



# BAT 151 Instruction Manual

Battery & Electrical System Diagnostic Analyzer

For testing 6- and 12-volt automotive batteries and  
12- and 24-volt charging systems



**BOSCH**



# Contents

## 1 Chapter 1: Before You Begin

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- 1 Safety Reminder
- 1 Personal Precautions

## 2 Chapter 2: Overview

---

- 2 Connections and Data Ports
- 3 Test Leads
- 3 Connecting the Battery Test Cable
- 3 Connecting an Accessory Cable
- 3 Removing and Inserting the SD Card
- 4 Display and Keypad
- 5 Data Entry Methods
  - 5 Menu Icons
  - 5 Option Buttons
  - 5 Scrolling Lists
  - 6 Scroll Boxes
  - 6 Alphanumeric Entry
- 7 Menu Structure
  - 7 Main Menu
  - 8 Info Menu
  - 9 Admin/Utility Menu (password required)
  - 10 DMM Menu

## 11 Chapter 3: Getting Started

---

- 11 Logging In for the First Time
  - 11 Bootup
  - 11 Entering Your Store ID Number and Postal Code
  - 11 Logging in as an Unregistered User
  - 11 Adding a User
  - 12 Initial Administrator Login

## 12 Chapter 4: Admin/Utility Menu

---

- 13 Clock
  - 13 Mode
  - 13 Time
  - 13 Format
  - 13 Date
- 14 Shop
- 14 Users
  - 14 Entering a New User ID
  - 15 Deleting a User ID
- 15 Display
  - 15 Backlight Time
- 16 Coupon
- 16 Edit Coupon
- 17 Temp

- 17 Track Calls
- 17 Language
- 17 Admin
  - 18 Options
    - 18 1 – USER ID
    - 18 2 – PIN
    - 18 3 – UNREG. USER
    - 18 4 – ADMIN
  - 18 Change Admin PIN
  - 18 Reset Defaults
- 18 Select Printer
- 18 Store ID#
- 19 Buzzer
- 19 Format Disk
- 19 Update

## 19 Chapter 5: Test Preparation

---

- 19 Inspecting the Battery
- 19 Testing Out-of-Vehicle (Battery Test)
- 19 Testing In-Vehicle (System Test)
- 20 Connecting to the Battery

## 20 Chapter 6: Battery Test

---

- 21 Additional Test Requirements
  - 21 System Noise Detected
  - 21 Unstable Battery Detected
  - 21 Deep Scan Test
- 21 Battery Test Results
  - 22 State of Health (SOH)

## 23 Chapter 7: System Test

---

- 23 Battery Test
- 23 Starter System Test
  - 23 Starter System Test Results
- 23 Charging System Test
  - 24 Charging System Test Results

## 26 Chapter 8: DMM (Digital Multimeter)

---

- 26 DC and AC Voltmeter
- 26 Scope
- 26 DC Ammeter, AC Ammeter, Volts/Ammeter
- 26 Temp
- 27 Ohmmeter
- 2 Diode

## 28 Chapter 9: Info Menu

---

- 28 View Test
- 28 View Cable Test

**28 Totals**

- 28 1  TOTALS
- 28 2  USER TOTALS
- 28 3  SYSTEM TEST
- 28 4  TOTALS BY DECISION

**28 Transfer**

**28 Version**

**28 Chapter 10: Cable Drop Test**

---

**29 Battery Ground Test**

**30 Battery Ground Test Results**

**30 Starter Circuit**

**30 Alternator Circuit**

**31 Other Circuit**

**31 Chapter 11: Printing Test Results**

---

**31 Changing the Paper in the Internal Printer**

**32 Chapter 12: Troubleshooting**

---

**32 Problems with the Internal Printer**

**33 Chapter 13: Test Cable Maintenance**

---

**33 Cleaning the Clamps**

**33 Handling the Test Cables**

**33 Storing Test Cables**

**33 Chapter 14: BAT 151 Internal Batteries**

---

**33 Battery Power Indicator**

**33 Replacing the Internal Batteries**

## Chapter 1: Before You Begin



### Attention!

For safe, efficient, and accurate testing, review the safety and operating instructions in this manual before using the analyzer. In addition, follow all manufacturers' instructions and BCI (Battery Council International) safety recommendations.



### Caution!

Inspect the battery for damages and check the electrolyte level. If the electrolyte level is too low, replenish it and fully charge the battery. Always use the necessary safety precautions when working with batteries to prevent severe injury or death..

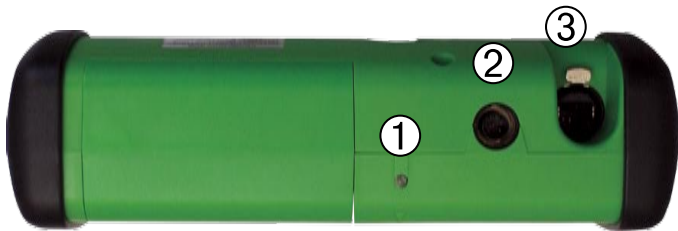
Follow all manufacturers' instructions and BCI (Battery Council International) safety recommendations, which include the following precautions:

- ▶ **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 cold running water for at least 15 minutes and seek medical attention. If battery acid gets on your skin or clothing, wash immediately with a mixture of 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.

## Chapter 2: Overview

This chapter describes the analyzer's hardware and software interface. The components include test leads and connectors, and the display and keypad. The user interface comprises the software menus, test options, and utilities.

### Connections and Data Ports



Top



Front



### Bottom

- 1 Data transmitter: sends test results to an optional IR printer
- 2 6-pin connector for the battery test cable

- 3 Accessories port: an RJ45 connector with a release lever for accessory test cables
- 4 Integrated thermal printer
- 5 LCD screen
- 6 LED: lights in conjunction with beeping alarm to indicate transitions and warnings
- 7 Control Panel: keypad and power button
- 8 Mini USB connector for future accessories
- 9 DB-9 connector for future accessories

### Rear



### Right Side



- 1 Infrared temperature sensor
- 2 Compartment for six AA 1.5-volt batteries (alkaline recommended)
- 3 Spring-loaded SD card slot for test data storage and software upgrades.

## Test Leads

- 1 Battery test cables (10-foot)
- 2 Amp clamp (optional)
- 3 Cable-Drop cable (optional)
- 4 Probes (optional)



phone jack. To remove it, press the lever and pull out the cable connector.

## Removing and Inserting the SD Card

The analyzer ships with a plastic insert in the SD card slot to protect it from dust and debris. To remove the insert or an SD 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!

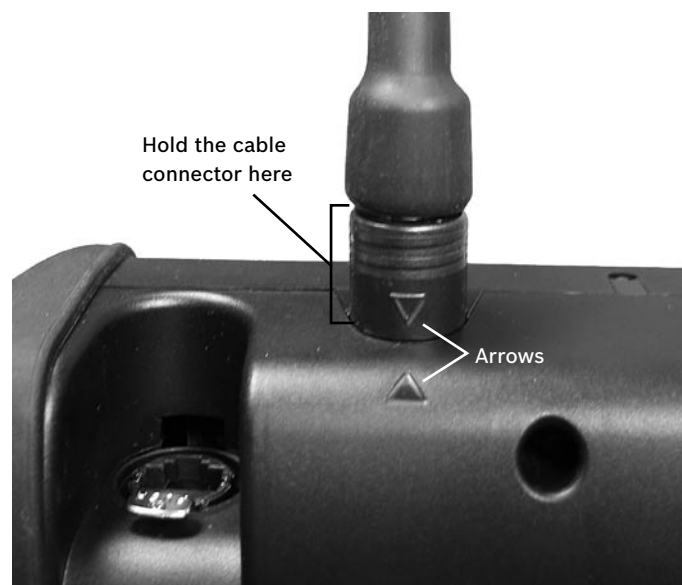
To prevent damage to the analyzer's circuitry, do not connect the analyzer to a voltage source greater than 60 Vdc.

To connect the battery test cable to the analyzer align the arrow on the cable connector with the arrow on the analyzer's housing. Hold the ridged part of the cable connector and firmly insert the connector into analyzer's six-pin receptacle. **Do not twist.**

To avoid damaging the battery test cable, always hold the ridged part of the cable connector (as shown in the photo) when inserting and removing the cable.

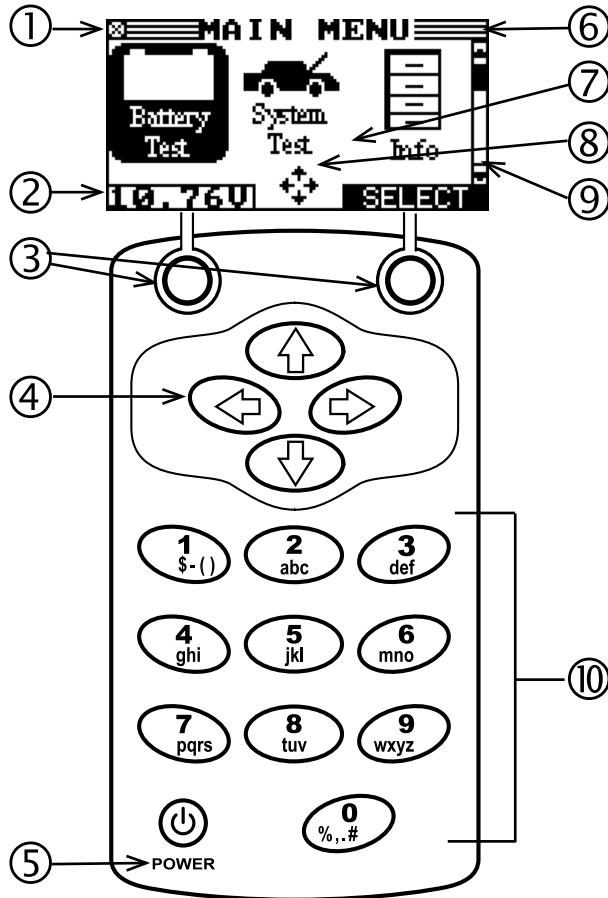
## Connecting an Accessory Cable

If you are using an accessory cable, plug it into the accessories port on top of the analyzer as you would a



## Display and Keypad

The BAT 151 display and keypad 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. The illustration shows how the elements on the screen relate to the keypad.



