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# ***FORD EXP-1050***

## **Vehicle Battery Diagnostic Platform**

*For testing 6 and 12 volt automotive batteries, and 24 volt electrical systems*

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# ***INSTRUCTION MANUAL***

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## Chapter 1: Before you begin



### Safety

Because of the possibility of personal injury, always use extreme caution when working with batteries. Follow all manufacturers' instructions and BCI (Battery Council International) safety recommendations.

### General Precautions

- **DANGER—RISK OF EXPLOSIVE GASES:** Batteries can produce a highly explosive mix of hydrogen gas and oxygen, even when the battery is not in operation. Always work in a well-ventilated area. Never smoke or allow a spark or flame in the vicinity of a battery.
- **WARNING—REQUIRED BY CALIFORNIA PROP. 65:** Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.
- Battery acid is highly corrosive. If acid enters your eyes, immediately flush them thoroughly with running cold water for at least 15 minutes and seek medical attention. If battery acid gets on your skin or clothing, wash immediately with water and baking soda.
- Always wear proper safety glasses or face shield when working with or around batteries.
- Keep hair, hands, and clothing as well as the analyzer cords and cables away from moving engine parts.
- Remove any jewelry or watches before you start servicing the battery.
- Use caution when working with metallic tools to prevent sparks or short circuits.
- Never lean over a battery when testing, charging or jump starting it.

### Conventions Used in This Manual

To help you learn how to use your analyzer, the manual uses these symbols and typographical conventions:



The safety symbol followed by the word **WARNING** or **CAUTION** indicates instructions for avoiding hazardous conditions and personal injury.

### CAUTION

The word **CAUTION** without the safety symbol indicates instructions for avoiding equipment damage.



The wrench symbol indicates procedural notes and helpful information.

### UP ARROW

The text for keypad buttons and soft-key functions are in bold capital letters.

### POST TYPE

The text for screen options are in regular capital letters.

## Chapter 2: Description

### Connections and Data Ports

- ① Data transmitter: sends test results to a PC using an optional hardware and software kit.
- ② Infrared temperature sensor with a range of -28.°C to +93.°C
- ③ 6-pin connector for the battery test cable.
- ④ Input for accessories. (optional)
- ⑤ Spring-loaded data card slot for test data storage and software upgrades.
- ⑥ DB-9 connector for future expandability.



### Removing and Inserting the Data Card

The analyzer ships with a storage card slot to protect it from dust and debris. To remove the data card, push briefly on its edge to release it and pull it from the slot.

When inserting a card, push it into the slot until it locks. The card is correctly inserted when it is not protruding from the slot. To protect the card slot and enable the analyzer to read and write to the card, leave the card in the slot.



### Connecting the Battery Test Cable



#### CAUTION:

To prevent damage to the analyzer's circuitry, do not connect the analyzer to a voltage source greater than 30 Vdc.

## Display and Keypad

The keypad and display work together to help you quickly find and use the right tools at the right time. The display also keeps you on track with on-screen navigation aids, directions and messages. "Figure 1: Main Menu and Keypad" on page 6 shows how the elements on the screen relate to the keypad.

The **Internal Batteries Status Indicator**, which appears in the screen's top left corner, lets you know the status and charge level of the analyzer's 6 1.5 V batteries. The X shown in the figure shows that the tester is powered by the battery you're testing to conserve the internal batteries.

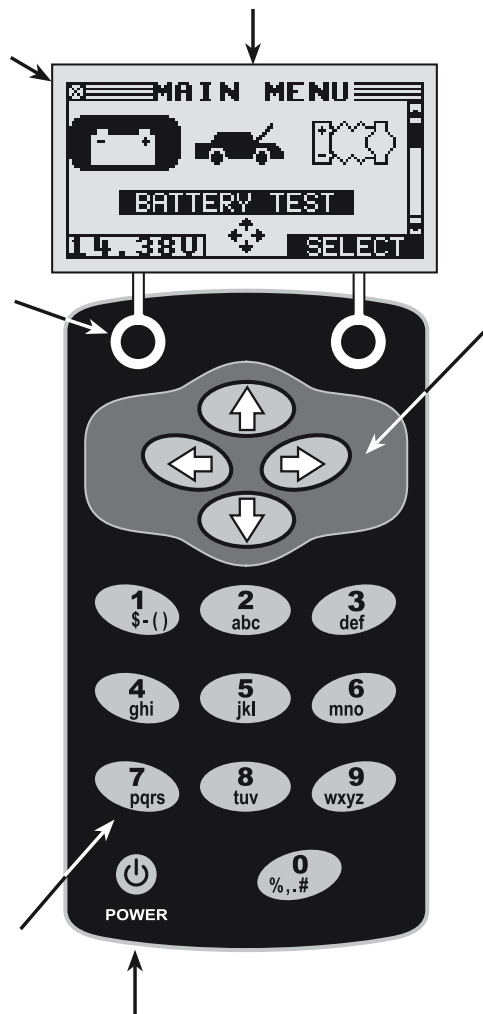
Press the two **Soft Keys** linked to the bottom of the screen to perform the functions displayed above them. The functions change depending on the menu or test process. So it may be helpful to think of the words appearing above them as part of the keys. Some of the more common soft-key functions are SELECT, BACK, and END.

When you connect the tester to a battery it functions as a voltmeter. The voltage reading **12.31V** appears above the left soft key until you move to other menus or functions.

In some cases, you can use the **Alphanumeric Keypad** to enter numerical test parameters instead of scrolling to them with the **ARROW** keys.

