MIDTRONICS

Advancing
Battery Management

EXP-1000 Heavy Duty

For testing 12-volt Truck- and automotive batteries and 12- and 24-volt charging systems

INSTRUCTION MANUAL

Contents

Chapter 1: Before You Begin

Starting the tester for the first time

When the tester is first used the operator is asked to enter a couple of items such as language, date and time. Changes can be made afterwards by going in to the Utility Menu and selecting CONFIG TESTER.

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

⇨ 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.

⚠ DANGER

Risk of explosive gases.
Never smoke or allow a spark or flame in the vicinity of a battery.

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.

⚠ WARNING

Wash hands after handling.

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.

The tester is manufactured in line with the latest state of the art and according to recognised safety standards. If used incorrectly or misused, however, it can cause

- injury or death to the user or a third party,

- damage to the tester and other material assets belonging to the operator,

- inefficient operation of the tester.

All persons involved in commissioning, operating, maintaining and servicing the tester must

- be suitably qualified,

- have knowledge of and experience in dealing with testers and batteries and

- read and follow these operating instructions carefully.

Conventions Used in This Manual

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

Convention	Description
⚠	The safety symbol followed by the word **WARNING** or **CAUTION** indicates instructions for avoiding hazardous conditions and personal injury.
CAUTION	The word **CAUTION** 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.
CAPITAL LETTERS	The text for screen options are in regular capital letters.

Chapter 2: Description

Connections and Data Ports

❶ Data transmitter: sends test results to a PC using an optional hardware and software kit.

❷ Infrared temperature sensor with a range of -28 °C to +93 °C

❸ 6-pin connector for the battery test cable.

❹ Input for accessories. **(optional)**

❺ Spring-loaded data card slot for test data storage and software upgrades.

❻ 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.
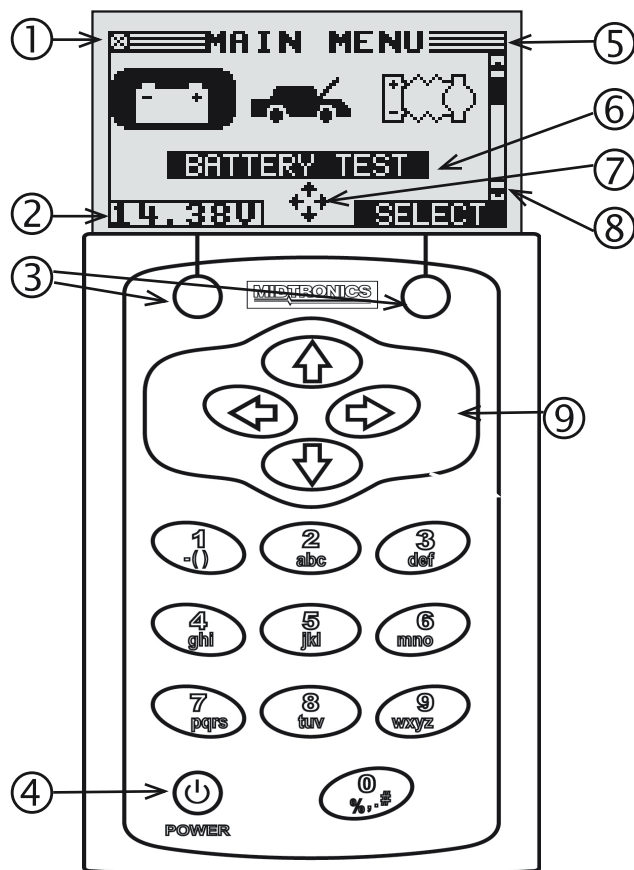
Connecting the Battery Test Cable

⚠

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.

❹ POWER Key

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

❺ Title Bar

The title bar shows you the name of the current menu, test tool, utility, or function.

❻ Selection Area

The selection area below the Title Bar contains selectable items or dialog boxes that display information or require a response.

❼ Menu Screen Arrows

When displayed in menu screens, the menu screen arrows show you which **ARROW** key on the keypad to press to display other icons or screens. The Up and Down Menu Screen Arrows, for example, indicate when to press the **UP** (▲) and **DOWN** (▼) **ARROW** keys to display the screens above and below the current screen.

The Left and Right Menu Screen Arrows tell you when to use the **LEFT** (◄) or **RIGHT** (►) **ARROW** keys to select an icon.