### 1 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.

### 2 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.

### 3 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**.

### 4 Arrow keys

Press the **ARROW** keys to scroll to numerical values and move to menus and icons

### 5 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.

### 6 Title Bar

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

### 7 Selection Area

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

### 8 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.

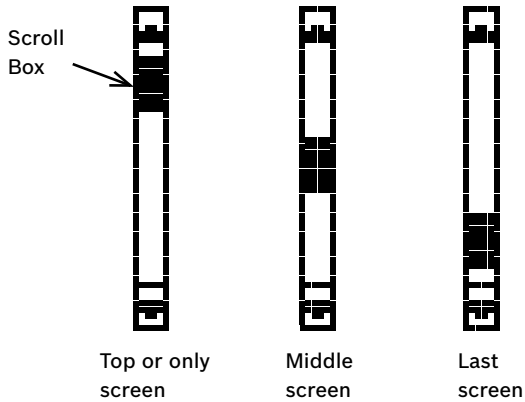
When displayed under a list of options, the menu screen arrows show you which keypad arrow to press to highlight a character or item in a list.

### 9 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.



### 10 Alphanumeric Keypad

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

You can also use the alphanumeric keys to create and edit customer coupons and your shop contact information on printed test results, and manage User IDs.

To add a space, press the **RIGHT ARROW** key. To erase a space and insert a character, press the **LEFT ARROW** key.

Refer to the table below for the characters associated with each alphanumeric key.

#### Keypad Character Assignment

Key	Character
①	\$ - ( ) 1
②	a b c 2
③	d e f 3
④	g h i 4
⑤	j k l 5
⑥	m n o 6
⑦	p q r s 7
⑧	t u v 8
⑨	w x y z 9
⑩	% , . # 0
	Backspace
	Space

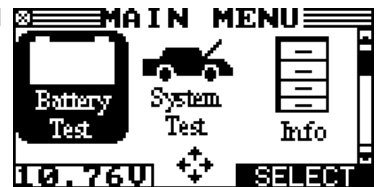
## Data Entry Methods

To perform a particular test or function, the BAT 151 requires different types of information. This means that the methods you use to enter information will change depending on the type of information requested. The five 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 **END**.)

### Menu Icons

A menu icon is a graphical representation of a function you can select, such as the Battery test Icon in the Main Menu.



To select an icon, use the **LEFT ARROW** 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** or **DOWN ARROW** key 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 keypress is needed to proceed.

### Scrolling Lists

Scrolling lists contain 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 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.

To move the highlight bar up five lines at a time, press the **LEFT ARROW** key.

To move the highlight bar down five lines at a time, press the **RIGHT ARROW** key.

### Scroll Boxes

Scroll boxes contain variables that are displayed by scrolling using arrow keys.



To select, use the **UP** or **DOWN ARROW** key to scroll to the value, or use the keypad to enter the value directly, and press the appropriate soft key. In the illustration the left directional arrow indicates that you can press the **LEFT ARROW** key to clear all or part of the entry.)

### 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. 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** key to highlight a line for editing. When finished, press the appropriate soft key to save your settings.

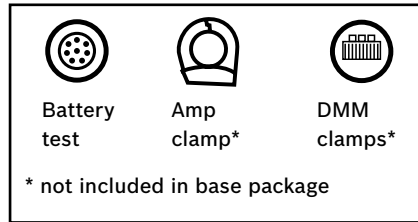
# Menu Structure

This section contains a graphical representation of the menu structure with brief descriptions of the utilities in each menu.

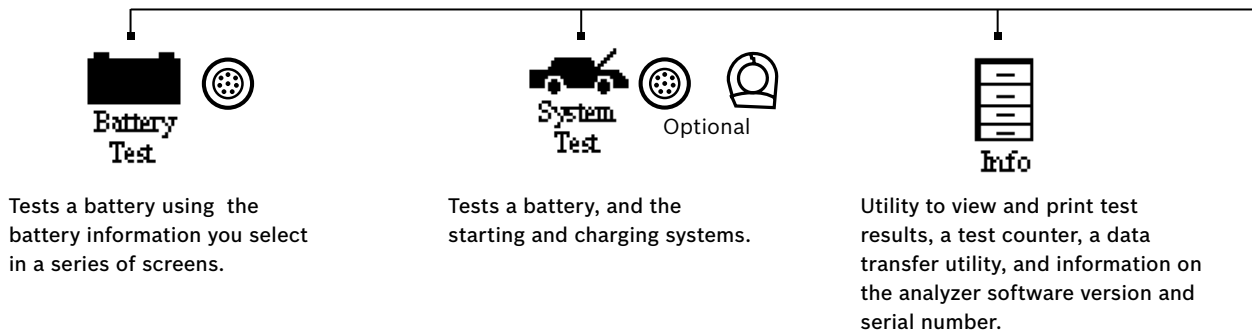
## Main Menu

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 options. Menu icons marked with an asterisk (\*) are mapped on the following pages.