You'll also use the Alphanumeric Keys to create and edit customer coupons. The keypad includes characters for punctuation. To add a space, press the RIGHT and LEFT ARROW keys simultaneously.

The **Title Bar** shows you the name of the current menu, test tool, utility, or function.



Press the **POWER** button to turn the Tester on and off. The Tester also turns on automatically when you connect its test leads to a battery.

Whichever way you turn on the Tester, it always highlights the icon and setting you last used for your convenience

The **Selection Area** below the **Title Bar** contains items you select or into which you enter information. The area also displays instructions and warnings.

The **Directional Arrows** on the display show you which **Arrow Keys** to press to move to other icons or screens. The Up and Down Directional Arrows, for example, let you know to press the **UP** and **DOWN ARROW** keys to display the screens that are above and below the current screen.

The Left and Right Directional Arrows let you know to use the **LEFT** or **RIGHT ARROW** keys to highlight an icon for selection.

Another navigational aid is the **Scroll Bar** along the right side of the screen. The position of its scroll box tells you which menu screen you're viewing

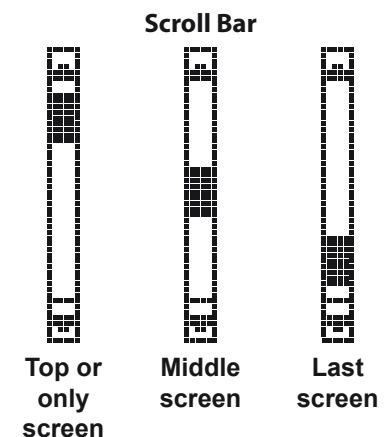


Figure 1: Main Menu and Keypad

## Data Entry Methods

To perform a particular test or function, the tester requires different types of information. This means that the methods you use to enter information will change depending on the type of information that is requested. The types of entry methods are described below.

Typically, the soft key below the right half of the screen confirms your choice, although the command above it may vary. (Examples: **SELECT**, **NEXT**, and **SAVE**.) In a similar fashion, the soft key below the left half of the screen cancels your choice or returns you to the previous screen, although the word above it may also vary. (Examples: **BACK** and **CLEAR**)

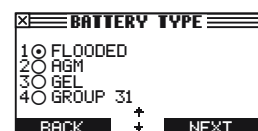
### Menu Icons



A menu icon is a graphical representation of a function you can select. To select an icon, use the **LEFT (◀)** or **RIGHT (▶)** **ARROW** to highlight it.

Highlighting changes the icon to a white picture on a black background. To confirm your selection, press the **SELECT** soft key.

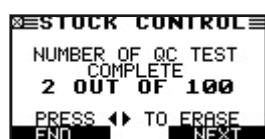
### Option Buttons



Some lists have option buttons before each item. To select an item, use the **UP (▲)** or **DOWN (▼)** **ARROW** keys to move the dot to the button next to the item. To

confirm your selection, press the appropriate soft key. You can also use the alphanumeric keypad to enter the number preceding the option button of your choice. No additional key press is needed to proceed.

### Scrolling Lists



A scrolling list contains items that extend above and below the screen. The first number above the right soft key indicates the position in the list of the highlighted item.

The second number above the right soft key indicates the total number of items in the list.

To select an item, press the **UP (▲)** or **DOWN (▼)** **ARROW** key to highlight the item, and press the appropriate soft key.

## Alphanumeric Entry



Some selections require you to use the alphanumeric keypad. These “user-defined” selections have a blinking horizontal line (cursor) to the right of the last character. Use

the **UP (▲)** or **DOWN (▼)** **ARROW** keys to highlight a line for editing.

Display the character, symbol, or number you want by rapidly pressing its key as many times as needed. For example: the key number 2 on the keypad represents the digit 2 and letters A,B and C.

If you pause, the cursor moves to the right. To backspace, press the **LEFT (◀)** **ARROW** key. Use the **RIGHT (▶)** **ARROW** key to add a space. Use the **UP (▲)** or **DOWN (▼)** **ARROW** keys to highlight a line for editing.

When finished, press the appropriate soft key to save your settings.







## Description

### Menu Maps

This section will help you get to your destination while letting you know what test leads you may need when you arrive. The test leads are represented by symbols for their connectors.



### Main Menu

The Main Menu is the starting point for all tools and utilities, which are depicted as icons. Some icons lead directly to the function they represent, while others are menu icons that lead to two or more functions. Menu icons are marked here with an asterisk (\*) and are mapped on the following pages.

Icon	Description
	The <b>12V BATTERY TEST</b> tests a battery using the battery information you select in a series of screens.
	With the <b>24V SYSTEM TEST</b> you can test the truck batteries, generate a battery pair, and test the starting and charging systems.
	The <b>QC TEST</b> is for testing stock batteries or compound batteries.
 *	Go to <b>PRINT/VIEW</b> for all statistical info.
 *	<b>INFO</b> contains a test counter, data transfer utility, and the EXP software version and serial number.
 *	The <b>UTILITY MENU</b> includes functionality to setup the tester.




### Print/View Menu

The tester stores the last test results in its memory until you perform another test. To review or print results before you retest, select a test type in the Print/View Menu.

Icon	Description
	<b>VIEW TEST</b> Displays the last test results.
	<b>VIEW QC TEST</b> gives you the option of viewing and printing all results of the Quality Control Test.











### Info Menu

The Info Menu has three utilities to help you manage your test data, and track the usage and history of your tester.

Icon	Description
	<b>TOTALS</b> displays the total battery tests performed, the totals by decision, or allows you to clear the counters.
	An optional IR software and hardware package enables you to transfer test data to a PC.
	Displays the software version, total tests from first use, and the serial number.

