
- Results of the test presented in simple display with battery voltage, rating, and condition.
  - Good Battery
  - Good—Recharge
  - Charge & Retest
  - Replace Battery
  - Bad Cell—Replace
- Live voltmeter function presented with Live, Minimum, and Maximum measurement values.
- Access to Battery Test and Voltmeter Function on the same user interface.

## CONNECTING THE BATTERY TEST MODULE

### To connect the Battery Test Module, do the following:

1. Connect the Battery Test Module to the MTS 3100 by inserting the IP cable connector of the Battery Test Module into the IP serial port at the bottom of the MTS 3100 (see [Figure 1](#)).
2. Press the **ON** key on the MTS 3100

### To select the Battery Test function, do the following:

3. Select the **ENTER** key from the MTS 3100 title screen.
4. Select **F2**: Digital Meter from the function menu.
5. Select **F7**: Battery Test from the digital meter menu.
6. Select **ENTER** at Battery Test Module connect display.

The Battery Test function is now ready for use.

#### NOTE



#### Battery Test Module Not Connected

If the Battery Test Module is not connected to the MTS 3100 I/P when the function is selected, an error message is displayed:

```
BATTERY TEST
Error :

Battery Test Module
Not Detected

Check:
I/P Cable
Connection, Tester
Connector, Module
Connector.
[ENTER]
```

#### NOTE



Batteries connected in parallel must have the ground cable disconnected or false test readings may result.



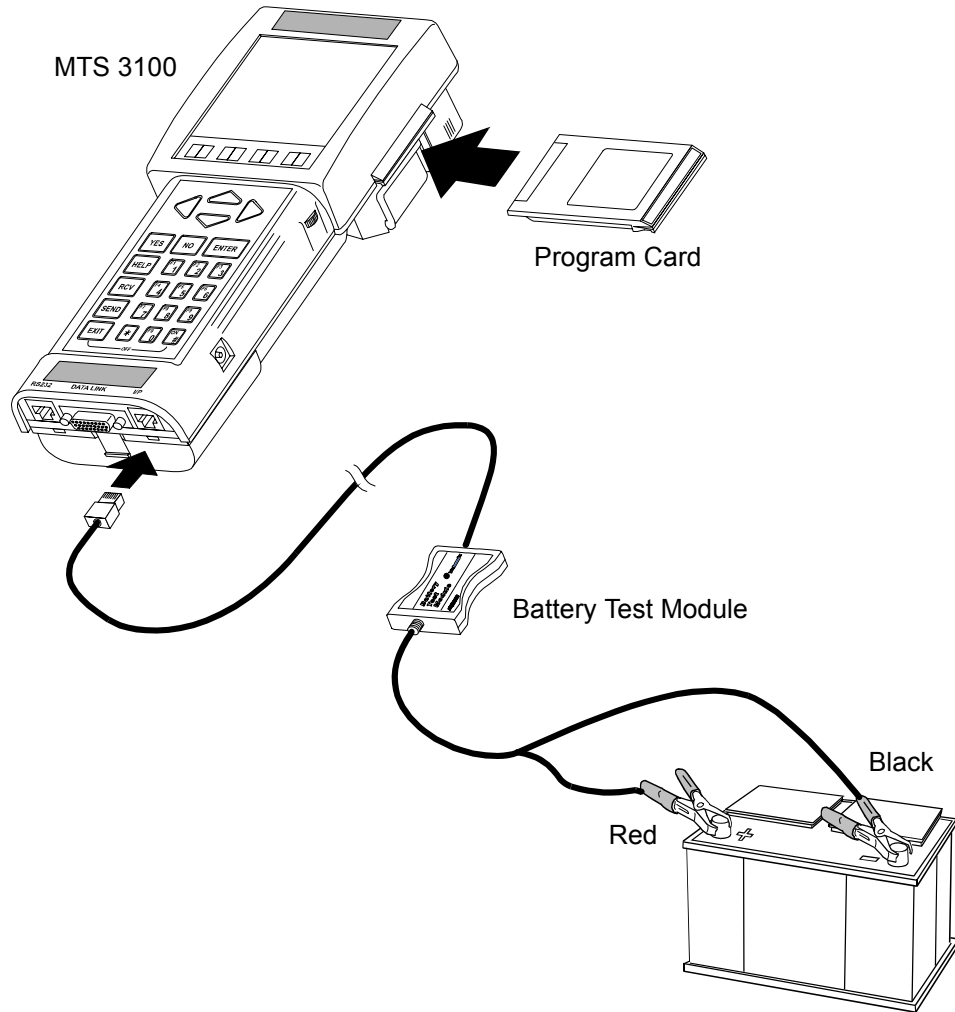


FIGURE 1. Connecting the Battery Test Module

# BEFORE YOU START

## BATTERY IN-VEHICLE TEST

Turn off the vehicle and all accessory loads. Testing with the ignition switch on or vehicle loads on may cause inaccurate readings.