When displayed under a list of options, the menu screen arrows show you which keypad arrow to press to highlight a character or item in a list.

❶ Internal Batteries Status Indicator

This indicator appears in the screen's top left corner, lets you know the status and charge level of the analyzer's six 1.5-volt batteries. The **X** in the top left corner of the screen shows that the analyzer is powered by the battery you're testing to conserve the analyzer's internal batteries.

❽ Scroll Bar

Another navigational aid is the scroll bar on the right side of the screen. The position of its scroll box shows you whether the screen is the top (or only screen), middle, or last in a series.

❷ Voltmeter

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

❾ ARROW keys

Press the **UP ARROW** key to move up to the next selectable item or row. When entering text, use the **UP ARROW** key to move to the previous character.

❸ Soft Keys

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**.

Data Entry Methods

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

Typically, the soft key below the right half of the screen confirms your choice, although the word above it may vary. 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.

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

Option Buttons

Some lists have option buttons before each item. To select an item, use the **UP/DOWN ARROW** keys to move the dot into the button next to the item you want. You can also use the alphanumeric keypad to enter the number preceding the option button. To confirm your selection, press the appropriate soft key.

Scrolling Lists

Scrolling lists contain items that extend above and below the screen or the selection box that contains them. To indicate that there are more items, the symbols ♦ appear to the right of the first visible or highlighted item on the list.

To select from this type of list, use the **UP/DOWN ARROW** keys to scroll to the item, or use the keypad to enter your choice, and press the appropriate soft key.

Alphanumeric Entries

Even though the tester does not use an alphanumeric keypad it is possible to enter alphanumeric values. When applicable the alphanumeric values appear on the display. Use the **UP/DOWN or LEFT/RIGHT ARROW** keys to scroll and confirm this with the > key. To return one or more steps use the < key.

Menu Structure

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 **BATTERY TEST** tests a battery using the battery information you select in a series of screens.
	Optional	The **SYSTEM TEST** tests a battery, and the starting and charging system.
		Performs a Pre Delivery Inspection test.
		GENERATE PAIR allows you to check whether two batteries can be used together.
		QC TEST is used for testing stock or compound batteries.
	*	**INFO** contains a test counter, data transfer utility, and the tester software version and serial number.
	*	**PRINT/VIEW** enables you to view your stored test results and print them to an optional IR printer.
	*	**UTILITY** includes functionality to setup the tester.

Info Menu

Icon	Description
	TOTALS displays the total battery tests performed since the tester was first used, 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.
i	Displays the software version, total tests from first use, and serial number.

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
	VIEW TEST displays the last Battery and System Test results. Sends the results to an optional IR printer..
	VIEW QC TEST displays the last QC Test result. Sends the result to an optional IR printer..

Utility Menu

The Utility Menu lets you customize your analyzer for your needs.

Icon	Description
	The **CONFIG TESTER** menu allows you to set the following parameters: TIME, MODE, DATE, FORMAT, TEMPERATURE UNITS, and WRITE FAIL.
	Settings to adjust the contrast level and backlight time.
	Enables you to configure the printer to IrDA.
	Create your own address details for printouts with the **SHOP INFO** icon.
	If you have created a coupon in the **EDIT COUPON** utility, use **COUPON** to enable or disable.
	EDIT COUPON allows you to create and store up to three separate coupons to be printed on test results.
	With the **LANGUAGE** menu you can select one of the 24 available languages.
	With **FORMAT CARD** you erase all information on the data card.
	With **UPDATE** you can install new software on the tester.
	Add or delete battery information

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.

Initial Setup

When starting the EXP for the first time you are asked to enter a number of settings so you can already adapt the analyzer to your personal settings. Among these settings are the language and date and time. This only needs to be done once, it can be changed afterwards in the **UTILITY MENU (CONFIG TESTER)**.

Chapter 4: Battery Test

The tester guides 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*.