### Utility Menu

The Utility Menu allows you to set certain preferences and view options.

Icon	Description
	The <b>CONFIG TESTER</b> menu allows you to set the following parameters: TIME, MODE, DATE, FORMAT, TEMPERATURE UNITS, and WRITE FAIL.
	The <b>DISPLAY</b> allows you to set the contrast of the LCD.
	<b>CONFIG PRINTER</b> enables you to configure the printer to IrDA.
	Create your own address details for printouts with the <b>SHOP INFO</b> icon.
	If you have created a coupon in the <b>COUPON</b> utility, use coupon to enable or disable.
	<b>EDIT COUPON</b> allows you to create and store up to three separate coupons to be printed on test results.
	With the <b>LANGUAGE</b> menu you can select one of the 12 available languages.
	With <b>FORMAT CARD</b> you erase all information on the data card.
	With <b>UPDATE</b> you can install new software on the tester.
	Use the <b>BATTERY MENU</b> to add, delete a battery, or import or export a battery list.



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## Chapter 3: Test Preparation

### Inspecting the Battery

Before starting the test visually inspect the battery for:

- Cracked, buckled, or leaking case. If you see any of these defects, replace the battery.
- Corroded, loose, or damaged cables and connections. Repair or replace them as needed.
- Corrosion on the battery terminals, and dirt or acid on the case top. Clean the case and terminals using a wire brush and a mixture of water and baking soda.
- Low electrolyte level. If the electrolyte level is too low, add distilled water to fill up to 1/2 above the top of the plates and fully charge the battery. Do not overfill.
- Corroded or loose battery tray and hold-down fixture. Tighten or replace as needed.

### Testing Out-of-Vehicle

The preferred battery test location is in the vehicle. However, if you plan to test out of the vehicle:

- Always disconnect the negative cable from the battery first and reconnect it last.
- Always use a carry tool or strap to lift and transport the battery.

### Testing In-Vehicle

The preferred test position is at the battery posts. If you must test at a remote-post location, it should have both a positive and negative post.

At the start of the test, make sure all vehicle accessory loads are off, the key is not in the ignition, and the doors are closed.

### Connecting the Battery Test Cable

**CAUTION:** Do not connect the tester to a voltage source greater than 30 Vdc.

Connect the battery test cable to the tester by first aligning the cable connector's 6 pins with the holes on top of the tester. Firmly insert the connector and tighten the locking ring.

Connect the clamps to the battery: the red clamp to the positive (+) terminal and the black clamp to the negative (-) terminal.

If you connect the clamps in the wrong polarity (positive to negative or negative to positive), the tester displays **CLAMPS REVERSED!** Reconnect the clamps correctly.

To make sure both sides of the clamps are gripping the terminals, rock the each clamp back and forth. A poor connection will prevent testing, and the tester will display the message CHECK CONNECTION. If the message reappears after you have correctly reconnected the clamps, clean the terminals and reconnect.

### Setting User Preferences

Before starting your test you may want to customize the use of your analyzer by setting preferences in the Utility Menu. The menu has settings for the display's date and time, the contrast and backlight time, a utility to customize printouts for the optional IR printer, among others.

## Chapter 4: 12V Battery Test

The tester will guide you through the steps of selecting your battery test parameters and interpreting the results. Before you start the test, review the instructions in “Chapter 3: Test Preparation” on page 9.

1. Select the BATTERY LOCATION.
  - 1  UNDER HOOD
  - 2  UNDER SEAT
  - 3  OUT OF VEHICLE

Press the **NEXT** soft key to continue. The **BACK** soft key returns you to the Main Menu at the start of the test and to the previous screen as you progress. In case of OUT OF VEHICLE proceed as manual entry.

2. Select the TEST LOCATION. (IN-VEHICLE ONLY)
  - 1  BATTERY POST
  - 2  JUMP START POST
  - 3  JUMP START POST (BMS)

Press the **NEXT** soft key to continue.

3. Select the BATTERY RATING.
  - 300 A(SAE) / 40 AH
  - 350 A(SAE) / 50 AH
  - 360 A(SAE) / 50 AH
  - 390 A(SAE) / 43 AH
  - 500 A(SAE) / 52 AH
  - ...
  - MANUAL ENTRY

Press the **NEXT** soft key to continue.

4. Whenever a battery rating comes in more than one battery type, you will get to select the battery type.
  - 1  SLI
  - 2  EFB

Press the **NEXT** soft key to continue.

5. In case of a test on the jump start post, you will be asked about the vehicle type. Confirm the vehicle type and proceed.

For the next few seconds the tester will display the word TESTING and a stopwatch while it evaluates the battery.

The temperature and battery charge questions are asked only if it can influence the test result.

### Manual Entry / Out of Vehicle

1. Select the BATTERY TYPE
  - 1  SLI
  - 2  AGM
  - 3  EFB

Press the **NEXT** soft key to continue.

2. Select the RATING UNITS
  - 1  SAE
  - 2  EN
  - 3  EN2
  - 4  JIS
  - 5  DIN
  - 6  IEC

Press the **NEXT** soft key to continue.

3. Press the **UP/DOWN ARROW** keys or use the numeric keys to select the battery rating or in the case of JIS, the part number. To increase your scrolling speed, hold down the **UP** or **DOWN ARROW** key.
4. In case of a test on the jump start post, you will be asked about the vehicle type. Confirm the vehicle type and proceed.

Press the **NEXT** soft key to continue.

For the next few seconds the tester will display the word TESTING and a stopwatch while it evaluates the battery.