**NOTE**

If the vehicle was running before testing, turn on the headlights for 30 seconds to remove the battery surface charge. Let the battery rest for 1 minute to recover before testing.

**NOTE**

It is always a good idea to retest a battery out of the vehicle if a “replace battery” result was obtained while testing the battery in the vehicle. Disconnect the vehicle connections from the battery, clean the terminals, and retest the battery prior to removing from the vehicle.

## BATTERY OUT-OF-VEHICLE TEST

Clean the battery posts or side terminals with a wire brush. When testing side-post batteries, the lead terminal stud adapters should be installed and tightened. Failure to properly install the stud adapters, or using stud adapters that are dirty or worn, may result in false test results. **Do not use steel bolts.**

**NOTE**

Side terminal adapters (Lead) are available at most auto parts stores.

# USING THE BATTERY TEST FUNCTION

## BATTERY TESTS

To use the Battery Test Function, do the following:

1. Select **F7**: Battery Test from the digital meter menu
2. Confirm Battery Test Module connections by following the on-screen instructions. Battery Test Module clamps should be connected as follows:
  - Red - to Battery Positive (+) terminal
  - Black - to Battery Negative (-) terminal

### NOTE



An error message appears if the tester determines that the Battery Test Module clamps are not connected to a battery.

3. Press **ENTER** to confirm the Battery Test Module to battery connection.
4. Press **ENTER** to test the current battery that you are connected to.
5. Select the appropriate battery test rating units from the available selection using **F1**, **F2**, **F3**, or **F4**.

KEY SELECTION	RATING	DESCRIPTION	SYSTEM RANGES
<b>F1</b>	CCA	Cold Cranking Amps	250 - 850 CCA
<b>F2</b>	CA	Cranking Amps	300 - 1000 CA
<b>F3</b>	DIN	German import rating system	140 - 550 DIN
<b>F4</b>	EN	European imports rating system	200 - 900 EN

6. Enter the battery rating (read from the battery stamp or label) using the **↑** or **↓** arrow keys and press **ENTER**.

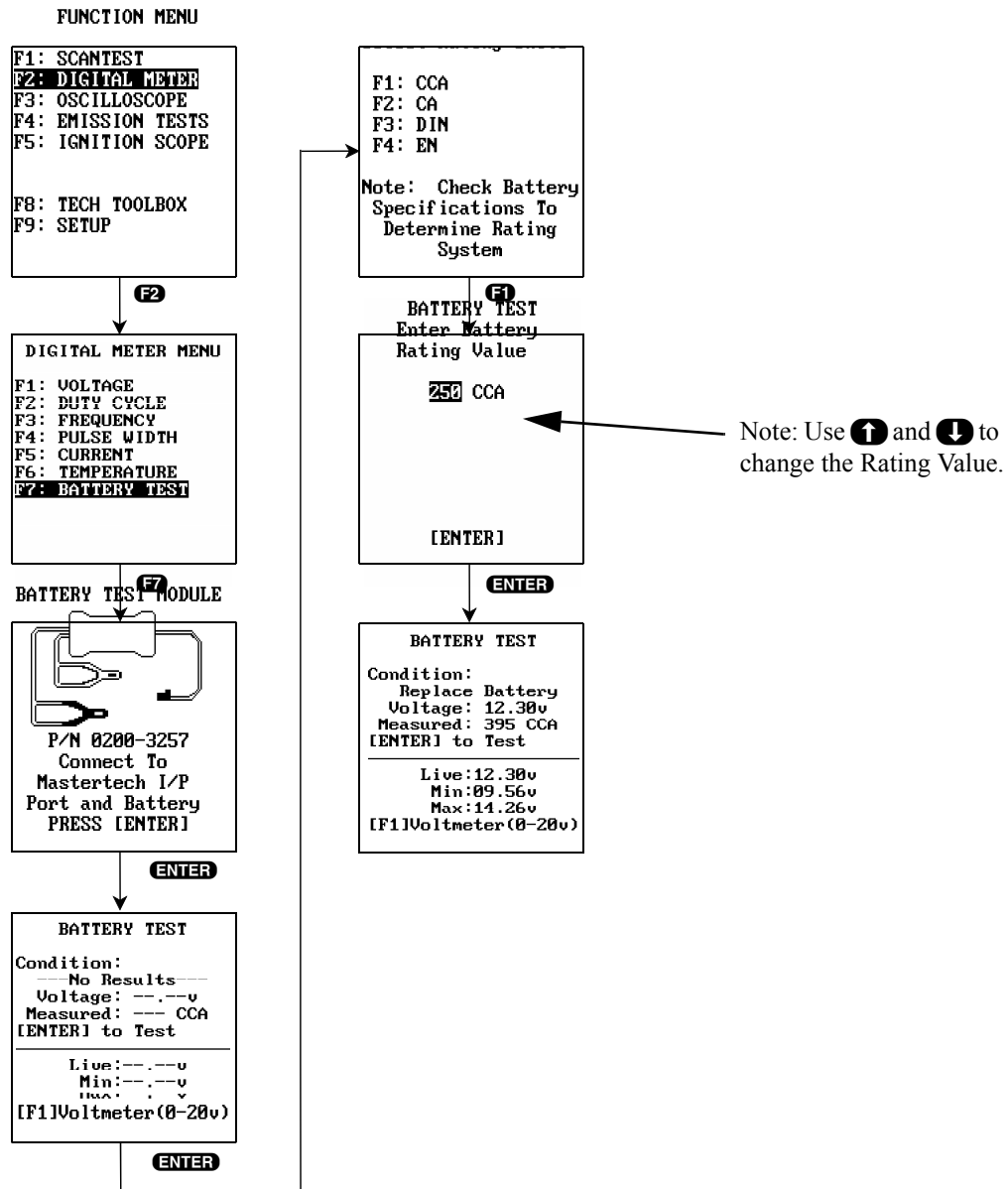
Results of the Battery Test are displayed in the upper portion of the display.