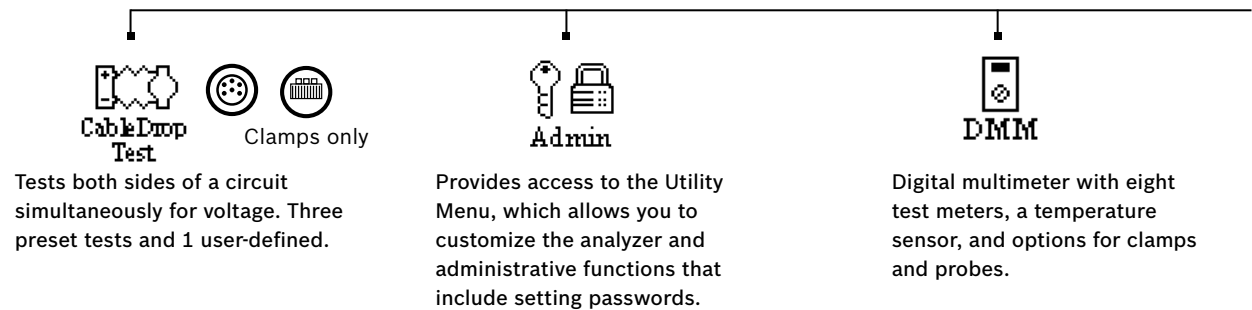
### Test leads



### Main Menu (Screen 1)



### Main Menu (Screen 2)

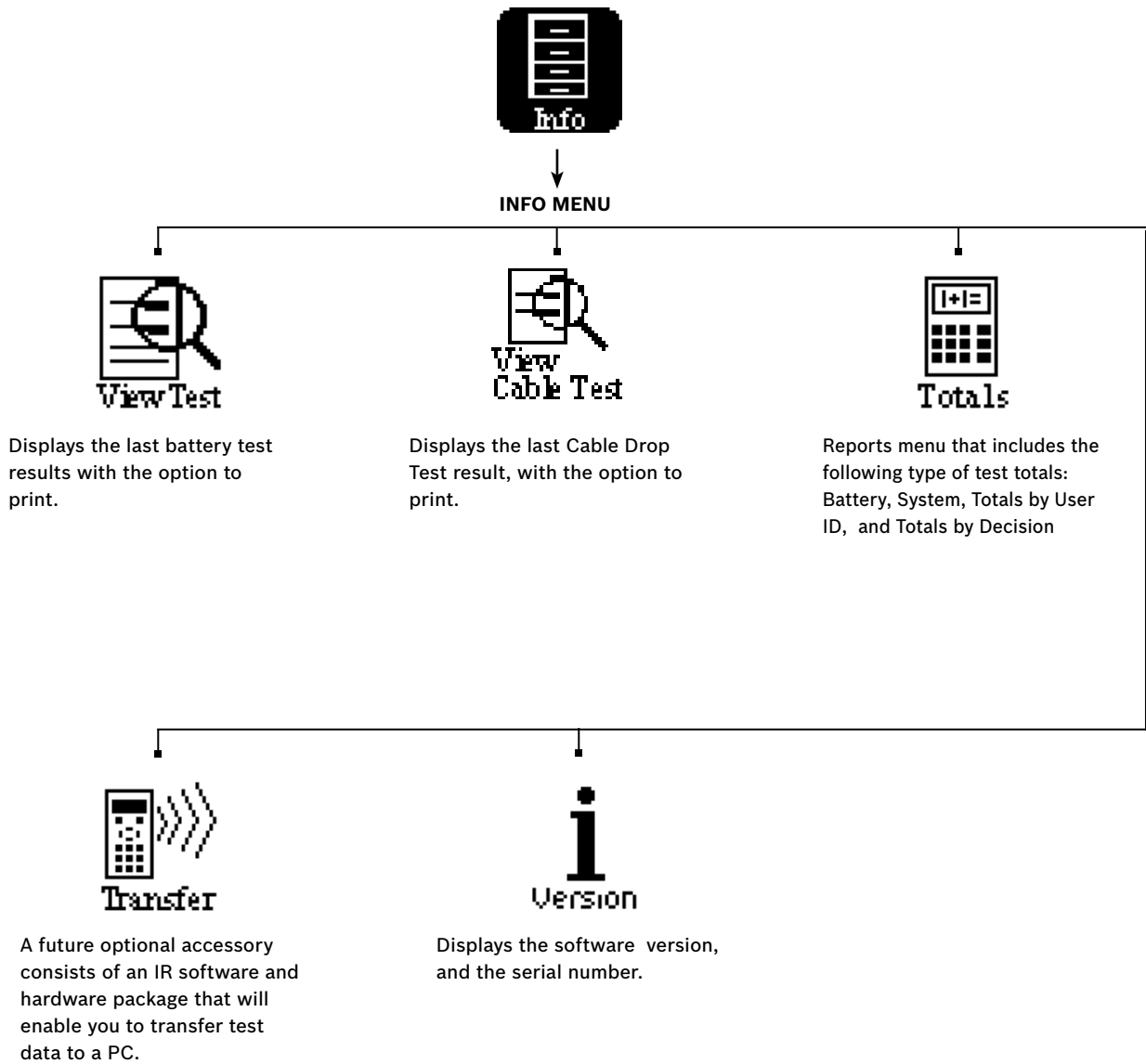


### Main Menu (Screen 3)



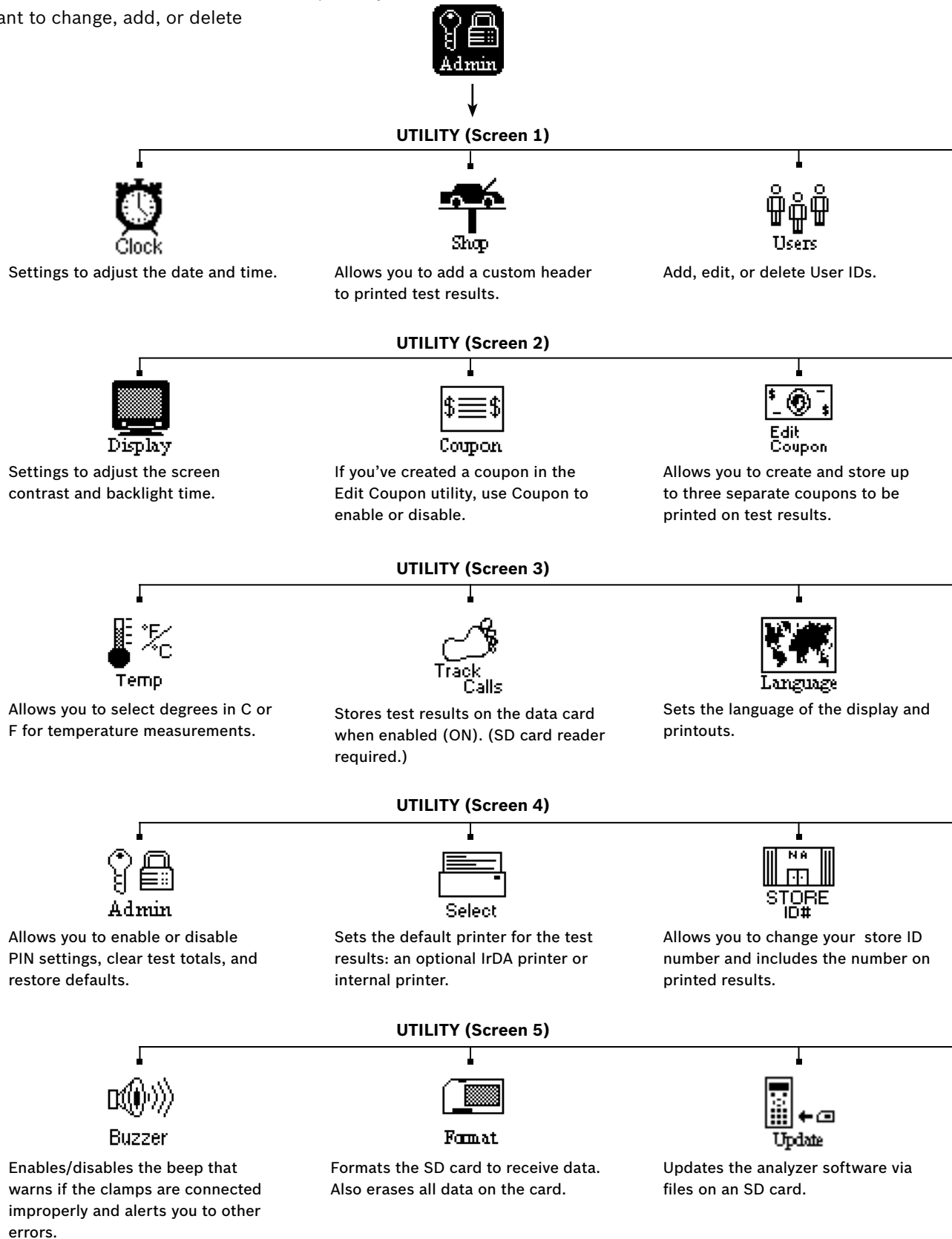
## Info Menu

The Info Menu has utilities to allow you to view and print test results, track the usage and history of your analyzer, and manage test data.



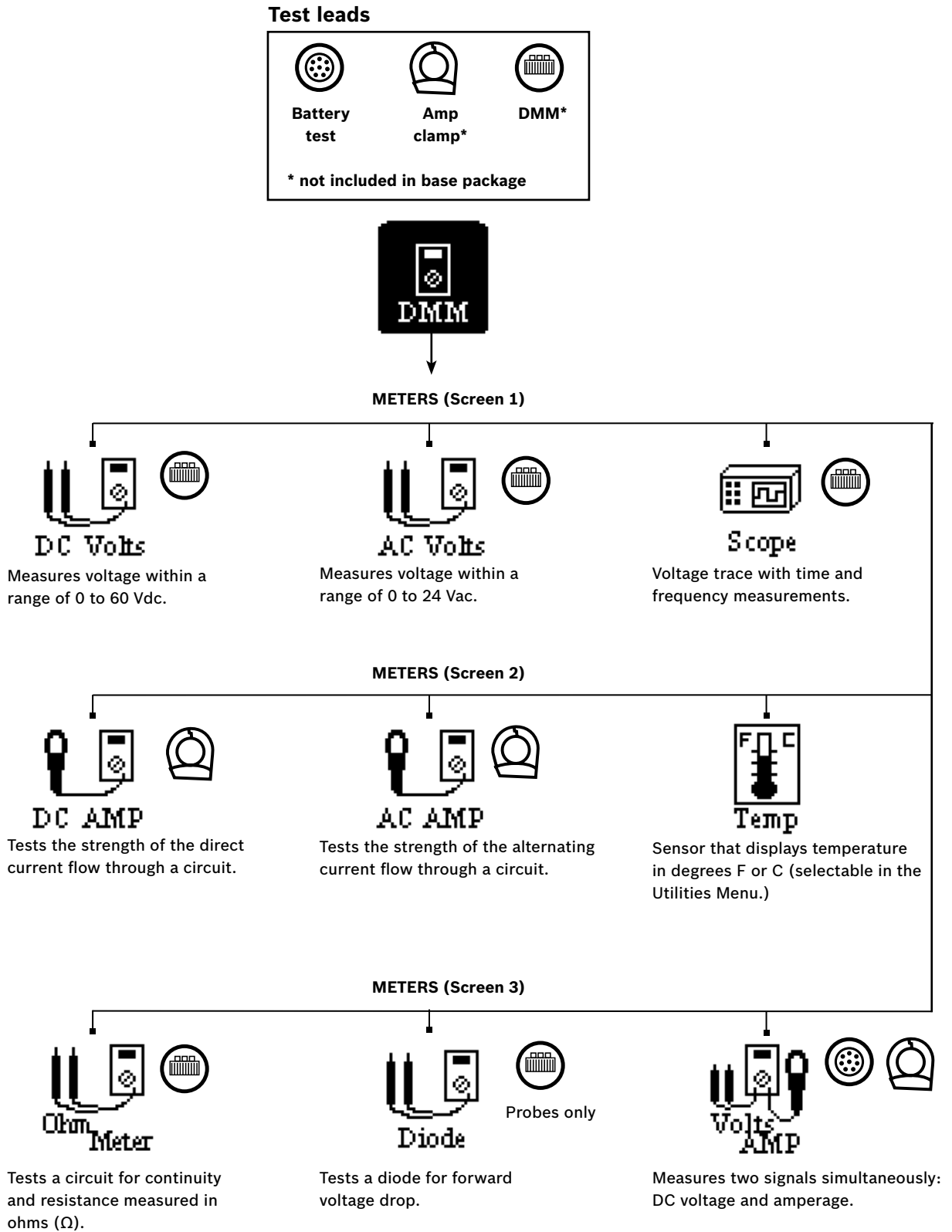
## Admin/Utility Menu (password required)

The Admin/Utility Menu lets you customize your analyzer for your needs. Before using the analyzer for the first time, check the default values to see what options you may want to change, add, or delete



### DMM Menu

The DMM Menu has icons for a temperature sensor and eight test meters, some of which require different test leads.



## Chapter 3: Getting Started

The BAT 151 has the capability to require a default USER ID and PIN to access the Main Menu. In addition, it can require a default ADMIN PIN to access the Admin/Utility Menu. The instructions in this section will help you quickly put your BAT 151 to work if the PIN access is turned on.

### Logging In for the First Time

When you turn on the BAT 151, it takes approximately eight seconds to boot up while testing the integrity of its software.

#### Bootup

After the logo appears, the first selection screen to appear enables you to temporarily set the language for the display and printed test results.

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

- 1  ENGLISH
- 2  ESPAÑOL
- 3  FRANÇAIS

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

### Entering Your Store ID Number and Postal Code

The next screen asks you to enter your store ID number.

1. Insert a character by pressing the alphanumeric key associated with the character as many times as needed.

ENTER STORE ID#

2. Press the **NEXT** soft key to continue.
3. Use the alphanumeric keypad to enter your postal code.

ENTER ZIP CODE

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

The next time you log in, you will not be asked for your store ID and postal code. The analyzer saves stores them in memory until you change them using the STORE ID# option in the Utility Menu. An administrator password is required to access the menu.

### Logging in as an Unregistered User

The default setting requires a user name and password to display the Main Menu. You can log in as an unregistered user or you can create a new user ID and PIN.

1. To log in as an unregistered user, press the **NEXT** soft key to selected the highlighted **UNREG**.

0 UNREG  
1 ADD USER

2. USER PIN: The PIN login screen appears. Enter the default PIN **0000** (four zeros) and press **NEXT**. (Only when PIN protection is turned ON under Admin Menu. Default setting is OFF.)

ENTER PIN

**IMPORTANT:** When you enter the PIN number, be sure to slowly enter the numbers so that the all the asterisks appear on screen. If you enter the PIN too quickly not every keypress may register, and the message PIN DOES NOT MATCH may appear.

If you enter the wrong PIN, the BAT 151 prompts you to re-enter it. Press the **BACK** soft key to re-enter your PIN, or press **BACK** to return to the log-in screen.