The temperature and battery charge questions are asked only if it can influence the test result.

### Additional Test Requirements

For a more decisive result the tester may ask for additional information or probe deeper into the battery's condition. The following messages and instructions may appear before the analyzer displays the results of your test.

#### Surface Charge

The battery will hold a surface charge if the engine has been running or after the battery has been charged. The tester may prompt you to remove the surface charge before it begins testing.

1. Follow the instructions indicating when to turn the headlights on and off.
2. The tester will resume testing after it detects that the surface charge is removed.

#### Deep Scan Test

In some cases the tester may need to further analyze the battery to determine whether the battery should be replaced or it has a significant chance to be recovered. It will then conduct a deep scan test of the battery for a few seconds.



After the Deep Scan test the tester will display the results. The next section describes the battery test decisions and suggests actions to take.

#### Battery Test Results

After the test the tester will display one of five battery decisions with the complete results in a series of screens as shown in "Figure 2" on page 11. Use the **UP/DOWN ARROW** keys to scroll through each result. To send the results to an IR printer, press the **PRINT** soft key. To return to the Main Menu, press the **END** soft key.

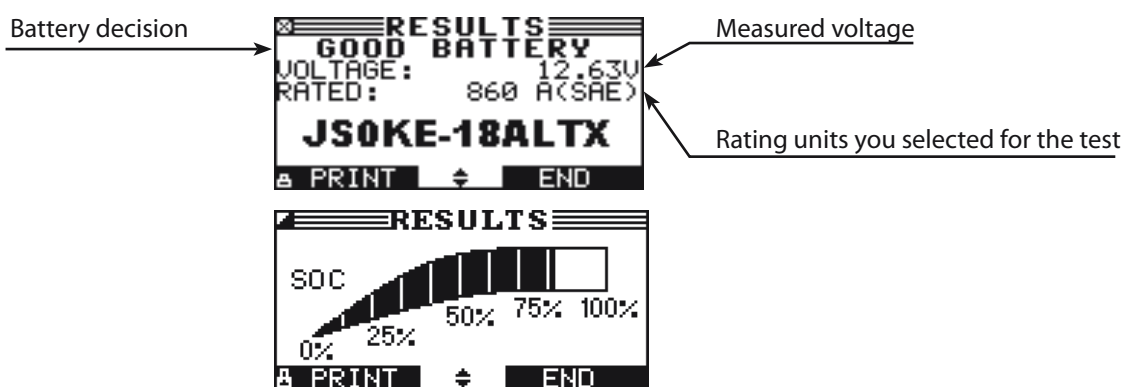


Figure 2

Table 1: Battery Decisions and Recommendations

Decision	Recommended action	Battery's state of charge
GOOD BATTERY	Return the battery to service.	
GOOD - RECHARGE	Fully charge the battery and return it to service.	
CHARGE & RETEST	Fully charge the battery and retest. Failure to fully charge the battery before retesting may cause false readings. If CHARGE & RETEST appears again after you fully charge the battery, replace the battery.	
REPLACE BATTERY	Replace the battery and retest. A REPLACE BATTERY result may also mean a poor connection between the battery cables and the battery. After disconnecting the battery cables, retest the battery using the out-of-vehicle test before replacing it.	
UNCONFIRMED RESULT	Due to testing at the jump start post the tester was unable to find a result. Retest the battery directly at the battery post. If necessary, disconnect or remove the battery to access it.	
FROZEN BATTERY	Warm up the battery and retest.	

**All test results are stored on the SD Card. This data can be copied from the card and used to verify / compare results.**

## Chapter 1: 24V System Test

The tester will guide you through the steps of selecting your battery test parameters and interpreting the results. Before you start the test, review the instructions in “Chapter 3: Test Preparation” on page 9.

### Battery Test

1. Select the BATTERY LOCATION.

- 1  IN VEHICLE
- 2  OUT OF VEHICLE

Press the **NEXT** soft key to continue. The **BACK** soft key returns you to the Main Menu at the start of the test and to the previous screen as you progress.

2. Select the BATTERY TYPE.

- 1  SLI
- 2  AGM

Press the **NEXT** soft key to continue.

3. Select the RATING UNITS.

- 1  SAE
- 2  EN
- 3  EN2
- 4  JIS
- 5  DIN
- 6  IEC

Press the **NEXT** soft key to continue.

4. Press the **UP/DOWN ARROW** keys or use the numeric keys to select the battery rating or in the case of JIS, the part number. To increase your scrolling speed, hold down the **UP** or **DOWN ARROW** key.

Press the **NEXT** soft key to continue.

The temperature question is asked only if it can influence the test result.

For the next few seconds the tester will display the word **TESTING** and a stopwatch while it evaluates the battery.

5. Connect the tester to the second battery.

Press the **NEXT** soft key to start the test.

### Generate Pair

1. Select the BATTERY TYPE.

- 1  SLI
- 2  AGM

Press the **NEXT** soft key to continue.

2. Select the RATING UNITS.

- 1  SAE
- 2  EN
- 3  EN2
- 4  JIS
- 5  DIN
- 6  IEC

Press the **NEXT** soft key to continue.

3. Press the **UP/DOWN ARROW** keys or use the numeric keys to select the battery rating or in the case of JIS, the part number. To increase your scrolling speed, hold down the **UP** or **DOWN ARROW** key.

Press the **NEXT** soft key to continue.

The temperature question is asked only if it can influence the test result.

For the next few seconds the tester will display the word **TESTING** and a stopwatch while it evaluates the battery.