1. Select the BATTERY LOCATION.
   1 ◉ OUT OF VEHICLE
   2 ◯ IN VEHICLE

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

2. Select the VEHICLE TYPE.
   1 ◉ TRUCK
   2 ◯ CAR / VAN

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

3. In case of IN-VEHICLE please select the NUMBER OF BATTERIES.
   1 ◉ 1
   2 ◯ 2

4. Select the BATTERY TYPE.
   1 ◉ REGULAR
   2 ◯ AGM
   3 ◯ SPIRAL
   4 ◯ GEL

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

5. Select the battery's capacity rating standard. The standard, and the rating units required are printed on the battery label. If the information is unreadable, contact the battery manufacturer.
   1 ◉ CCA
   2 ◯ JIS
   3 ◯ DIN
   4 ◯ SAE
   5 ◯ IEC
   6 ◯ EN

Battery Standards

Rating System	Description	Range
CCA	Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 ºF (–17.8 ºC).	100 to 1700
JIS	Japanese Industrial Standard: (shown on a battery as a combination of numbers and letters.	73 numbers from 26A17 to 245H52
DIN (A)	Deutsche Industrie-Norm	100 to 1000
SAE (A)	European labeling of CCA	100 to 1700
IEC (A)	International Electrotechnical Commission	100 to 1000
EN (A)	European Norm	100 to 1700

If you select JIS, the analyzer asks for the JIS part number. Scroll to the part number. To increase your scrolling speed, hold the **UP (▲)** or **DOWN (▼) ARROW** key, or use the **LEFT (◄)** or **RIGHT (►) ARROW** key to move up or down four part numbers at a time.

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

6. Press an **UP (▲)** or **DOWN (▼) ARROW** key 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.

   500 ⬍ CCA

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

7. Select the **TEMPERATURE**.

   Aim the tester 5 cm from the sides or top of the battery case. As soon as the temperature reading is stable the operator can press **NEXT.**

   The tester will now test the battery.

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

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.

System Noise

To perform a correct measurement the tester requires the vehicle to be in rest. After the car has been driven some vehicle specific systems might still be active in the background. The tester will detect this and displays the message **SYSTEM NOISE**. When this message appears switch off all consumers(radio, airconditioning) and remove the key from the ignition. As soon as there is no more activity in the vehicle the tester will continue testing and display the test result.

Unstable Battery Detected

A battery that is weak or that has just been charged may retain enough electrical activity to be detected by the analyzer and will adversely affect the test results. A fully charged battery should stabilize quickly, after which the analyzer will automatically retest. Weak batteries should be charged and retested. If the battery is fully charged, check the clamp connections.

Surface Charge

The battery can 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 displays a test result.

1. Follow the instructions indicating when to turn the head-lights on and off (IN-VEHICLE)

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. This test will typically be performed on batteries that are in a low state of charge.

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 below. 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, or to continue testing if you've selected the system text, press the **NEXT** soft key. You'll have the opportunity to print all the results at the end of the system test.

Battery decision →

Temperature indication →

Measured voltage

Measured capacity rating units

Rating units you selected for the test

General health of the battery and its ability to deliver its specified performance compared with a new battery

Battery's state of charge

Good Battery Result
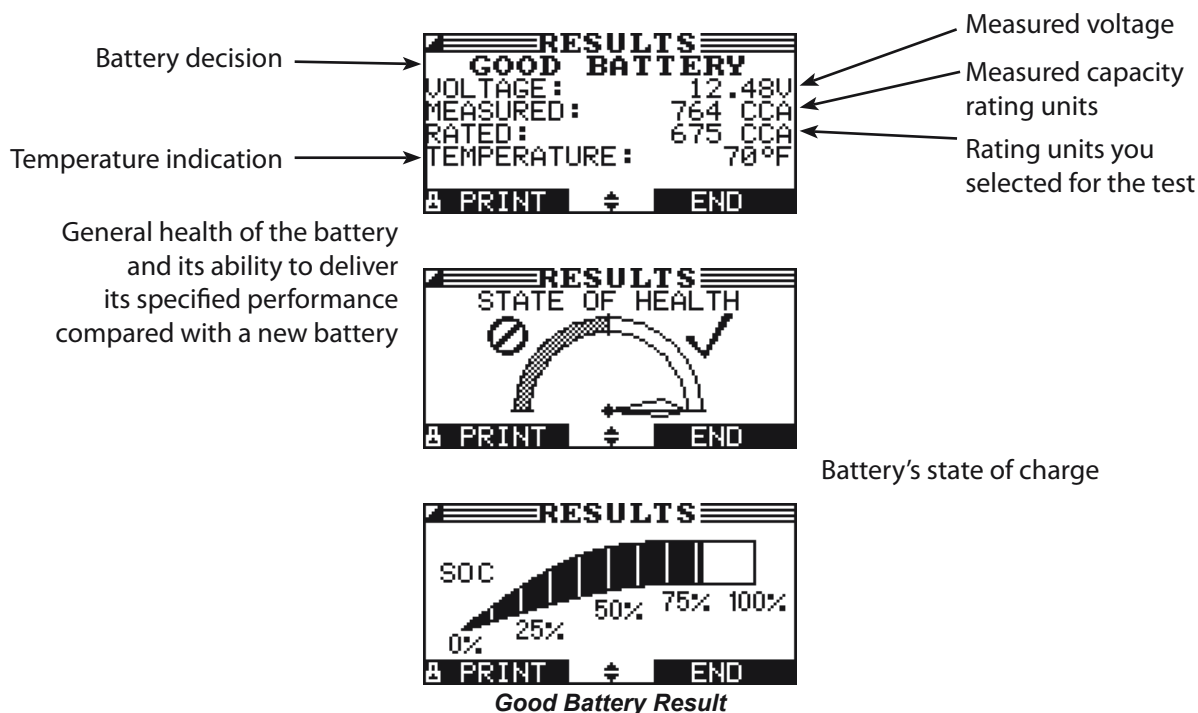
Battery Decisions and Recommendations