### Adding a User

1. Use the **DOWN ARROW** key to scroll to ADD USER. Press the **NEXT** soft key to continue.

0 UNREG  
1 ADD USER

2. Use the **UP** or **DOWN ARROW** keys to scroll to the ID placeholder you want to use. Scrolling past the first line displays the previous screen. Scrolling past the fourth line displays the next screen. To display more placeholders, continue scrolling or use the **LEFT** or **RIGHT ARROW** key to jump up or down through the list five lines at a time. Press the **NEXT** soft key to continue.

- 1 USER01
- 2 USER02
- 3 USER03
- 4 USER04

- To clear the default characters, press the **LEFT ARROW** key. To add a space, move the cursor forward by pressing the **RIGHT ARROW** key.

ENTER USER ID

- Insert a character by pressing the alphanumeric key associated with the character as many times as needed. Press the **SAVE** soft key.

ENTER USER ID

- Enter a four-digit PIN and press **NEXT**.

ENTER PIN

- The analyzer asks you to re-enter the PIN correctly before it can be saved. Re-enter your PIN and press the **SAVE** soft key.

RE-ENTER PIN

**Initial Administrator Login**

- In the Main Menu, select the **ADMIN** icon.



- Enter the default PIN **12345**. You now have access to ADMIN/UTILITY menu. (Only when PIN protection is turned ON under Admin Menu. Default setting is OFF.)

ENTER PIN

If you enter the wrong PIN, the analyzer prompts you to re-enter it. Press the **BACK** soft key to re-enter your PIN, or press **EXIT** to return to the Main Menu. We recommend that you change your PIN as soon as possible and keep a record of it in a secure place.

## Chapter 4: Admin/Utility Menu

The Admin/Utility Menu has several utilities that customize the BAT 151—from the language of the user interface to the contrast of the text on the display. The utilities have default settings that you can change, depending on your requirements. The most important function is the ADMIN (administrative) function which controls user access. Access to the Admin/Utility Menu initially requires an ADMIN PIN (default: 12345).

Table 1: Utility Default Settings

Setup Function	Default Settings
CLOCK TIME MODE DATE FORMAT	The current Central Standard Time AM Current MM/DD/YYYY (month/day/year)
SHOP	Generic header for printouts with 12 lines of text and a maximum of 17 characters per line
USERS	USER01 through USER48 are placeholder IDs used to create user names and PINs.
DISPLAY CONTRAST LEVEL BACKLIGHT TIME	Range: 0 (lightest) to 10 (darkest). The default is set at 9. Range: 0 to 60 seconds. The default is set at 15 seconds.
COUPON	Disabled (NO COUPON PRINTED)
EDIT COUPON	Eight lines of text with 17 characters per line. Default: USER COUPON LINE 1 through USER COUPON LINE 8
TEMPERATURE	DEGREES F (Fahrenheit)
TRACK CALLS	Tracking ON
LANGUAGE	English (French-Canadian and Spanish are available). The language can also be selected at startup.
ADMIN OPTIONS 1-USER ID 2-PIN 3-UNREG. USER 4-ADMIN	User login screen enabled (ON) User PIN screen enabled (OFF) Unregistered user accessibility enabled (ON) Administrative PIN enabled (OFF)
SELECT printer type	INTERNAL PRINTER
BUZZER	ON





## Clock

The CLOCK ADJUST utility has four settings. Use the UP (▲) or DOWN (▼) **ARROW** key to highlight the setting you want to change. Although the date and time have been set at the factory, you may want to make adjustments based your time zone or Daylight Saving Time.

```

MODE :          AM/PM
TIME :          9:07 AM
FORMAT :        /MM/DD/YYYY
DATE :          /11/29/2006
  
```

### Mode

Use the **UP** or **DOWN ARROW** key, or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.

- Select the or 24-hour or 12-hour (AM/PM) clock.
  - 24 HOUR
  - AM/PM
- If you used the **ARROW** keys, 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.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

### Time

- Use the **LEFT** or **RIGHT ARROW** keys to highlight the hour, minutes, or AM or PM. To rapidly scroll, hold down an **UP** or **DOWN ARROW** key.

```

9 : 19 PM
  
```

- Press the **SAVE** soft key to save your setting, or press the **BACK** soft key to return to the CLOCK ADJUST screen.

### Format

Use the UP or DOWN ARROW or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.

- Select the format of the date.
  - MM/DD/YYYY (month/day/year)
  - DD/MM/YYYY (day/month/year)
- If you used the **ARROW** keys, 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.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

#### 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-
  
```

### Date

- Use the LEFT or RIGHT ARROW key to highlight the month, day, or year. To rapidly scroll, hold down an UP or DOWN ARROW key.

```

6 / 17 / 2005
  
```

- 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.



**Shop**

The SHOP INFO utility allows you to create a header for your printed test results with your business location information. Its three information screens contain 12 lines of text with a maximum of 17 characters per line.


To help you edit and center your header, use a pencil to write the information in the template below before entering it into the BAT 151.

**Header Template**

Line 1																	
Line 2																	
Line 3																	
Line 4																	
Line 5																	
Line 6																	
Line 7																	
Line 8																	

To create or overwrite a header:

1. Press the **UP** or **DOWN ARROW** to highlight the line you want to change. The cursor blinks to the right of the last character in the line. (The cursor is not visible if all character spaces are filled.)
2. To erase a character, press the **LEFT ARROW** key.
3. Insert a character by pressing the alphanumeric key associated with the character as many times as needed. You can center text by inserting blank spaces with the **RIGHT ARROW** key. If you pause momentarily, the cursor will automatically move to the right.



**Important**

Be sure to erase any default characters on unused lines by pressing the **LEFT ARROW** key.

4. 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.



**Users**

The USERS utility allows you to create and edit a USER ID with 1 to 7 alphanumeric characters and link it to a test counter. It also allows you to delete a USER ID and its associated test total.

**Entering a New User ID**

1. To create a USER ID, select:
  - 1  ENTER NEW
  - 2  DELETE
  - 3  EDIT

Press the **NEXT** soft key to display the list of available IDs.

2. Use the **UP** or **DOWN ARROW** keys to scroll to the ID placeholder you want to use. Scrolling past the first line displays the previous screen. Scrolling past the fourth line displays the next screen. To display more placeholders, continue scrolling or use the **LEFT** or **RIGHT ARROW** key to jump up or down through the list five lines at a time.