4. Connect the tester to the second battery.

Press the **NEXT** soft key to start the test.

#### Generate Pair Decisions

Decision	Action
IN BALANCE	Batteries are in balance and OK for use.
OUT OF BALANCE	Batteries are not equally charged or healthy. Look into the individual battery results for the required action.
CHARGE	Fully charge the pair and retest.
REPLACE	Replace the pair.

### Starter Test

1. Select the use of AMP CLAMP.
  - 1  INTEGRATED
  - 2  OTHER
  - 3  NONE

Press the **NEXT** soft key to continue.

2. Zero the amp clamp.

Press the **NEXT** soft key to continue.

3. Place the amp clamp around the negative cable with the arrow pointing away from the battery.

Press the **NEXT** soft key to continue.

4. Start the vehicle's engine when prompted. If after the vehicle started and the results do not appear after approximately 25 seconds, press the **NO START** soft key.

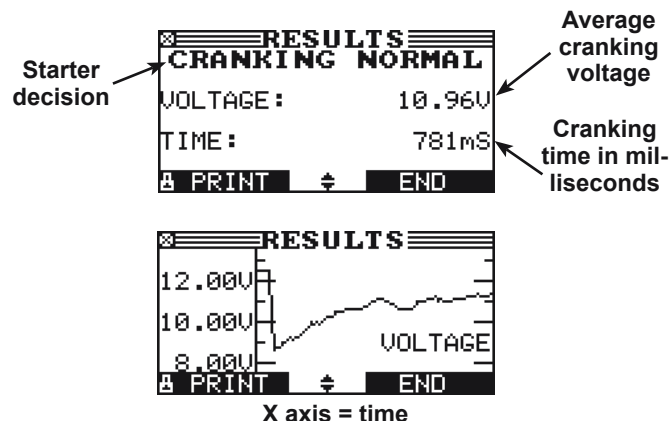
5. The analyzer displays one of the decisions and the results in a series of screens.



**NOTE:** In some cases the tester may not detect the vehicle's starting profile. It will display the soft key options **STARTED** and **NO START**. If you select **STARTED**, the analyzer skips to the alternator test. If you select **NO START**, the test process ends.

### Starter Test Results

The results include the battery analysis. Use the **UP (▲)** or **DOWN (▼) ARROW** key to scroll to each screen. See the Starter System Decision table for an explanation of the starter system decisions. To continue testing, press the **NEXT** soft key.



### Starter System Test Decisions

Decision	Action
CRANKING NORMAL	The starter voltage is normal and the battery is fully charged.
LOW VOLTAGE	The starter voltage is low and the battery is fully charged.
CHARGE BATTERY	The starter voltage is low and the battery is discharged. Fully charge the battery and retest the starter system.
REPLACE BATTERY	Replace the battery and retest before testing the alternator test..
NO START	The engine did not start and the test was aborted.
CRANKING SKIPPED	The tester didn't detect the vehicle's starting profile and skipped the Starter Test.

### Dynamic Response Test

In some cases, when dealing with a discharged battery, the dynamic response test will be prompted. Usually it is hard to determine the condition of a discharged battery, but in this way we can base the condition on how the battery responds to this test.

1. The tester will start checking for alternator output.
2. In case no ripple is detected the tester will prompt you to select the ENGINE TYPE.
  - 1  GASOLINE ENGINE
  - 2  DIESEL ENGINE

Press the **NEXT** soft key to continue.

3. If ripple is not detected the second time, you will need to check if the amp clamp is pointing away from the negative battery post.

If you are not using an amp clamp you can continue with the Alternator Test.

4. TURN ALL VEHICLE LOADS OFF, IDLE ENGINE: Turn off vehicle loads (blowers, interior light, radio, etc.) and idle the engine. Press the **NEXT** soft key to continue.

5. Enter the charge current taken by the battery using the **UP (▲)** and **DOWN (▼) ARROW** keys. Press the **NEXT** soft key to continue.

After a few minutes this is asked again to determine the battery's condition.

6. Enter the charge current taken by the battery using the **UP (▲)** and **DOWN (▼) ARROW** keys. Press the **NEXT** soft key to continue.

### Alternator Test

1. ANALYZING CHARGING SYSTEM DATA: After you press the **NEXT** soft key to begin the alternator test, the tester will immediately begin testing for alternator voltage.



**NOTE:** If necessary the analyzer will ask if you are testing a diesel engine. It will resume testing after you make your selection.

2. TURN ALL VEHICLE LOADS OFF, IDLE ENGINE: Turn off vehicle loads (blowers, interior light, radio, etc.) and idle the engine. Press the **NEXT** soft key to continue.
3. REV ENGINE WITH LOADS OFF FOR 5 SECONDS: Rev the engine with the loads off. Gradually increase the rpm until the analyzer tells you to HOLD the rev level as the bar on the display crosses the rpm target line.
4. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the Tester takes system measurements.
5. ENGINE REV DETECTED, IDLE ENGINE: The tester has detected the rev. Press the **NEXT** soft key to continue.
6. TESTING ALTERNATOR AT IDLE, LOADS OFF: The analyzer will next test the engine at idle for comparison to other readings, and then test the diode ripple. Excessive ripple usually means one or more diodes have failed in the alternator or there is stator damage.
7. TURN HIGH BEAMS AND BLOWER MOTOR ON, IDLE ENGINE: After a few seconds, the Tester will ask you to turn on the accessory loads. It will determine if the charging system is able to provide enough current for the demands of the electrical system.



**IMPORTANT:** Turn on the high-beam headlights, the blower to high and the rear defogger. Don't use cyclical loads such as air conditioning or windshield wipers.