Decision	Recommended Action
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.
BAD CELL–REPLACE	Replace the battery and retest.
FROZEN BATTERY	Thaw the battery and retest. Do NOT charge the battery!.

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

Chapter 5: System Test

Before starting the test, inspect the alternator drive belt. A belt that is glazed or worn, or lacks the proper tension, will prevent the engine from achieving the rpm levels needed for the test.

The System Test includes 3 tests that provide a complete diagnosis of the vehicle's electrical system:

- BATTERY TEST
- STARTER TEST
- ALTERNATOR TEST

Battery Test

The System Test includes a test of the battery to eliminate it as the cause of starting or charging problems. See Chapter 4 for the Battery Test procedure.

Starter Test

1. Have your amp clamp ready and select the AMP CLAMP availability.

   1 ⦿ INTEGRATED

   2 ◯ OTHER

   3 ◯ NONE

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

2. Attached the Amp clamp to the tester, do not connect it around any wire.

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

3. Tester will zero out the Amp clamp.

4. Place Amp clamp around negative cable.

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

5. 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.

6. 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 System 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.
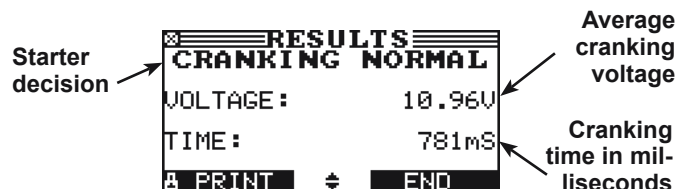
Starter System Test Decisions

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	Replace the battery and retest before testing the alternator test..
LOW CRANKING AMPS	The starter voltage is high, but the cranking amps are low.
NO START	The engine did not start and the test was aborted.
CRANKING SKIPPED	The tester did not detect the vehicle's starting profile and skipped the Starter Test.

5 Minute Discharged Battery 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 resonds to this test.

1. The tester starts checking for alternator output.

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

2. Depending on whether you are working with an integrated Amp clamp, you will be either prompted to TURN OFF LOADS AND ENGINE or asked to CHECK IF CLAMP POINTS AWAY FROM THE NEGATIVE BATTERY POST.

   In case of the former, turn off vehicle loads (blowers, interior light, radio, etc.) and the engine. Press the **NEXT** soft key to continue.

3. 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.

4. 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.

5. 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. The tester starts checking for alternator output.

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

2. Depending on whether you are working with an integrated Amp clamp, you will be either prompted to TURN OFF LOADS AND ENGINE or asked to CHECK IF CLAMP POINTS AWAY FROM THE NEGATIVE BATTERY POST.

   In case of the former, turn off vehicle loads (blowers, interior light, radio, etc.) and the engine. Press the **NEXT** soft key to continue.

3. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the tester takes system measurements.

4. 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.

5. 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. Do not use cyclical loads such as air conditioning or windshield wipers.

6. 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.

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

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

   In case you are using an Amp clamp

9. DRAIN TEST or DRAIN CURRENT: This will be asked ONLY when the Amp clamp is in use. Depending on whether or not using the integrated clamp, press **NEXT** to proceed drain test or fill in the current as displayed on the Amp clamp.