```

1 USER01
2 USER02
3 USER03
4 USER04
    
```

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

- To clear the default characters, press the **LEFT ARROW** key. To add a space, move the cursor forward by pressing the **RIGHT ARROW** key.

ENTER USER ID

USER01

- Insert a character by pressing the alphanumeric key associated with the character as many times as needed. Press the **SAVE** soft key.

ENTER USER ID

DAN L.

- Enter a four-digit PIN and press **NEXT**.

ENTER PIN

\*\*\*\*

### Deleting a User ID



#### Note

You cannot delete placeholder USER IDs (i.e., USER03).

- To delete a USER ID, select:

- ENTER NEW
- DELETE
- EDIT

Press the **NEXT** soft key to display the list of IDs.

- Use the **ARROW** keys to select a USER ID as described in step 2 in “Entering a New User ID” on page 19.

1 ANDY

2 JIM F

3 USER03

4 USER04

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



### Display Display

The LCD OPTIONS utility allows 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:

- Press the **UP** or **DOWN ARROW** key to highlight the option.

CONTRAST LEVEL	10
BACKLIGHT TIME	60

- Press the **ADJUST** soft key to display the option’s numerical scroll box.

9 (1-10)

- Press the **UP** or **DOWN ARROW** key or the corresponding numerical keys to select your preference. To erase a character, press the **LEFT ARROW** key.

- Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the LCD OPTIONS screen without saving the changes.

### Backlight Time

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

- Press the **UP** or **DOWN ARROW** key to highlight the option.

CONTRAST LEVEL	10
BACKLIGHT TIME	60

- Press the **ADJUST** soft key to display the option’s numerical scroll box.

15 SEC

- Press the **UP** or **DOWN ARROW** key or the corresponding numerical key to select your preference. To erase a character, press the **LEFT ARROW** key.

- Press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the LCD OPTIONS screen without saving the changes.



**Coupon** Coupon

The COUPON utility allows you to enable and disable the custom coupons or message created in the EDIT COUPON utility. You also have the option of having no coupon print.

1. Use the **UP** or **DOWN ARROW** key, or press the corresponding numerical key to move the dot to the option button of your choice (1 or 2).
  - 1  NO USER COUPON PRINTED
  - 2  USER COUPON
2. If you used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.



**Edit Coupon** Edit Coupon

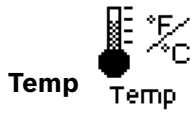
The EDIT COUPON utility allows you to create and store a promotional coupon or message on the printed test results you give for your customers. The utility’s two information screens contain eight lines of text with a maximum of 17 characters per line. To enable and disable the inclusion of the text on your test results, use the COUPON utility.

To create and edit a coupon, see the procedure under “Shop” in this chapter for using the keypad to enter and backspace over characters.

To help you edit and center your coupon, use a pencil to write the information in the template below before entering it into the analyzer.

**Coupon Template**

Line 1																	
Line 2																	
Line 3																	
Line 4																	
Line 5																	
Line 6																	
Line 7																	
Line 8																	



## Temp

The TEMP. UNITS utility allows you to set the units of measurement to either Fahrenheit or Celsius. To set your preference:

1. Use the **UP** or **DOWN ARROW** key, or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.

- 1  DEGREES F
- 2  DEGREES C

2. If you used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Admin/Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.



## Track Calls

The TRACK CALLS utility stores the test results and test codes by date as an .xml (Extensible Markup Language) file in a folder named "XML" on the data card. This utility requires an SD card reader (not included) to read or transfer the file to a PC. You can open the file in Microsoft® Internet Explorer®. The data in the file is separated by tags (identifiers enclosed in angle brackets) that define the data.



### Note

To avoid corrupting the file, copy rather than move the file to your PC..

The default setting for the utility is ON. To set your preference:

1. Use the **UP** or **DOWN ARROW** key, or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.

- 1  TRACKING OFF
- 2  TRACKING ON

2. If you have used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection



### Note

Over time disk access slows as the SD card reaches its capacity. To free up card space, transfer the files to a PC and reformat the card to permanently erase data no longer needed.



## Language

The LANGUAGE utility allows you to select a language for the display and printouts. You can override the selection when the BAT 151 displays the language option after you turn it on or print results.

To set your preference:

1. Use the **UP** or **DOWN ARROW** key or press the corresponding numerical key (1, 2, or 3) to move the dot to the option button of your choice.

- 1  ENGLISH
- 2  ESPAÑOL
- 3  FRANÇAIS

2. If you used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Admin/Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.



## Admin

This section explains how to use the Admin Utility to control password access to the BAT 151. It also describes functions that clear test totals and restore settings to factory defaults.

Select the ADMIN icon to display a list of administrative functions:


- 1  OPTIONS
- 2  CHANGE ADMIN PIN
- 3  CLEAR TEST TOTALS
- 4  RESET DEFAULTS

**Options**

In the OPTIONS section there are four functions that allow you to control user access to the Main Menu and Admin/Utility Menu. Each option is easily enabled or disabled by turning it ON or OFF. To save your settings after each selection, press the **SAVE** soft key. To return to the administrative functions list without saving, press the **BACK** soft key.

**1 – USER ID**

Select this setting to enable (ON) or disable (OFF) the USER ID login screen.



**Note**  
When you turn off the USER ID, the USER PIN option is disabled.

**2 – PIN**

Select this setting to enable (ON) or disable (OFF) the USER PIN login screen.

**3 – UNREG. USER**

Select this setting to enable (ON) or disable (OFF) unregistered login access to the analyzer when option **1 – USER ID** is ON. When the option **2 – PIN** is ON, the PIN for the unregistered user ID **UNREG** is **0000** (4 zeros).

**4 – ADMIN**

Select this setting to enable (ON) or disable (OFF) the ADMIN PIN login screen that allows access to the Admin/Utility Menu.

**Change Admin PIN**

This function allows you to change your five-digit Administrator PIN. The default PIN is **12345**. **Clear Test Totals**

This function allows you to clear the test totals by User ID and battery test decision. The analyzer verifies that you want the counter reset to 0 before it continues.



**Note**

This will not clear the lifetime test total available in the VERSION information screen.

**Reset Defaults**

This function allows you to reset Administrative options to their original settings. It will clear all registered users and restrict access to the BAT 151.

Option	Default Settings
1 – USER ID	ON
2 – PIN	OFF
3 – UNREG. USER	ON
4 – ADMIN	OFF



**Select Printer**    Select

The SELECT PRINTER utility allows you to select a default printer for the test results: an optional handheld IRDA printer or the analyzer’s integrated (internal) printer. To set your preference:

- Use the **UP** or **DOWN ARROW** key or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.
  - 1  IRDA PRINTER
  - 2  INTERNAL PRINTER
- If you used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Admin/Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.



**Store ID#**

The next screen asks you to enter your store ID number.

- Insert a character by pressing the alphanumeric key associated with the character as many times as needed.

ENTER STORE ID#

2. Press the **NEXT** soft key to continue.
3. Use the alphanumeric keypad to enter your store's zip code, and press the **SAVE** soft key.

ENTER ZIP CODE

**Buzzer** Buzzer

The BUZZER utility allows you to enable or disable the beep that warns you if the clamps are connected improperly and alerts you to other errors.

1. Use the **UP** or **DOWN ARROW** key or press the corresponding numerical key (1 or 2) to move the dot to the option button of your choice.
  - 1  OFF
  - 1  ON
2. If you used the **ARROW** keys, press the **SAVE** soft key to save your setting or the **BACK** soft key to return to the Admin/Utility Menu without saving the changes.

If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

**Format Disk** Format

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

**Update** Update

When software updates become available for the BAT 151, this utility walks you through the quick process of updating the analyzer's software using a data card. Chapter 5: Test Preparation

## Chapter 5: 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 (Battery Test)

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.

**Caution!**

When testing side-post or Group 31 batteries, always use lead terminal adapters provided with the BAT 151—do not test at the battery's steel bolts. To avoid damage, never use a wrench to tighten the adapters more than 1/4 turn. Failure to properly install lead terminal adapters, or using adapters that are dirty or worn, may cause false test results.

### Testing In-Vehicle (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 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. Otherwise, you must remove the battery and perform a System Test.

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

### Connecting to the Battery

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

If you connect the clamps in the wrong polarity (red to negative or black to positive), the analyzer displays CLAMPS REVERSED! Reconnect the clamps.

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 analyzer displays the message CHECK CONNECTION. If the message reappears after you have correctly reconnected the clamps, clean the terminals and reconnect

## Chapter 6: Battery Test

The Battery Test analyzes a battery not connected to a vehicle. The BAT 151 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 5: Test Preparation.

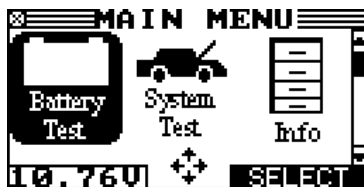