8. TESTING ALTERNATOR AT IDLE, LOADS ON: The analyzer will determine if the charging system is able to provide sufficient current for the demands of the vehicle's electrical system.
9. REV ENGINE WITH LOADS ON FOR 5 SECONDS: The tester will test the charging system with the loads on and prompt you to rev the engine. Gradually increase the rev until the analyzer tells you to HOLD the rev level as the bar on the display crosses the rpm target line.
10. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the Tester takes system measurements.
11. ENGINE REV DETECTED, IDLE ENGINE: The tester has detected the rev. Press the **NEXT** soft key to continue.

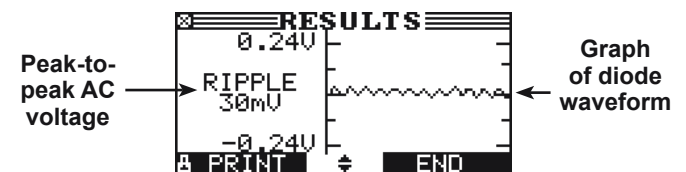
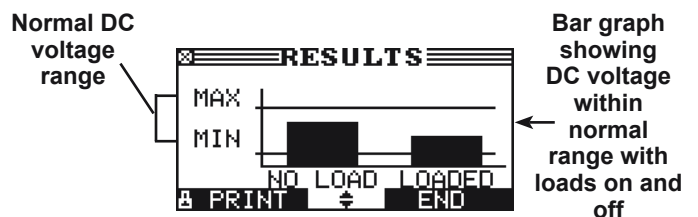
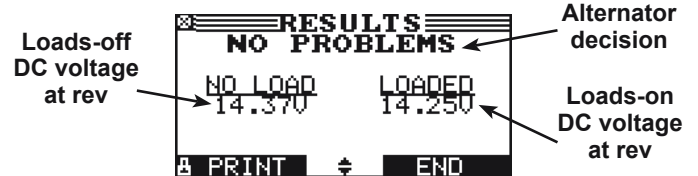
12. ANALYZING CHARGING SYSTEM DATA: The tester is completing its final analysis of the charging system data.

13. TURN OFF LOADS AND ENGINE: Press the **NEXT** soft key to display the results.

*In case you are using an amp clamp*

14. DRAIN CURRENT: This will be asked ONLY when the amp clamp is in use. Fill in the current as displayed on the amp clamp.

#### Alternator Test Results



**Alternator Decisions**

<b>Decision</b>	<b>Action</b>
NO PROBLEMS	The system is showing normal output from the alternator. No problem detected.
NO OUTPUT	<p>The alternator is not providing charging current to the battery.</p> <ul style="list-style-type: none"> <li>√ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest.</li> <li>√ Check all connections to and from the alternator, especially the connection to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest.</li> <li>√ If the belts and connections are in good working condition, replace the alternator. (Older vehicles use external voltage regulators, which may require only replacement of the voltage regulator.)</li> </ul>
LOW OUTPUT	<p>The alternator is not providing enough current to power the system's electrical loads and charge the battery.</p> <ul style="list-style-type: none"> <li>√ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest.</li> <li>√ Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest.</li> </ul>
HIGH OUTPUT	<p>The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator.</p> <ul style="list-style-type: none"> <li>√ Check to ensure there are no loose connections and that the ground connection is normal. If there are no connection problems, replace the regulator. (Most alternators have a built-in regulator requiring you to replace the alternator. In older vehicles that use external voltage regulators, you may need to replace only the voltage regulator.)</li> </ul>

**Diode Decisions**

<b>Decision</b>	<b>Action</b>
EXCESSIVE RIPPLE	<p>One or more diodes in the alternator aren't functioning or there's stator damage, which is shown by an excessive amount of AC ripple current supplied to the battery.</p> <ul style="list-style-type: none"> <li>√ Make sure the alternator mounting is sturdy and that the belts are in good shape and functioning properly. If the mounting and belts are good, replace the alternator.</li> </ul>
OPEN PHASE	The analyzer has detected an open phase within the alternator. Replace the alternator.
OPEN DIODE	The analyzer has detected a open diode within the alternator. Replace the alternator.
SHORTED DIODE	The analyzer has detected an shorted diode within the alternator. Replace the alternator.

## Chapter 5: QC Test

The tester has the ability to test multiple batteries one after the other without having to input the battery rating/settings.

There are two types of QC tests: the **STOCK CONTROL** or **COMPOUND TEST**.

**STOCK CONTROL** is meant for batteries standing in a warehouse or on a pallet where as **COMPOUND TESTING** is done when the battery is in the vehicle.

### STOCK CONTROL

1. The first screen shows you the amount of tests performed. Once you press both the arrow keys you reset the test counter. Press **NEXT** if you want to continue without clearing the tests.
2. Select the BATTERY TYPE
  - 1  SLI
  - 2  AGM
  - 3  SPIRAL
  - 4  GEL

Press the **NEXT** soft key to continue. The **BACK** soft key returns you to the Main Menu at the start of the test and to the previous screen as you progress.

3. Select the RATING UNITS
  - 1  SAE
  - 2  EN
  - 3  EN2
  - 4  JIS
  - 5  DIN
  - 6  IEC

Press the **NEXT** soft key to continue. The **BACK** soft key returns you to the previous screen.

4. Select the BATTERY RATING
 

Press the **UP** (**▲**) and **DOWN** (**▼**) **ARROW** keys to select the rating. In case of a JIS battery type the part number.
5. Enter the minimum VOLTAGE.

The tester will now test the battery.