Alternator Test Results
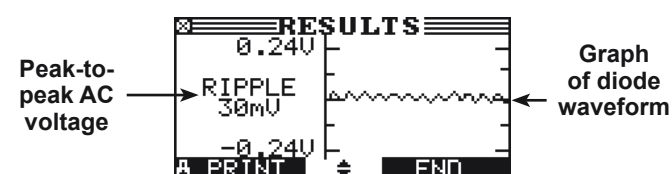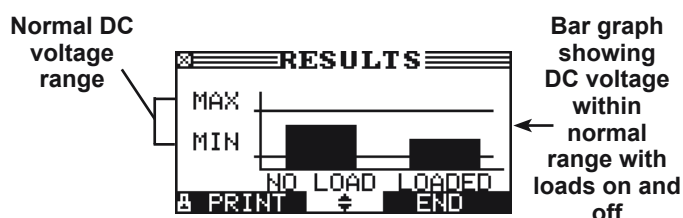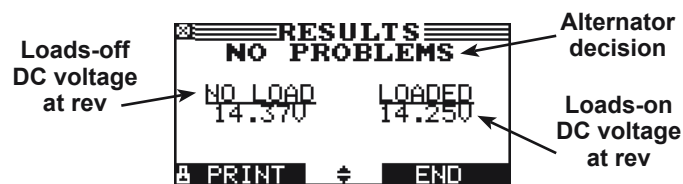
Alternator Decisions and Recommendations

Decision	Action
NO PROBLEMS	The system is showing normal output from the alternator. No problem detected.
NO VOLTAGE	The alternator is not providing charging current to the battery. √ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest. √ 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. √ 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.)
LOW VOLTAGE	The alternator is not providing enough current to power the system's electrical loads and charge the battery. √ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest. √ Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest.
HIGH VOLTAGE	The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. √ 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.)

Diode Decisions and Recommendations

Decision	Action
EXCESSIVE RIPPLE	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. √ 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.
PHASE OPEN	The Tester has detected an open phase within the alternator. Replace the alternator.
DIODE OPEN	The Tester has detected a open diode within the alternator. Replace the alternator.
DIODE SHORT	The Tester has detected an shorted diode within the alternator. Replace the alternator.

Chapter 6: PDI Test

The PDI Test is run on new batteries before delivery to the customer. The test results are presented as text and as encrypted test codes.

NOTE: If the battery is dry charged, it must be filled with acid, fully charged and then left resting for 48 hours before the PDI is run. This is so that the chemical process is completed.

Procedure

Connect the battery analyser to the battery terminals. Note: Connect one battery at a time when running this battery test.

NOTE: Parallel connected batteries should be disconnected prior to a battery test.

Select the PDI test and enter the information about the battery. The PDI test will now be run and the test results displayed.

It is NOT possible to run the test if the battery analyser is connected to two batteries connected in series.

Test Results

The test results from a PDI test are displayed as text and with test codes.

Chapter 7: Generate Pair

This function checks whether two batteries can be used together and is always considered to be performed outside the vehicle. The batteries are NOT connected in the vehicle.

1. Select the BATTERY TYPE.

    1 ⦿ REGULAR

    2 ◯ AGM

    3 ◯ SPIRAL

    4 ◯ GEL

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

2. Select the battery's capacity rating standard. The standard, and the rating units required are printed on the battery label. If the information is unreadable, contact the battery manufacturer.

    1 ⦿   CCA

    2 ◯   JIS

    3 ◯   DIN

    4 ◯   SAE

    5 ◯   IEC

    6 ◯   EN

Battery Standards

Rating System	Description	Range
CCA	Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 ºF (–17.8 ºC).	100 to 1700
JIS	Japanese Industrial Standard: (shown on a battery as a combination of numbers and letters.	73 numbers from 26A17 to 245H52
DIN (A)	Deutsche Industrie-Norm	100 to 1000
SAE (A)	European labeling of CCA	100 to 1700
IEC (A)	International Electrotechnical Commission	100 to 1000
EN (A)	European Norm	100 to 1700

If you select JIS, the analyzer asks for the JIS part number. Scroll to the part number. To increase your scrolling speed, hold the **UP (▲)** or **DOWN (▼) ARROW** key, or use the **LEFT (◄)** or **RIGHT (►)** **ARROW** key to move up or down four part numbers at a time. Press the **NEXT** soft key to continue.