### Important

When you start a new test, the last test results in memory are overwritten. Remember to record or print the results if you need to retain them.

If you use the **ARROW** keys to select option buttons, press the **NEXT** soft key to continue to the next step. If you use the alphanumeric keypad to enter the number preceding the option button, no additional keypress is needed to save your selection.

1. In the Main Menu select the Battery test icon.



2. Use the numeric keys to enter the battery date code, which is printed on the battery label. Enter the date in the format MM/YY (for example, 01/07 for January 2007) and press **NEXT**. If the date code is unavailable, press **ENTER** to continue.

IF AVAILABLE, ENTER  
THE BATTERY DATE CODE

3. Select the POST TYPE. The REMOTE option appears for the IN VEHICLE test.
  - 1  BATTERY POST
  - 2  SIDE POST
  - 3  JUMP START REMOTE POST (appears for System Test)
 Press the **NEXT** soft key to continue.
4. Select the BATTERY TYPE.
  - 1  REGULAR/AUTO
  - 2  AGM
  - 3  AGM/SPIRAL
  - 4  MOTORCYCLE
 Press the **NEXT** soft key to continue.

If you select MOTORCYCLE as the battery type, the analyzer asks for the battery part number. Scroll to the part number (128 available). 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 five part numbers at a time. Press **ENTER** and continue the test at step 7 to determine the battery temperature.

5. Select the battery's rating units. The rating units and rating information required in the next step are printed on the battery label. If the information is unreadable, contact the battery manufacturer.
  - 1  CCA
  - 2  CA
  - 3  MCA
  - 4  JIS
  - 5  DIN
  - 6  SAE
  - 7  IEC
  - 8  EN
 Press the **NEXT** soft key to continue.



Table 2: Battery Rating Systems

Rating System	Description	Range
CCA	Cold Cranking Amps (specified by SAE): The amount of current a battery can provide at 0 °F (-17.8 °C).	100 to 3000
CA	Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000
MCA	Marine Cranking Amps: The amount of current a battery can provide at 32°F (0 °C).	100 to 3000
JIS	Japanese Industrial Standard: (shown on a battery as a combination of numbers and letters.	72 numbers from 26A17 to 245H52
DIN (A)	Deutsche Industrie-Norm	100 to 1000
SAE (A)	European labeling of CCA	100 to 3000
IEC (A)	International Electrotechnical Commission	100 to 1000
EN (A)	Europa-Norm	100 to 1700

- Press an **UP** or **DOWN ARROW** key, or use the numeric keys to select the BATTERY RATING. Press **ENTER**.

If you select JIS, the analyzer will ask 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 five part numbers at a time. Press **ENTER** to continue.

- Hold the analyzer two inches above the battery case so that the IR temperature sensor on its underside can approximate the battery temperature. Press **NEXT** to continue.

**Additional Test Requirements**

For a more decisive result the analyzer may ask for additional information or further explore the battery’s condition. The following messages and instructions may appear before the analyzer displays the results.

**System Noise Detected**

The analyzer has detected computer, ignition noise, or parasitic drain, and will attempt to retest. Make sure all vehicle loads are off, doors are closed, and the ignition is in the off position. The analyzer will automatically retest when it no longer detects system noise. If the message reappears:

- ▶ You may be testing too close to a noise source, such as a charger or other high-current device. If so, move away and retest.
- ▶ If you are unable to find the source of the noise, fully charge the battery and retest. If the message appears after recharging, test the battery out of the vehicle.
- ▶ Disconnect the battery cables and retest.

**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.

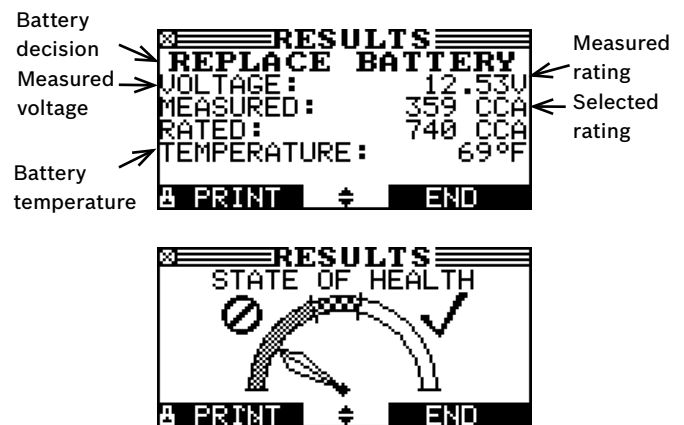
**Deep Scan Test**

In some cases the analyzer may need to further analyze a deeply discharged battery to determine whether the battery should be replaced or if it has a chance to be recovered. It will then conduct a Dynamic Scan Test of the battery for a few seconds while displaying a battery being scanned .

**Battery Test Results**

After the test, the analyzer displays a battery decision with an analysis in a series of screens. The analysis includes the battery state-of-health (SOH). See Table 3 on the next page for an explanation of the battery decisions.

Use the **UP** or **DOWN ARROW** key to scroll to each screen. To return to the Main Menu, press the **END** soft key. If you are performing a System Test, press the **NEXT** key to continue with the Starter System Test.



### State of Health (SOH)

The battery's state of health represents its general condition, and therefore its ability to deliver the specified performance compared with a fresh battery.

Although a poor state-of-health can be the result of defects in construction, it is most often caused by normal wear, which depends on vehicle needs, climate, and operating conditions. These cause irreversible physical and chemical changes within the battery until it can no longer hold a charge and supply the power to start the car and provide auxiliary power to the electrical system. As the battery approaches end of life, its deterioration accelerates until it finally fails to start the vehicle. Before failing, the battery may start the vehicle under normal conditions but may not be able to operate in more extreme conditions. Extreme heat or cold could expose a weak battery and cause it to fail.



#### Note

When testing at remote posts, the analyzer may need to verify a possible REPLACE result. It will give you the option of retesting at the battery posts.

When testing at side posts, the analyzer may find that the data is inconclusive and instruct you to test with side post adapters.

**Table 3: Battery Decisions**

Decision	Recommended Action
Good Battery	Return the battery to service.
Good-recharge	Fully charge the battery and return it to service.
Charge Required	Fully charge the battery and retest. <b>Failure to fully charge the battery before retesting may cause false readings.</b> If CHARGE REQUIRED appears again after you fully charge the battery, replace the battery.
Replace Battery	A REPLACE BATTERY result may also mean a poor connection between the battery and the vehicle. If you tested the battery using the System test, disconnect the battery cables and retest using the Battery Test before replacing it..
Bad Cell-replace	Replace the battery. <b>WARNING: Do not charge the battery. Charging a battery with one or more bad cells could cause an explosion and serious harm to the user.</b>
Marginal	The battery may fail under extreme climate conditions. A MARGINAL battery result may also mean a poor connection between the battery and the vehicle and the battery. If you tested the battery using the System test, disconnect the battery cables and retest using the Battery Test before replacing it.

## Chapter 7: System Test

The system test first evaluates the battery, then the starting and charging systems. The test provides the option of using the amp clamp to measure charging current.



### Important

When you start a new test, the last test results in memory are overwritten. Remember to record or print the results if you need to retain them.

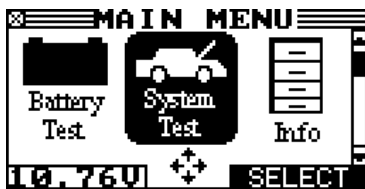
### Battery Test

The System Test includes a test of the battery to eliminate it as the cause of starting or charging problems. See Chapter 6 for the Battery Test procedure.

### Starter System Test

The performance of the starter and charging systems depends on the battery's condition. It is important that the battery is good and fully charged before any further system testing.

1. In the Main Menu select the Battery test icon.



2. Start the engine at the prompt. If after the vehicle started and the results do not appear after approximately 25 seconds, press the **NO START** soft key.
3. The analyzer displays one of six decisions and the results in a series of screens.



### Note

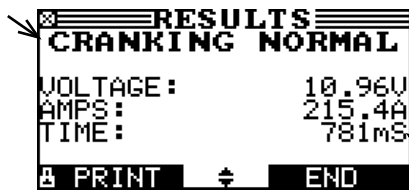
In some cases, the analyzer may not detect the vehicle's starting profile and display the soft key options **STARTED** and **NO START**. If you select **STARTED**, the analyzer skips to the Charging System Test. If you select **NO START**, the test process ends.

### Starter System Test Results

The results include the battery analysis. Use the **UP** or **DOWN ARROW** key to scroll to each screen. See Table 4 for on the next page for an explanation of the starter

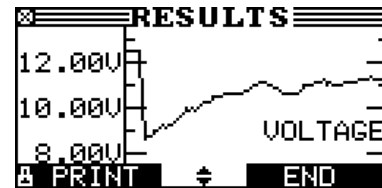
system decisions. To continue testing, press the **NEXT** soft key.

Starter decision



Average cranking voltage  
Average cranking current if amp clamp is used  
Cranking time in milliseconds

Y axis = System performance: cranking voltage



X axis = Time

Table 4: Starter System Decisions

Starting System 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 Required	The starter voltage is low and the battery is discharged. Fully charge the battery before retesting.
Replace Battery	Replace the battery and retest before testing the alternator test..
No Start	The engine did not start and the test was aborted.
Low Cranking Amps	Displayed if amp clamp is used. The starter voltage is high but the cranking amps are low.
Cranking Skipped	The analyzer did not detect the vehicle's starting profile and skipped the Starter Test.

### Charging System Test

When you press **NEXT** in any test result screen, the analyzer proceeds to the Charging System Test.

1. CHECKING FOR ALTERNATOR OUTPUT: The analyzer is 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 moves to the right.



**Note**

Some 8-cylinder and older vehicles idle at a high level after starting, allowing the analyzer to detect the rev automatically.

4. ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
5. ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. Press the **NEXT** soft key.
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 analyzer 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.



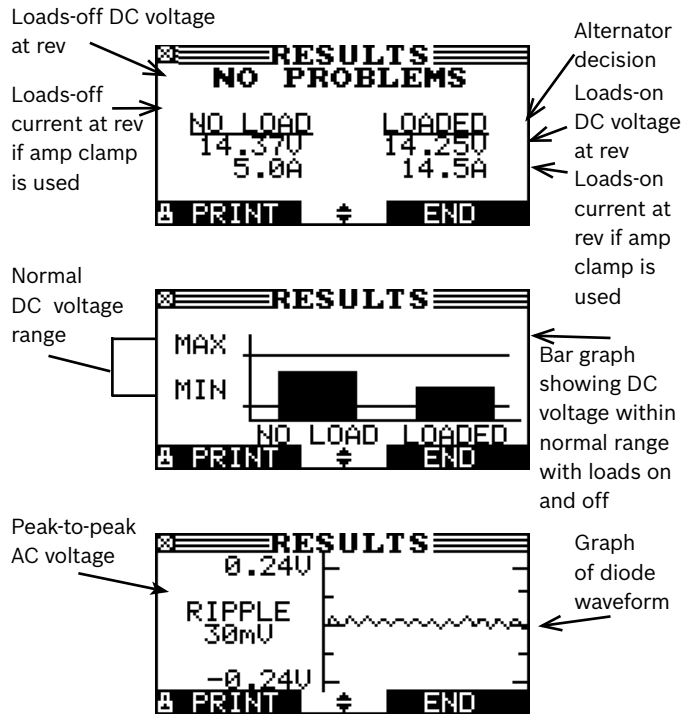
**Important**

Turn on the high-beam headlights and the blower to high. Do not 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 analyzer 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 moves to the right.

- 10.ACQUIRING DATA....HOLD ENGINE RPM: Continue to hold the rpm while the analyzer takes system measurements.
- 11.ENGINE REV DETECTED, IDLE ENGINE: The analyzer has detected the rev. Press the **NEXT** soft key.
- 12.ANALYZING CHARGING SYSTEM DATA: The analyzer 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.