### NOTE



The battery must be 8 volts or more to achieve accurate results. If the battery is less than 8 volts, charge prior to testing.

CONDITION	RECOMMENDATION
Good Battery	Return to service.
Good-Recharge	Fully charge the battery and return to service.
Charge & Retest	Fully charge the battery and retest. If you get the same result after charging, replace the battery.
Replace Battery	Battery has failed or is weak and may soon fail. Replace the battery.
Bad Cell-Replace	Battery has one or more bad cells. Replace the battery.



## VOLTMETER

7. From the Battery Test screen, press **F1**.

The Voltmeter Live, Min, and Max values are updated (using the red and black Battery Test Module clamps).

**NOTE**



You do not have to perform a battery test before activating the Voltmeter function.

Activating Voltmeter  
(No Battery Test Results)

```

BATTERY TEST
Condition:
---No Results---
Voltage: --.--v
Measured: --- CCA
[ENTER] to Test
-----
Live:--.--v
Min:--.--v
Max:--.--v
[F1]Voltmeter(0-20v)
    
```

**F1**

```

BATTERY TEST
Condition:
---No Results---
Voltage: --.--v
Measured: --- CCA
[ENTER] to Test
-----
Live:12.38v
Min:09.56v
Max:14.26v
[F1]Voltmeter(0-20v)
    
```

Activating Voltmeter  
(With Battery Test Results)

```

BATTERY TEST
Condition:
Good-Recharge
Voltage: 12.23v
Measured: 395 CCA
[ENTER] to Test
-----
Live:--.--v
Min:--.--v
Max:--.--v
[F1]Voltmeter(0-20v)
    
```

**F1**

```

BATTERY TEST
Condition:
Replace Battery
Voltage: 12.30v
Measured: 395 CCA
[ENTER] to Test
-----
Live:12.30v
Min:09.56v
Max:14.26v
[F1]Voltmeter(0-20v)
    
```

## VOLTMETER / SYSTEM TESTS

The Battery Test Module voltmeter function displays live voltage when the **F1** key is selected. In addition, the MTS 3100 displays the minimum captured voltage for the starting system and maximum captured voltage for the charging system.

### Testing the Starting System

To test the starting system, do the following:

#### NOTE



Prior to testing the starting system, the battery must have passed the Battery Test Condition with a Good Battery or Good-Recharge result.