3. Press an **UP (▲)** or **DOWN (▼) ARROW** key 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 start the test.

4. Select the **TEMPERATURE**.

    Aim the tester 5 cm from the sides or top of the battery case. As soon as the temperature reading is stable the operator can press **NEXT.**

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

5. Connect to another battery.

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

Battery Decisions and Recommendations

Decision	Recommended Action
IN BALANCE	The batteries are working correctly and are balanced.
OUT OF BALANCE	The batteries are not balanced with each other and should not be used together.
CHARGE	Charge the battery pair and retest. *Failure to fully charge the battery before retesting may cause false readings.* If CHARGE appears again after you fully charge the battery, replace the battery.
REPLACE	Replace the battery and retest. A REPLACE 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.

Chapter 8: 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.

1. Select the **QC MODE**

    1 ⦿ STOCK CONTROL

    2 ◯ COMPOUND TEST

    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.

Stock control

2. 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.
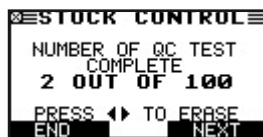
3. Select the **BATTERY TYPE**

    1 ⦿ REGULAR

    2 ◯ AGM

    3 ◯ SPIRAL

    4 ◯ GEL

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

4. Select the **RATING UNITS**

    1 ⦿ CCA

    2 ◯ JIS

    3 ◯ DIN

    4 ◯ SAE

    5 ◯ IEC

    6 ◯ EN

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

5. 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.

6. Enter the **MINIMUM VOLTAGE**.

7. Select the **TEMPERATURE**.

    Aim the tester 5 cm from the sides or top of the battery case. As soon as the temperature reading is stable the operator can press **NEXT.**

    The tester will now test the battery.

Compound test

2. 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.
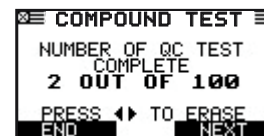
3. Select the **BATTERY MENU**.

    1 ⦿ MANUAL

    2 ◯ PRE-SELECTION

MANUAL input is selecting the different battery parameters that can be found on the battery. The **PRE-SELECTION** is what is entered in the tester memory. This is initially empty but can be filled in from the **UTILITY** menu.

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

For selection of the **MANUAL** input see the previous explanations and screens.

Chapter 9: Utility Menu

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

Config tester

TIME :	**9:07**
MODE :	24 HOUR
DATE :	01/01/2017
FORMAT :	MM/DD/YYYY
TEMP. UNITS :	°C
WRITE FAIL :	ASK

Time

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

9 : 07   AM

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 **OK** soft key to save your setting

Date

Date cannot be changed.

Format

Use the **UP/DOWN ARROWS** to select the desired option.

1. MM/DD/YYYY (month/day/year) or DD/MM/YYYY (day/month/year)

2. Press the **OK** soft key to save your setting.

Temp. units

Use the **LEFT/RIGHT ARROWS** to select either Celsius or Fahrenheit as temperature indication.

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.

CONTRAST LEVEL	**10**
BACKLIGHT TIME	60

2. Press the **LEFT/RIGHT ARROW** key to display the option's numerical scroll box.

   10 ◆ (1-10)

3. Press the **UP/DOWN ARROW** keys 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.

CONTRAST LEVEL	10
BACKLIGHT TIME	**60**

2. Press the **LEFT/RIGHT ARROW** key to display the option's numerical scroll box.

   60 ◆ SEC

3. Press the **UP/DOWN ARROW** keys 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

When using this option it allows you to switch our printer from HP protocol to IrDA 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

5–YOUR COUNTRY __
6–YOUR PHONE NUMBER
7–WWW.WEBSITE.COM
8–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.

2. Press SELECT to activate the line for editing, 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 utility enables and disables the printing of the custom coupon you have created in the EDIT COUPON utility.

1. Use the **UP/DOWN ARROWS** to move the dot to the option button of your choice.

2. Press the **NEXT** soft key to save your setting or the **BACK** soft key to return to the UTILITY menu 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** to move the dot to the option button of your choice. There is a selection of 24 languages.

2.   Press the **NEXT** soft key to save your setting.

Format Card

Select this utility to format a data card to receive data or erase all data on the card. The Tester will warn you before formatting the card and ask you if you want to continue. When a new blank data card is used you always have to use this function before the tester can write to the card.

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. The use of a special formatted card is required for this action.