**Charging System Test Results**



**Table 5: Charging System Decisions**

Charging System Decision	Action
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> <p>The regulator controls voltage output based on the battery voltage, under-hood temperature, and vehicle loads used. In other words, it controls the maximum voltage the system can produce based on the current needs and amount of current that can be produced by the spinning of the rotor in the alternator. The normal high limit of a typical automotive regulator is 14.5 volts +/-0.5. Refer to the manufacturer specifications for the correct limit, which may vary by vehicle type.</p> <p>A high charging rate will overcharge the battery and may decrease its life and cause it to fail. If the battery test decision is REPLACE and the charging system test shows a HIGH OUTPUT, check the battery's electrolyte levels. A symptom of overcharging is battery fluid spewing through the vent caps, which causes low electrolyte levels and will harm the battery.</p>

**Table 6: Diode Decisions**

Diode Decision	Action
EXCESSIVE RIPPLE	<p>One or more diodes in the alternator are not functioning or there is 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 8: DMM (Digital Multimeter)

Select the DMM icon to display its METERS menu. The tools in this menu are available in a series of three screens.



### Note

A measurement that is beyond the limit displays as OL. Refer to the manufacturer specifications for the correct limits, which may vary by component or vehicle type.



### DC and AC Voltmeter DC Volts AC Volts

The DC and AC voltmeters measure voltage between two points in a circuit. The voltmeter is connected in parallel with the circuit.

1. Connect the DMM test lead to the analyzer's accessories port.
2. Select the DC Volts or AC Volts icon.
3. Connect the clamps or probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
4. The meter autoranges and displays the measurement.
5. To return to the METERS menu, press the END soft key.



### Scope Scope

The scope is a voltmeter that provides a graph of voltage difference as it varies over time. After you select the scope icon, note the instructions in the next screen before proceeding. You'll need them after you press the **SELECT** soft key to continue:

- ▶ Press 1 on the keypad to autoscale the scope.
- ▶ Press 3 on the keypad for the time display.
- ▶ Press 4 on the keypad for the FFT (frequency) display.

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

In the time display the horizontal axis is in seconds and the vertical axis is in volts.

In the frequency display the horizontal axis is in hertz and the vertical axis is in volts.

Press the right soft key to alternate between the options to **RUN** (measure and display the signal) and **HOLD** (freeze the signal). When you freeze the signal, the scope allows you to print the voltage trace. For information on printing test results see page 44.



### DC Ammeter, AC Ammeter, Volts/Ammeter

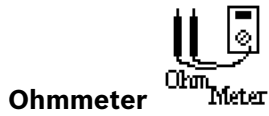
The DC ammeter measures the magnitude and flow of the direct current in a circuit. The volts/amp meter simultaneously measures charging voltage and charging current.

1. Connect the amp clamp lead to the analyzer's accessories port.
2. Select the DC Amps, AC Amps, or Volts/Amps icon.
3. Select the amp clamp range.
  - 1  70 AMP MAX.
  - 2  700 AMP MAX.
 Press the NEXT soft key to continue.
4. The meter zeros itself.
5. Place the clamp's jaws around the negative (-) cable.
6. The analyzer displays the measurement.
7. To return to the METERS menu, press the END soft key.




### Temp

The IR temperature sensor measures surface temperature within a range of -20 to 200 °C. The tool can be used for checking the transmission for overheating, and the temperature levels of the heater and air conditioner.



**Ohmmeter**

The meter is connected in parallel with the circuit under test. It uses the power supplied by the analyzer’s internal batteries to detect open or excessive resistance.



**Caution!** Always remove power from the circuit before connecting the ohmmeter to avoid damaging the analyzer.

1. Connect the DMM test lead to the analyzer’s accessories port.
2. Select the Ohmmeter icon.
3. Connect the clamps or probes in the correct polarity: red clamp or probe to positive (+); black to negative (-).
4. The meter autoranges and displays the measurement.
5. When finished, press the **END** soft key.
6. To return to the Meters menu, press the **END** soft key.



**Diode**

This test measures the voltage drop across components, such as diodes.

1. Connect the probes test lead to the analyzer’s accessories port.
2. Select the meter’s icon.
3. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
4. The meter autoranges and displays the measurement.
5. When finished, press the **END** soft key.

**Table 7: BAT 151 Multimeter Specifications**

The accuracy specification is defined as  $\pm$  (n% reading + [count \* resolution]) at 25 °C / 77 °F.

**Vdc**

Range	Resolution	Accuracy	Overload Protection
0–60 V	0.01 V	0.05% + 2	120 Vrms

Accuracies are specified from 2% to 100% of range.

**Vac**

Range	Resolution	Accuracy	Overload Protection
0–24 Vac rms	0.01 Vac	0.1% + 3	120 Vrms

Accuracies are specified from 2% to 100% of range.

**Adc**

Range	Resolution	Accuracy	Overload Protection
0–70 A	0.01 A	$\pm$ 3% of reading $\pm$ 1A	1000 Arms
0–700 A	0.1 A	$\pm$ 3% of reading $\pm$ 1A	1000 Arms

Accuracies are specified from 2% to 100% of range.

**Aac**

Range	Resolution	Accuracy	Overload Protection
0–70 A	0.01 A	$\pm$ 3% of reading $\pm$ 1A	1000 Arms
0–700 A	0.1A	$\pm$ 3% of reading $\pm$ 1A	1000 Arms

Accuracies are specified from 2% to 100% of range.

**Ohm**

Range	Resolution	Accuracy	Overload Protection
10 $\Omega$ –2 M $\Omega$	1 $\Omega$	2.0% + 4	120 Vrms

**Continuity**

Range	Resolution	Accuracy	Overload Protection
< 10 $\Omega$	1 $\Omega$	2.0% + 4	120 Vrms

**Diode**

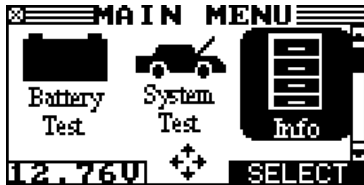
Range	Resolution	Accuracy	Overload Protection
0–1.5 V	0.01 V	0.05% + 2	120 Vrms

**Temperature**

Range	Resolution	Accuracy	Overload Protection
-20–200 °F	1 °F	1.0% + 5	-----

## Chapter 9: Info Menu

The Info Menu has several types of reports to help you manage your test data and track the usage and history of your analyzer. All the reports can be displayed and sent to an optional handheld or to the analyzer's internal printer. It also has a utility to transfer test data to a PC using an optional IR receiver and software package. In the Main Menu, select the Info icon.



### View Test

This report displays the results of the Battery and System Tests. See “Battery Test Results” on page 31, “Starter System Test Results” on page 33 and “Charging System Test Results” on page 35.



### View Cable Test

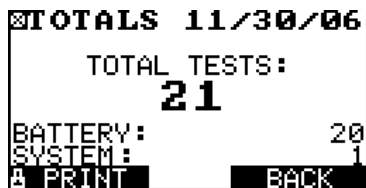
VIEW TEST gives you the option of viewing and printing the results of the Cable Drop Test.



### Totals

The TOTALS menu shows the total number of tests in four categories since the totals were reset to zero. Use the **UP** or **DOWN ARROW** key, or press the corresponding numerical key (1, 2, 3, or 4) to move the dot to the option button of your choice.

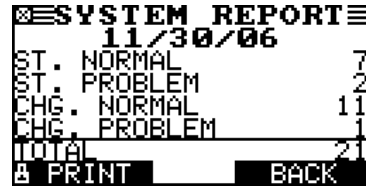
#### 1. TOTALS



#### 2. USER TOTALS



#### 3. SYSTEM TEST



#### 4. TOTALS BY DECISION



### Transfer

The TRANSFER utility is for service purposes only.



### Version

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

## Chapter 10: Cable Drop Test

If the test results for the starter or charging systems indicate that there may be a problem, you may want to perform the Cable Drop Test to determine if it is due to worn cables or bad connections between the battery and the alternator or starter. Worn cables or bad connections create higher resistance, which causes a drop across the circuit. The voltage drop reduces current carrying capability that displays the same symptoms as a weak alternator or starter and causes premature battery failure.




There's no need to run the engine. The Cable Drop Test uses conductance technology to send a signal through the circuit at the component under test. The BAT 151 then simultaneously calculates voltage drop on the positive (+) and negative (-) sides of any circuit as well as the total voltage drop. The amperage range for each of the four tests is 0 to 1000 A. When you change the setting from the factory defaults, the BAT 151 will store your setting in memory for your next test.

There are three preset tests:

- ▶ Battery Ground
- ▶ Starter Circuit
- ▶ Alternator Circuit

A fourth test, OTHER CIRCUIT, tests other grounds and circuits against your specified amperage capacity.

The test requires two test lead connections, as shown in Figure 17:

- ▶ Battery test leads at the component's output lead (the B+ or output screw on the alternator) and the component's housing as ground
- ▶  DMM test leads at the battery terminals



**Note**

The test requires a complete circuit. If you're testing a system with a remote solenoid, you can test from the battery to the solenoid, but not from the battery to the starter.

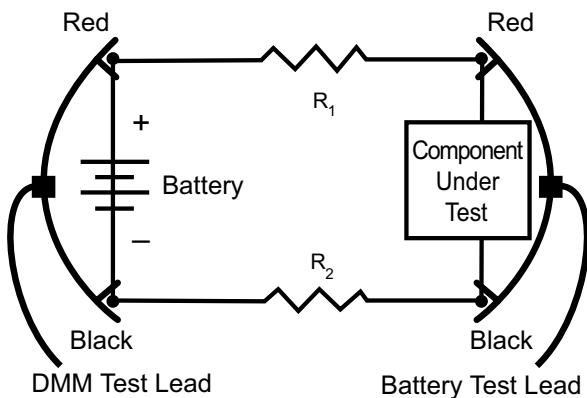


Figure 17: Connections for the Cable Drop Test

To begin, select the Cable Drop Test icon in the Main Menu and follow the instructions on the display.



**Important**

For accurate results the battery should be good and fully charged before you perform a test.

**Battery Ground Test**

The Battery Ground Test measures the voltage drop for the ground strap.

1. SELECT CIRCUIT: Use the **UP/DOWN ARROWS** or the numerical keypad to select the Battery Ground Test.

- 1  BATTERY GROUND
- 2  STARTER CIRCUIT
- 3  ALT CIRCUIT
- 4  OTHER

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

3. SET AMPS: Use the **UP/DOWN ARROWS** or the keypad to select the rated amperage of the circuit you are testing. The default is 80 A.



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

3. Connect the main clamps (battery test leads) to the battery and ground: positive (+) clamp to the battery's positive post; negative (-) clamp to the vehicle chassis.

4. Connect the DMM cable to the battery posts: positive (+) clamp to the positive post; negative clamp (-) to the negative post.



For the next few seconds the BAT 151 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Battery Ground Test Results

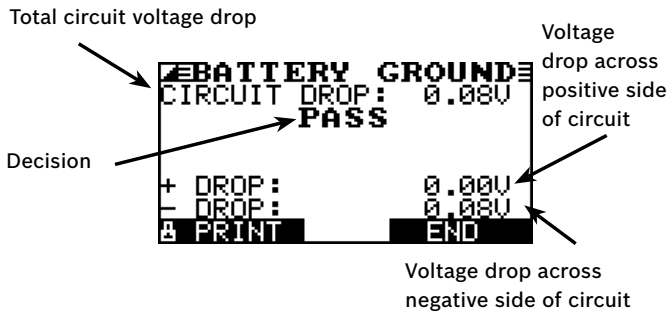


Figure 18: Battery Ground Test PASS Result