### COMPOUND TEST

1. The first screen shows you the amount of tests performed. Once you press both the arrow keys you reset the test counter. Press **NEXT** if you want to continue without clearing the tests.
2. Select the BATTERY LOCATION
  - 1  UNDER HOOD
  - 2  QC BATTERY

Press the **NEXT** soft key to continue. The **BACK** soft key returns you to the Main Menu at the start of the test and to the previous screen as you progress.

3. Select the TEST LOCATION
  - 1  BATTERY POST
  - 2  JUMP START POST
  - 3  JUMP START POST (BMS)

Press the **NEXT** soft key to continue.

4. Select the BATTERY RATING.
  - 300 A(SAE) / 40 AH
  - 350 A(SAE) / 50 AH
  - 360 A(SAE) / 50 AH
  - 390 A(SAE) / 43 AH
  - 500 A(SAE) / 52 AH
  - ...
  - MANUAL ENTRY

Press the **NEXT** soft key to continue.
5. Select the BATTERY TYPE (590 A(SAE) / 60 AH only)
  - 1  SLI
  - 2  EFB

6. Enter the minimum VOLTAGE.

The tester will now test the battery.



## Chapter 6: Utilities

The Utility Menu allows you to easily set up your analyzer:

### Config Tester

<b>TIME :</b>	<b>AM/PM</b>
<b>MODE :</b>	<b>9:07 PM</b>
<b>DATE :</b>	<b>MM/DD/YYYY</b>
<b>FORMAT :</b>	<b>01/01/2016</b>
<b>TEMP. UNITS</b>	<b>C</b>
<b>WRITE FAIL</b>	<b>ASK</b>

### Time

1. Use the **LEFT/RIGHT ARROWS** to highlight the hour, minutes. To rapidly scroll, hold down an **ARROW** key.

**9** : **19** PM

2. Press the **SAVE** soft key to save your setting or **BACK** to return to the ADJUST screen.

### Mode

Use the LEFT/RIGHT ARROWS to select the option of your choice.

1. Select the 24-hour or AM/PM mode
2. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the ADJUST screen without saving the changes.

### Date

Date cannot be changed.

### Format

Use the **UP/DOWN ARROWS** or press the corresponding numerical key to move the dot to the option button of your choice or enter its number.

1. MM/DD/YYYY (month/day/year) or DD/MM/YYYY (day/month/year)
2. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the CLOCK ADJUST screen without saving the changes.

### Temperature Units

The TEMP. UNITS utility enables you to set the units of measure to either Celsius or Fahrenheit.

### Write Fail

After each measurement the test results are stored on the data card. In case the data cannot be stored on to the card you can select the way this is notified to the operator.

- ASK (operator is asked if it is ok to continue even when results are not stored)
- FORCE (measurements can only continue when data card is entered)
- IGNORE (measurement is not stored and operator not notified)

### Display

The LCD OPTIONS utility enables you to adjust the contrast of the text on the display and the backlight time.

### Contrast Level

The contrast level is 0 (lightest) to 10 (darkest). To change it:

1. Press the **UP** or **DOWN ARROW** to highlight the option.

<b>CONTRAST LEVEL</b>	<b>10</b>
<b>BACKLIGHT TIME</b>	<b>60</b>

2. Press the ADJUST soft key to display the option's numerical scroll box.

**10**  **SEC**

3. Press the **UP/DOWN ARROW** keys or the corresponding numerical key to select your preference.
4. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the CONTRAST LEVEL screen without saving the changes.

### Backlight Time

Backlight time is from 0 to 60 seconds. To change it:

1. Press the **UP** or **DOWN ARROW** to highlight the option.

<b>CONTRAST LEVEL</b>	<b>10</b>
<b>BACKLIGHT TIME</b>	<b>60</b>

2. Press the **ADJUST** soft key to display the option's numerical scroll box.



3. Press the **UP/DOWN ARROW** keys or the corresponding numerical key to select your preference.
4. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the **BACKLIGHT** screen without saving the changes.

### Config printer

Use this option to configure your printer. It's easy to switch your IrDA printer in to the correct protocol.

### Shop Info

The **SHOP INFO** utility enables you to create a header for your printed test results showing your business location information. Its two information screens contain eight lines of text with up to 16 characters on each line.

Screen 1

- 1 - YOUR SHOP NAME
- 2 - 1000 ANY STREET
- 3 - YOUR TOWN, STATE
- 4 - YOUR POSTAL CODE

Screen 2

- 1 - YOUR COUNTRY
- 2 - YOUR PHONE NUMBER
- 3 - WWW.WEBSITE.COM
- 4 - YOUR SHOP ID NUMBER

To create or overwrite a header:

1. Press the **UP** or **DOWN ARROW** to highlight the line you want to change. The cursor will be blinking to the right of the last character in the line.
2. To move the cursor backward to erase a character, press the **LEFT ARROW** key; to move the cursor forward, press the **RIGHT ARROW** key.
3. Insert a character by pressing the key associated with the character as many times as needed.

4. You can center text by selecting blank spaces before and after lines of text or insert spaces between words.
5. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the **SHOP INFO** screen without saving the changes.

### Coupon

The **COUPON SELECT** utility enables and disables the printing of the custom coupon you've created in the **EDIT COUPON** utility.

1. Use the **UP/DOWN ARROWS** or press the corresponding numerical key to move the dot to the option button of your choice.
  - 1  NO USER COUPON PRINTED
  - 2  USER COUPON
2. Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the **COUPON SELECT** screen without saving the changes.