   FIRMWARE (use this option when new software becomes available from Midtronics)

   SAVE CONFIG (the tester will store the workshop address to the data card, file name is CONFIG.CSV)

   LOAD CONFIG (after new software is uploaded you can reload the workshop details to the tester)

1.   Connect the tester to a 12V battery to ensure the tester does not switch off during the proces

2.   Insert the disc in the tester

3.   Select one of the options and follow the instructions on the screen

4.   When finished the tester will prompt you to remove the card and reboot the tester

QC Mode

Use this option to configure your way of quality control measurements. Select either the Compound mode or Stock Control mode.

1.   Use the **UP/DOWN ARROWS** to move the dot to the option button of your choice.

2.   Press the **NEXT** soft key to save your setting or the **BACK** soft key to return to the UTILITY menu without saving the changes.

Chapter 10: 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 utility lets you transfer test data to a PC using an optional IR receiver/software package.

Version Info

Version info displays the software versions and serial number of the analyzer.

Chapter 11: Print/View

The Print/View Menu enables you to view and print the results of the Battery and or System Tests before you perform another test and overwrite the results in memory.

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 12: 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. Follow the directions in *Chapter 14: EXP Internal Batteries* and replace the batteries (alkaline recommended).

• If troubleshooting does not solve the problem, contact Midtronics at 1-800-776-1995 to obtain service. See "Patents, Limited Warranty, Service" for more information.

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:

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 at 800-776-1995 for assistance. (See "Patents, Limited Warranty, Service" for more information.)

Chapter 13: 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.

Full   **Decreasing**   **Low**   **Powered by test battery**
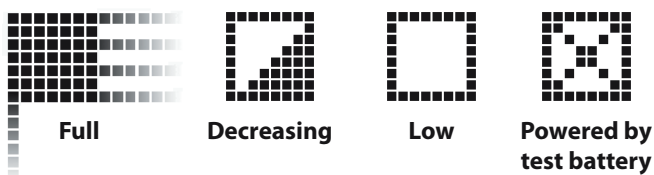
Power Level Indicator for AA Batteries

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 as shown in the figure on the right side. 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.

Latch   **Press here**   **Slide in this direction**
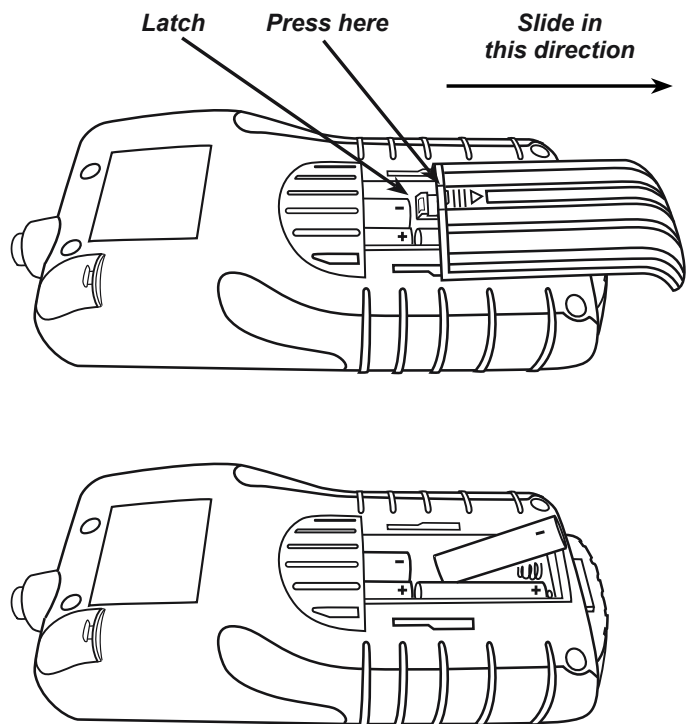
Battery Replacement

PATENTS

The EXP series 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.

MIDTRONICS

www.midtronics.com

Corporate Headquarters
Willowbrook, IL USA
Phone: 1.630.323.2800

Canadian Inquiries
Toll Free: 1.866.592.8052

Midtronics B.V.
European Headquarters
Houten, The Netherlands
Serving Europe and Africa
Phone: +31 30 68 68 150

Midtronics China Office
China Operations
Shenzhen, China
Phone: +86 755 23741010

Midtronics India
Mumbai, India
Phone: +91 22 27564103/1513

Asia/Pacific (excluding China)
Contact Corporate Headquarters
Phone: +1 630 323 2800