1. From the Battery Test display mode, select **F1**: Voltmeter from the Battery Test main menu.
2. Press the **ENTER** key.
3. Start the engine.
4. Read the captured minimum voltage reading:

VOLTAGE	CHARGING STATE
V > or = 9.6	OK
V < 9.6	Problem detected. Refer to the vehicle owner's manual or repair guide for instructions.

## TESTING THE CHARGING SYSTEM

To test the charging system, do the following:

### NOTE



Prior to testing the charging system, the battery must have passed the Battery Test Condition with a Good Battery or Good-Recharge result.

1. From the Battery Test display mode, select **F1**: Voltmeter from the Battery Test Module main menu.
2. Start the engine.
3. Observe the Live voltage reading with the engine running at idle.
4. Rev the engine to 2000 rpm for 5 seconds, and observe the maximum captured voltage reading. Compare your observations to the following ranges:

VOLTAGE	CHARGING STATE
13.3 V to 15.5 V	OK
$V < 13.3$	Charging system problem detected. Refer to the vehicle owner's manual or repair guide for instructions. Check connections, belts, and the alternator.
$V > 15.5$	Charging system problem. Check connections, field winding, and the regulator.

## CAPTURING DATA ON TECHVIEW PRO

### NOTE



Both the Battery Test Condition and the Voltmeter Function tests must be run prior to establishing communication with TechView Pro.

To capture data in TechView Pro, do the following:

1. Ensure that the RS232 cable is connected to the PC RS232 port and the tester RS232 port.
2. Run the Battery Test Condition function.
3. Run the Voltmeter function.
4. Select Data List in TechView Pro.

# CHARGING A BATTERY

To charge a battery, do the following:

1. Carefully follow the battery manufacturer instructions and the instructions that came with your battery charger.

**WARNING!**



**AVOIDING INJURY**

Always wear proper protection while working around a charging battery.

**WARNING!**



**AVOIDING INJURY**

Always charge a battery in a well ventilated area, with at least 60°F ambient temperature. Do not allow sparks or flames near a charging battery.

2. Check the water level by removing vent caps, and if it is low, add distilled water to the top of the plates. Do not overfill! Remember to re-install vent caps before charging.
3. Turn off the charger and unplug the charger from its power source.
4. Connect the battery charger leads to the correct battery terminals.
5. Plug the charger into its power source.
6. Select the correct setting on the battery charger. Begin charging a low battery on a low amperage and increase the setting only if the battery can take the charge.

**WARNING!**



**AVOIDING INJURY**

Do not overcharge the battery (refer to battery manufacturer and/or battery charger instructions).

7. Once charged, turn off the charger and unplug the charger from its power source. Disconnect the battery charger leads from the terminals.

## ACTIVE KEYS: BATTERY TEST DISPLAY

<b>ENTER</b>	Selects the Battery State of Health test.
<b>F1</b>	Selects Voltmeter for a dynamic display of the Battery Voltage measurement.



<b>ACTIVE KEYS: SELECT RATING UNITS</b>	
<b>F1</b>	Displays the CCA value selections.
<b>F2</b>	Displays the CA value selections.
<b>F3</b>	Displays the DIN value selections.
<b>F4</b>	Displays the EN value selections.
<b>↑ / ↓</b>	Scrolls through the battery rating values.
<b>ENTER</b>	Select the highlighted rating value.

# A. IF YOU'RE HAVING A PROBLEM

---

This section is intended to help you get back on track if the tester appears to be operating abnormally. Examples of most of the displays which you might see under abnormal conditions are shown. In addition, the most likely cause for the condition is given as well as other possible causes and recommendations on how to isolate or eliminate the problem.

## TROUBLESHOOTING RESULTS

### If this happens

- The in-vehicle test result was *Replace Battery*, which changed to *Good Battery* when you tested the battery out of the vehicle.

### Recommendation

- A *Replace Battery* message when testing in the vehicle may mean a poor connection between the vehicle's cables and the battery. Ensure that the terminals and the cable connections are clean. Reconnect the battery cables and retest before replacing the battery.

### If this happens

- A Charge and Retest message is displayed after the battery has already been recharged.

### Recommendation

- Remove the battery from the vehicle and test again. If the Charge and Retest condition persists and the correct charge procedure has been followed, replace the vehicle battery.

### If this happens

- Bad Cell-Replace message is displayed.

**Recommendation**

- Remove the battery from the vehicle. Retest out of the vehicle. If the message persists, replace the vehicle battery.

## **TROUBLESHOOTING THE STARTING SYSTEM**

**With the vehicle lights on, try to start the engine:****If this happens**

- The engine does not crank and the lights dim heavily.