### Edit Coupon

The **EDIT COUPON** utility enables you to create a promotional coupon for your customers that prints at the bottom of every test result. Its two information screens contain eight lines of text with up to 16 characters each.

The editing process is the same as when you create a header for your test results printouts. See the **SHOP** utility for more information.

### Language

The **LANGUAGE** utility enables you to select a language for the display and printouts. To set your preference:

1. Use the **UP/DOWN ARROWS** or press the corresponding numerical key to move the dot to the option button of your choice. There is a selection of 24 languages.
2. Press the **SAVE** soft key to save your setting.

### Format Card

Select this utility to format an SD card to receive data or erase all data on the card. The Tester will warn you before formatting the disk and ask you if you want to continue.

### **Update**

As software updates become available you'll be able to use this utility to update the Tester software using files on an SD card.

### **Battery Menu**

Use this option to add, delete a battery, or import or export a battery list.

## Chapter 8: Print/View

The Print/View Menu enables you to view and print the results of the Battery Test.

### **View Test**

VIEW TEST gives you the option of viewing and printing the results of the Battery and System Tests. To print the results, align the analyzer's IR transmitter with the printer's receiver, and select the PRINT soft key. To return to the Main Menu, press the END key.

### **View QC Test**

VIEW QC TEST gives you the option of viewing and printing all results of the Quality Control Test. To print the results, align the analyzer's IR transmitter with the printer's receiver, and select the PRINT soft key. To return to the Main Menu, press the END key.

## Chapter 7: Info Menu

The Info Menu has 3 utilities to help you manage your test data and track the usage and history of your analyzer.

### **Totals**

The TOTALS report displays the total number of battery tests performed since the Tester was first used. Press the LEFT and RIGHT ARROW keys simultaneously to clear the total and reset the starting date.

### **Transfer Data**

The TRANSFER DATA utility lets you transfer test data to a PC using an optional IR receiver/software package.

### **Version Info**

Version info displays the software version, the date the software was released, and the serial number of the analyzer. The utility keeps a permanent count of the number of battery tests performed since the analyzer was first used.

## Chapter 9: Troubleshooting

If you have problems with the display or the Midtronics printer, try these troubleshooting suggestions:

### The Display Does Not Turn On

- Check the connection to the vehicle battery.
- Press the POWER button.
- The vehicle's battery may be too low to power the analyzer (below 1 volt). Fully charge the battery and retest.
- The analyzer's 6 AA batteries may need to be replaced.
- If troubleshooting does not solve the problem, contact Midtronics.

### The Status LED Flashes (Midtronics Printer)

When a printer fault occurs, the STATUS LED flashes. You can identify the fault by the number of sequential flashes:

Table 2: Printer STATUS LED

Sequence	Condition	Solution
* * *	No paper	Insert new paper
** ** **	Thermal head too hot	Allow head to cool
*** ** *	Batteries weak	Recharge printer batteries for 16 hours

### Data Will Not Print

- If the IR transmitter and receiver are not aligned, all the data may not print. The infrared ports on the top of the analyzer and on the printer below the MODE button should be pointed directly at each other. The maximum distance for reliable transmission between the ports is 17 in (45 cm).

To realign, press the END button to cancel the print job. Verify alignment between the analyzer and printer; then try to print the test results again.

- Make sure the printer is on. The printer shuts off after 2 minutes of inactivity to conserve the batteries. To turn the printer on, briefly press the MODE button. The green STATUS light should turn on. Make sure you are using the Midtronics printer. Other printers may not be compatible.
- Direct sunlight interferes with infrared data transmission and receiving. If the printer is not receiving data, remove the printer and EXP from direct sunlight. If the printed characters are not clear or are partially missing, recharge the battery and reprint.
- If you are unable to print after ensuring the analyzer is functioning, the printer is on, the batteries are good, and the IR transmitter and receiver are aligned, check the printer manual for further instructions or call Midtronics.

## Chapter 10: Tester Internal Batteries

The Tester uses 6 AA, 1.5-volt batteries (alkaline recommended) to allow testing of batteries down to 1 volt and supply power while the menu is active. The analyzer can test batteries down to 5.5 volts when the internal batteries are not functioning.

### Battery Power Indicator

The square in the upper left corner of the display indicates the charge level of the battery pack. The square is black when the battery pack is fully charged. It gradually changes to white as the charge level declines. The Tester will display a warning message when the batteries need replacing.



Figure 3: Power Level Indicator for AA Batteries

### Replacing the Tester Batteries

1. Turn the Tester face down.
2. Press gently on the ridges above the arrow on the battery compartment cover.
3. Slide the cover in the direction of the arrow and remove the cover.
4. Remove the discharged batteries.
5. Insert new batteries. Make sure the positive and negative terminals are positioned correctly.
6. Insert the door's tabs into the slots on the analyzer and slide the door closed, making sure the latch locks.

## Patents & Limited Warranty

### Patents

The EXP-1000 Expandable Electrical Diagnostic Platform is made by Midtronics, Inc., and is protected by one or more U.S. and foreign patents. For specific patent information, contact Midtronics, Inc. at +1 630 323-2800.

### Limited Warranty

This analyzer is warranted to be free of defects in materials and workmanship for a period of two years from date of purchase. Midtronics will, at our option, repair or replace the unit with a remanufactured unit. This limited warranty applies only to the analyzer, and does not cover any other equipment, static damage, water damage, overvoltage damage, dropping the unit, or damage resulting from extraneous causes including owner misuse. Midtronics is not liable for any incidental or consequential damages for breach of this warranty. The warranty is void if owner attempts to disassemble the unit or to modify the cable assembly.



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