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, align the BAT 151's IR transmitter with the printer's receiver, and select the **PRINT** soft key. To return to the Main Menu, press the **END** key.

### Starter Circuit

The Starter Circuit Test measures the voltage drop of the starter circuit.

1. SELECT CIRCUIT: Use the **UP/DOWN ARROWS** or the numerical keypad to select STARTER CIRCUIT.

- 1  BATTERY GROUND
- 2  STARTER CIRCUIT
- 3  ALT CIRCUIT
- 4  OTHER

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

2. SET AMPS: Use the **UP/DOWN ARROWS** or the keypad to select the rated amperage of the starter circuit. The default is 150 A.



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

3. Connect the positive (+) clamp of the battery test leads to the starter's battery terminal stud. Connect the negative (-) clamp to the starter's housing.
4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.



For the next few seconds the BAT 151 will display the word TESTING and a stopwatch while it evaluates the battery ground.

### Starter Circuit Test Results

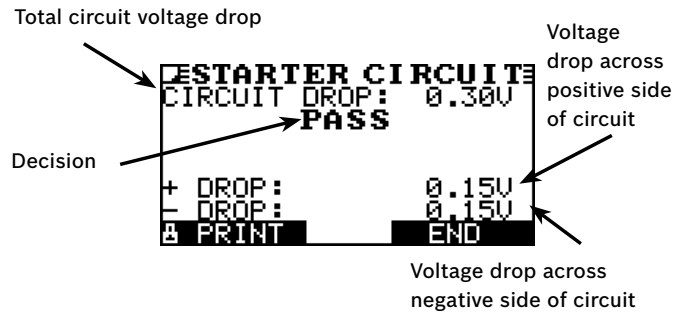


Figure 19: Starter Circuit PASS Result

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, align the BAT 151's IR transmitter with the printer's receiver, and select the **PRINT** soft key. To return to the Main Menu, press the **END** key.

### Alternator Circuit

The Alternator Circuit Test measures the voltage drop of the alternator circuit.

1. SELECT CIRCUIT: Use the **UP/DOWN ARROWS** or the numerical keypad to select ALT CIRCUIT.

- 1  BATTERY GROUND
- 2  STARTER CIRCUIT
- 3  ALT CIRCUIT
- 4  OTHER

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

2. SET AMPS: Use the UP/DOWN ARROWS or the keypad to select the rated amperage of the alternator circuit. The default is 80 A.



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

3. Connect the positive (+) clamp of the battery test leads to the alternator's output stud (B+). Connect the negative (-) clamp to the alternator's housing.



For the next few seconds the BAT 151 will display the word TESTING and a stopwatch while it evaluates the battery ground.

4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.

**Alternator Circuit Test Results**

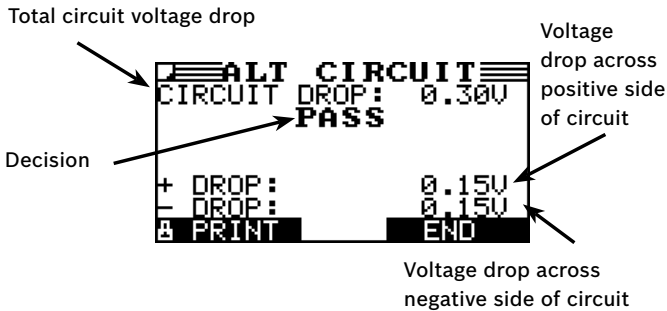


Figure 20: Alternator Circuit PASS Result

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, align the BAT 151's IR transmitter with the printer's receiver, and select the **PRINT** soft key. To return to the Main Menu, press the **END** key.

**Other Circuit**

This test enables you to measure voltage drop across other components.

1. SELECT CIRCUIT: Use the **UP/DOWN ARROWS** or the numerical keypad to select OTHER.

- 1  BATTERY GROUND
- 2  STARTER CIRCUIT
- 3  ALT CIRCUIT
- 4  OTHER

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

2. SET AMPS: Use the **UP/DOWN ARROWS** or the keypad to select the rated amperage of the circuit you are testing. The default is 10 A.



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

3. Connect the positive (+) clamp of the battery test leads to the component's positive terminal (+). Connect the negative (-) clamp to the component's negative (-) terminal.
4. Connect the positive (+) DMM clamp to the battery's positive (+) post. Connect the negative clamp (-) to the battery's (-) negative post.



For the next few seconds the BAT 151 will display the word TESTING and a stopwatch while it evaluates the battery ground.

**Other Circuit Test Results**

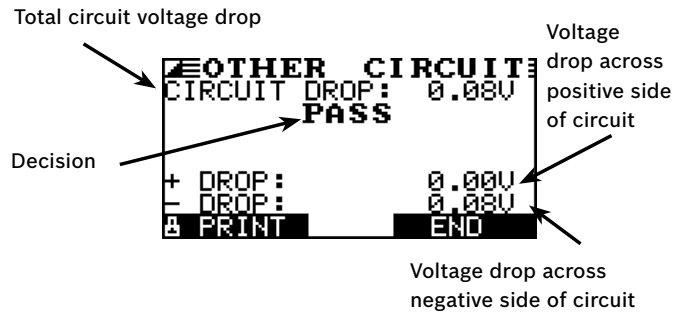


Figure 21: Other Circuit PASS Result

If there is a problem, the decision is CLEAN AND RETEST OR REPLACE. To print the results, align the BAT 151'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 11: Printing Test Results

If you are using the BAT 151 internal printer, keep the clamps connected to the battery during the printing process. After a test the results automatically print.

To print a second copy of the results:

1. Press the **PRINT** soft key.
2. Select the language for the printed results. Use the UP/DOWN ARROWS, or press the corresponding numerical key to move the dot to the option button of your choice.
  - 1  ENGLISH
  - 2  ESPAÑOL
  - 3  FRANÇAIS
3. Press the **NEXT** soft key to continue.

**Changing the Paper in the Internal Printer**

The internal printer is shipped with a roll of thermal printing paper installed in the paper compartment. The roll size is 2-1/4 inches wide by 1-7/8 inch in diameter. Replacement rolls are available at most office supply stores.

The analyzer uses only thermal printing paper. Below are four major office supply stores that carry the recommended paper:

Store	Part Number	Phone
Office Depot	209-653-271	800-463-3768
Office Max	20121146	800-283-7674
Quill	856607	800-789-1331
Staples	531236	800-378-2753

To replace the paper roll:

1. Unlock the printer door by gently pressing down on the red lever.
2. Lift the printer door and remove the spent roll.



3. Place a new roll of paper in the compartment. As the diagram in the paper compartment indicates, the paper feeds from the bottom of the roll.



4. Pull the paper forward so that it extends past the serrated edge of the paper slot.

5. Close the door and make sure the lever locks securely. For a clean tear, pull the paper along the serrated edge. Do not pull the paper straight out of the printer.



## Chapter 12: Troubleshooting

In addition to the troubleshooting suggestions in this chapter, the BAT 151 Help Menu provides tips on troubleshooting problems with the printer, the cables, and loss of power.

### Problems with the Display

The display does not turn on:

- ▶ Check the connection to the battery.
- ▶ The analyzer's internal batteries may need to be replaced. See "Chapter 13: BAT 151 Internal Batteries" on page 51.
- ▶ The display flickers or is dim:
- ▶ The contrast may need to be adjusted in the Admin/Utility menu. Highlight the Display icon and press **ENTER**. Use the **UP** or **DOWN ARROW** key to scroll the contrast value to 10.
- ▶ The analyzer's internal batteries may need to be replaced. See "Chapter 13: BAT 151 Internal Batteries" on page 51.

### Problems with the Internal Printer

The internal printer will not print

- ▶ The analyzer must be connected to the vehicle battery to print to the internal printer. Check the clamp connections to the battery.
- ▶ The vehicle battery may be too low to power the printer. Connect to a battery with at least 5.5 volts.

- ▶ Verify that INTERNAL PRINTER is selected in the Admin/Utility Menu. See page “Select Printer” on page 18.
- ▶ Verify that the paper is properly installed.
- ▶ Verify that the paper sensor is clean and undamaged (see page 45).

## Chapter 13: Test Cable Maintenance

The test cables that come with your analyzer are consumable items. Cables are like tires in that the more you use them and the harder you drive them, the shorter their useful life. Here are a few things you can do to protect your test cables from damage and premature wear:

### Cleaning the Clamps

- ▶ The grease, dirt, and sulfation that build up on battery terminals are highly corrosive and can damage the clamps over time. Before connecting the clamps, ensure accurate test readings and protect the clamps by cleaning the battery case and terminals using a wire brush and a mixture of water and baking soda.
- ▶ Periodically clean the clamps using a mixture of baking soda and water, or a mild hand-soap, and a small bristle brush.

### Handling the Test Cables

- ▶ Always connect and disconnect the clamps to the battery by opening and closing the clamps. Never pull on the test cables to remove the battery clamps. Pulling can damage the Y-junction, the cables, and the clamps to the extent that the analyzer may produce lower-than-expected conductance readings or fail completely.
- ▶ Never carry the analyzer by the cables. Carrying the analyzer or swinging it by the cables puts unnecessary strain on the cables and can result in premature failure. Handle the analyzer with care to get the maximum use from the product.

### Storing Test Cables

- ▶ Never wrap the cables around the analyzer; this puts unnecessary strain on the test cables.

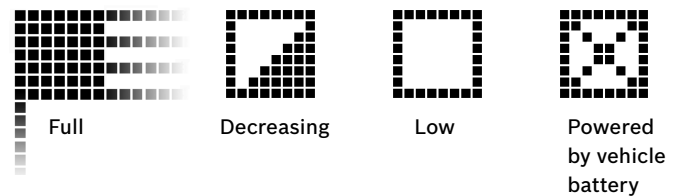
Because the test cables are the “tires” of the analyzer, they have a certain life expectancy and will wear out eventually. However, the abuse examples cited above are not covered under warranty. To ensure the best performance and longest life of the test cables, attach and remove them with care, and carry the analyzer and cables together.

## Chapter 14: BAT 151 Internal Batteries

The BAT 151 uses six AA, 1.5-volt batteries (alkaline recommended) to allow testing of batteries down to 1 volt and supply power while the menu is active.

### 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 BAT 151 will display a warning message when the batteries need replacing.



### Replacing the Internal Batteries

1. Turn the analyzer face down.
2. Use a Philips screwdriver to remove the screw securing the door to the battery compartment.



Slide door  
off in this  
direction.



3. Press on the ridges above the arrow on the battery compartment cover.
4. Slide the door in the direction of the arrow and remove the door.
5. Remove the discharged batteries.
6. Insert new batteries as shown. Make sure the positive and negative terminals are positioned correctly.
7. Insert the door's tabs into the slots on the analyzer and slide the door closed.
8. Reinsert and tighten the screw.

## Patents

Made in the U.S.A. Robert Bosch LLC. This product is protected by one or more of the following U.S. Patents: 4,816,768; 4,825,170; 4,881,038; 4,912,416; 5,572,136; 5,585,728; 5,592,093; 5,757,192; 5,821,756; 5,831,435; 5,914,605; 6,051,976; 6,091,245; 6,163,156; 6,249,124; 6,304,087; 6,310,481; 6,316,914; 6,323,650; 6,351,102; 6,359,441; 6,363,303; 6,392,414; 6,441,585; 6,445,158; 6,456,045; 6,469,511; 6,534,993; 6,544,078; 6,556,019; 6,566,883; 6,586,941; 6,707,303. Canadian Patents: 1,295,680; 1,280,164. United Kingdom Patent: 0,672,248; 0,417,173. German Patent: 693 25 388.6; 689 23 281.0-08; 93 21 638.6. And other U.S. and Foreign patents issued and pending.

## Limited Warranty

This analyzer is warranted to be free of defects in materials and workmanship for a period of one year from date of purchase. We will, at our option, repair or replace the unit with a remanufactured unit. This limited warranty applies only to the BAT 151 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. We are 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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