**Recommendation**

- Check the connections to ensure the wiring is clean and in good condition. If the wiring is in good condition, diagnose the starter motor operation.

**If this happens**

- The engine does not crank and the lights go out.

**Recommendation**

- There is probably a poor connection. Check the connection to the battery and ground, and ensure they are clean and tight.

**If this happens**

- The starter does not crank and the lights do not turn on.

**Recommendation**

- Check for an open circuit and retest the battery to ensure it is good and fully charged. Replace any defective wiring, and clean and tighten all wiring connections.

**With the vehicle lights off, try to start the engine:****If this happens**

- The engine cranks slowly but will not start.

### Recommendation

- Check all wiring to ensure it is in good condition. Make sure the cables from the starter to the battery are sized according to the manufacturer's specifications. If the engine is operating properly and the wiring is in good condition, repair or replace the starter.

### If this happens

- The engine cranks but does not start.

### Recommendation

- Check the ignition system and fuel system for other problems.

### If this happens

- The engine does not crank and you hear a clicking noise.

### Recommendation

- Check the starter solenoid.

## TROUBLESHOOTING TEST PROBLEMS

### If this happens

- Message: *Battery Test Module Not Detected.*

```
BATTERY TEST
Error:
Battery Test Module
Not Detected

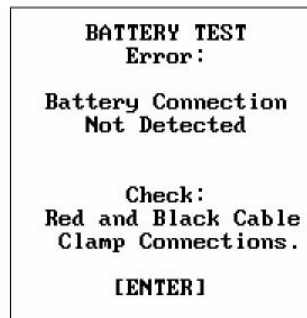
Check:
I/P Cable
Connection, Tester
Connector, Module
Connector.
[ENTER]
```

### Recommendation

- Make sure the cable from the Battery Test Module is connected to the MTS 3100 I/P connector. If already connected, disconnect and reconnect the cable to the I/P connector on the MTS 3100. Turn OFF the tester, then turn it back ON with the Battery Tester Module already connected to the tester. If repeated efforts for the MTS 3100 to recognize the connection fail, call Vetronix Customer Service.

### If this happens

- Message: *Battery Connection Not Detected.*



### Recommendation

- Make sure that the black clamp is connected to the negative (-) battery terminal and the red clamp is connected to the positive (+) battery terminal. The Battery Test Module does not recognize the connection if the clamps are reversed. The Battery Test Module requires a good connection from both sides of each clamp to function properly. When connecting, rock the clamps back and forth to ensure a good connection.

#### NOTE



The best connection is made when the red clamp is attached directly to the positive (+) lead terminal and the black clamp is connected directly to the negative (-) lead terminal. Connection to the battery through the vehicle leads attached to the battery terminals may result in a false reading.

## TROUBLESHOOTING TECHVIEW PRO COMMUNICATION PROBLEMS

### If this happens

- TechView Pro displays *No Response from Diagnostic Tester.*

### Recommendation

- Ensure that the RS232 cable connection is secure between the PC RS232 port and the tester RS232 port.
- Ensure that both the Battery Test Condition and the Voltmeter function have been run and display data prior to establishing communication with the TechView Pro.

#### NOTE



TechView Pro will not establish communication with the Battery Test Module until both the Battery Test Condition and the Voltmeter function display data values.

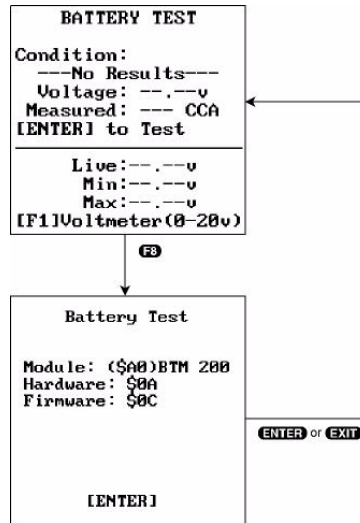
# BATTERY TEST MODULE INFORMATION

If required for technical support, you can read the Battery Test Module's information.

**To read the Battery Test Module's information, do the following:**

1. Select **F8** from the Battery Test screen.

The Battery Test screen displays the module hardware and firmware hex values.



## B. GLOSSARY AND ABBREVIATIONS

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TERM	DEFINITION
BTM	Battery Test Module
CA	Cranking Amps
CCA	Cold Cranking Amps (SAE)
DIN	Deutsche Industry Norm; German import rating system
EN	European Norm; European import rating system
MCA	Marine Cranking Amps

